



West Virginia Purchasing Division

2019 Washington Street, East
Charleston, WV 25305
Telephone: 304-558-2306
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Bid Fax: 304-558-3970

The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at ***wvOASIS.gov***. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at ***WVPurchasing.gov*** with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.

Header

List View

General Information

Procurement Folder: 189210

Procurement Type: Central Master Agreement

Vendor ID: 000000205829

Legal Name: SMITH LAND SURVEYING INC

Alias/DBA:

Total Bid: \$123,400.00

Response Date: 06/21/2016

Response Time: 13:01

SO Doc Code: CRFQ

SO Dept: 0313

SO Doc ID: DEP1600000053

Published Date: 6/14/16

Close Date: 6/21/16

Close Time: 13:30

Status: Closed

Solicitation Description: Addendum No. 01-Mapping Services in Southern WV

Total of Header Attachments: 0

Total of All Attachments: 0



Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

**State of West Virginia
 Solicitation Response**

Proc Folder : 189210

Solicitation Description : Addendum No. 01-Mapping Services in Southern WV

Proc Type : Central Master Agreement

Date issued	Solicitation Closes	Solicitation No	Version
	2016-06-21 13:30:00	SR 0313 ESR06211600000006206	1

VENDOR

000000205829

SMITH LAND SURVEYING INC

FOR INFORMATION CONTACT THE BUYER

Beth Collins
 (304) 558-2157
 beth.a.collins@wv.gov

Signature X

FEIN #

DATE

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	Control Surveying	600.00000	HOUR	\$47.000000	\$28,200.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description : (Spec Item 3.1.1.2 & 4.2)

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
2	Topographic, Planimetric and Check Surveying	1800.00000	HOUR	\$47.000000	\$84,600.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description : (Spec Item 3.1.1.3 & 4.2)

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
3	Topographic Mapping - (0-25 Acres)	15.00000	ACRE	\$160.000000	\$2,400.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description : (Spec Item 3.2 & 4.2)

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
4	Topographic Mapping - (25-50 Acres)	30.00000	ACRE	\$90.000000	\$2,700.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description : (Spec Item 3.2 & 4.2)

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
5	Topographic Mapping - (50-100 Acres)	75.00000	ACRE	\$40.000000	\$3,000.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description : (Spec Item 3.2 & 4.2)

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
6	Topographic Mapping - (Over 100 Acres)	125.00000	ACRE	\$20.000000	\$2,500.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description : (Spec Item 3.2 & 4.2)



PROJECT NAME: SEALED BID

West Virginia Dept. of Environmental Protection
Office of Abandoned Mine Lands & Reclamation
Mapping Services in Southern Counties of WV

RECIPIENT: BUYER: Beth A. Collins, Senior Buyer

SOLICITATION NUMBER: CRFQ 0313 DEP 1600000053

BID OPENING DATE: June 21, 2016

BID OPENING TIME: 1:30 p.m.

FAX NUMBER: 304-462-5656

DATE: June 21, 2016





Company History

Smith Land Surveying, Inc. (SLS) was founded in 1978 by Gregory A. Smith with one employee. Original services provided by SLS included boundary, construction, and oil & gas well location surveys. SLS experienced steady growth, gaining employees each year and in 1982, services were expanded to include design data surveys for architectural and engineering firms throughout West Virginia.

In 1986, SLS further diversified by forming an environmental service group, providing oil & gas drilling pit waste disposal, independent lab support, water sampling, and erosion and sediment control plans.

A reclamation group was formed in 1988 to provide implementation of erosion and sediment control plans and NPDES permits on both commercial and oil & gas sites. Services such as seeding and mulching provided by the SLS team contributed to numerous reclamation awards for SLS clients.

Services again expanded in 1991 to include project management for developers of shopping centers and retail outlets. The SLS land department was created in 1996 to assist members of the oil & gas industry in identifying tract or parcel ownership and obtaining right-of-way and mineral leases. A demand grew for midstream services and SLS built up the land department to include pipeline route selection, acquisition, mapping/surveys, environmental and regulatory permitting assistance and a complete project management staff.

The mid-to-late 1990s saw SLS serving clients such as the West Virginia School Building Authority, the United States Bureau of Prisons, and the Natural Resources Conservation Service at the Hughes River Dam. From 1998 to present, SLS has primarily served existing clients in the oil, gas, and coal industries, the West Virginia Department of Transportation, and the West Virginia Department of Environmental Protection.

The most recent endeavor for SLS Land & Energy Development was the 2016 addition of an in-house engineer for geotechnical evaluations to complement the core drilling services provided since early 2014. In turn, SLS can provide high quality services in an expedited timeframe. The drilling services, in addition to geotechnical evaluations, aerial and Lidar mapping services, turnkey and design build services for well pads, water impoundment design and certification, and quality control management makes SLS prepared to tackle any job within expected timeframes and within budget.



Under SLS's leadership team, SLS has been able to adapt and grow to meet the needs of its clients. The core of professionals at SLS has over 250 years of combined experience and is supported by a highly qualified group of technical staff. Over three decades of success and steady growth proves that SLS and its variety of services is a trusted source for the energy and land development industries as well as private and government entities.

Capacity

SLS employs approximately 50 people. Our core management of experienced surveyors and engineers also includes in-house legal counsel and accountant. We have the capability to send out up to 10 separate field crews at any given time if a project requires it. SLS owns 10 completely equipped four-wheel drive vehicles as well as ATVs and UTVs. Our vehicle fleet and central location in the state of West Virginia allow us to access even the most remote sites in order to accomplish necessary tasks. Our safety record is also of great importance. We have logged 536,444 hours without time lost due to injury.

Summary

SLS's 37-year track record has proven that we have the ability and expertise to accomplish even the most difficult of projects and meet our client's needs. Our highly trained staff and state-of-the-art equipment allow us to complete jobs on time and within required budgets.





Legal Business Name: Smith Land Surveying, Inc.

Vendor Code: 000000205829





Smith Land Surveying ftp Site

Pursuant to section 5.1 referencing ordering a payment in the request for quotation, SLS uses Citrix Share File (ftp site). Files can easily be shared outside a network, simply by having a SLS administrator send a post link through to the recipient's email.

Once the recipient receives the link they select the files to be sent and attach them to the page. The SLS ftp site is capable of storing up to 100 GB of data.

Once the link is sent with the attachments, the SLS administrator downloads the file and shares with the appropriate team member.





Project Manager

Jason McVicker

Telephone Number: 1-304-462-5634

Fax Number: 1-304-462-5656

Email Address: jmcvicker@slssurveys.com





Contact Information

Sarah Smith

Telephone Number: 1-304-462-5634

Fax Number: 1-304-462-5656

Email Address: ssmith@slssurveys.com





GREGORY A. SMITH

President

SMITH LAND SURVEYING, INC.

Education/Special Training

- A.S. Degree in Land Surveying - Glenville State College - 1976
- American Congress on Surveying & Mapping, Association of Photogrammetry & Photo Interpretation (1.3 units)
- US Geological Survey National Mapping Center Resources & Information
- Land Sat Image Interpretation at Purdue University
- Bluefield State College Land Surveying Seminar (1.6 units)
- Pennsylvania State University Computer & Business Courses (2.1 units 1986), Photogrammetry & Business (2.1 units 1985)
- Soil Erosion & Sediment Control Plans (1986)
- Spill Prevention Control & Countermeasure Plans
- Computer Training at CLM Systems, Tampa, FL.
- Auto Cad Training at Putnam County Training Center
- Surface Mine Permitting & Regulations (1990) - WV Dept. of Energy
- Geographic Information System (1990) - RDA Associates, Maryland
- Design & Permitting for Water & Sewer Systems (1991) - WV Dept. of Health
- Erosion & Sediment Control (1991) - WV Dept. of Natural Resources
- Global Position System - Technical & Use (1991)
- Wetlands Evaluation (1991) - EPA, US Army Corps, Fish & Wildlife, & WV DNR
- Law Enforcement Program – National Standards Committee - NCEES (1997)
- IRS Tax & Revenue Program for Employee Classification and Audit (1998)
- National Geodetic System – Use and Standards (1998)
- Geodetic Control with GPS – NSG Program (1998)



- GPS Advancements/ Applications for Mountainous Terrain (1999)
- Knud Hermanson – Boundary Litigation, the Surveyor & Court (2000)
- Professionalism & Ethics for the Professional Surveyor (2000)
- NGS – HARN Statewide Monument Densification Project (2000)
- Flood Plane Management/National Flood Insurance Program (2002)
- Influencing Public Policy to Meet the Needs of the Surveying Profession (2002)
- Boundary Law and Legal Aspects of Surveying (2002)
- Risk of Doing Business Liability & Regulatory Compliance (2003)
- Knud Hermanson – Minimum Standards for Boundary Surveys (2003)
- Charm School for Surveyors – Public & Client Relations (2004)
- WVSPS Floodplain Management (2006)
- Knud Hermanson – Minimum Standards & Ethics (2007)
- Surveyor’s Use of Historical Maps (2007)
- NCEES Meeting – Expanding the Scope of Surveying Practice (2007)

Professional Organizations

- Director for WVALS (1984-1989)
- Legislative Chairman for State Surveyors Association (1987-present)
- Exam Evaluation Committee for NCEE (1988-1989)
- President Elect WVALS (1989 – President 1990 – 1991)
- Glenville State College Advisory Board – Land Surveying
- Glenville State College Advisory Board – Environmental Technology
- Glenville State College Advisory Board – Natural Resources Management
- Glenville State College Advisory Board – Landman Program (2002 & 2006)



- Calhoun-Gilmer Career Center Advisory Board – CAD and Drafting Program
- West Virginia Association of Land Surveyors
- American Congress on Surveying & Mapping
- Pennsylvania Society of Land Surveyors
- WV Independent Oil and Gas Association (IOGA)
- National Society of Professional Surveyors
- Gilmer County Industrial Development Association
- WV Society of Architects – Affiliate Member
- National Society of Wetland Scientists
- WV Oil & Gas Association
- Little Kanawha Parkway Authority
- American Association of Petroleum Landmen
- State Democratic Executive Committee
- Democratic Co-Chair for Gilmer County (2006-Present)
- Presenter for the WV Auditor’s Office – Seminar on Recordation Laws (2006)
- Member – Gilmer County Utility Board
- Member, IOGA Board of Governors
- Chairman, Glenville State College Board of Governors



Charles Victor Moyers

Senior Licensed Professional Surveyor

SMITH LAND SURVEYING, INC.

Education

Glennville State College, Glennville, West Virginia
Associate in Science in Land Surveying

**Professional
Organizations**

- Former National Exam Evaluation Committee for NCEES—
Invitation Only (1992 & 2005)
- Former Member and Chapter Representative for Central
Chapter of WVALS
- Former WV Association of Land Surveyors (Now WVSPS)
Board of Directors Member, Vice President & President
- Current Member of Professional Land Surveyors of Ohio
(PLSO)

Profile

Mr. Vic Moyers was licensed as West Virginia Professional Surveyor No. 849 in 1988. When starting for SLS in 1988, he already had over eight years' experience in office and field aspects of boundary, oil and gas, and mining surveys. Since then, has worked as Project Surveyor in charge of supervision of surveying oil and gas well locations, pipeline surveys, boundary surveys, control surveys, highway (route) surveys including centerline, cross-section and profile work with all related computations and calculations. Vic's experience includes supervision and planning of GPS projects as well as processing GPS record research, as-built surveys, topographic mapping, strip mine pit and stockpile volumes, field reconnaissance, instrument man, office calculations & drafting. He has managed several large surveying/mapping projects such as Coal Company purchase of 30+ parcels totaling over 1500 Acres, government purchase/acquisition of over 200



parcels of land for construction and flood easements for the North Fork of Hughes River Dam Project, several miles of four land highway control, stake-out and property acquisition, GPS control surveys for aerial photo mapping projects for commercial development projects, many miles of gas pipeline surveys for construction and permitting. He also supervised all preliminary boundary surveying and topographic mapping for the Federal Prison site in Preston County, West Virginia and normal supervises the surveying of numerous oil and gas related surveys each year and several property surveys. His experience also includes boundary disputes and has served as an expert witness in court proceedings in disputes and property acquisition/condemnations.



JASON McVICKER

Survey Manager & Licensed Professional Surveyor

SMITH LAND SURVEYING, INC.

Education

West Virginia University
Civil Engineering

Glennville State College
Associate Degree – Land Surveying Technology

**Licensing,
Certificates**

State of West Virginia Professional Surveyor License [REDACTED]
(Obtained in 2001)
Member of the West Virginia Society of Professional Surveyors
CSX Railroad Training and Certification
24 hours MSHA Surface Mine Coal and Construction Safety
Certification
24 hours MSHA training towards 40 hr Underground Miner
Certification
OSHA 10 Hour Certification
Safeland Certification

Experience

Survey Manager
Smith Land Surveying, Inc., Glennville, West Virginia
(2014 to Present)
Schedule and supervise 8 field crews, supervise office personnel performing data reduction of field data, plat work, and deed research; client meetings and client development, oversee vehicle and equipment maintenance.



Field Supervisor and Crew Chief
Blue Mountain Engineering, Wadestown, West Virginia
(2012 to 2014)

Schedule and supervise 2-5 field crews, on well pad and pipeline survey work as well as title mapping work. Supervise 3+ office personnel performing data reduction of field data, plat work, and deed research, client project manager for gas client, client meetings.

Survey Project Manager
Herbert, Rowland & Grubic, Inc., Morgantown, West Virginia
(2012)

Schedule and supervise 2-5 field crews, supervise 3+ office personnel performing data reduction of field data, plat work, and deed research, client project manager for gas client, field reviews for new gas well pad sites, construction management, client meetings, and help to supervise construction management staff, oversee vehicle and equipment maintenance.

Survey Supervisor
Triad Engineering, Inc., Morgantown, West Virginia
(2011-2012)

Management of GPS field operations and equipment, training of staff on GPS field operations and equipment, and field equipment purchasing. Management of coal and oil & gas survey work, job estimates and bids, billing review and over-site, project management for a variety of survey projects ranging from small to large, including rural and residential boundary surveys, topographic surveys, aerial flight control, control surveys, surface mine related surveys, construction stakeout on jobs varying from roadways and site work to concrete and steel work, and Railroad surveys for construction.

Project Manager
Greenway Engineering, Inc., Winchester, Virginia
(2003-2011)

Management of up to 6 office staff, job estimates and bids, project management for a variety of survey projects ranging from small to large, including rural and residential boundary surveys, topographic surveys, aerial flight control, control surveys, surface



mine related surveys, construction stakeout on jobs varying from roadways and site work to concrete and steel work, Oil and Gas related surveys including: the staking of gas wells, topography for gas well pads, ponds, and roads, pipeline surveys, lease unit boundary surveys of up to 2000 acres each.

Partial management of a sister office (2009 & 2010)

with duties including: scheduling of up to 6 field crews, management of up to 8 office staff, over site of employee timesheets, pricing of potential new jobs, negotiation of past due bills with clients, vehicle maintenance coordination, over site of survey equipment maintenance and repair, reviewing bills, and reviewing work performed by staff.

Field Coordinator (2000-2003)

Order and distribute field supplies, management of up to 4 office staff and up to five 2-man field crews, company vehicle management, job estimates and bids, project management, field data entry, computer drafting, survey computations to include boundary related (calculating surveys as to where property corners are to be set, traverse computations, deed delineation, and deed research), and construction related (calculating stockpile volumes, yardage moved volumes, calculating survey stakeout data from building and site grading plans, and developing as-built drawings of existing structures that are to be moved and re-erected). Direct rural and residential boundary surveys, topographic surveys, aerial flight control, control surveys, and surface mine related surveys, as well as construction stakeout on jobs varying from roadways and site work to concrete and steel work.

Chief Surveyor and Department Manager

Garbart Consulting Services, Inc., Uniontown, Pennsylvania (1998-2000)

Personnel management, company vehicle management, order and distribute supplies and equipment, job estimates and bids, project management, field data entry, computer drafting, and survey computations to include boundary related (calculating surveys as to where property corners are to be set, traverse computations, deed delineation, and deed research), and construction related (calculating stockpile volumes, yardage moved volumes, calculating survey stakeout data from building and site grading



plans, and developing as-built drawings of existing structures that are to be moved and re-erected).

