



## Town and Village of Northfield, Vermont

51 South Main Street  
Northfield, Vermont 05663  
[www.northfield-vt.gov](http://www.northfield-vt.gov)

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### Village of Northfield Digital Orthoimagery

Request for Proposals

April 12, 2010

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## GENERAL INFORMATION

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### Introduction

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The Village of Northfield is seeking a qualified contractor to produce digital, low-level orthophotographs and a two-foot interval contour map of its utilities corridor, primarily for the use of the water and sewer department.

For the purposes of this RFP, a digital orthophotograph is defined as a geo-referenced image prepared from perspective photography, or other remotely-sensed data in which the displacement within the image due to sensor orientation and terrain relief has been removed. A digital orthophotograph represents the combination of photographic image characteristics with the geometric qualities of a map.

Although Vermont has statewide digital orthophotographs, the 1:5000 scale does not offer the resolution that is necessary for some existing and future needs. Some examples of what the product of this RFP should allow users to identify are: hydrants, manholes, road striping and utility poles. It is intended that the products of the RFP will allow the municipality to provide better and more accurate digital representation of what is actually on the ground. The municipality may use this imagery to refine and improve upon the digital parcel boundary data, develop more accurate storm water infrastructure delineations, map water and sewer system lines and connections, and inform land use planning projects.

Three dimensional modeling is becoming more important to municipal utility management. Digital Terrain Models (DTMs) developed for photogrammetric corrections in the development of the orthoimagery will also be used for a variety of other purposes. For this reason, the Village of Northfield seeks to develop the most detailed DTM possible with the limited budget available for this project. LIDAR elevation data collection is the preferred method, but other means of collecting elevation data will be considered.

Northfield will consider any proven photogrammetric and data collection methods and technologies, including film and digital techniques. Respondents must state their methods to be used in generating the final product and their resulting horizontal/vertical positional accuracies. Quality Control procedures should also be stated in the respondent's proposal.

***A full and unrestricted use license that makes the data available in the public domain is a requirement.***

Interested Contractors or Contractor Teams are invited to submit technical and cost proposals addressing the scope of work. Proposals must be postmarked by Thursday, May 27, 2010.

### Village of Northfield Background

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The Village of Northfield is located in Washington County, ten miles south of the state capital, Montpelier. The 1.8-square-mile Village is surrounded by the Town of Northfield, and the Town and Village share much of their administrative staff and functions. The Village administers its own Water and Sewer department, as well as the Village of Northfield Electric Department. These departments provide utility service to some contiguous areas of the Town.

The municipal staff uses ArcMap 9.3 for a variety of purposes. Departments using GIS include the Listers (tax assessment), Planning and Zoning, Town & Village Clerk, and the utility departments. The high-resolution orthoimagery will benefit numerous staff in our ability to provide responsive service to residents.

## PROPOSAL REQUIREMENTS

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All respondents or teams must prepare a Technical Proposal and a Cost Proposal as part of this submission. In order to be considered responsive to this RFP, each proposal must conform to the following requirements. The contractor shall:

- Submit six (6) copies of the Technical Proposal. The Technical Proposal must not have acetate or plastic covers.
- Submit one (1) copy of the Cost Proposal (see requirements below) in a sealed, separate package.
- Clearly indicate the following on the outside of each Technical Proposal and the two sealed packages:
  1. Project name (Village of Northfield Digital Orthoimagery);
  2. Contents (Technical Proposal or Cost Proposal); and
  3. Name and address of the prime contractor.

**Submissions must be postmarked by Thursday, May 27, 2010. Sealed proposals will be opened publicly on June 1, 2010, at 12:00 pm (noon), in the Municipal Building.**

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Northfield, VT 05663

If any of the above requirements are not met, the proposal may not be considered. Proposals received after the deadline will not be accepted. Questions regarding this RFP should be directed to Michele Braun, Zoning Administrator. The Village will maintain a list of questions and answers for contractor information. Questions will be accepted until May 4, 2010 to ensure all parties have adequate time to review the answers.

