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Header

List View

General Information | Contact | Default Values | Discount | Document Information

Procurement Folder: 133232

SO Doc Code: CRFQ

Procurement Type: Central Master Agreement

SO Dept: 0313

Vendor ID:

SO Doc ID: DEP1600000017

Legal Name: THRASHER GROUP INC

Published Date: 10/5/15

Alias/DBA:

Close Date: 10/29/15

Total Bid: \$751,375.00

Close Time: 13:30

Response Date:

Status: Closed

Response Time:

Solicitation Description:

Total of Header Attachments: 0

Total of All Attachments: 0



State of West Virginia Solicitation Response

Solicitation Description : Addendum 01: Mapping Services in Northern West Virginia

Proc Type : Central Master Agreement

Date issued	Solicitation Closes	Solicitation No	Version
	2015-10-29 13:30:00	SR 0313 ESR10281500000001803	1

VENDOR

000000204789

THRASHER GROUP 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	\$110.000000	\$66,000.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :	Control Surveying

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
2	Topographic, Planimetric and Check Surveying	1800.00000	HOUR	\$110.000000	\$198,000.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :	Topographic, Planimetric and Check Surveying

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
3	Terrestrial LIDAR Collection	600.00000	HOUR	\$150.000000	\$90,000.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :	Terrestrial LIDAR Collection

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
5	Topographic Mapping - Aerial Photography (0-25 Acres)	15.00000	ACRE	\$600.000000	\$9,000.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :	(including LIDAR Collections)
	List only one rate for each category.

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
6	Topographic Mapping - Aerial Photography (25-50 Acres)	30.00000	ACRE	\$300.000000	\$9,000.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :	(including LIDAR Collections) List only one rate for each category.
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Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
7	Topographic Mapping - Aerial Photography (50-100 Acres)	75.00000	ACRE	\$150.000000	\$11,250.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :	(including LIDAR Collections) List only one rate for each category.
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Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
8	Topographic Mapping - Aerial Photography (Over 100 Acres)	125.00000	ACRE	\$125.000000	\$15,625.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :	(including LIDAR Collections) List only one rate for each category.
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Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
9	Licensed Land Surveyor	600.00000	HOUR	\$125.000000	\$75,000.00

Comm Code	Manufacturer	Specification	Model #
81151601			

Extended Description :	Professional Rates (Listed Disciplines Only)
------------------------	--

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
10	Survey Manager	1200.00000	HOUR	\$95.000000	\$114,000.00

Comm Code	Manufacturer	Specification	Model #
81151601			
Extended Description :	Professional Rates (Listed Disciplines Only)		

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
11	Mapping/CAD Technician	2400.00000	HOUR	\$65.000000	\$156,000.00

Comm Code	Manufacturer	Specification	Model #
81151601			
Extended Description :	Professional Rates (Listed Disciplines Only)		

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
12	Travel Per Diem (Rate/Person)Day)	125.00000	EA	\$60.000000	\$7,500.00