Direct and perform rural and residential boundary surveys, topographic, aerial flight control, control surveys, underground and surface mine related surveys, as well as construction stakeout on jobs varying from roadways and site work to concrete and steel work.



Earl Thompson

Project Manager & Licensed Professional Surveyor

SMITH LAND SURVEYING, INC.

Education

Glennville State College

AS – 1994

Land Surveying

Licensing

State of West Virginia Professional Surveyors License [REDACTED]

Class A CDL Driver's License

Fuel Handling Safety (2203)

ABS Brake System Class (2003)

Warehouse Safety & Chemical Neutralization Class (2003)

Airborne Hazards Class (2004)

Experience

- Has experience in hand drafting and entries of field notes.
- Experienced on the operating systems of Carlson Software and several versions of Auto-CAD systems.
- Has experience in the operation of data collection devices and on site calculations and decisions.
- Has worked as a Project Surveyor in charge of surveying oil and gas well locations, and boundary and partition surveys.
- Experienced with pipeline profiles for both road and stream crossings, GPS data processing, construction stake-outs, courthouse research, topographic surveys and mapping, field reconnaissance, all positions on field crews, and drafting. Has been in charge of several projects for EQT including both office and field sides.



- Experienced with controlling multiple crews simultaneously and public relations and with designing multiple well pad locations and spacing plans of horizontal well paths.
- Has been in charge of and overseen the operation and checking of levels which was performed for a coal company consisting of approximately 1.5 miles located in Wyoming County, WV. And was in charge of the stake-out for tower bases and most of the As- Builts for this project as well.
- Marked many miles of seismic lines using long-hand calculations on site in Southern Kentucky.
- Several years of experience as an over-the-road truck driver, mechanics on tractor trailers and many military vehicles and associated components.
- Experienced with the operation and mechanics of several different pieces of heavy equipment such as bulldozers, trackhoes, backhoes, and fork lifts.



Matthew J. Hilton, Jr.

Project Manager & Licensed Professional Surveyor

SMITH LAND SURVEYING, INC.

Education

Glennville State College
AS – Land Surveying

Licensing

State of West Virginia Professional Surveyors License [REDACTED]
OSHA 10 Hour Certification
Heartsaver First Aid, CPR

Experience

2011-Present

Smith Land Surveying, Inc., Glennville, West Virginia - Project Manager

Monitor the progress of projects under my supervision, check well plats and rec plans, perform boundary surveys and compute corners, prepare for drafting, perform level loops and compute elevations for elevation certificates and Loma surveys

2009-2011

Allegheny Surveys Inc., Birch River, West Virginia - Senior Party Chief

Staked gas wells and prepared plats and rec plans for drafting, topo'd coal mine stock piles using conventional and survey grade GPS, set control points using survey grade GPS, set control points using survey grade GPS, ran field crews on boundary surveys.

2009-2009

Pocahontas Coal Company, Beckley, West Virginia - Survey Helper

Assist in setting spads in high wall for lining up high wall mining equipment, assist in running traverse and set bore hole stake, assist in as-built for access roads and high wall reclamation.



2006-2009

Allegheny Surveys Inc., Birch River, West Virginia - Senior Party Chief

Staked gas wells and prepared plats and rec plans for drafting, topo coal mine stock piles using conventional and survey grade GPS, set control points using survey grade GPS, ran field crews on boundary surveys.

2001-2006

Smith Land Surveying Inc., Glenville, West Virginia - Field Technician/Party Chief

Assist in staking gas wells and access roads, assist with performing boundary surveys, assist with construction surveys, became party chief and began staking gas wells, laying out access roads and preparing well plats for drafting, ran boundary survey crews and helped with the computation of boundary corners and preparing plats and description for drafting, ran level loops and computed elevations for elevation certificates.

1999-2001

Smith Land Surveying Inc., Glenville, West Virginia

Assist with the project at hand, which included giving back-sights, head chaining on boundary surveys, assist in staking gas wells.



Leslie Pierce

Project Manager & Licensed Professional Surveyor

SMITH LAND SURVEYING, INC.

Education

1967 - King High School- Tampa, Fl

1968-2012 - Continuing educational seminars and training in surveying and business management

2012 - Phase 1 ESA Training (ER-Due Diligence at Dawn Seminar)

Licensing

State of Florida Professional Surveyors License [REDACTED]

Experience

2010-Present **Project Surveyor, Smith Land Surveying, Inc.**
Responsibilities include Phase1 Environmental Site Assessments, road condition surveys and reports, preparation of permit applications for local, state and federal agencies, research public records, QAC of field and office data, prepare maps and reports for field surveys.

2009-2010 **Self Employed Professional Surveyor (Florida)**
Provide professional land surveying and related consulting services to private and public clients. Provide boundary, topographic, photogrammetric control, accident surveys, right of way surveys, subdivision platting and hydrographic surveys.



**2006-2009 Hillsborough County Florida-Manager of
County Survey Field Office**

Managed survey field office for Hillsborough County, Florida. Responsibilities included day to day operations of surveying office and personnel, develop budgets, perform and prepare boundary, topographic, environmental surveys. Provide surveys and data to public and private clients. Establishment of continuously operating GPS reference base stations. Supervised staff in the use of flatbed photogrammetric scanners. Provided QA/QC on photogrammetric projects. Prepared photo overlay exhibits for proposed highway related projects used in property acquisition and eminent domain proceedings. Established three dimensional survey control for large and small projects.

**1997-2006 Hillsborough County Florida-Manager of
County Right of Way Section**

Responsible for management of 20 + staff and contract with 21 surveying and mapping consulting firms. Perform quality control for subdivision platting, road right of way surveys, road design plans and photogrammetric mapping. Created inter-local agreements with other government organizations, develop budget, maintain technical hardware and software. Developed countywide right of way inventory program. Created specifications for individual and county-wide aerial mapping projects (included 1,000 square miles semi-annual flights) both film and digital base. Negotiated and managed contracts for over six photogrammetric consultant contracts. Supervised photogrammetric staff in data acquisition by use of analog and digital stereoplotters

**1990-1997 Hillsborough County Florida-Professional
Surveyor**

**1986-1990 Delta Engineering Corporation-Chief of
Surveying**

**1968-1986 Delta Engineering Corporation-Professional
Surveyor**



Ken Simmons

CADD Specialist / IT Manager

SMITH LAND SURVEYING, INC.

Education

Lewis County High School, graduate
Fairmont State University AS in Civil Engineering
Glennville State College, BA in Sociology / Psychology

Certifications

Nine Years of office supervisory experience
Twenty/five years of Auto CADD experience
Experienced in field work
OSHA certified in Construction Safety and Health 10 Hour
ComTIA certification in A+
ComTIA certification in Linux+
ComTIA certification in Server+
DCA (Dell Certified Associate)

Experience

IT/CADD Specialist, Smith Land Surveying (2008-current)

Design land features such as ponds, pads and drains using
Carlson Civil Software.
Create Topographical data for Quantities for cut and fill.
Created and continue to update written job descriptions for
office personnel.
Developed manual for all business office procedures, resulting
in standardized operations.
Well Plats, Permits, and Exhibits.
Design of Site Plans for Marcellus Shale Gas Wells.
Take care of all computer and network issues.



Office Supervisor, Thrasher Engineering (2004-2008)

Design land features such as ponds, pads and drains using Civil Land Desktop.
Create Topographical data for Quantities for cut and fill.
Deed research and right-of-way information for P.S.D. related jobs and work done for Eastern Coal.
Created and continue to update written job descriptions for office personnel.
Developed manual for all business office procedures, resulting in standardized operations.
Worked primarily for pipeline, pipeyard and test stations for four years.

Office Manager, Wheeler, Jackson and Ferrell, Inc. (2004)

Performed business office duties.
Field work as instrument man as well as court research.
Survey plats using Eagle Point software.
Ordered office and survey supplies.

Cadd Tech. Smith Land Surveying (2001-2004)

Survey and Well Plats using Carlson Software.
Field Work as a rod man

Cadd Tech. & Field Crew, D. L. Wheeler and Associates (1991-2001)

Survey, Mortgage and Alta plats using Auto Cadd and Eagle Point software.
Field work as a rod man and as instrument man.

D. BRADY STUTLER

Geotechnical Drilling Manager/CAD & GIS Specialist

SMITH LAND SURVEYING, INC.

EXPERIENCE

2012 - Present Smith Land Surveying Glenville, WV

Geotechnical Drilling Manager / CAD & GIS Specialist

- Prepare base mapping and topographic mapping for multiple engineering and as-built sites.
- Complete as-built survey plats from start to finish.
- Worked on multiple proposed pipeline surveys.
- Prepared and set up information for geodatabasing in GIS.
- Drafting well plats, road approaches, and reclamation plans.
- Managing Geotechnical Drilling operations.
- Organizing and completing geotechnical testing evaluations.
- Setup final designs through Carlson Construction for use on Caterpillar and other GPS equipment for well site construction.
- Mapping and topo work with Cyclone and other Point Cloud software.
- Designing rough / preliminary pad and access road locations.
- Converting design files to shape files for client geodatabasing.
- Preparing exhibit maps and information for environmental permitting.
- Completing road condition surveys from start to finish.

2006-2012 Thrasher Engineering Inc. Bridgeport, WV

Survey CAD Technician

- Worked under five WV Licensed Surveyors and eight WV/PA licensed Professional Engineers.
- Drafted multiple property, easement, condemnation, well, and permit plats.
- Received information from field crews on a daily basis and updated base mapping and topographic mapping for the engineers and GIS departments
- Drafted as-built surveys and Alta surveys from start to finished product.
- Completed over 1000 miles of proposed and as-built pipeline surveys, working both indoors doing drafting / engineering, and outdoors surveying.
- Worked on long wall mining mapping and water sampling on multiple jobs, covering over 2000 homes and businesses, both in office and out. Doing water well sampling and mapping for every sampled home or business in the project area (within a 2-mile radius of a long wall mine).



EDUCATION

2002-2005 South Harrison High School Lost Creek, WV

- Completed courses in board and computer aided drafting.
- Graduated with a 3.0 grade average.

2004-2005 United Technical Center Clarksburg, WV

- Completed 1000 hours of drafting training in a two year course.
- The first year in the course was for mechanical drafting and design.
- During the first year in the course I won 3rd place in the state for the VICA mechanical drafting competition.
- The second year of the course was for architectural drafting.
- During the second year of the course I won 1st place at the state level VICA architectural competition and 15th in the National VICA competition for architectural drafting.

2005-2007 Fairmont State University Fairmont/Clarksburg, WV

- Completed 1.5 semesters in the civil engineering program.
- 50 hours of Autodesk Land Desktop training.

SOFTWARE EXPERIENCE

I have multiple years of experience with 2009 Autodesk Land Desktop, 2010-2014 Carlson with Autodesk, and 2010-2012 Autodesk Civil 3D. I also have roughly three years of experience with Carlson GIS, ESRI ArcGIS, general point cloud software, and Carlson Construction.

INTERESTS

I enjoy spending time with my children and family, also golfing, hunting, fishing, dirt track racing, donating time to raise money for my Shriners organization, and taking kids to and from multiple Shriners hospital locations.

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SOLICITATION NUMBER: CRFQ 0313 DEP1600000053

Addendum Number: No.01

The purpose of this addendum is to modify the solicitation identified as ("Solicitation") to reflect the change(s) identified and described below.

Applicable Addendum Category:

- Modify bid opening date and time
- Modify specifications of product or service being sought
- Attachment of vendor questions and responses
- Attachment of pre-bid sign-in sheet
- Correction of error
- Other

Description of Modification to Solicitation:

Addendum issued to publish and distribute the attached documentation to the vendor community.

1. The purpose of this addendum is to answer technical questions received.

No other Changes.

Additional Documentation: Documentation related to this Addendum (if any) has been included herewith as Attachment A and is specifically incorporated herein by reference.

Terms and Conditions:

1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.
2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

CRFQ 0313 DEP160000053 Version 1 Mapping Services in Southern WV

Addendum 1

1. Question: In Section 3.2.1.3 LiDAR of the RFQ LiDAR is mentioned, but there is no line item or bidding. Is LiDAR a requirement?

Answer: No. Method of data acquisition is at the discretion of the mapping services contractor.

2. Question: In Section 3.2.1.1 Topographic Mapping mentions imagery but there is no line item as in past mapping contracts? Is imagery required as a deliverable?

Answer: No.

3. Question: In Section 3.3 Mapping Consultant Qualifications Requirements, a Professional Surveyor is mentioned. There is no line item for bidding. Is this a required item?

Answer: The Professional Surveyor is required to stamp drawings per the RFQ. This cost should be included in the product.

4. Question: In Section 3.3 Mapping Consultant Qualifications Requirements Professional Drafting is mentioned. There is no line item for bidding. Is this a required item?

Answer: This is at the discretion of the Professional Surveyor who is in responsible charge of the product.

ADDENDUM ACKNOWLEDGEMENT FORM

SOLICITATION NO.: CRFQ 0313 DEP 1600000053

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:

(Check the box next to each addendum received)

- | | |
|--|--|
| <input checked="" type="checkbox"/> Addendum No. 1 | <input type="checkbox"/> Addendum No. 6 |
| <input type="checkbox"/> Addendum No. 2 | <input type="checkbox"/> Addendum No. 7 |
| <input type="checkbox"/> Addendum No. 3 | <input type="checkbox"/> Addendum No. 8 |
| <input type="checkbox"/> Addendum No. 4 | <input type="checkbox"/> Addendum No. 9 |
| <input type="checkbox"/> Addendum No. 5 | <input type="checkbox"/> Addendum No. 10 |

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

SMITH LAND SURVEYING, INC.

Company

Gregory A. Smith
Authorized Signature

6-21-16

Date

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.
Revised 6/8/2012

ADDENDUM ACKNOWLEDGEMENT FORM

SOLICITATION NO.: CRFQ 0313 DEP 1600000053

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(Check the box next to each addendum received)

- | | |
|--|--|
| <input checked="" type="checkbox"/> Addendum No. 1 | <input type="checkbox"/> Addendum No. 6 |
| <input type="checkbox"/> Addendum No. 2 | <input type="checkbox"/> Addendum No. 7 |
| <input type="checkbox"/> Addendum No. 3 | <input type="checkbox"/> Addendum No. 8 |
| <input type="checkbox"/> Addendum No. 4 | <input type="checkbox"/> Addendum No. 9 |
| <input type="checkbox"/> Addendum No. 5 | <input type="checkbox"/> Addendum No. 10 |

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SMITH LAND SURVEYING, INC.

Company

Authorized Signature

Date

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.



CERTIFICATE OF LIABILITY INSURANCE

SMILA03

OP ID: RC

DATE (MM/DD/YYYY)
10/27/2015

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Jim Lively Insurance PO Box 1633 531 Jones Ave. Oak Hill, WV 25901 Robin Chapman	CONTACT NAME:	
	PHONE (A/C, No, Ext):	FAX (A/C, No):
INSURED Smith Land Surveying, Inc. P.O. Box 150 Glenville, WV 26351-0150	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	
	INSURER A: Westfield Insurance	NAIC # 24112
	INSURER B: Travelers Insurance	36137
	INSURER C:	
	INSURER D:	
	INSURER E:	
	INSURER F:	

COVERAGES**CERTIFICATE NUMBER:****REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input checked="" type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR			TRA7841510 106171665	08/01/2015 08/01/2015	08/01/2016 08/01/2016	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 500,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000
B	<input checked="" type="checkbox"/> EPLI INCL 3RD PAR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:						
A	<input checked="" type="checkbox"/> AUTOMOBILE LIABILITY ANY AUTO <input type="checkbox"/> SCHEDULED AUTOS ALL OWNED AUTOS <input type="checkbox"/> NON-OWNED AUTOS HIRED AUTOS <input type="checkbox"/>			TRA7841510	08/01/2015	08/01/2016	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ 1,000,000 PROPERTY DAMAGE (Per accident) \$ 1,000,000
A	<input checked="" type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$			TRA7841510	08/01/2015	08/01/2016	EACH OCCURRENCE \$ 9,000,000 AGGREGATE \$ 9,000,000
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below		Y/N N/A				PER STATUTE OTHER E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER**CANCELLATION**

STATE OF WEST VIRGINIA 2019 WASHINGTON ST., EAST CHARLESTON, WV 25305	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE Robin Chapman <i>Robin Chapman</i>
---	--

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DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

Sarah A. Smith
(Name, Title)
SARAH A. SMITH
(Printed Name and Title)
PO BOX 150 GLENVILLE, WV. 26351
(Address)
1-304-462-5634 / 1-304-462-5656
(Phone Number) / (Fax Number)
SSMITH@SLSSURVEYS.COM
(email address)

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

SMITH LAND SURVEYING, INC.
(Company)

Gregory A. Smith
(Authorized Signature) (Representative Name, Title)

GREGORY A. SMITH PRESIDENT
(Printed Name and Title of Authorized Representative)

6-21-16
(Date)

1-304-462-5634 / 1-304-462-5656
(Phone Number) (Fax Number)

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

MANDATE: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (W. Va. Code §61-5-3) that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: SMITH LAND SURVEYING, INC.