### Technical Proposal Requirements

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The Technical Proposal should demonstrate that the Respondent understands the intent and scope of the project, the character of the deliverables, the services required for their delivery, and the specific tasks that must be performed in the course of supplying these services. In addition, the qualifications of the Proposer to supply the required services must be demonstrated. In order to assist in the evaluation process, please include the following information in the technical proposal.

#### A. Cover Letter

#### B. Project Abstract

This section should convey the Respondent's understanding of the nature of the work and approach to be taken. This section should briefly address project objectives, scope of work, the proposed approach, and any other pertinent elements.

#### C. Introduction to the Contractor Firm(s)

Proposers shall provide the following information relative to their firms. Similar information must be provided for each subcontractor or each member of a joint venture.

1. Firm name, business address, and telephone number.
2. Year established. Include former firm name(s) and year(s) established, if applicable. Identify the state in which the firm was organized or incorporated.
3. Type of ownership, and name and location of parent company and subsidiaries, if any.
4. Indication of whether the firm is licensed to do business in the State of Vermont.
5. Certification of liability and workers compensation insurance coverage that meets the requirements of the State of Vermont.

6. Number of full-time employees. Part-time employees or consultants routinely engaged by the Respondent may be included if clearly identified as such.

**D. Qualifications and Experience of the Contractor Firm(s)**

Proposers shall describe recent experience relevant to the project. Particular emphasis should be placed on projects managed by the key personnel to be assigned to this project. If the respondent anticipates the use of subcontractors, the respondent shall identify:

1. The role and extent to which these parties will participate in the project;
2. The means by which the contractor will oversee the work of these parties; and
3. The experience and credentials of these parties relevant to this project.

**E. Qualifications and Experience of Key Staff**

Proposers shall identify key individuals assigned to this project and include the function and/or responsibility of each of the identified individuals along with the percentage of their normal work week estimated to be spent on this project. Experience summaries of these key individuals shall be provided, with emphasis on previous experience on similar projects in similar roles. Resumes of these key individuals may also be included as an appendix.

**F. References**

The respondent shall submit names, addresses, and phone numbers of at least four references familiar with the contractor's ability, experience, and reliability in the performance and management of projects of a similar nature.

**G. Imagery Description and Methods**

This section should include a detailed description of the proposed imagery product. Each of the functional requirements listed in the scope of work must be addressed. This section should also address items such as camera specifications, image rectification, license agreements, and any other pertinent information.

**H. Quality Assurance / Quality Control Overview**

Describe processes and procedures used for QA/QC on the project, addressing the technological and procedural elements to be used to ensure the orthoimagery meets or exceeds all required specifications.

**I. Work Plan**

This section will include a description of tasks, products, milestones, and time tables. Task descriptions should fully discuss the steps to be followed in carrying out the work. Sufficient detail should be presented to show a clear understanding of the work and the proposed approach. A detailed timetable should accompany the work description showing the expected sequence of tasks and resource requirements for both the contractor and Village of Northfield staff.

## Cost Proposal Requirements

The contractor will be reimbursed via a fixed fee for the development of the imagery products. Payment will be made within 60 days of delivery of satisfactory final products. Partial payments may be agreed upon for a series of deliverables to be negotiated by the selected proposer and the Village of Northfield.

The Cost Proposal should include the following items, listing the prime contractor and sub-contractors or partners separately.

**Fixed price for completion of all tasks in the Scope of Work for the area specified in Attachment A.**

This will be broken down into the following:

- a. Cost of aerial imagery development: true color at 1:1250 scale (0.1524 meter cell resolution)

- b. Digital terrain model development costs.
- c. Quality assurance and checking costs.

### **Total Project Costs.**

Where applicable, costs shall be provided in the form of a composite schedule by task of direct labor hours, direct labor cost per class of labor, overhead rate, and fee. The prime and each subcontractor shall provide separate schedules. Direct costs for meals, travel, and lodging shall be estimated, but will be considered part of the total project costs.

Depending on funding available and the contractor bids received in response to this RFP, the project area or requirements may be adjusted to stay within budget constraints.