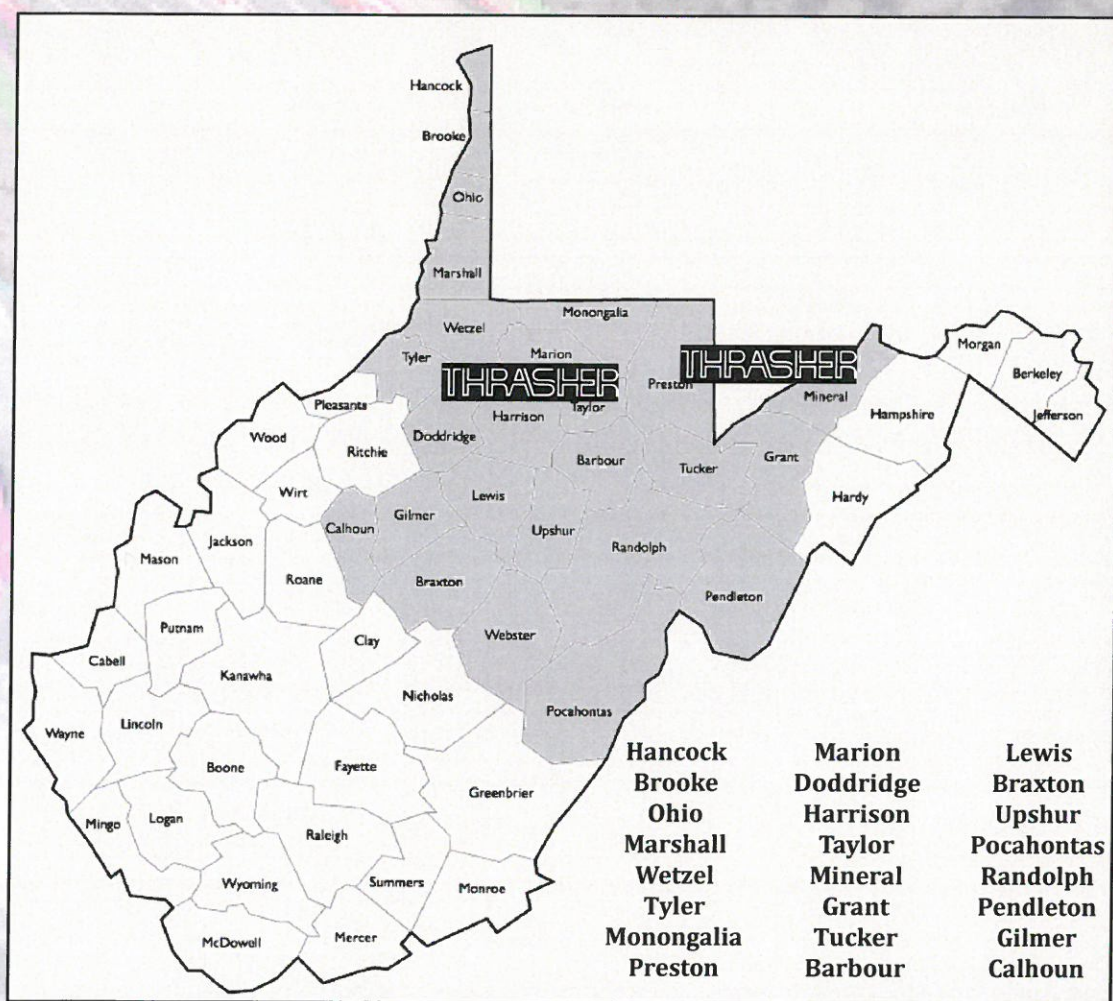
Comm Code	Manufacturer	Specification	Model #
81151601			
Extended Description :	Applicable to Survey Crews Only		

EXPRESSION OF INTEREST

Mapping Services for Northern West Virginia

DEP 16000000017

October 29, 2015



THRASHER

**600 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
www.thrashereng.com**

October 29, 2015

Department of Administration, Purchasing Division
2019 Washington Street East
Charleston, WV 25305-0130

RE: DEP 16000000017

Dear Members of the Selection Committee:

For decades, Thrasher has worked on projects involving the West Virginia Department of Environmental Protection. As West Virginia's largest privately owned engineering firm, we specialize in multidisciplinary engineering services, including survey and mapping services.

We employ one of the largest survey departments in the Mid-Atlantic region and offer a wide range of land surveying and related services for federal, state, and private clients. We are committed to evolving our techniques and equipment to best serve our clients and their growing needs. Thrasher's experience with survey has evolved into mapping focusing on our ability to analyze, process, and visualize information to assist in solving problems and making sound business decisions. The team at Thrasher utilizes commercially available software as well as develop custom GIS software to provide workable tools that are user friendly for resolving everyday issues.

Thrasher has first hand experience in working with a variety of clients to provide the survey and mapping needed to successfully complete projects. We understand the impact survey and mapping has on DEP AML projects, as we have completed dozens of mine reclamation projects across West Virginia.

Thrasher looks forward to the opportunity to interview for this very important task and continuing our working relationship with the DEP for the benefit of AML projects.

Sincerely,



CHADWICK D. BILLER, PE

Partner, Principal-in-Charge

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- Survey Manager
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- Travel Per Diem ((Rate/Person) Day)

Thrasher's Response to Southern Mapping

- Background
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- Equipment

Certified Signature Page

Addendum Acknowledgment Form

THRASHER'S BACKGROUND

Thrasher is a privately owned engineering firm that specializes in multidisciplinary engineering services. Established in 1983, Thrasher is built on stable leadership, financial strength and reputation. Our dedication to creative design solutions, well-managed projects and customer service has made Thrasher West Virginia's largest privately owned engineering firm and an industry leader in the Mid-Atlantic region.

Since our formation, the company has grown to a firm of more than 350 employees. Our diverse staff has the resources to handle many projects, both large and small, simultaneously. Our client base is diverse and includes municipalities, state and federal government agencies, secondary and higher education, public and private entities, etc.