Authorized Signature: Gregory A. Smith Date: 6-21-16

State of West Virginia

County of Gilmer, to-wit:

Taken, subscribed, and sworn to before me this 21st day of June, 2016.

My Commission expires Jan. 22, 2023.



NOTARY PUBLIC Deanna S. McVicker

State of West Virginia VENDOR PREFERENCE CERTIFICATE

Certification and application* is hereby made for Preference in accordance with **West Virginia Code**, §5A-3-37. (Does not apply to construction contracts). **West Virginia Code**, §5A-3-37, provides an opportunity for qualifying vendors to request (at the time of bid) preference for their residency status. Such preference is an evaluation method only and will be applied only to the cost bid in accordance with the **West Virginia Code**. This certificate for application is to be used to request such preference. The Purchasing Division will make the determination of the Vendor Preference, if applicable.

1. **Application is made for 2.5% vendor preference for the reason checked:**
 Bidder is an individual resident vendor and has resided continuously in West Virginia for four (4) years immediately preceding the date of this certification; **or**,
 Bidder is a partnership, association or corporation resident vendor and has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or 80% of the ownership interest of Bidder is held by another individual, partnership, association or corporation resident vendor who has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; **or**,
 Bidder is a nonresident vendor which has an affiliate or subsidiary which employs a minimum of one hundred state residents and which has maintained its headquarters or principal place of business within West Virginia continuously for the four (4) years immediately preceding the date of this certification; **or**,
2. **Application is made for 2.5% vendor preference for the reason checked:**
 Bidder is a resident vendor who certifies that, during the life of the contract, on average at least 75% of the employees working on the project being bid are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; **or**,
3. **Application is made for 2.5% vendor preference for the reason checked:**
 Bidder is a nonresident vendor employing a minimum of one hundred state residents or is a nonresident vendor with an affiliate or subsidiary which maintains its headquarters or principal place of business within West Virginia employing a minimum of one hundred state residents who certifies that, during the life of the contract, on average at least 75% of the employees or Bidder's affiliate's or subsidiary's employees are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; **or**,
4. **Application is made for 5% vendor preference for the reason checked:**
 Bidder meets either the requirement of both subdivisions (1) and (2) or subdivision (1) and (3) as stated above; **or**,
5. **Application is made for 3.5% vendor preference who is a veteran for the reason checked:**
 Bidder is an individual resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard and has resided in West Virginia continuously for the four years immediately preceding the date on which the bid is submitted; **or**,
6. **Application is made for 3.5% vendor preference who is a veteran for the reason checked:**
 Bidder is a resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard, if, for purposes of producing or distributing the commodities or completing the project which is the subject of the vendor's bid and continuously over the entire term of the project, on average at least seventy-five percent of the vendor's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years.
7. **Application is made for preference as a non-resident small, women- and minority-owned business, in accordance with West Virginia Code §5A-3-59 and West Virginia Code of State Rules.**
 Bidder has been or expects to be approved prior to contract award by the Purchasing Division as a certified small, women- and minority-owned business.

Bidder understands if the Secretary of Revenue determines that a Bidder receiving preference has failed to continue to meet the requirements for such preference, the Secretary may order the Director of Purchasing to: (a) reject the bid; or (b) assess a penalty against such Bidder in an amount not to exceed 5% of the bid amount and that such penalty will be paid to the contracting agency or deducted from any unpaid balance on the contract or purchase order.

By submission of this certificate, Bidder agrees to disclose any reasonably requested information to the Purchasing Division and authorizes the Department of Revenue to disclose to the Director of Purchasing appropriate information verifying that Bidder has paid the required business taxes, provided that such information does not contain the amounts of taxes paid nor any other information deemed by the Tax Commissioner to be confidential.

Under penalty of law for false swearing (West Virginia Code, §61-5-3), Bidder hereby certifies that this certificate is true and accurate in all respects; and that if a contract is issued to Bidder and if anything contained within this certificate changes during the term of the contract, Bidder will notify the Purchasing Division in writing immediately.

Bidder: SMITH LAND SURVEYING, INC.

Signed: Gregory A. Smith

Date: 6-21-16

Title: President



Smith Land Surveying, Inc.

Current Aerial Mapping Projects Under Contract

- **Six New Gas Well Pad Sites**

Client: EQT Production Company

SLS is providing aerial mapping, survey control, and boundary survey work for well plat and permitting purposes, engineering and site design, survey stakeout for construction and site As-Builts. SLS also provides environmental and regulatory assistance.

- **One New Gas Well Pad Site**

Client: Mountaineer Keystone

SLS is providing aerial mapping, survey control, and boundary survey work for well plat and permitting purposes, engineering and site design, survey stakeout for construction and site As-Builts.

- **Two New Gas Well Pad Sites**

Client: Larson Design Group

SLS is providing aerial mapping and survey control.

- **500 Acre ± Unit Boundary**

Client: Larson Design Group

SLS is providing mapping and boundary survey services for one of Larson Design Group's clients.

- **Six Cell Tower Sites in North Central West Virginia**

Client: Aerial Erectors

SLS is providing field run topography of a .5 Acre ± cell tower site and for access roads ranging in length from 1800 feet to 5000 feet, boundary survey to provide lease area plats and survey stakeout for construction.

- **Individual Boundary Surveys**

Client: Various

SLS is providing a variety of boundary and mapping surveys with some environmental and flood plain services, ranging from city lots to large acreage rural tracts.





AERIAL MAPPING CLIENT LIST

EQT Production Company
Contact: Justin Meadows

Larson Design Group
Contact: Rob Matejczyk

Mountaineer Keystone
Contact: Amy Miller

Stantec
Contact: Richard Gaines

Precision Pipeline
Contact: Steven Grice

Allstar Ecology
Contact: Ernie Smith

XTO/Mountain Gathering
Contact: Michael "Mike" Jackson

Stone Energy
Contact: Clayton Ferguson

Mike & Ike LandAPlenty
Contact: Mike Ross

Dominion Transmission (Formerly CNG Transmission)

Louis Berger & Associates
Contact: George Younger

Gilmer County Economic Development Association
Contact: Jim Fealy/Jeff Campbell

West Virginia Department of Commerce
Contact: Canaan Valley Golf Course

Wolfpen Knob Development
Contact: Denny Stanhagen

Consol Coal – Birch Project
Client: Raymond Purr

Century Engineering
Client: Joel Oppenheimer

William Shriver Architects
Contact: Ted Shriver

WV DEP – Bond Forfeiture Projects

Federal Bureau of Prisons



Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

State of West Virginia
 Request for Quotation
 27 – Miscellaneous

Proc Folder: 189210

Doc Description: Addendum No. 01-Mapping Services in Southern WV

Proc Type: Central Master Agreement

Date Issued	Solicitation Closes	Solicitation No	Version
2016-06-14	2016-06-21 13:30:00	CRFQ 0313 DEP1600000053	3

BID RECEIVING LOCATION			
BID CLERK			
DEPARTMENT OF ADMINISTRATION			
PURCHASING DIVISION			
2019 WASHINGTON ST E			
CHARLESTON	WV	25305	
US			

VENDOR
Vendor Name, Address and Telephone Number:

FOR INFORMATION CONTACT THE BUYER
Beth Collins (304) 558-2157 beth.a.collins@wv.gov

Signature X <i>Gregory A. Smith</i>	FEIN # 55-0669832	DATE <i>6-21-16</i>
All offers subject to all terms and conditions contained in this solicitation		

ADDITIONAL INFORMATION:

Addendum

Addendum No.01 issued to publish and distribute the attached information to the vendor community.

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON WV25304 US		ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON WV 25304 US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	Control Surveying	600.00000	HOUR	\$47.00	\$28,200.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :
(Spec Item 3.1.1.2 & 4.2)

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON WV25304 US		ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON WV 25304 US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
2	Topographic, Planimetric and Check Surveying	1800.00000	HOUR	\$47.00	\$84,600.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :
(Spec Item 3.1.1.3 & 4.2)

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON WV25304 US		ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON WV 25304 US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
3	Topographic Mapping - (0-25 Acres)	15.00000	ACRE	\$160.00	\$2,700.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :
(Spec Item 3.2 & 4.2)

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON US	WV25304	ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON US	WV 25304

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
4	Topographic Mapping - (25-50 Acres)	30.00000	ACRE	\$90.00	\$2,700.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :
(Spec Item 3.2 & 4.2)

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON US	WV25304	ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON US	WV 25304

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
5	Topographic Mapping - (50-100 Acres)	75.00000	ACRE	\$40.00	\$3,000.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :
(Spec Item 3.2 & 4.2)

INVOICE TO		SHIP TO	
ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON WV25304 US		ENVIRONMENTAL PROTECTION OFFICE OF AML&R 601 57TH ST SE CHARLESTON WV 25304 US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
6	Topographic Mapping - (Over 100 Acres)	125.00000	ACRE	\$20.00	\$2,500.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :
(Spec Item 3.2 & 4.2)

SCHEDULE OF EVENTS

Line	Event	Event Date
1	Tech Question Deadline at 5:00 PM, EST	2016-06-03

DEP160000053	Document Phase Final	Document Description Addendum No. 01-Mapping Services in Southern WV	Page 5 of 5
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ADDITIONAL TERMS AND CONDITIONS

See attached document(s) for additional Terms and Conditions



Calibration Protocol
DMC IIe 250 – 25521



Camera Calibration Certificate
No: DMC IIe 250 – 25521



For

Midwest Aerial Photography
7535 West Broad Street

Galloway, Ohio 43119

Manufacturer: Z/I Imaging GmbH, D-73431 Aalen, Germany

Reference: PAN

Serial Number: 00121780 (PAN Head)

Date of Calibration: 27. October 2014

Date of Report: 10. November 2014

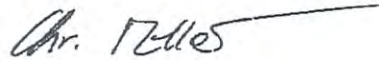
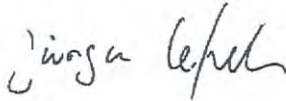
Number of Pages:

Calibration performed at: Carl Zeiss Jena, Carl-Zeiss-Promenade 10, 07745 Jena, Germany.

This camera system is certified by Z/I Imaging and is fully functional within its specifications and tolerances.

Date of Calibration: October 2014

Date of Certification: November 2014



Jürgen Hefe, Senior Software Developer

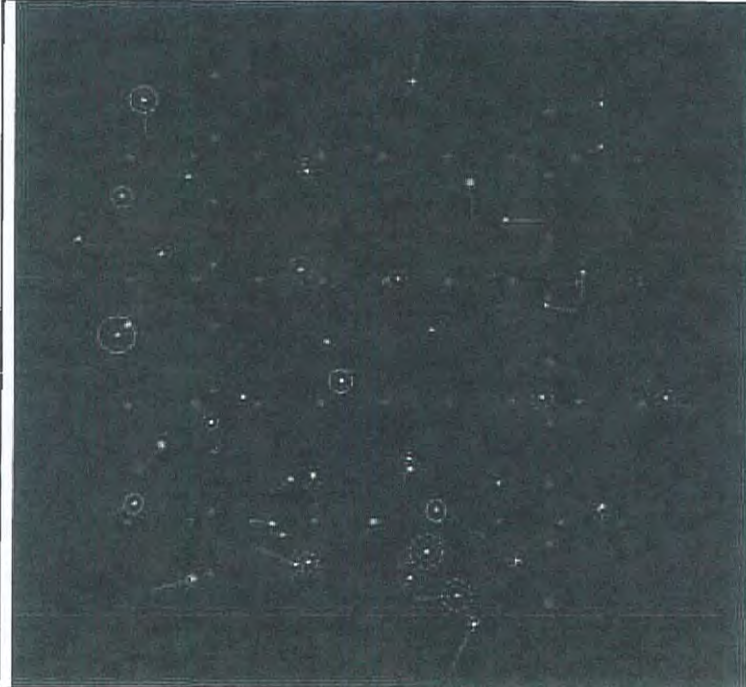
Dipl.Ing. Christian Müller, Product Manager

Camera Serial Numbers and Burn-In flight

Camera Head	Serial Number	Calib. Date
PAN (reference)	00121780	27.10.2014
MS1 (NIR)	00124702	27.10.2014
MS2 (Blue)	00124750	27.10.2014
MS3 (Red)	00124675	27.10.2014
MS4 (Green)	00124731	27.10.2014

Burn-In flight performed: 29. September 2014

Test block configuration

	Photo Scale	1:8928.6
	Flying Height [m]	1000 AGL
	Flying Altitude [m]	1450 AMSL
	Run-Spacing [m]	419.2
	Base-Length [m]	210.2
	Number of Exposures	54
	Side-lap [%]	50
	End-lap [%]	70
	Terrain Height [m]	450
	Number of strips	6
	Photos in one strip	2 x 9 N-S 4 x 9 W-E
	Photos Used	54
	Control Points Used	5
	Check Points Used	39
	GSD [cm]	5

Aerial triangulation statistic results:

Parameter	X/...	Y/Phi	Z/K...	XY
RMS Control	0.014	0.009	0.005	0.012
RMS Check	0.019	0.019	0.028	0.019
RMS Limits	0.050	0.050	0.050	
Max Ground Residual	0.019	0.014	0.007	
Residual Limits	0.070	0.070	0.070	
Mean Std Dev Object				
RMS Photo Position				
RMS Photo Attitude				
Mean Std Dev Photo Po...				
Mean Std Dev Photo Atti...				

Parameter	Value
Key Statistics	
Sigma	1.3 um
RMS Image (x, y)	1.1, 0.9 um
Number of iterations	2
Degrees of Freedom	15421
Gross Image Blunders	0
Gross Control Blunders	0
Image Blunders	0
Solution Status	Solution Successful

Parameter	Value
Current Count	
Control Points Used	5
Check Points Used	39
Photos Used	54
Photos Not Used	0
Image Points Used	13205

Camera Id	Len.	Grids
DMC_II_250	Off	Off

Parameter	Value
Project Settings	
Linear: Meters	Refraction: Off
Angular: Degrees	Curvature: Off
Deutsche Hauptdreiecksnetz - Gauss-Kruger (3-degree) (m)	

The results of the aerial triangulation were generated with ImageStation Automatic Triangulation (ISAT), Version 2013, from Intergraph Corp. The maximum RMS in check points is ≤ 0.5 GSD in x,y and ≤ 0.7 GSD in z.

Aerial Triangulation performed by



Dipl. Ing. C. Müller

10.11.2014

Date

Geometric Calibration

The output image geometry is based on the Pan Camera head (reference head = master camera). All other camera heads are registered and aligned to this head. Aerial triangulation checks overall system performance based on.

Output image

Reference Camera	PAN	
Serial Number	00121780	
Number of rows/columns [pixels]	16768 x 14016	
Pixel Size [μm]	5.600 x 5.600	
Image Size [mm]	93.9008 x 78.4896	
Focal Length [mm]	111.9906 mm	+ /- 0.002 mm
Principal Point [mm]	X= 0.0208 mm Y= -0.0019 mm	+ /- 0.002 mm

The geometric calibration takes place at Carl Zeiss Jena on a certified test stand. More than 800 "light targets", projected on 28 lines that are distributed diagonally on the focal plane, are automatically measured by finding their centers light with a precision of less than 1/10 of a pixel. The light targets are projected from the "infinity" by using a collimator (Figure 1).