## **CONTRACTOR SELECTION PROCEDURE**

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### **Review of Technical Proposals**

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The contractor or contractor team will be evaluated based on the following factors. These factors are not listed in any particular order of priority:

- I. **Experience and Capability** - Respondents will be evaluated with respect to the experience of the firm(s) and personnel assigned to the project both in terms of past efforts in this type of work and the level of commitment to this project. Of prime concern will be the capabilities and accomplishments of the individuals to be assigned to this particular project (including subcontractors) and the management qualifications of the firm in terms of its ability, experience, and reliability in performing and managing work within a schedule and budget. Specific emphasis will be placed on:
  - a. Firm's corporate history and experience (including references from recent customers)
  - b. Professional experience of both management and technical personnel to be assigned to the project (including sub-contractors).
  - c. Firm's experience in orthophotography
- II. **Technical Approach** - Respondents will be evaluated as to their understanding of the project, how well the proposed work program and schedule address the project requirements, the quality assurance/quality control procedures to be deployed, and the completeness and innovation evident in the approach to the project and the proposed work program.
- III. **Project Cost** - The bid price will be an important consideration in the selection, although it will not be the sole determining factor. Specific attention will be given to the commitment implied for key staff and the overall labor effort proposed, and their relationship to the estimated project cost.
- IV. **Other value-added tools and services** - Responses will be evaluated on the inclusion of tools and services to streamline production, project management, and data distribution. Such items may include tools for online project status tracking, automated QA/QC tools and procedures, and online data hosting/distribution services.

Proposals will be evaluated by Town and Village of Northfield staff, with support from the Central Vermont Regional Planning Commission, and other GIS specialists, as necessary. The Village of Northfield reserves the right to seek clarification of any proposal submitted and to select the proposal considered to best promote the public interest. All proposals become the property of the Village of Northfield upon submission. The cost of preparing, submitting and presenting a proposal is the sole expense of the contractor. The Village of Northfield reserves the right to reject any and all proposals

received as a result of this solicitation, to negotiate with any qualified source, to waive any formality and any technicalities or to cancel the RFP in part or in its entirety if it is in the best interest of the Village of Northfield. This solicitation of proposals in no way obligates the Village of Northfield to award a contract.

## Oral Presentations

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If deemed necessary, a short list of qualified contractors may be selected from those who submitted proposals, for oral presentations. Presentations will be made to a selection committee. Each contractor will be permitted approximately 20 minutes to make an oral presentation to the selection committee, with a question and answer session to follow not to exceed 40 minutes. The contractor may wish to present the following information: demonstration of imagery features, descriptions of similar projects completed by the firm, and any unique features of the firm's proposal. Firms may also wish to provide samples of materials that have been developed for other geographic areas.

## SCOPE OF WORK

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The following scope of work has been developed by the Town and Village of Northfield staff and Central Vermont Regional Planning Commission staff.

Although the scope presents a sound approach, the Village of Northfield is willing to consider revisions based on the experience and expertise of the Contractor. The first task for the selected contractor will be to review of the scope of work and recommend changes. Contractors are encouraged to suggest any innovative approaches that are not addressed in this scope. However, both the technical and cost sections of the proposal must include each of the tasks listed below. Changes to the scope of work will only be considered after the Contractor has been selected.

The purpose of this project is to provide high resolution orthorectified imagery for the utility corridor of the Village of Northfield. This covers approximately 1800 hectares. A map of the proposed area is included as Attachment A of this RFP.

### A. Image Acquisition

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The contractor shall acquire imagery to support high resolution digital orthophotographs.

#### **Acquisition Timing and Conditions**

Photo acquisition for this project may take place in the fall of 2010 or the spring of 2011, pursuant to agreement between the Village and the contractor. Images will be captured in leaf-off conditions of vegetation when the area is free of clouds, haze, fog, dust, smoke, floodwaters, and the ground is free of snow. Photo acquisition shall not begin without authorization from the Village of Northfield Project Manager.

#### **Photographic Mission**

The contractor shall be responsible for applying for, and obtaining, any required permit for access, overflight, or intrusion into restricted or otherwise limited ground access and/or airspace, which may be included within the requirement of this scope of services.