Principals:

H. Wood "Woody" Thrasher, PE
Kenneth P. Moran, PE, PS
Chad M. Riley, PE
Daniel E. Ferrell, PE
Wm. Randy Watson, PE
Clay P. Riley, PE
Jonathan Carpenter, PE
Chadwick D. Biller, PE
Craig Baker, Associate AIA
Robert R. Milne, PE
Ron Stanley, CPA
Jenelle Armstrong, PE
Matt Fluharty, PE

Our Locations:

Bridgeport, West Virginia
Charleston, West Virginia
Beckley, West Virginia
Oakland, Maryland
Canton, Ohio
Fredericksburg, Virginia
Canonsburg, Pennsylvania

Multi-Disciplinary Services:

Civil Engineering
Utility Services
Land and Site Development
Roadways
Bridges
Streetscapes
Airports
Storm Water Systems
Environmental Services
Architecture
Land Planning
Landscape Architecture
Construction Monitoring
Materials Testing
Pipeline Inspection
GIS Mapping

RELATED SERVICES

SURVEY

Thrasher employs one of the largest survey departments in the Mid-Atlantic region and offers a wide range of land surveying and related services for federal, state, and private clients. We are committed to evolving our techniques and equipment to best serve our clients and their growing needs.

At Thrasher, we are able to provide both surveying and engineering services which provide a distinct advantage over survey-only companies. The combination of these two services provide our surveyors with a better understanding of what engineers and architects require to develop an appropriate design for different types of projects. Our field and survey personnel offer extensive experience, certified training, and flexibility to meet our clients' unique project schedules.

GENERAL SURVEY SERVICES:

- Large-scale Boundary Work
- Topographic Survey and Mapping
- ALTA/ACSM Survey and Mapping
- Lake and River Soundings
- Accident Reconstruction Survey and Mapping
- Drug-free Zone Mapping
- Expert Witness Testimony
- Construction Layout
- Permanent Project GPS Base Stations
- Building Control and Layout
- Road/Bridge Alignment and Staking
- Sewer/Water/Pipeline
- Site Layout
- Quality Assurance Surveying
- Volume/Quantity Surveys
- As-Built Surveys

GPS SURVEYS:

- Geodetic Control Networks
- Ground Control for Aerial Mapping
- Telecommunications
- FAA 1A and 2C Letters

ROUTE LOCATION SURVEYS:

- Transmission Lines
- Natural Gas Pipelines
- Wind Turbine
- Roadway, Railway and Rec Trails

COAL AND ENERGY SURVEYS:

- Pre and Post Mining Blast Surveys
- Water Quality Monitoring Plan
- Construction Layout
- Emergency Control Survey/Plans



RELATED EXPERIENCE

Thrasher has worked with the Department of Environmental Protection to successfully complete the following AML projects. Thrasher is aware of the importance of accurate survey and mapping that is needed to get these projects to engineering design.

Roaring Creek

- Portals, Subsidence Depressions, Dewatering of Farm pond into subsided areas

Anglins Run

- Portals and AMD

Squire's Creek

- Portals, Highwall, AMD and Refuse

Overfield (Lafferty)

- Clogged Stream, Portal and Landslide

Clarksburg (Lyons) Landslide

- 2 acre Landslide

Lauren Run #1

- Portals, Highwall and AMD

Pleasant Valley (Brown)

- Portals, Highwall and AMD

Roger Camp Hill

- 1/2 Acre AMD Impoundment and Refuse

Stowe (Prince) Landslide

- Emergency Landslide

Owl Creek #2

- Portals, Highwalls, AMD and Refuse

Landgraff Refuse Pile

- Refuse

Canyon Refuse and Dump

- Portals, Highwalls and Refuse

BEFORE**AFTER**

RELATED EXPERIENCE

Thrasher has successfully completed topographic surveys and aerial mapping for the following coal companies in and surrounding West Virginia.

Apogee Coal Company
Scott Depot, West Virginia

ARCH/Beckley, LLC
Eccles, West Virginia

ARCH/Mountain Laurel Mining
Sharples, West Virginia

Greenbrier Minerals, Coronado Coal II
Rupert, West Virginia

MET Resources
Bridgeport, West Virginia

Pinnacle Mining LLC
Cleveland, Ohio

Sugar Camp Energy, LLC
Macedonia, Illinois

Vecellio & Grogan, Inc.
Beckley, West Virginia

Mid-Vol Coal Sales
Princeton, West Virginia

Berkeley Land Surveyors, Inc.
Berkeley Springs, West Virginia

Cliffs Logan County Coal, LLC
Cleveland, Ohio

Magnum Coal Company
Yolyn, West Virginia



RELATED EXPERIENCE

Thrasher's survey teams have performed numerous survey assignments for the WVDOH through our Statewide Agreement. The following is a list of recent projects:

Brooke County – Route 2

Prepared right-of-way plans, legal descriptions, plats, field surveys

Putnam County - Route 35

Prepared route location surveys, right-of-way plans, legal descriptions, plats, field surveys

Fairmont Connector – Construction Stakeout for Mountaineer Contractors

Construction layout, quantity surveys

Hurricane Creek Road – WVDOH Project #U340-35-4.40 00

Construction layout, property corner verifications, GPS control verifications, GPS control confirmation, cemetery location, electronic deliverables, and route location surveys for 6 miles of proposed roadway.