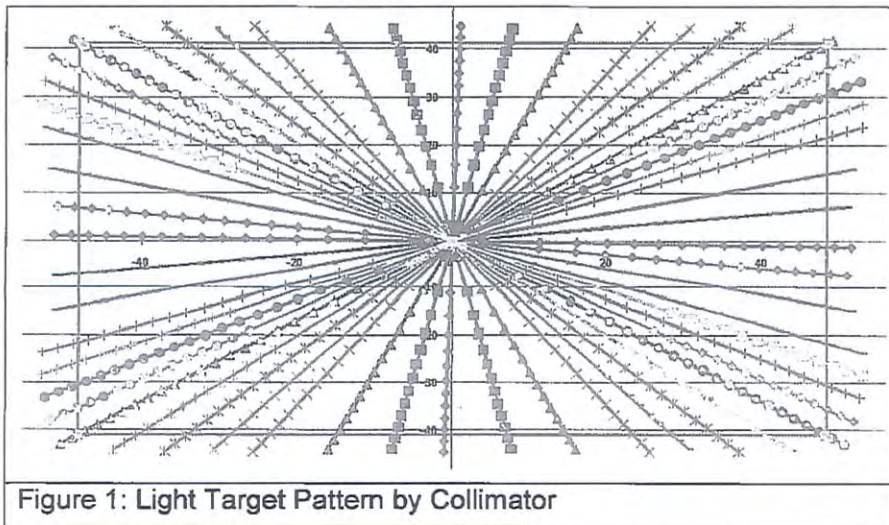


Figure 1: Light Target Pattern by Collimator

Geometric Calibration

Image Residuals

Figure 2 shows the image residuals, split in radial and tangential directions after the calibration adjustment. The maximum residuals are less than or equal to 1.5 microns and the RMSE values are below 0.5 microns.

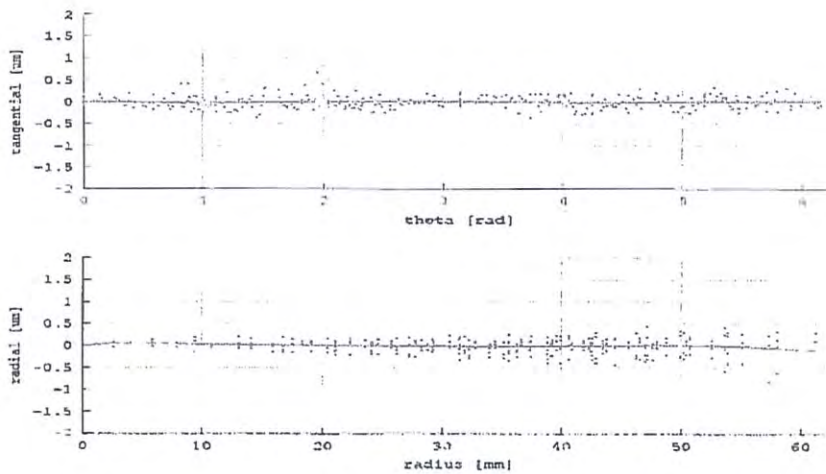


Figure 2: Tangential/Radial Distortion Residuals

Figure 3 shows the 2-D plot of the image residuals in mm.

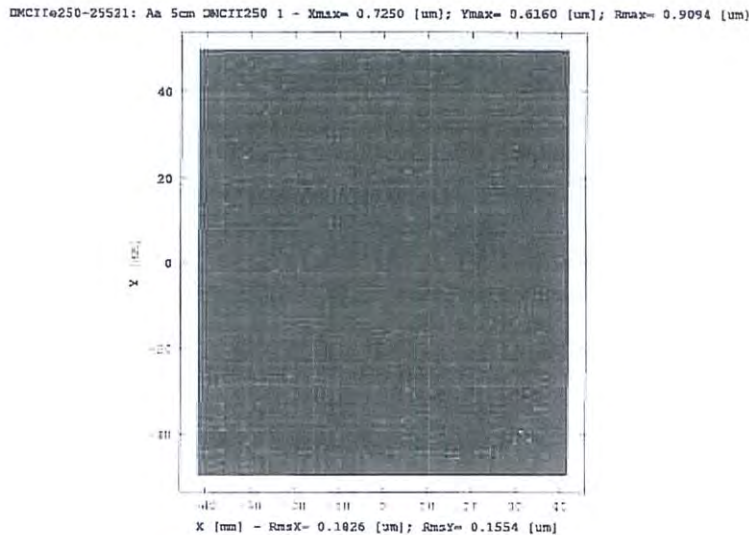


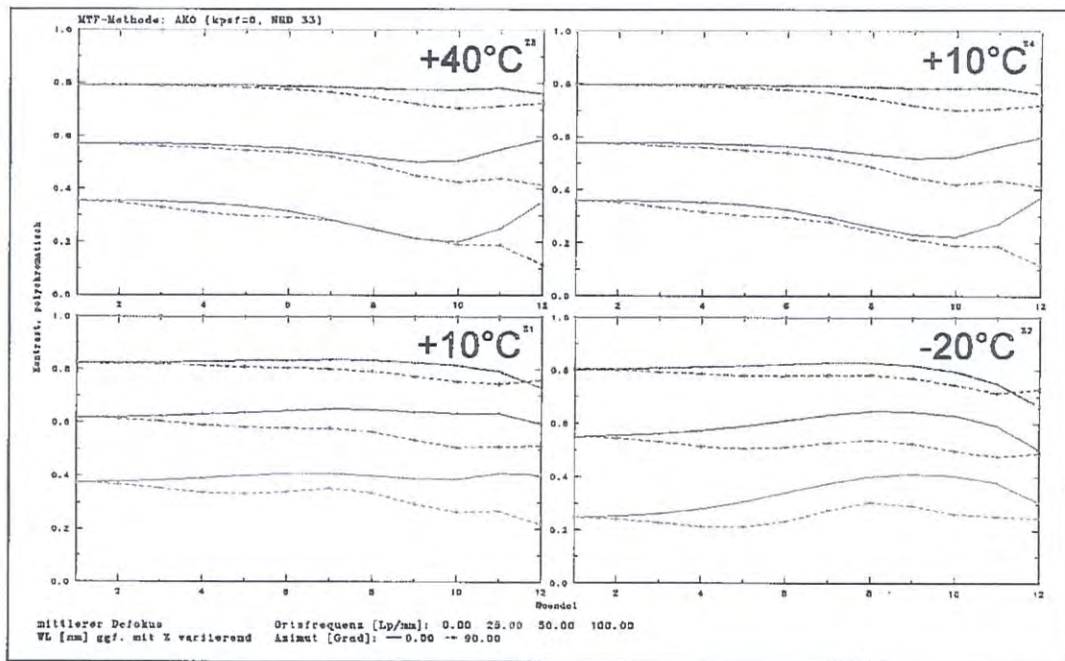
Figure 3: 2-D Image Residuals.

RMS < 0.19 um (maximum 0.73 microns)

Optical System

Modulation Transfer Function, MTF of PAN Camera (Reference)

DMC II PAN – MTF Polychromatic F/5.6 ; 112 mm – Temperature Stability

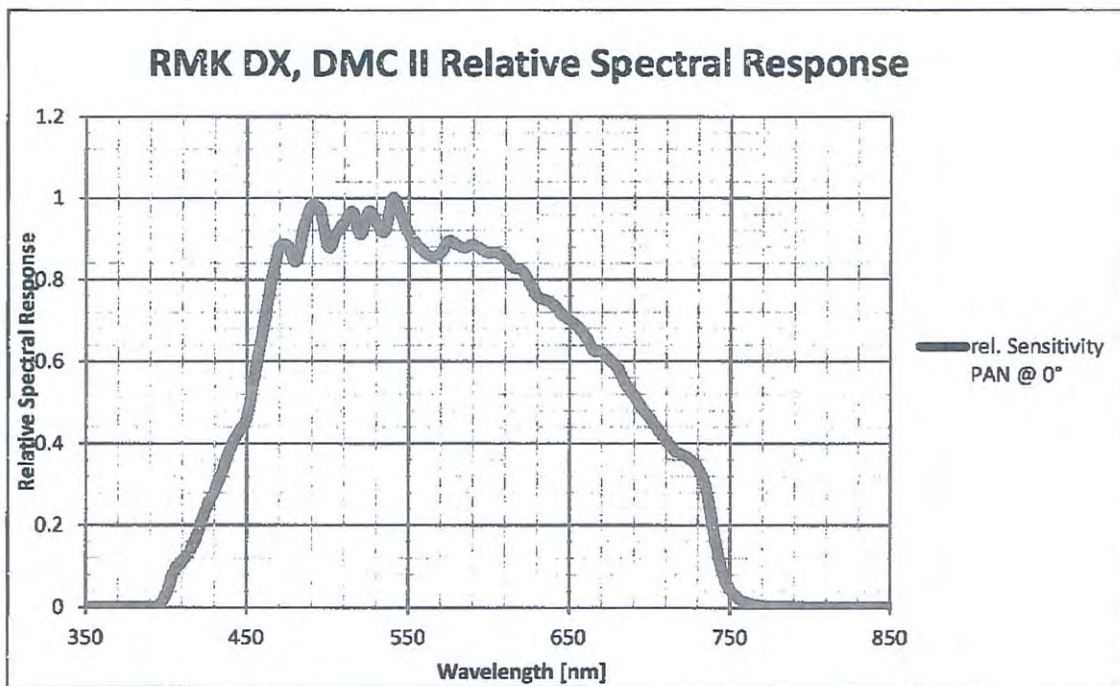


The MTF measurement is camera type specific and shows variation of the MTF within the specified temperature range.

This is a camera type specific measurement.

Radiometric Calibration

Sensitivity of PAN camera (Reference)



The sensitivity shows the spectral response curve of the single camera head including the optical system (optics, filter) and the sensor response. The DMC IIe 250 is calibrated with respect to the absolute spectrometer. This allows computing pixel radiance values from pixels digital numbers and is a camera type specific calibration.

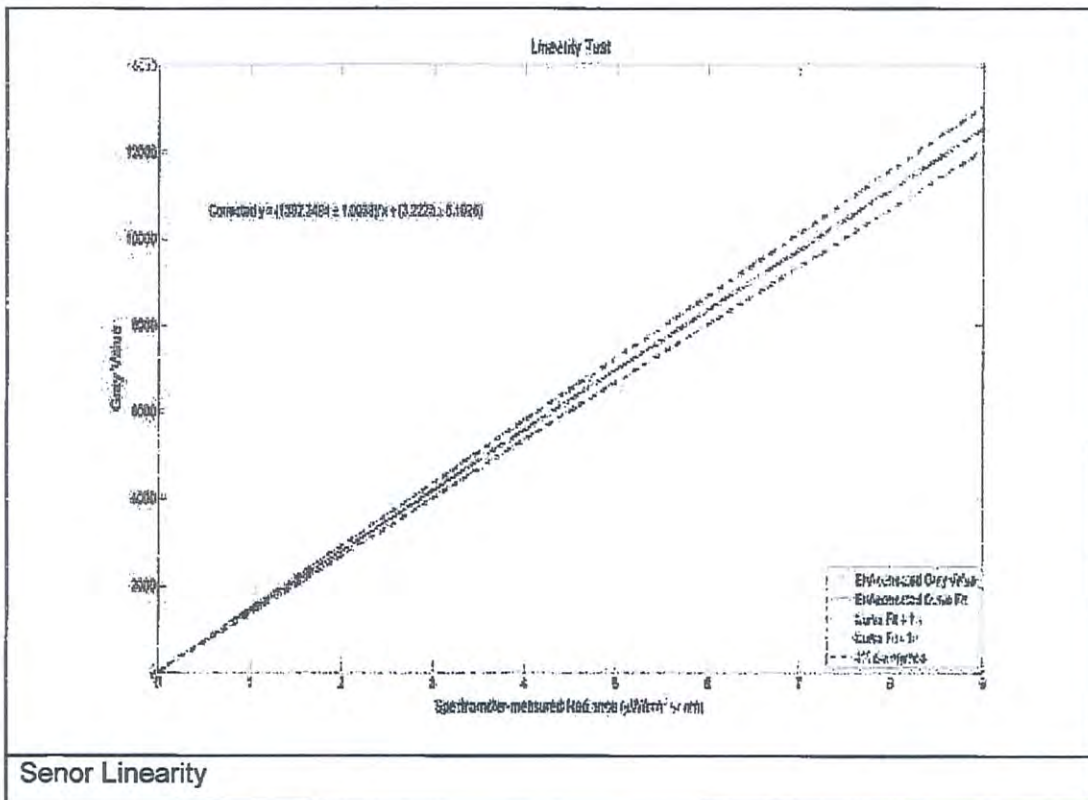
This is a camera type specific measurement.

Radiometric Calibration

Sensor Linearity (Reference)

The sensor linearity is measured in the Lab with calibrated spectrometer. This is a camera type specific calibration.

Below figure shows the linearity of the raw sensor and after flat fielding:



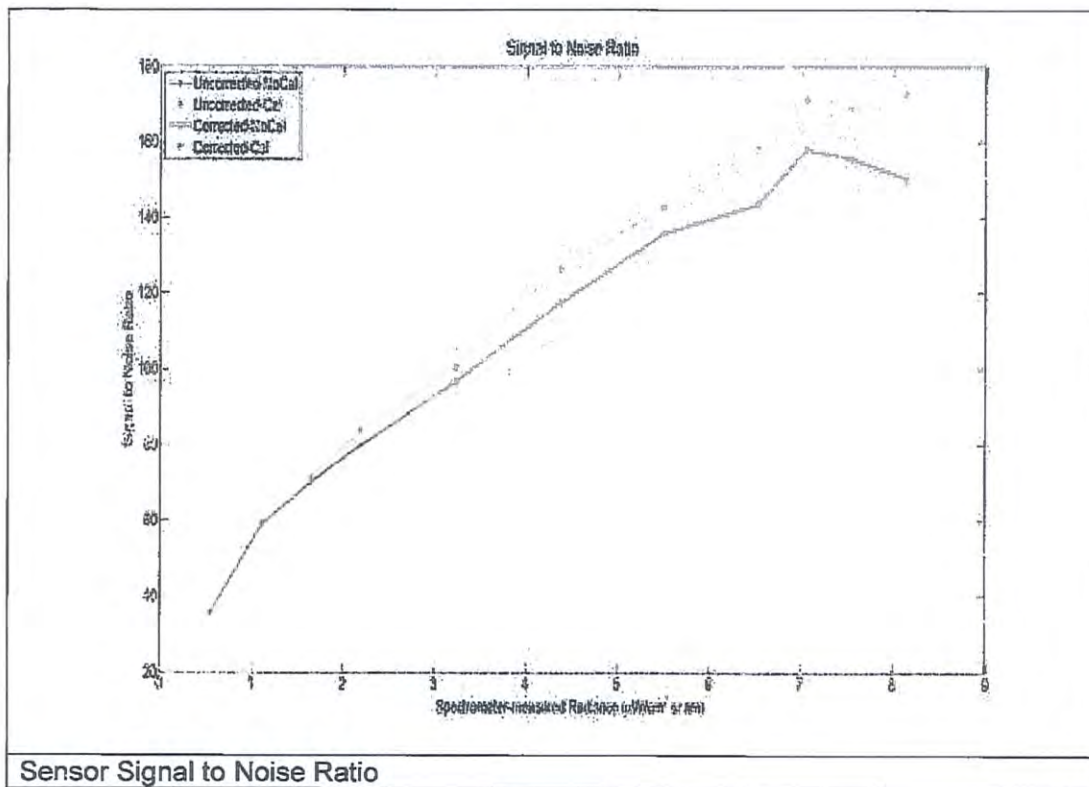
The deviation from the linearity is below 1%.

This is a camera type specific measurement.

Radiometric Calibration

Sensor Noise (Reference)

Sensor noise shows image noise with respect to the image center measured at an aperture of 16 with exposure time of 16msec.