Every effort shall be made to avoid breaks within individual flight lines. Where breaks within a flight line are necessary, the entire flight line composed of the resulting segments shall meet all of the requirements set forth in these Specifications. Where breaks occur, these shall have an overlap of at least four frames to ensure a stereo model of overlap or tie. All photos within a single flight line shall be acquired with the same aerial camera and with the camera oriented in the same direction.

**Overlap/Sidelap**

All photography shall be acquired to provide adequate stereo coverage. Minimum overlap shall be 60% forward and 30% side. However, additional exposures shall be captured over urban core areas and mountain areas to ensure that no more than 25% of roadways/transportation features are obscured in urban areas and valley bottoms are visible in the mountains. The imagery should not contain any objectionable shadows caused by terrain relief or low solar altitude.

**Image Quality**

All images should be clear and sharp in detail with no light streaks, static marks, scratches, dust marks, or other noticeable blemishes. The imagery should be free from defects, such as out-of-focus imagery, and should not contain inconsistencies in tone and/or density between individual orthos and/or adjacent sheets. To ensure consistency, the imagery should be radiometrically and geometrically corrected to enable adjacent files to be displayed simultaneously without obvious distinctions between them.

**Imagery Scanning**

In the case of imagery acquired through traditional film-based methods, the imagery shall be scanned directly from negative film, at a resolution of 14 microns. The device used for scanning shall be a precision instrument designed for photogrammetric applications having an aperture capable of producing a scanning resolution of at least 10 microns, a geometric accuracy of 5 microns RMSE, and a capability of resolving sufficient levels of red, green, and blue to produce natural color imagery.

**Camera Station Control**

Camera position (VT State Plane coordinate system (units of meters), NAD 83, x, y, and elevation) shall be recorded at the instant of exposure with airborne GPS. Airborne GPS data shall be differentially corrected and organized as individual data sets grouped by corresponding film roll (or digital image groups if using non-film methods). The horizontal root-mean-square error (RMSE) of the airborne GPS control data shall not exceed 20cm. The vertical RMSE of the airborne GPS control shall not exceed 30cm. Final post-processed airborne GPS data shall be submitted to the Village in a format mutually agreeable to the Village and the Contractor.

**B. Image Rectification**

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Digital orthophotograph production shall be produced consistent with the following requirements.

- a. Digital Orthorectified Images shall be 24-bit true color. Other available formats may be considered (e.g. color-infrared).
- b. Digital Orthorectified Image ground resolution shall be appropriate to the scale of imagery acquired (0.1524 meter resolution).
- c. The rectification process shall involve solution of the appropriate photogrammetric equations for each pixel in the output image. It will not be permissible to solve photogrammetric equations at anchor points only and then warp the content of the original image between the anchor points.
- d. Digital Orthorectified Images shall be rectified to the Vermont State Plane Coordinate System, NAD 83 Datum, with meters as the unit of measure.
- e. Digital Terrain Model Vertical Accuracy - Vertical positional accuracy of the resultant DTM shall meet National Map Accuracy Standards so that "Vertical accuracy, as applied to contour maps on all publication scales shall be such that not more than 10 percent of the elevations tested shall be in error more than one-half the contour interval." The contractor must ensure that the data be capable of producing a two (2) foot interval contour map.