Lodgeville Road – WVDOH Project # X317-50/76-00.00 00

Prepared route location surveys, right-of-way plans, legal descriptions, plats, field surveys

Jakes Run Arch Bridge – WVDOH Project #BR0007(180)

Prepared right-of-way plans, legal descriptions, plats, field surveys

Old Bridgeport Hill Drainage – WVDOH Project # S317-20/75-0.43 00

Prepared right-of-way plans, legal descriptions, plats, field survey

SR 279 North Bridgeport By-Pass – WVDOH Project #X317-279-0.00

Performed route location surveys, construction layout, prepared right-of-way plans, legal descriptions, plats, field surveys

Route 11 Near Musselman High School – WVDOH Project # U302-11-4.36

Prepared right-of-way plans, legal descriptions, plats, field surveys

King Coal Hwy Baisden-Mudlick – WVDOH Project #U330-52-44.70 00 C-2

Prepared right-of-way plans, legal descriptions, plats, field surveys

Corridor H, Grant County, West Virginia – WVDOH Project #X312- H-79.05 00

Prepared route location surveys, right-of-way plans, legal descriptions, plats, field surveys

RELATED EXPERIENCE

Thrasher has completed every phase of topographical survey and mapping needed to properly execute site development for various confidential oil and gas clients. Examples of this work includes the following:

Confidential Client

500 mile survey, mapping and alignment sheets

West Virginia Confidential Client

34 mile survey, mapping, erosion and sediment control plans and routing recommendations

West Virginia Confidential Client

60 mile survey for construction of propane line

Marion and Monongalia Counties, West Virginia

8,000 linear feet of survey and drawings completed within 4 months

TL 536/ TL 543 in Wellsville, NY

22 mile survey, wetland survey, as-built survey and mapping completed within 10 months

LN-19 in Delmont, Pa

2 mile as-built survey for gas transmission line completed within 3 months

TL260 in Bridgeport, Harrison County, WV

1.5 mile survey for gas transmission line completed within 3 months

Tioga/Storage Field in Tioga, PA

4.8 mile stakeout, survey and mapping completed within 10 weeks

TL-272 in Cornwell Compressor Station, Clendenin, WV

Two hundred foot of as-built survey in Kanawha County, West Virginia completed within 1 month

TL-570/TL-263 Boone County, WV

6.4 mile survey for rural areas of Boone County, West Virginia. completed within 7 months

TL-342/EXT.4 Waynesburg, Pa

9.7 mile pre-construction survey in Greene County, Pennsylvania completed within 3 months

RELATED EXPERIENCE

TRANSMISSION/ DISTRIBUTION LINE FIELD SURVEY EXPERIENCE

Specific examples of project experience for transmission lines include:

Performed boundary, ALTA, topographic, and/or control and construction stakeout surveys for substation sites at:

Lazenby – Mercer County, WV
Jarrod – Raleigh County, WV
McGraws – Wyoming County, WV
Caretta – McDowell County, WV
Hall's Ridge – Mercer County, WV
Patrick Street – Kanawha, WV
Claypool Hill – Tazewell County, VA
Spectra Energy – Washington County, VA
Garrison Switch – Boone County, WV
Rockhouse Road – Boone County, WV
Lockhart – Dickenson County, VA
Cross Lanes – Kanawha County, WV
Patrick Street – Kanawha County, WV
Lanham – Kanawha County, WV
Duffield – Scott County, VA
Wellmont – Sullivan County, TN