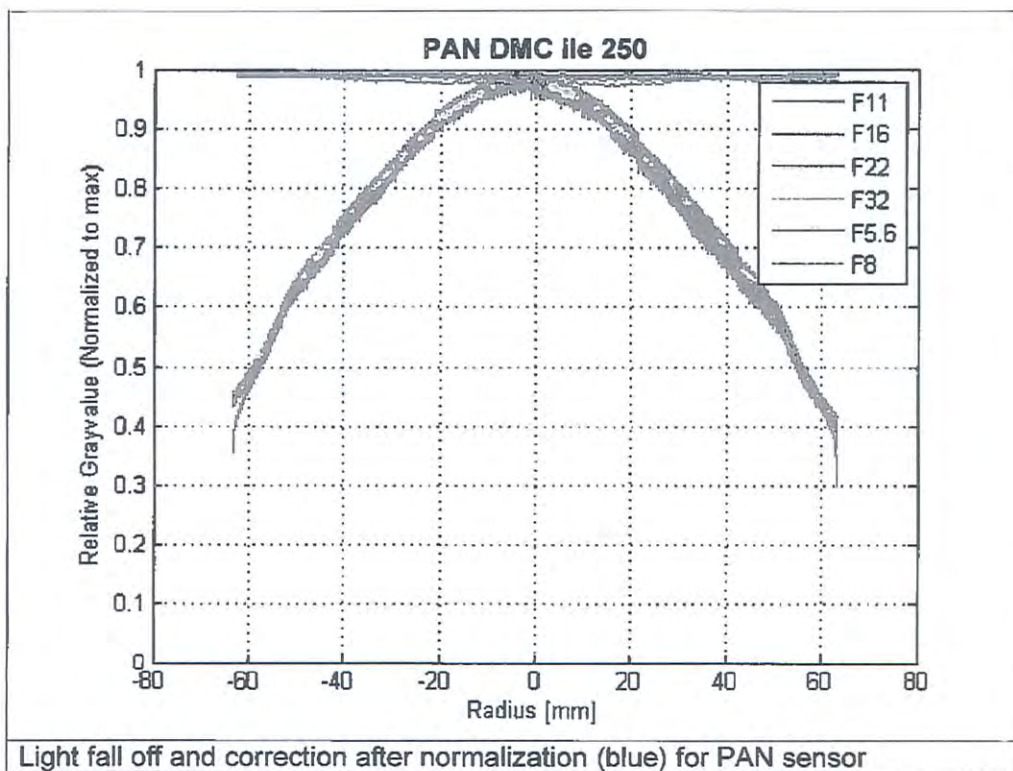
This is from a camera type specific calibration.

Radiometric Calibration

Aperture Correction (Reference)

Camera PAN (00121780)

The light fall off to the border due the influence of the optics depends on the aperture used. Therefore this calibration approach delivers individual calibration images for each aperture (Full F-Stop). In general the light fall off is a function of the image height (radial distance from center). The figure below shows the profile from the upper left corner to the lower right corner of the calibration images. Compensation of the light fall off can be measured after normalization and is within $\pm 2.5\%$ of the dynamic range.



This is from a camera type specific calibration.

Radiometric Calibration

Defect Pixel

Camera PAN (00121780)

Defect pixels are detected during radiometric calibration and will be corrected during radiometric processing of the images. The quantity and cumulative percentage and specification of defects is described in Appendix "Defect Pixel Recognition".

Revision of calibration:	131073	
CCDRevision:	1	
Date Number:	1412090612	
Date:	140930	
Number of defect pixels:	180	
Number of defect clusters:	0	
Number of defect columns:	3	
Nr	Row	Column
0	909	32
1	3098	110
2	3043	123
3	13717	154
4	908	217
5	13582	380
6	13583	380
7	9503	449
8	434	455
9	435	455
10	2897	567
11	2897	568
12	9323	644
13	9324	644
14	9323	645
15	9324	645
16	10175	785
17	697	838
18	779	1151
19	13087	1302
20	10740	1409
21	4284	1610
22	14302	1746
23	955	2074
24	5758	2262
25	5769	2262
26	3209	2426
27	3209	2427
28	1926	2564
29	14397	2919
30	14398	2919
31	14399	2919
32	14397	2920
33	14398	2920
34	14399	2920
35	14397	2921
36	14398	2921
37	14541	3118
38	8416	3535
39	10290	3674
40	11162	3687
41	11162	3688
42	1288	3708
43	1286	3710
44	1288	3711
45	8937	3800

DMC IIe 250 Calibration

Protocol

46	9672	3860
47	4413	3865
48	4365	3899
49	344	4050
50	3968	4751
51	3873	4884
52	2573	5786
53	5229	6046
54	5230	6046
55	2012	6631
56	2013	6631
57	2014	6631
58	11546	6647
59	11546	6648
60	11546	6649
61	6269	6654
62	6270	6654
63	7327	6654
64	362	6771
65	4631	6968
66	4634	6968
67	4635	6969
68	4630	6970
69	4635	6970
70	4635	6971
71	4631	6972
72	4633	6973
73	3786	7378
74	11979	7852
75	12428	7876
76	1159	9079
77	1159	9080
78	1180	9080
79	3725	9144
80	21	9275
81	22	9275
82	22	9276
83	23	9276
84	24	9276
85	1818	9689
86	512	9850
87	14	9994
88	7149	10040
89	7151	10042
90	7152	10042
91	7152	10043
92	32	10255
93	33	10255
94	34	10255
95	32	10256
96	33	10256
97	34	10256
98	1902	10284
99	1903	10284
100	11123	10743
101	11125	10743
102	11123	10744
103	11123	10745
104	11125	10745
105	5513	10787
106	2833	11533
107	2831	11534
108	2835	11534
109	2830	11535
110	2831	11535
111	2832	11535
112	2835	11535
113	2830	11536
114	2832	11536
115	2833	11536
116	2834	11536
117	2831	11537
118	2832	11537
119	2833	11537
120	2834	11537
121	2830	11538
122	2832	11538

DMC Ile 250 Calibration

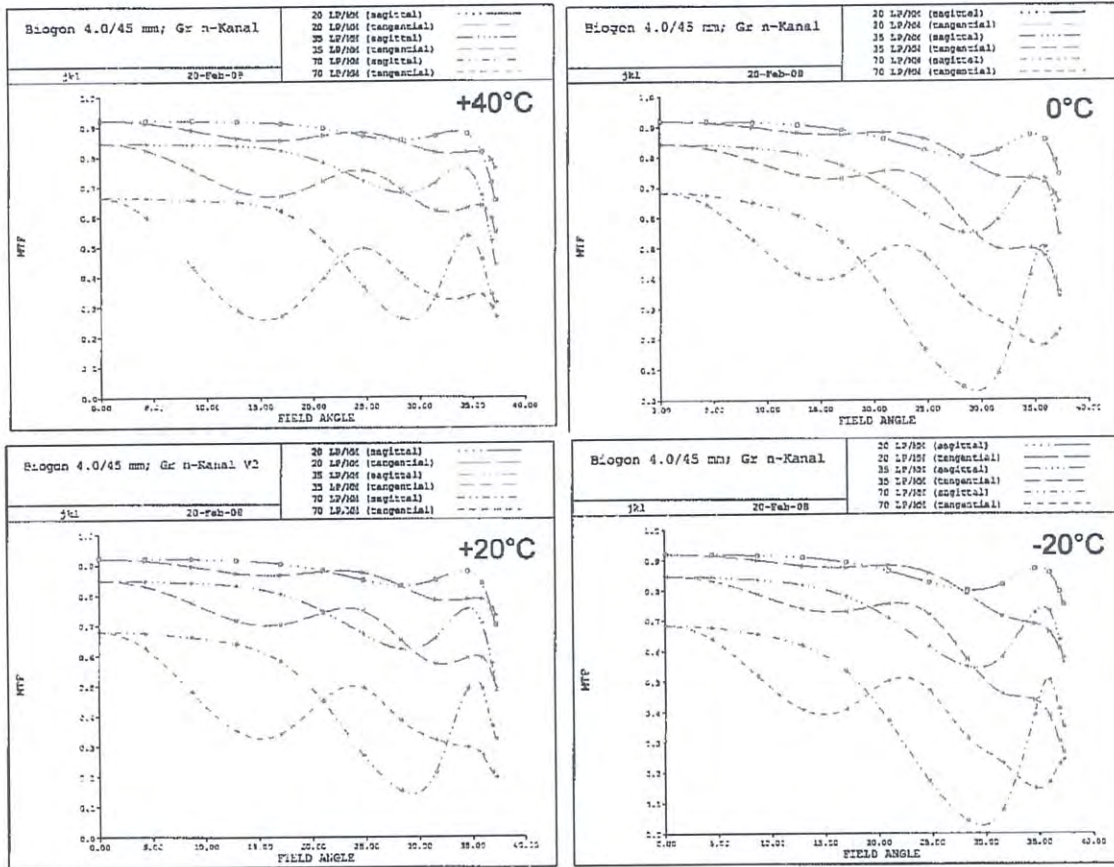
Protocol

123	2835	11538		
124	1975	11570		
125	1976	11570		
126	1977	11570		
127	1976	11571		
128	1977	11571		
129	1978	11571		
130	1976	11572		
131	1977	11572		
132	1978	11572		
133	1976	11573		
134	1977	11573		
135	1978	11573		
136	8826	12453		
137	8826	12454		
138	8830	12454		
139	410	12878		
140	1819	13141		
141	1818	13142		
142	1819	13142		
143	9446	13740		
144	4286	13754		
145	3331	13756		
146	3332	13756		
147	2509	14121		
148	1795	14244		
149	5095	14322		
150	5096	14322		
151	5094	14323		
152	5097	14323		
153	5096	14325		
154	14128	14437		
155	3572	14614		
156	3572	14615		
157	8110	14626		
158	8110	14627		
159	8110	14628		
160	369	15151		
161	370	15151		
162	371	15151		
163	372	15151		
164	373	15151		
165	373	15152		
166	9734	15159		
167	7786	15228		
168	7376	15966		
169	7375	15967		
170	7375	15968		
171	7377	15968		
172	2230	16351		
173	2230	16352		
174	11610	16409		
175	14335	16646		
176	3126	16681		
177	3127	16681		
178	1511	16899		
179	6662	16907		
Defect Column	RowStart	ColumnStart	RowEnd	ColumnEnd
0	0	10768	7328	10768
1	0	12350	7327	12350
2	11091	16887	11105	16887

Optical System

Modulation Transfer Function, MTF of Green camera

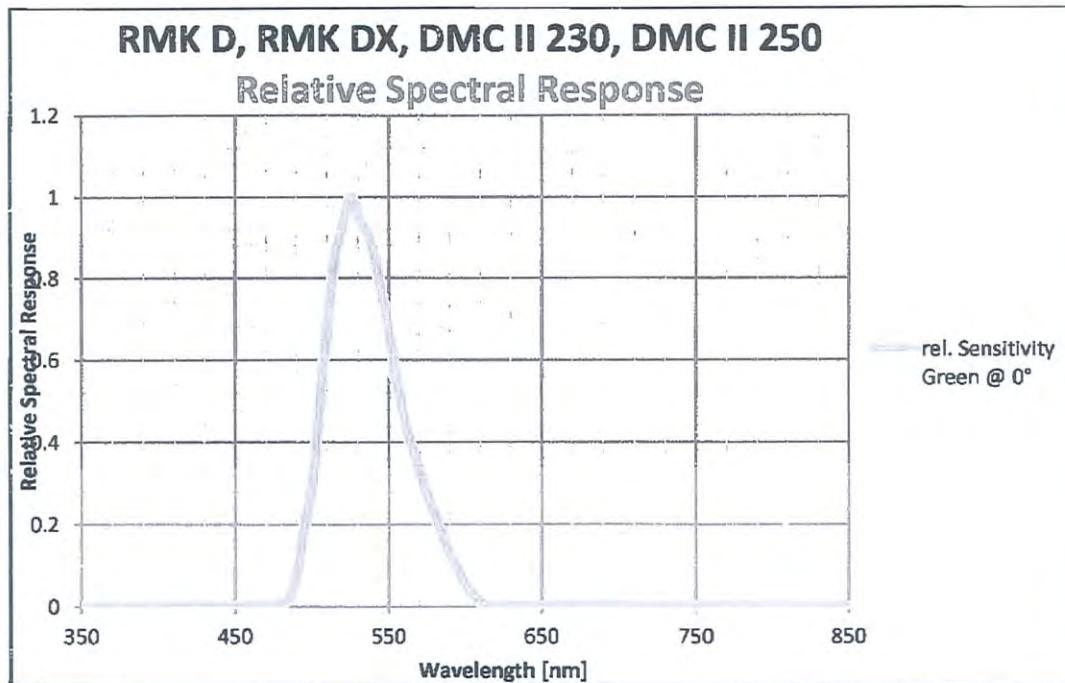
RMK D / RMK DX / DMC II MS Green – MTF F/4.0 ; 45 mm– Temperature Stability



Radiometric Calibration

Sensitivity of Green camera

Spectral response curve of the single camera head.

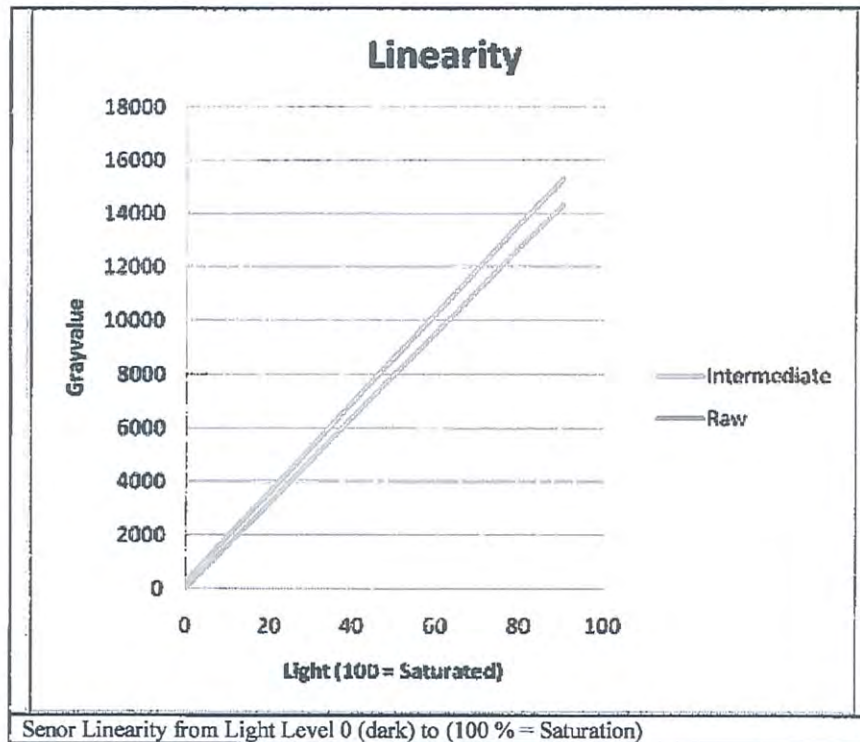


The sensitivity shows the spectral response curve of the single camera head including the optical system (optics, filter) and the sensor response. The DMC IIe 250 is calibrated with respect to the absolute spectrometer. This allows computing pixel radiance values from pixels digital numbers and is a camera type specific calibration.