- f. Digital Orthorectified images shall be rectified to a composite Digital Terrain Model (DTM) developed by the vendor at appropriate resolutions and accuracy to develop the acquired imagery.
- g. Digital Orthorectified Image Horizontal Accuracy – Horizontal positional accuracy of the resultant imagery shall meet National Map Accuracy Standards for imagery at a 1:1250 scale. The contractor will detail the methods used to ensure this level of accuracy in the Technical Proposal.
- h. Digital Orthorectified Image Tile Size – Orthorectified GeoTIFF files shall represent 100-hectare tiles (2000 meters X 2000 meters) cut at even 2000 meter grid lines with no overedge. The Village will provide the contractor with a tile index indicating the tile layout and tile names. The index will be supplied as a shapefile suitable for loading into ArcGIS.
- i. Orthorectified Image Chips shall be tonally balanced prior to generation of an image mosaic. Building tilt shall be corrected to the extent that transportation features are not obscured (as outlined above). Relative join (misalignment) of transportation features between adjacent image chips/tiles shall be within the tolerance defined by the horizontal positional accuracy requirement set out above. Any methods of mosaicing orthoimagery to reduce relief displacement of buildings and terrain should be detailed in the technical proposal.
- j. File Naming Convention – The ortho tile filenames shall be derived from the tile index supplied to the contractor by the Village.
- k. Coverage Area – The quoted price shall include all costs to provide complete coverage of the area shown in the coverage diagram of approximately 1800 hectares included in Attachment A. The coverage area may be adjusted in the final contract depending on the cost proposals and funds available.

### C. Quality Assurance

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The contractor shall perform quality assurance tasks on the orthorectified imagery to ensure the product meets all of the requirements for horizontal and vertical accuracy, image resolution, and image characteristics in this scope of work. Specific tasks to complete quality assurance will be detailed in the finalized scope of work.

### D. Project Deliverables

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The resultant imagery will be delivered on a timetable defined at the time of contracting.

The deliverable products of this project will consist of the following items:

1. Flight Diagrams--A Flight Diagram plot and associated digital plot file shall be delivered that illustrates project area outline, photo identification (roll/exposure if film), and approximate location of photo centers.
2. AGPS Track Plots--An Airborne GPS Ground Track Plot and associated digital plot file shall be delivered. Ground track plot shall be created from airborne GPS coordinates recorded during flight.
3. Digital Orthorectified Images – Contractor shall deliver two master copies of the orthophotographs for the project area in the following formats.
  - i. Uncompressed, ArcGIS readable, GeoTIFF computer file format on a mutually acceptable storage medium. The Contractor shall furnish geo-referenced world files for all ortho images.
  - ii. Compressed, MrSID encoded image format on a mutually acceptable storage medium. The compression ratio shall be 20:1. The MrSID imagery must be compatible with current ESRI software. Other image compression file format will be considered: for instance, JPEG2000 at the above mentioned compression ratio with a world file.

4. Composite Elevation data developed for the DTM in the orthorectification process shall be submitted as a deliverable in non-proprietary format suitable for use in ESRI GIS software and industry standard CAD software, such as a point DXF file. The contractor should list alternative file formats if available.
5. Two-foot contour interval file compatible with ESRI GIS software.
6. FGDC-compliant metadata for each tile (both GeoTIFF and MrSID format).

## E. Acceptance Criteria

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Imagery delivery must pass through a comprehensive evaluation and review process. This process will verify the positional accuracy of the data, and ensure its aesthetic and functional quality. The Village of Northfield will oversee this quality control process using in-house resources, project partners, a third party vendor, or some combination of all three. The Village may reject any or all tiles that fail to meet the project's positional accuracy or aesthetic and functional quality requirements.

Prior to delivery of the product, horizontal positional accuracy testing will be performed following the methods proposed by the contractor in the technical proposal.

The Village of Northfield will review and test orthoimagery as it is delivered to ensure it meets the required accuracy standards and imagery qualities.

Aesthetic and functional quality will be tested through a variety of qualitative and quantitative methods to ensure the imagery generally matches the aesthetic and functional quality of previous years of imagery. In overall terms, the imagery must be free of the following types of errors:

- Misalignments in linear features (roads/curbs/building edges etc.) resulting from poorly stitched mosaics
- Obvious seams between images (in both the SIDs and the TIFFS)
- Blurred, out-of-focus, or poorly scanned imagery
- Scratches, lint, blemishes or other artifacts introduced in the processing of the film or imagery
- Stark changes in color balance and contrast
- Stark shadows or bright spots in the imagery
- Buildings that obscure more than 25 percent of adjacent roadways/transportation features. Obscured valley bottoms in the mountains.
- Warped bridges/overpasses/viaducts

ATTACHMENT A  
Village of Northfield  
Approximate Project Area