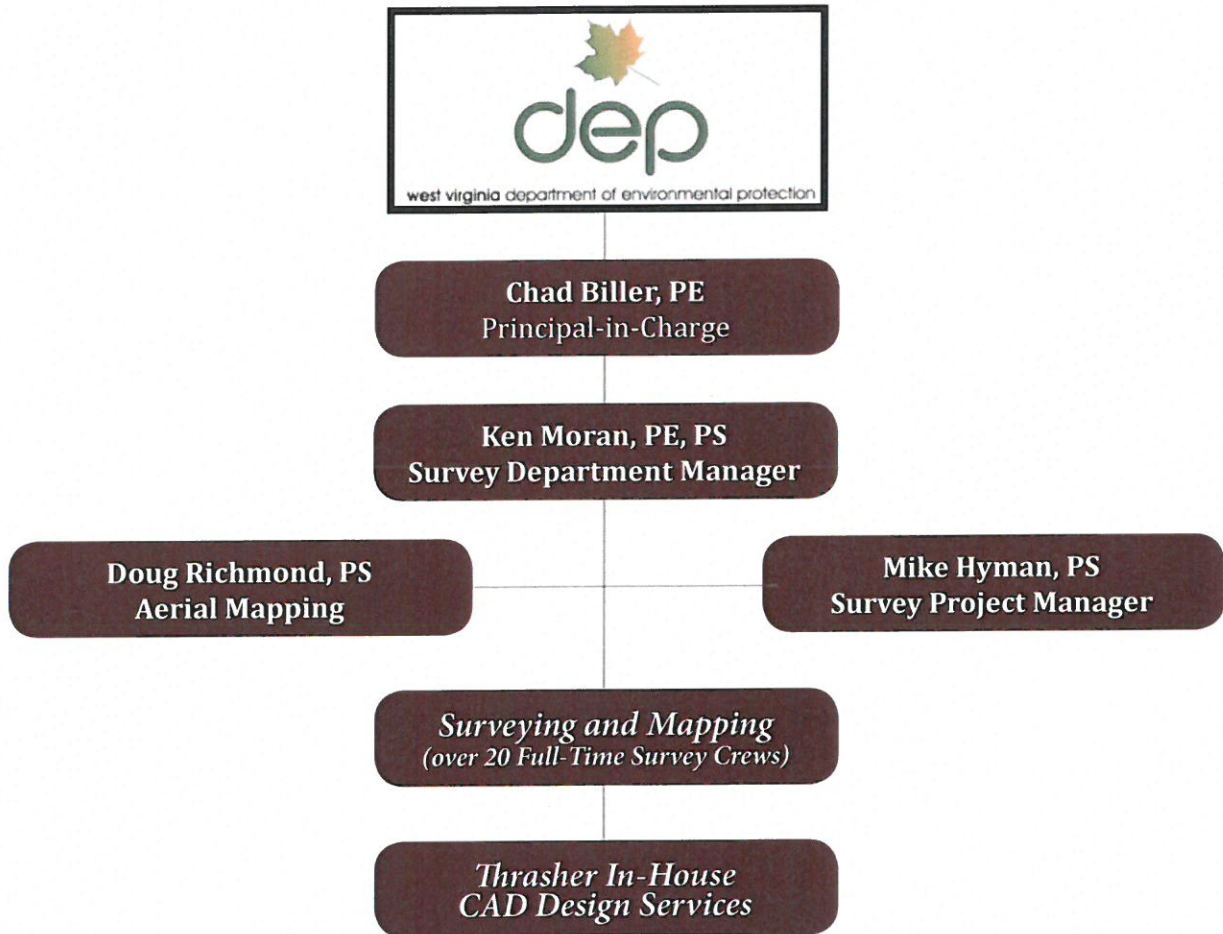
Performed Transmission Line Surveys at:

McGraws – Wyoming County, WV
Patrick Street – Kanawha County, WV
Halls Ridge – Mercer County, WV
Lockhart – Dickenson County, VA
Spectra Energy – Washington County, VA
laeger-Wharncliffe – McDowell/Mingo County, WV
Duffield, Scott County, VA



PROJECT TEAM

THRASHER



Contract Manager: Mike Hyman, PS
Contract Telephone Number: (304) 624-4108
Cell Phone Number: (304) 677-6962
Fax Number: (304) 624-7831
E-Mail Address: mhyman@thrashereng.com

PROJECT TEAM

Chadwick Biller, PE Principal-in-Charge

In 1999, Chad Biller, PE, joined the team at Thrasher and is now a partner within the firm. Mr. Biller has extensive experience in all aspects of civil engineering. He has successfully completed hundreds of projects for the WVDEP and WVDOT. Chad has a clear understanding of the procedures required for the DEP, as he has completed over a dozen AML restoration projects. Chad's knowledge of this type of project will be helpful to the survey and mapping team.

Education:

- Bachelor of Science, Civil Engineering - West Virginia University

Registrations:

- Registered Professional Engineer
 - States of West Virginia, Pennsylvania, and Ohio

Affiliations/Certifications:

- American Society of Highway Engineers
- American Society of Civil Engineers
- National Society of Professional Engineers

Related Experience Includes:

- **WVDOT Corridor H, Davis to Bismark**—Mr. Biller served as Principal-In-Charge/Project Manager for the design of over two miles of a four-lane divided highway. This roadway includes an additional 1.5 miles of secondary roads.
- **WVDOT Jakes Run Bridge**— Mr. Biller served as Principal-In-Charge/Project Manager for the design of a 95 foot long, single span steel girder bridge, roadway approaches, water line relocation and right-of-way .
- **WVDOT Orlando Bridge**— Mr. Biller served as Principal-In-Charge/Project Manager for the single concrete box beam bridge with approximately 1,000 LF of roadway realignment.
- **Landgraaf Refuse Pile**: Involved a ± 3 acres exposed refuse site, 500 linear feet of dangerous highwall and streambank restoration of an unnamed tributary of Elkhorn Creek. The scope of work for this project included regrading the refuse site from the unnamed tributary's stream bank and to reclaim the highwall. Then an adjoining borrow sites were used to obtain sufficient suitable material to entomb the refuse for re-vegetation. The project site covered a total area of 4.3 acres and reclamation included ±16,000 cubic yards of earthwork.
- **Stowe Landslide**: Involved a 2 acre landslide caused an abandoned portal blowout. The slide mass was situated directly above a private residence at the base of a steep mountainside. The slide material upon removal was transported to a nearby waste site, spread, dried and compacted. The project site covered a total area of 2.9 acres and reclamation included ± 6,000 cubic yards of earthwork.

PROJECT TEAM

Ken Moran, PE, PS **Survey Department Manager**

Kenneth P. Moran, PE, PS, serves as Vice President of Thrasher. Mr. Moran is the Chief Operating Officer of Thrasher and the manager of the Survey Division within the firm. His areas of responsibility include quality assurance and quality control of engineering design and survey services for projects ranging from well site development through midstream.

Aside from his work in the oil and gas field, Mr. Moran has extensive experience in all aspects of engineering and surveying with an emphasis on project management and administration. Ken works on both large-scale, multi-million dollar projects as well as smaller community improvement projects.

Education:

- Bachelor of Science, Civil Engineering Technology - Fairmont State University

Registrations:

- Registered Professional Engineer
 - States of West Virginia, Virginia, and Ohio
- Registered Professional Land Surveyor
 - State of West Virginia

Related Experience Includes:

- **Statewide Aerial Survey/Mapping Open End Contract - Statewide, West Virginia**
- **WVDOH Road Widening (Big Elm) - Harrison County, West Virginia**
- **WVDOH Robert C. Byrd High School Access Road - Harrison County, West Virginia**
- **Doddridge County Recreation Park Phase I Property Development - Doddridge County, West Virginia**
- **Confidential Client - 500 mile survey, mapping and alignment sheets**
- **West Virginia Confidential Client - 34 mile survey, mapping, erosion and sediment control plans and routing recommendations**
- **West Virginia Confidential Client - 60 mile survey for construction of propane line**
- **Marion and Monongalia Counties, West Virginia - 8,000 linear feet of survey and drawings completed within 4 months**
- **TL 536/ TL 543 in Wellsville, NY - 22 mile survey, wetland survey, as-built survey and mapping completed within 10 months**

PROJECT TEAM

Doug Richmond, PS Aerial Mapping

Douglas Richmond joined Thrasher in 2012 and serves as a Senior Survey Manager for the firm, as well as heads up the entire Survey Division in Virginia. Mr. Richmond has experience nationally and internationally in survey construction, engineering, GPS scales and technical support and training related to the fields of surveying and mapping for public and private clients.

Mr. Richmond has performed numerous integrated survey projects utilizing GNSS, Robotic Total Station, 3D Laser Scanning, Hydrographic Tools, and Photogrammetry.

Education:

- Bachelor of Science, Civil Engineering - University of New Orleans

Registrations:

- Registered Professional Surveyor
Commonwealth of Virginia [#043001718], State of Louisiana, [#0004507], Ohio [#7860], Texas [#4660], Mississippi [#01959], Alabama [#15925], and North Carolina [#L-4008]

Affiliations/Certifications:

- **Certified Floodplain Manager**
- **Virginia Association of Surveyors**
- **Virginia Association of Mapping and Land Information System**

Related Experience:

- **NGS Height Modernization Surveys - various locations**
- **FAA Airport Surveys - various locations**
- **Mid-Atlantic & Midwest NAVFAC Projects (VA, MD, DC, MI, MN, WI, ND, SD, IA, NE) - various locations**

PROJECT TEAM

Mike Hyman, PS Survey Project Manager

Michael Hyman joined Thrasher in 2000 and serves as Survey Crew Supervisor for the firm. Mr. Hyman is responsible for project set-up, review and coordination of his field crews for all types of survey projects including, boundary and easement surveys and the preparation of plats and legal descriptions.

Mr. Hyman also performs courthouse research and computes field data for construction layout. Because of his fine attention to detail and meticulous methods, Mr. Hyman dissects each record and compares it thoroughly to performed field work.