Radiometric Calibration

Sensor Linearity (Reference)

The sensor linearity is measured in the Lab with calibrated spectrometer. This is a camera type specific calibration. Below figure shows the linearity of the raw sensor and after flat fielding:

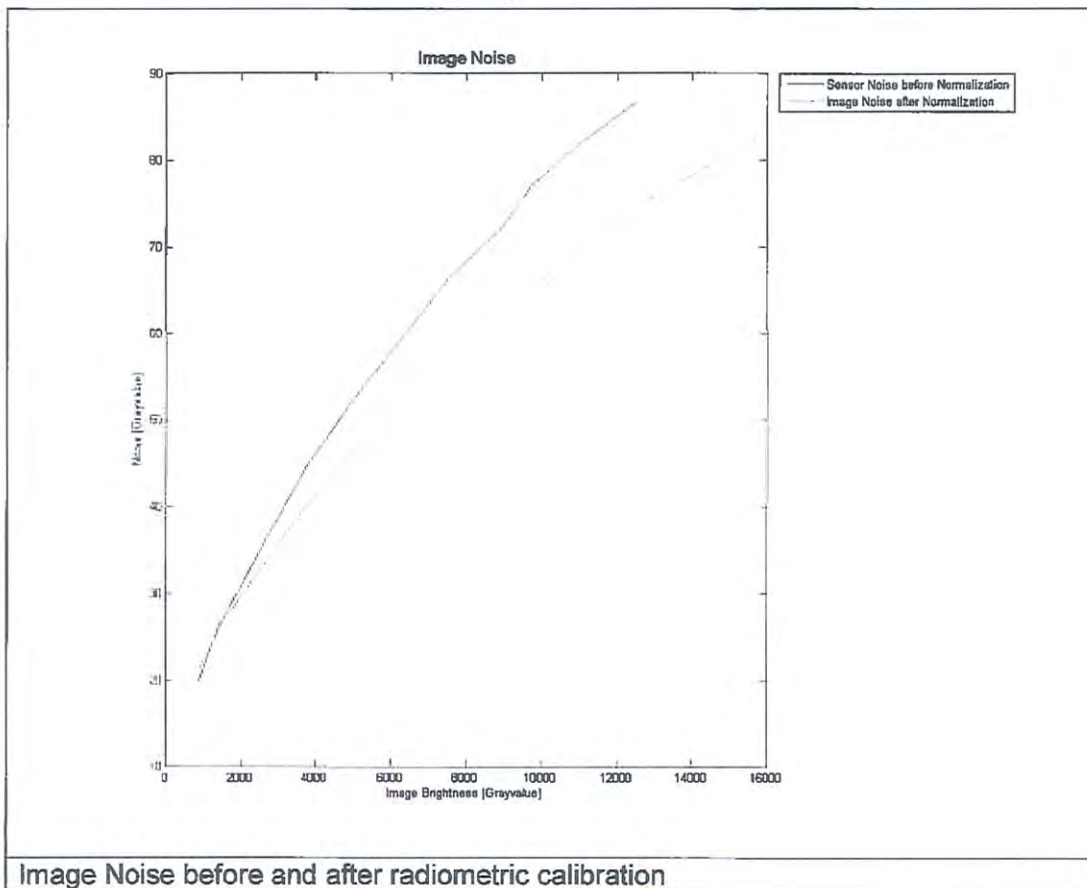


The deviation from the linearity is below 1%.

Radiometric Calibration

Sensor Noise (Reference)

Sensor noise shows image noise with respect to the image center measured at an aperture of 8 with exposure time of 22msec. Sensor noise after calibration shall be less or equal 0.5% of radiometric resolution. At 14bit radiometric resolution 0.5% (of 16384) is equal to 82 gray values. This is a camera type specific calibration.

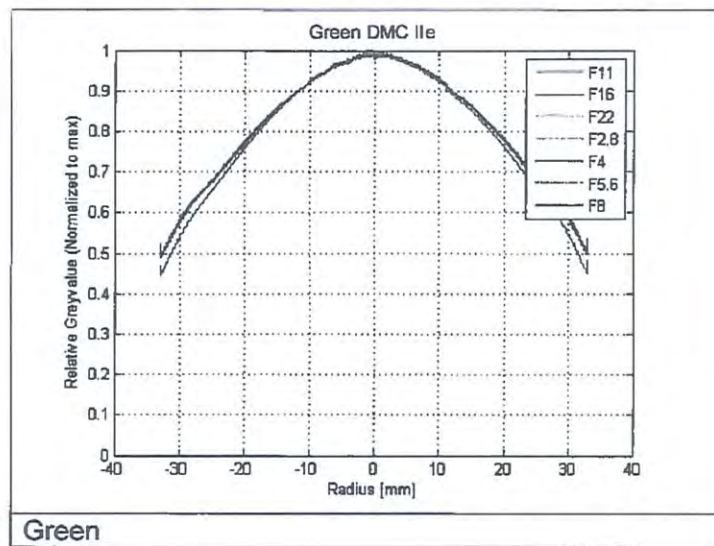


Radiometric Calibration

Aperture Correction

Green (00124731)

The light fall off to the border due the influence of the optics depends on the aperture used. Therefore this calibration approach delivers individual calibration images for each aperture (Full F-Stop). In general the light fall off is a function of the image height (radial distance from center). The figure below shows the profile from the upper left corner to the lower right corner of the calibration images.



This is a camera type specific calibration.

Radiometric Calibration

Defect Pixel

Green (00124731)

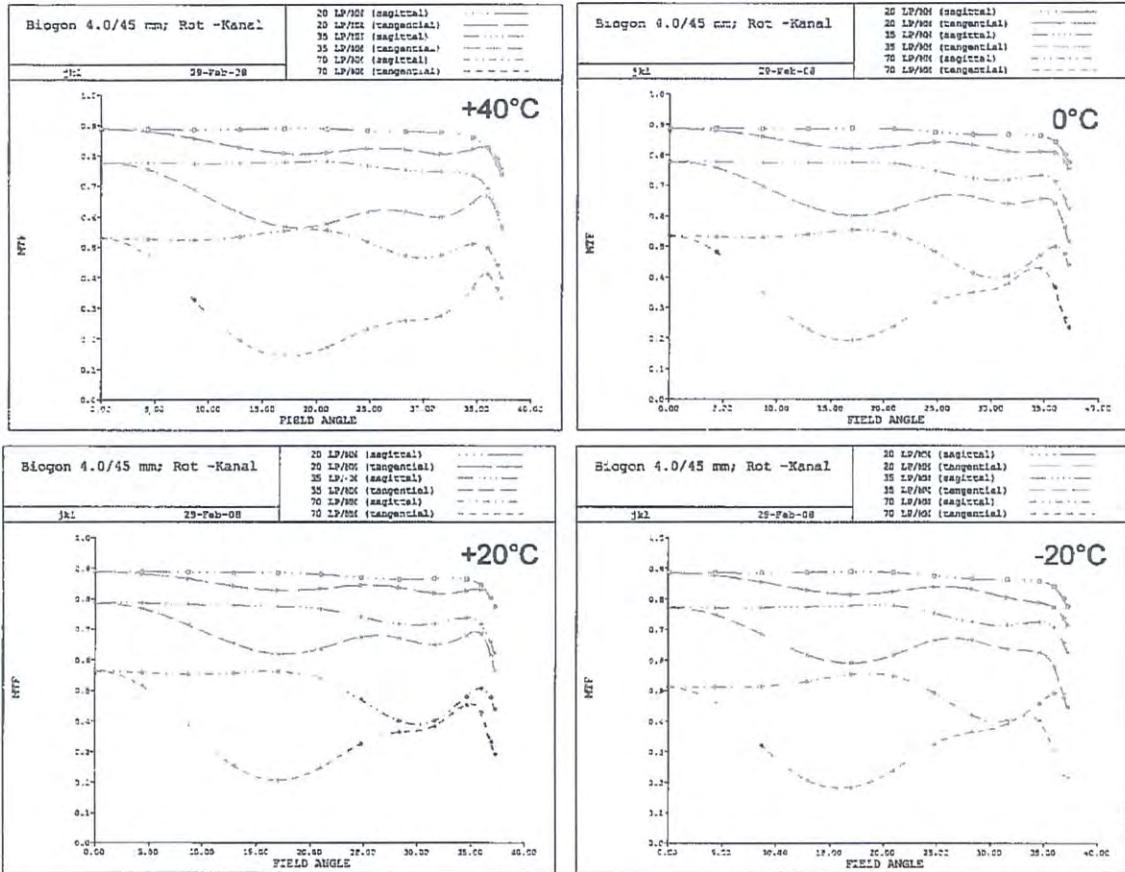
Defect pixels are detected during radiometric calibration and will be corrected during radiometric processing of the images. The quantity and cumulative percentage and specification of defects is described in Appendix "Defect Pixel Recognition".

Revision of calibration:	131073			
CCDRevision:	1			
Date Number:	1410352402			
Date:	140910			
Number of defect pixels:	5			
Number of defect clusters:	0			
Number of defect columns:	0			
Nr	Row	Column		
0	6510	119		
1	4970	1551		
2	6155	3504		
3	6615	3759		
4	6543	5641		
Defect Column	RowStart	ColumnStart	RowEnd	ColumnEnd

Optical System

Modulation Transfer Function, MTF of Red camera

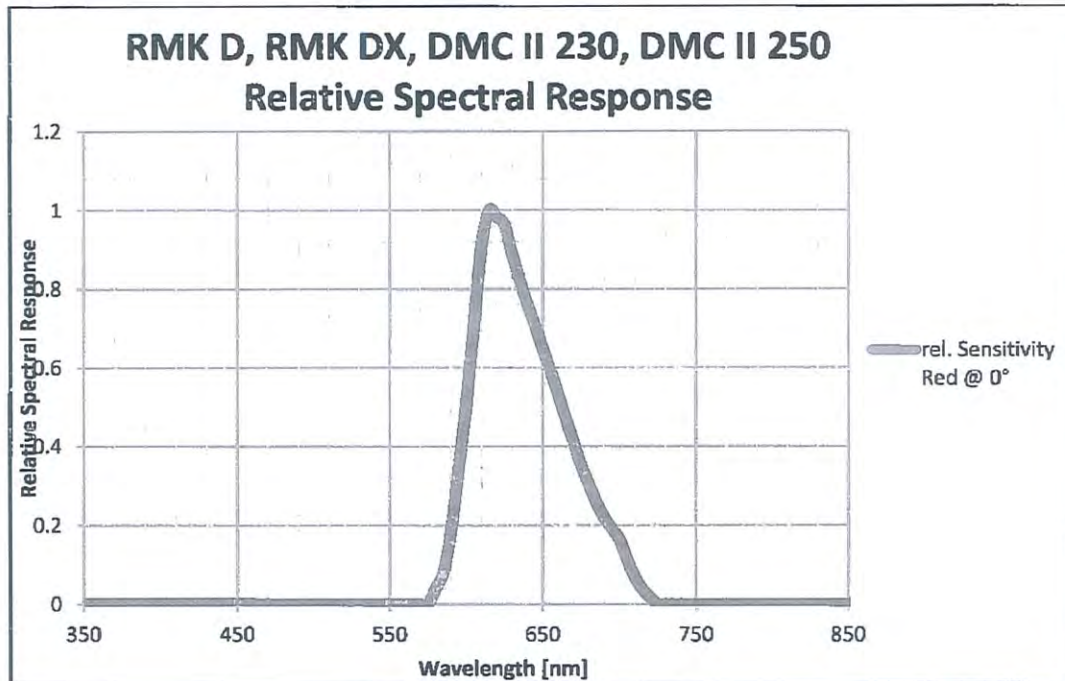
RMK D / RMK DX / DMC II MS Red – MTF F/4.0 ; 45 mm– Temperature Stability



Radiometric Calibration

Sensitivity of Red camera

Spectral Response Curves of the single camera head.



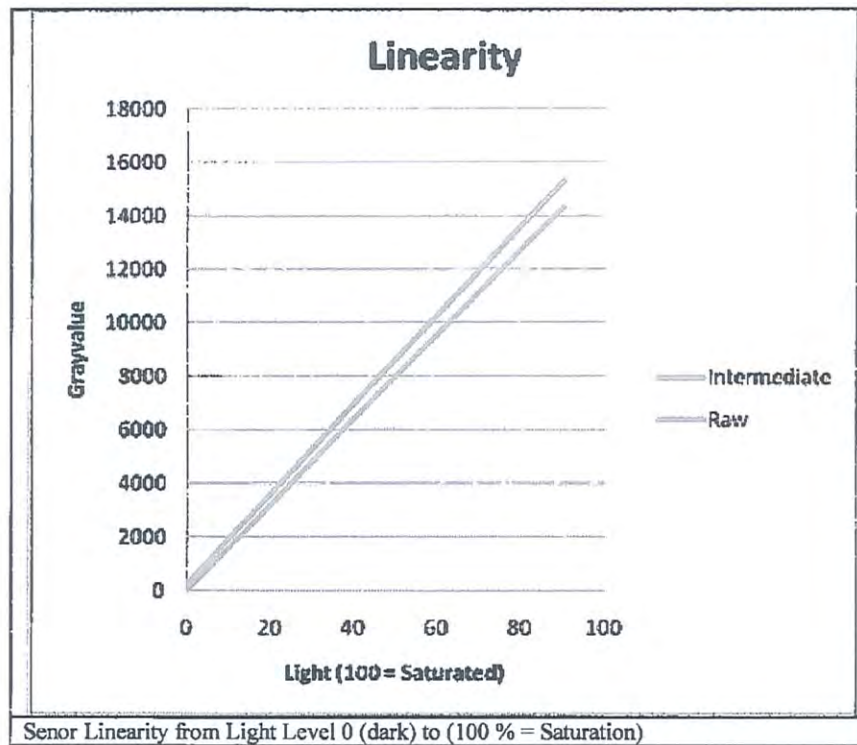
The sensitivity shows the spectral response curve of the single camera head including the optical system (optics, filter) and the sensor response. The DMC IIe 250 is calibrated with respect to the absolute spectrometer. This allows computing pixel radiance values from pixels digital numbers and is a camera type specific calibration.

Radiometric Calibration

Sensor Linearity (Reference)

The sensor linearity is measured in the Lab with calibrated spectrometer. This is a camera type specific calibration.

Below figure shows the linearity of the raw sensor and after flat fielding:



The deviation from the linearity is below 1%.

Radiometric Calibration

Sensor Noise (Reference)

Sensor noise shows image noise with respect to the image center measured at an aperture of 8 with exposure time of 22msec. Sensor noise after calibration shall be less or equal 0.5% of radiometric resolution. At 14bit radiometric resolution 0.5% (of 16384) is equal to 82 gray values. This is a camera type specific calibration.

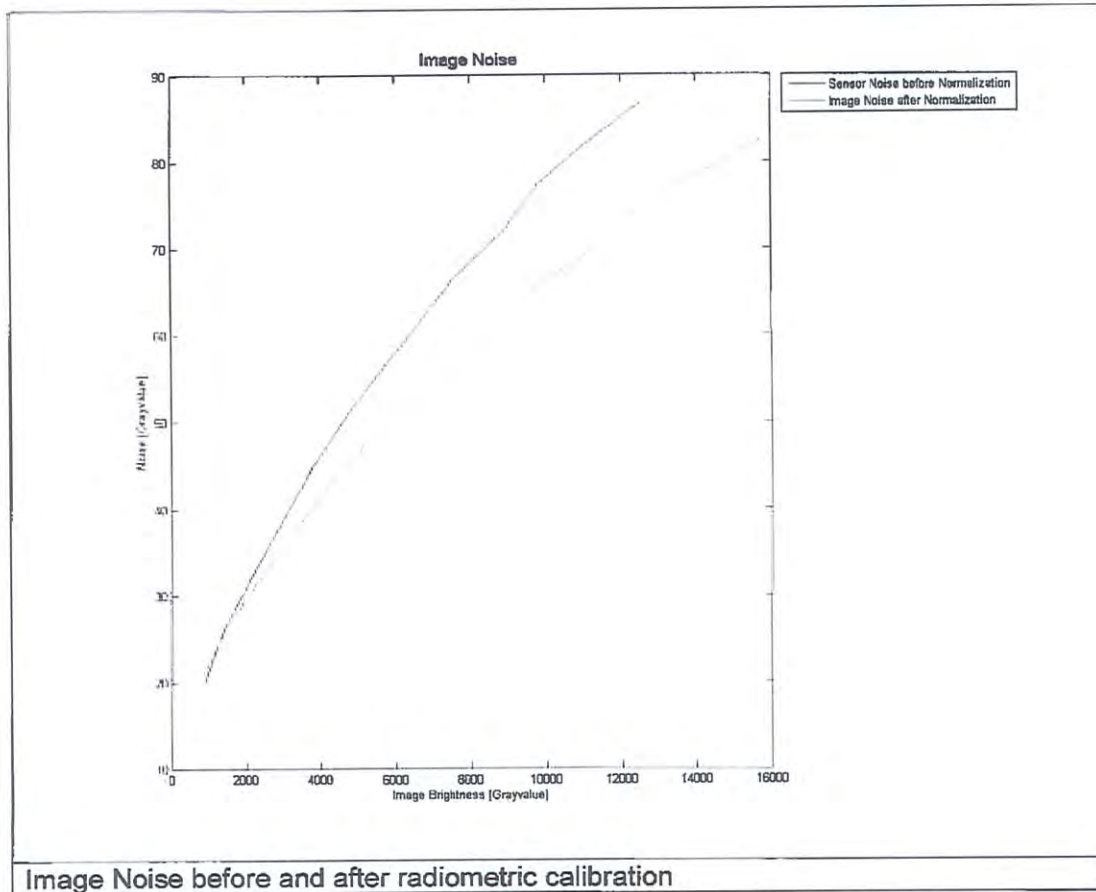


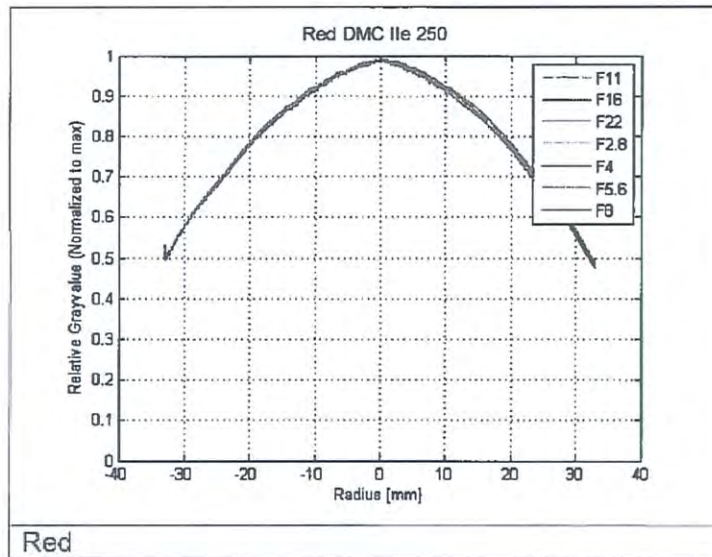
Image Noise before and after radiometric calibration

Radiometric Calibration

Aperture Correction

Red (00124675)

The light fall off to the border due the influence of the optics depends on the used aperture. Therefore this calibration approach has for each aperture (Full F-Stop) its own calibration image. In general the light fall off is a function of the image radius. In this calibration approach instead of function the real measured values in the image is used. The figure below shows the profile from the upper left corner to the lower right corner of each of this calibration images to give a feeling on the amount of correction.