Education:

- Bachelor of Science, Civil Engineering Technology - Fairmont State University
- Associate of Science, Engineering Design and Drafting - Fairmont State University
- Law of Colonial State - University of Maryland
- Continuing Education: Subdivision Design, Hydrology/Storm Water Management and Boundaries

Registrations:

- Professional Land Surveyor:
State of West Virginia

Related Experience:

- **WVDOH Topographic Survey of Route 41/9** - Mr. Hyman was responsible for supervising the survey and construction crews.
- **WVDOH Center Line Layout for Route 20** - During this project, Mr. Hyman was tasked with the management of all survey crews as well as the input and drafting of all data collected.
- **WVDOH Meadowbrook Road Survey** - Mr. Hyman was responsible for supervising the survey and construction crews.

EQUIPMENT

The following is a summary of the available equipment that Thrasher owns. Attached in the appendix, is a complete list of our equipment with calibrations:

- 46- total stations, 8 of these are Trimble Robotic Total stations, other are compiled of Nikon Nivo's, Topcons, and Leica Total Stations- All calibrated within the last year.
- 69-Trimble R-8's
- 42-Trimble R-10's
- 63-Trimble TSC3's
- 2 Trimble Geo-7x
- 5 Trimble Geo XH6000
- 7 Trimble Geo XR6000
- 28 Trimble TDL 450H Repeaters
- 5 Metro Tech Spar Units
- 19 Levels, Trimble, Leica and Topcons

Please see attached camera calibration report.