This is a camera type specific calibration.

Radiometric Calibration

Defect Pixel

Red (00124675)

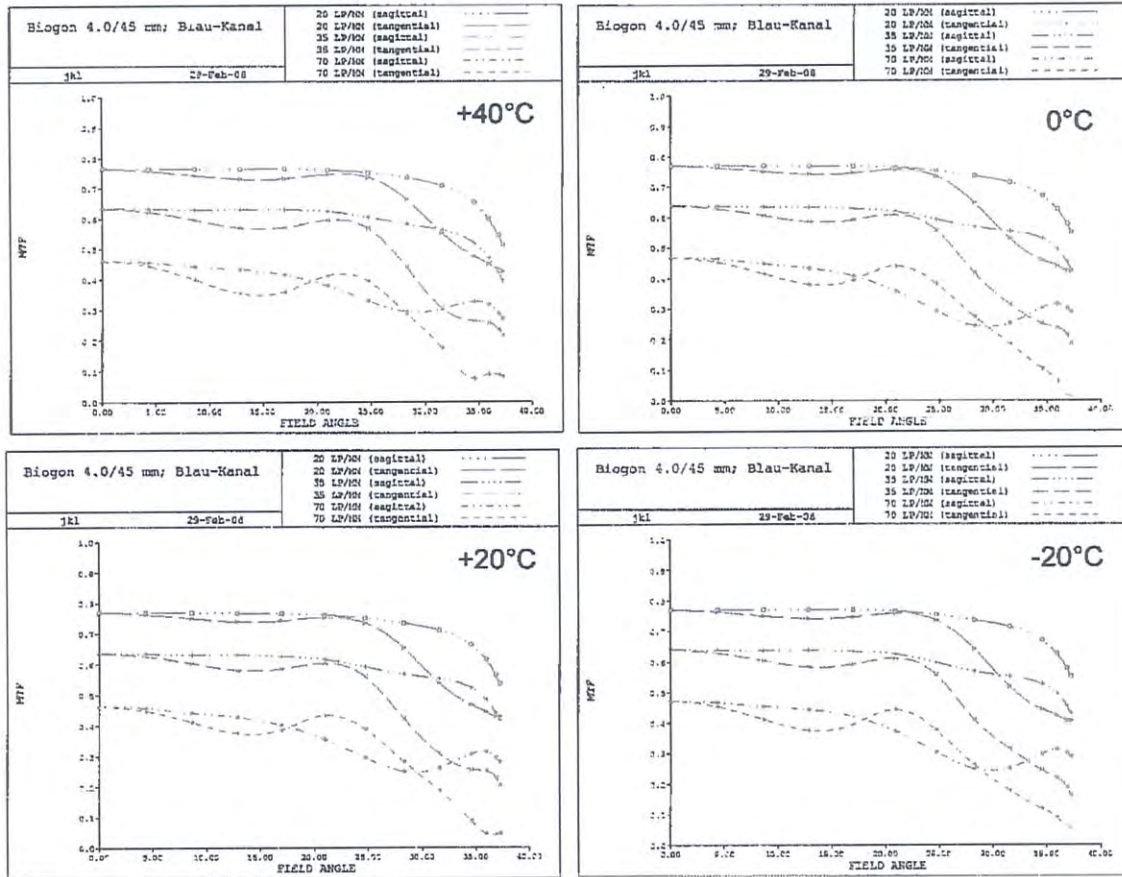
Defect pixels are detected during radiometric calibration and will be corrected during radiometric processing of the images. The quantity and cumulative percentage and specification of defects is described in Appendix "Defect Pixel Recognition".

Revision of calibration:	131073				
CCDRevision:	1				
Date Number:		1411477244			
Date:		140923			
Number of defect pixels:	6				
Number of defect clusters:	0				
Number of defect columns:	2				
Nr	Row	Column			
0	3308	6495			
1	3307	3739			
2	533	3737			
3	5747	6611			
4	5744	5748			
5	6612	5744			
Defect Column	RowStart	ColumnStart	RowEnd	ColumnEnd	
0	6588	5744	6631	5744	
1	6509	4415	6536	4415	

Optical System

Modulation Transfer Function, MTF of Blue camera

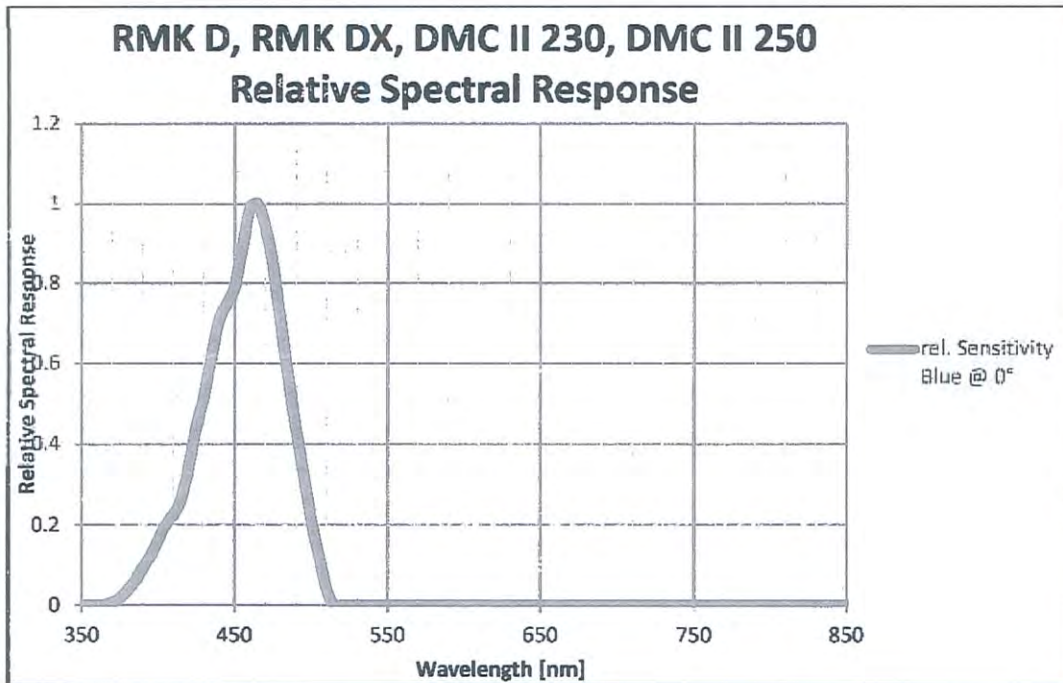
RMK D / RMK DX / DMC II MS Blue – MTF F/4.0 ; 45 mm– Temperature Stability



Radiometric Calibration

Sensitivity of Blue camera

Spectral Response Curves of the single camera head.



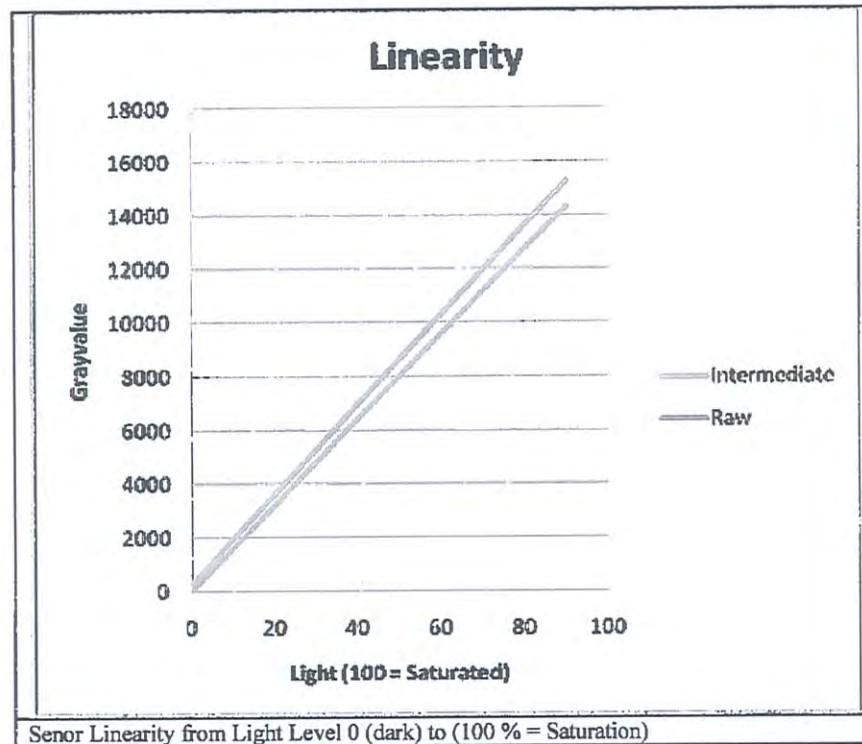
The sensitivity shows the spectral response curve of the single camera head including the optical system (optics, filter) and the sensor response. The DMC IIe 250 is calibrated with respect to the absolute spectrometer. This allows computing pixel radiance values from pixels digital numbers and is a camera type specific calibration.

Radiometric Calibration

Sensor Linearity (Reference)

The sensor linearity is measured in the Lab with calibrated spectrometer. This is a camera type specific calibration.

Below figure shows the linearity of the raw sensor and after flat fielding:



The deviation from the linearity is below 1%.

Radiometric Calibration

Sensor Noise (Reference)

Sensor noise shows image noise with respect to the image center measured at an aperture of 8 with exposure time of 22msec. Sensor noise after calibration shall be less or equal 0.5% of radiometric resolution. At 14bit radiometric resolution 0.5% (of 16384) is equal to 82 gray values. This is a camera type specific calibration.

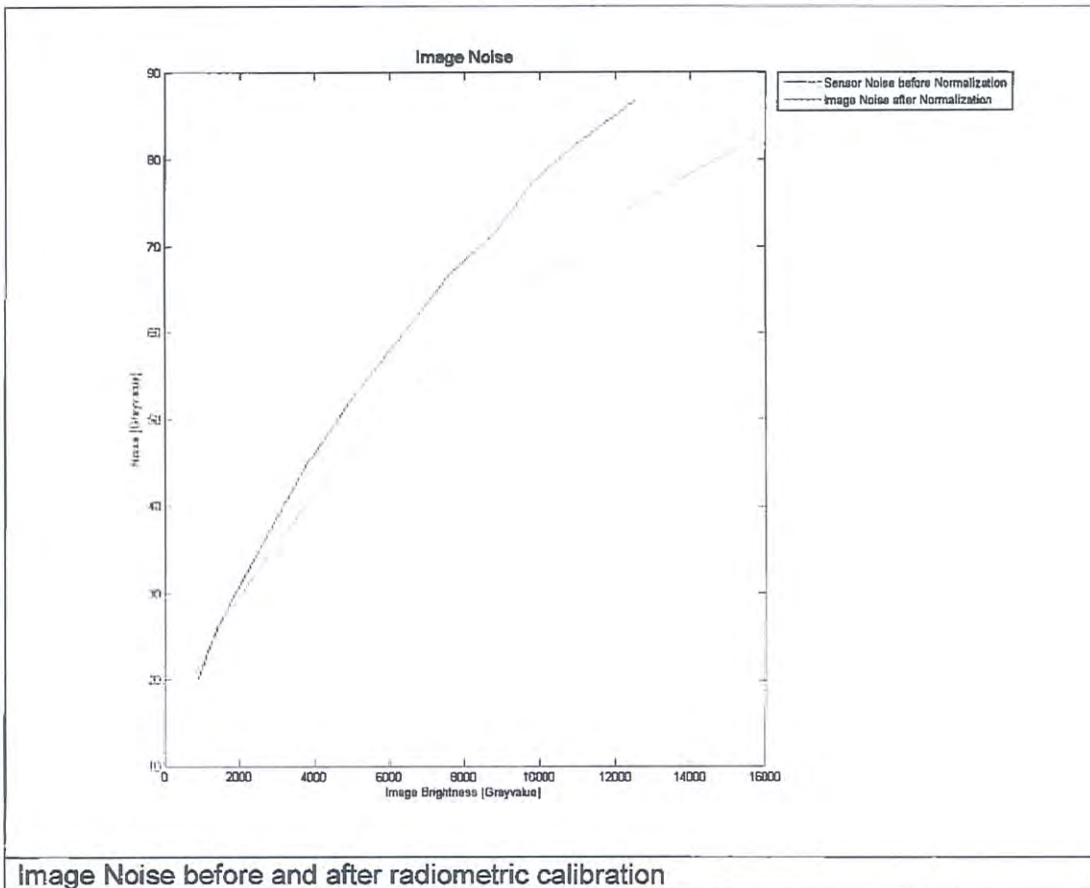


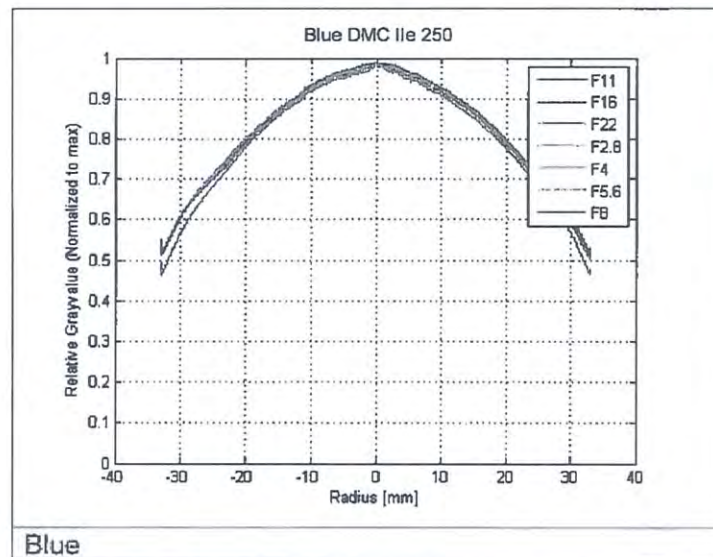
Image Noise before and after radiometric calibration

Radiometric Calibration

Aperture Correction

Blue (00124750)

The light fall off to the border due the influence of the optics depends on the used aperture. Therefore this calibration approach has for each aperture (Full F-Stop) its own calibration image. In general the light fall off is a function of the image radius. In this calibration approach instead of function the real measured values in the image is used. The figure below shows the profile from the upper left corner to the lower right corner of each of this calibration images to give a feeling on the amount of correction.



This is a camera type specific calibration.

Radiometric Calibration

Defect Pixel

Blue (00124750)

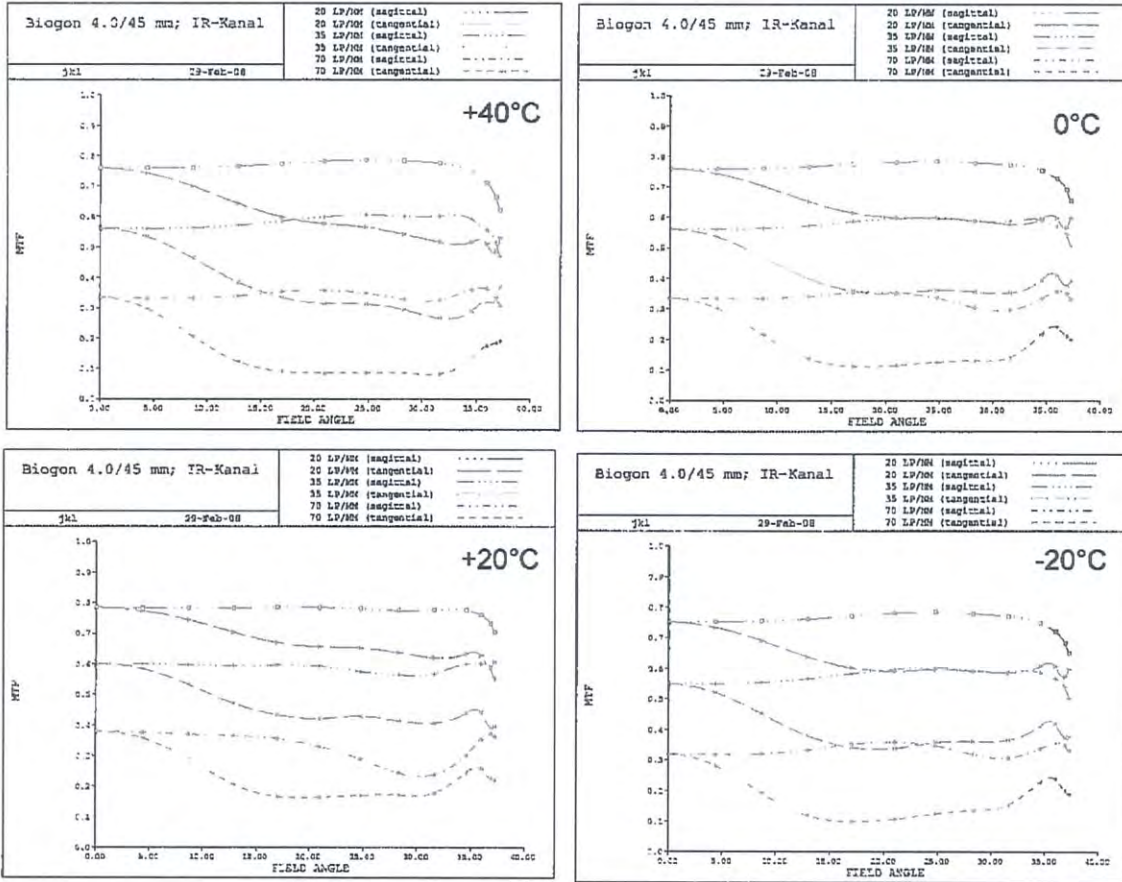
Defect pixels are detected during radiometric calibration and will be corrected during radiometric processing of the images. The quantity and cumulative percentage and specification of defects is described in Appendix "Defect Pixel Recognition".

Revision of calibration:	131073			
CCDRevision:	1			
Date Number:	1410278960			
Date:	140909			
Number of defect pixels:	1			
Number of defect clusters:	0			
Number of defect columns:	0			
Nr	Row	Column		
0	1878	1675		
Defect Column	RowStart	ColumnStart	RowEnd	ColumnEnd

Optical System

Modulation Transfer Function, MTF of IR camera

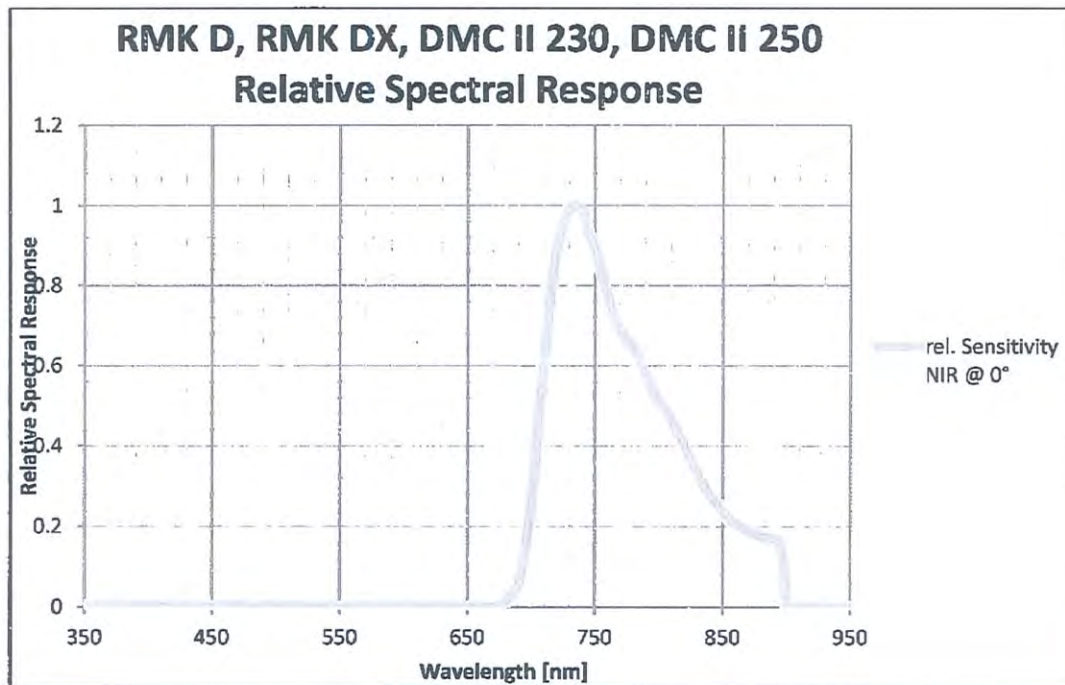
RMK D / RMK DX / DMC II MS IR – MTF F/4.0 ; 45 mm– Temperature Stability



Radiometric Calibration

Sensitivity of NIR camera

Spectral Response Curves of the single camera head.



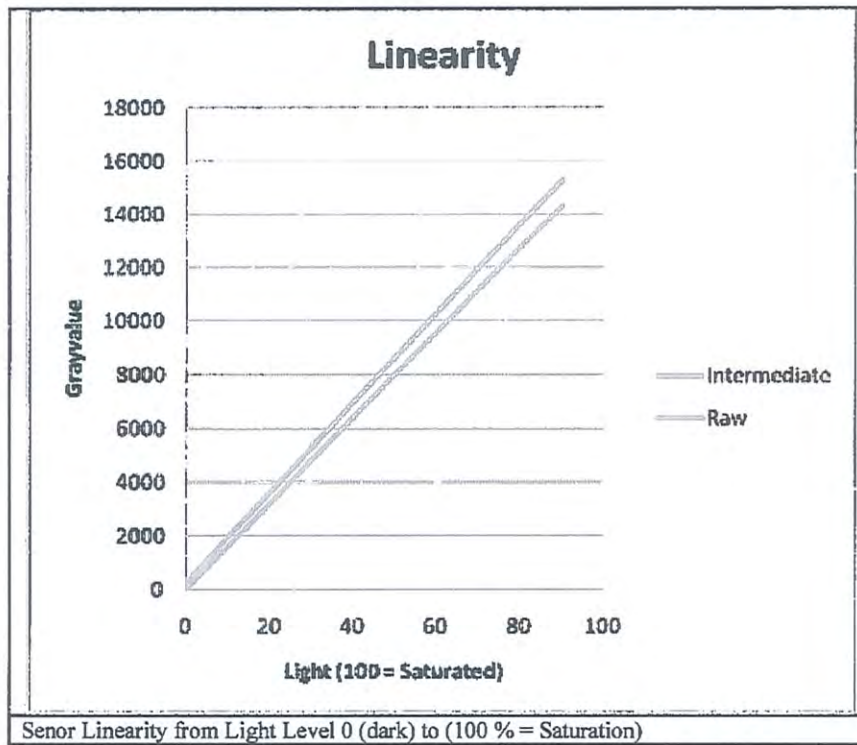
The sensitivity shows the spectral response curve of the single camera head including the optical system (optics, filter) and the sensor response. The DMC IIe 250 is calibrated with respect to the absolute spectrometer. This allows computing pixel radiance values from pixels digital numbers and is a camera type specific calibration.

Radiometric Calibration

Sensor Linearity (Reference)

The sensor linearity is measured in the Lab with calibrated spectrometer. This is a camera type specific calibration.

Below figure shows the linearity of the raw sensor and after flat fielding:

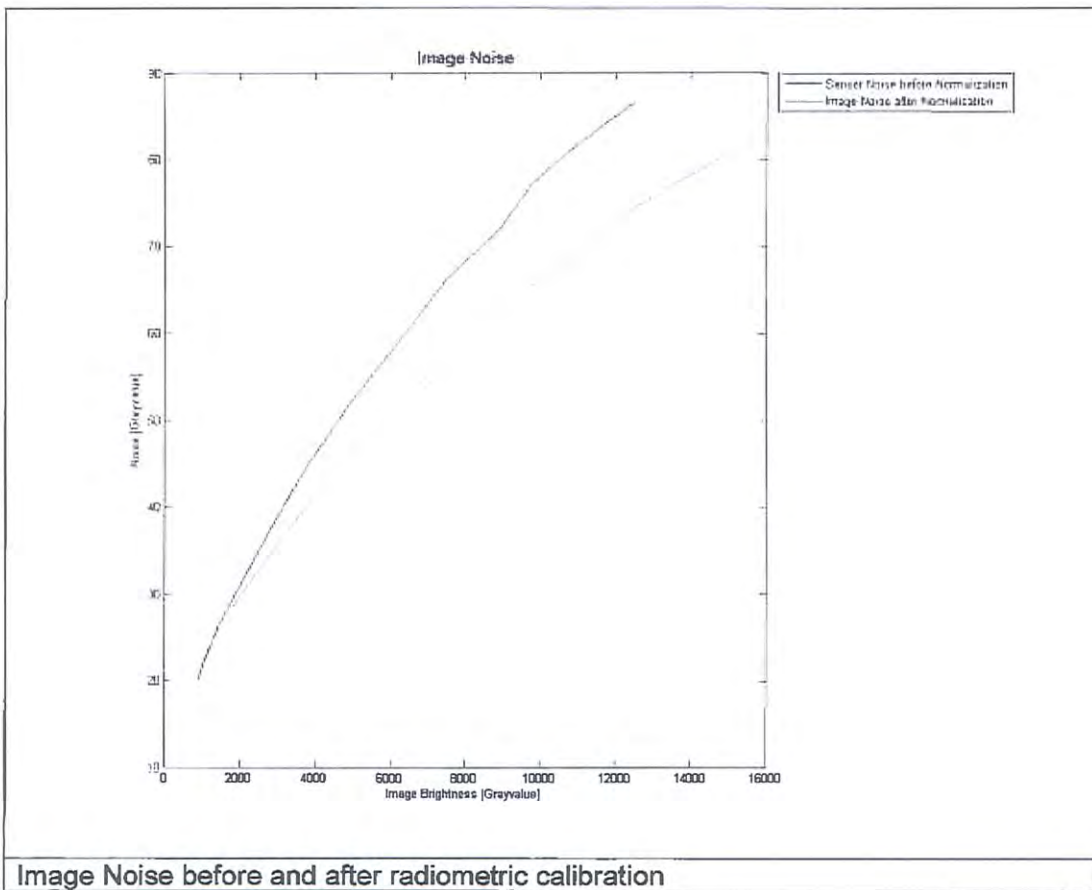


The deviation from the linearity is below 1%.

Radiometric Calibration

Sensor Noise (Reference)

Sensor noise shows image noise with respect to the image center measured at an aperture of 8 with exposure time of 22msec. Sensor noise after calibration shall be less or equal 0.5% of radiometric resolution. At 14bit radiometric resolution 0.5% (of 16384) is equal to 82 gray values. This is a camera type specific calibration.

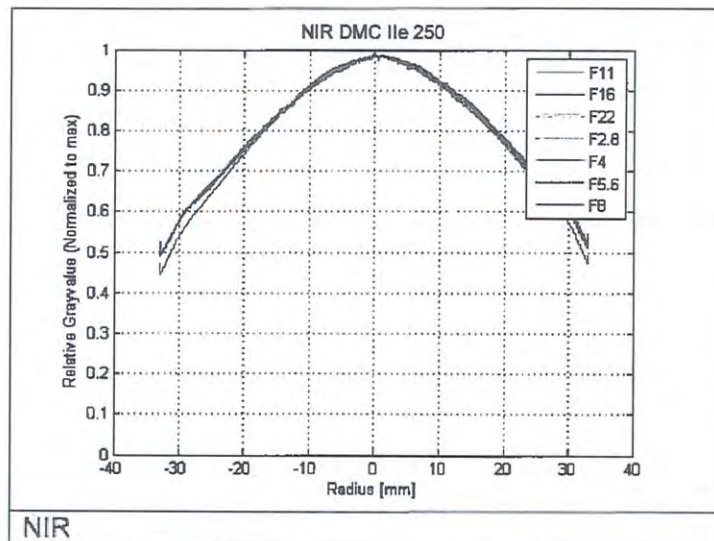


Radiometric Calibration

Aperture Correction

NIR (00124702)

The light fall off to the border due the influence of the optics depends on the used aperture. Therefore this calibration approach has for each aperture (Full F-Stop) its own calibration image. In general the light fall off is a function of the image radius. In this calibration approach instead of function the real measured values in the image is used. The figure below shows the profile from the upper left corner to the lower right corner of each of this calibration images to give a feeling on the amount of correction.



This is a camera type specific calibration.

Radiometric Calibration

Defect Pixel

NIR (00124702)

Defect pixels are detected during radiometric calibration and will be corrected during radiometric processing of the images. The quantity and cumulative percentage and specification of defects is described in Appendix "Defect Pixel Recognition".

Revision of calibration:	131073			
CCDRevision:	1			
Date Number:	1410279515			
Date:	140909			
Number of defect pixels:	0			
Number of defect clusters:	0			
Number of defect columns:	0			
Nr	Row	Column		
Defect Column	RowStart	ColumnStart	RowEnd	ColumnEnd

Sensor Geometric Accuracy

Large area CCD imagers are composed (stitched) from several blocks. Stitching on wafer with semiconductor lithographic equipment results in geometric accuracy better than $0.1\mu\text{m}$ (Stoldt, H. (2010)).

Therefore the geometric accuracy of individual pixels within a block can be assumed as better or equal the stitching accuracy.

Defect Pixel Recognition

The table below shows the maximal allowed physical defects on the CCD Sensor and its definitions.

Description		CCD Spec
Pixel	Bright image	Pixel whose signal, at nominal light (illumination at 50% of the linear range), deviates more than $\pm 30\%$ from its neighboring pixels.
	Dark image	Pixel whose signal, in dark, deviates more than 6mV from its neighboring pixels (about 1% of nominal light).
	Max Count	PAN \leq 3500 MS $<$ 500

Description		CCD Spec
Column	Definition	A column which has more than 8 pixel defects in 1 1x 12 kernel Column defects must be horizontally separated by 5 columns for single line defects and 10 for double line defects
	Recognition (bright and dark)	Same as defect pixel recognition
	Max Single column	PAN \leq 140 MS \leq 20
	Max double Column	PAN \leq 40 MS \leq 6

The Post-Processing-Software is correcting following pixel and columns:

PPS Correction	
Pixel	Pixel whose gray value in a 16 x16 kernel differs from the median more than 30%

PPS Correction	
Column	Pixel whose gray value in a 16 x16 kernel differs from the median more than 5% and more than 15 defects in one column

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