Thrasher Equipment Matrix							
R-8							
DESCRIPTION	MODEL	S/N	ASSIGNMENT	WARRANTY EXP. APR 16	FIRMWARE 5.01	2015 PU LIST	
TRIMBLE-R8	R8 Model 3	5046455633	Scott Whitlock	No Warranty??????????		X	
TRIMBLE-R8	R8 Model 4	5329440901	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 4	5433475877	Josh Oyler (OH)	16-Apr		X	
TRIMBLE-R8	R8 Model 4	5434462260	Chris DeFino (PA.)	NO WARRANTY		X	
TRIMBLE-R8	R8 Model 4	5230487625	Daniel Boyd (VA.)	16-Apr		X	
TRIMBLE-R8	R8 Model 4	531643917	Charleston Office				
TRIMBLE-R8	R8 Model 4	5411458728	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 4	5414461814	Josh Kincaley	16-Apr	X	X	
TRIMBLE-R8	R8 Model 4	5414461809	Mark Gallagher	16-Apr		X	
TRIMBLE-R8	R8 Model 4	5414461761	Mark Gallagher	16-Apr		X	
TRIMBLE-R8	R8 Model 4	5410457626	@ Work Station in Garage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 4	5133470499	@ Work Station in Garage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 4	5414461849	Drake Levo	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5251421574	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 4	5414461821	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 4	5316434005	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 4	5316434313	Tyler Riffle	16-Apr	X	X	
TRIMBLE-R8	R8 Model 4	5414461847	Mac Fulmer	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5243499198	David Fritz	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5247417232	Joseph Lambert (Beckley)	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5414462256	Joe Dodson (VA.)	No Warranty??????????	X	X	
TRIMBLE-R8	R8 Model 4	5423467764	Gregg Goodwin	NO WARRANTY		X	
TRIMBLE-R8	R8 Model 3	4918170714	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	4921173275	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	4921173278	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	4921173297	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 4	5316434025	Cage	16-Apr		X	
TRIMBLE-R8	R8 Model 3	493440707	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	493440641	Cage w/ 5251421000	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	493440643	Mike Walker (Canton OH)	16-Apr		X	
TRIMBLE-R8	R8 Model 3	493440640	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	493440646	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5026435651	Cage (Adam Cooper)	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5026435652	Cage w/ 5216485800	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5026435682	Chris Baker	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5026435701	Kirk Wilson	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5044453844	Jonathan Denison	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5044453495	James Howes	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5026435217	Scott Whitlock	Equipment is Missing			
TRIMBLE-R8	R8 Model 3	5046455656	John Leary	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5046455706	Rob Lynch	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5046455934	Mike Brown (OH)	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5047456004	Oakland (Spare)	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5106461055	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5106461115	Toby Paul (Canton OH)	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5106461136	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5114464687	Eddie Westfall	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5134483107	Canton Office	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5134483122	Rob Lynch	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5139473035	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5152479840	????????????????	Removed	Removed	Removed	
TRIMBLE-R8	R8 Model 3	5152479868	Kirk Wilson	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5215485099	????????????????	Removed	Removed	Removed	
TRIMBLE-R8	R8 Model 3	5215485743	Found in Cage 7/29/15	Removed	Removed	Removed	
TRIMBLE-R8	R8 Model 3	5215485600	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5216485800	Cage w/ 5026435652	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5216485819	Jarrett Lantz	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5220487390	Fredricksburg Office	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5220487415	Justin Gordon	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5220487626	David Boyd (VA.)	No Warranty	X	X	
TRIMBLE-R8	R8 Model 3	5220487748	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5225490460	Andrew Middleton	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5226491548	Bud Bargy (MD)	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5235494511	Bryan Hudkins	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5235494513	Cage	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5242486554	Oakland (Spare)	16-Apr		X	
TRIMBLE-R8	R8 Model 3	5251421160	Cage w/ 4934406441	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5243499132	Toby Paul (Canton OH)	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5026435710	PENTREE / ?????????			X	
TRIMBLE-R8	R8 Model 3	5026435613	Cage	16-Apr	X	X	
TRIMBLE-R8	R8 Model 3	5243499233	Jason Garrett		X	X	
TRIMBLE-R8	R8 Model 4	5326460537	Andy Stull	Have no record	Have no record		
R-10							
DESCRIPTION	MODEL	S/N	ASSIGNMENT	WARRANTY EXP. APR-16	FIRMWARE 5.01	2015 PU LIST	
TRIMBLE-R10	001-60	5312440356	Bryan Hudkins	16-Apr	X	X	
TRIMBLE-R10	001-60	5308426305	Fredricksburg - David Boyd	16-Apr		X	
TRIMBLE-R10	001-60	5220487390	Fredricksburg				
TRIMBLE-R10	001-60	5252422269	Cage	16-Apr	X	X	
TRIMBLE-R10	001-60	5306426368	Jarrett Lantz			X	
TRIMBLE-R10	001-60	5320436619	Andrew Middleton	16-Apr	X	X	
TRIMBLE-R10	001-60	5306426549	Tyler Riffle	16-Apr	X	X	
TRIMBLE-R10	001-60	5313432346	Cage	16-Apr	X	X	
TRIMBLE-R10	001-60	5312430350	Cage	16-Apr	X	X	
TRIMBLE-R10	001-60	5302423131	Joe Lowther	16-Apr	X	X	
TRIMBLE-R10	001-60	5324438795	Andy Stull (Beckley)	16-Apr		X	
TRIMBLE-R10	001-60	5311428820	Jonathan Denison	16-Apr	X	X	
TRIMBLE-R10	001-60	5313432363	Mike Walker (Canton OH)			X	
TRIMBLE-R10	001-60	5242498180	Cage	16-Apr	X	X	
TRIMBLE-R10	001-60	5308426566	Chris Baker	16-Apr	X	X	
TRIMBLE-R10	001-60	5410564414	Scott Whitlock			X	
TRIMBLE-R10	001-60	5410564824	Joseph Lambert	NO WARRANTY			
TRIMBLE-R10	001-60	5242498177	Chris DeFino (PA.)	NO WARRANTY		X	
TRIMBLE-R10	001-60	5412459660	Cage (No Warranty)			X	
TRIMBLE-R10	001-60	5430479452	James Howes	16-Apr	X	X	
TRIMBLE-R10	001-60	5406453896	Brant Busdecker	16-Apr	X	X	
TRIMBLE-R10	001-60	5435477234	Gregg Goodwin	NO WARRANTY		X	
TRIMBLE-R10	001-60	5430473543	Joe Dodson (Va.)	16-Apr		X	
TRIMBLE-R10	001-60	5324438795	Andy Stull (Beckley)	16-Apr		X	
TRIMBLE-R10	001-60	5335442476	Mike Brown (Charleston)	16-Apr		X	
TRIMBLE-R10	001-60	5322437945	Kirk Wilson	16-Apr	X	X	
TRIMBLE-R10	001-60	5313432433	Justin Gordon	16-Apr	X	X	
TRIMBLE-R10	001-60	5325448838	Jason Garrett	16-Apr	X	X	
TRIMBLE-R10	001-60	5324438746	Eddie Westfall	16-Apr	X	X	
TRIMBLE-R10	001-60	5320436678	????????????????				
TRIMBLE-R10	001-60	5406454953	Mac Fulmer	16-Apr	X	X	

TRIMBLE-R10	001-60	5312436283	Scott Whitehead	16-Apr		X
TRIMBLE-R10	001-60	5411458547	Drake Levo	16-Apr		X
TRIMBLE-R10	001-60	5320436622	Cage	16-Apr	X	X
TRIMBLE-R10	001-60	5413460447	Phil Odonell (Beckley)			X
TRIMBLE-R10	001-60	5413460395	Cage (No Warranty)	No Warranty	Removed	Removed
TRIMBLE-R10	001-60	5412460054	Bud Bary (MD)	16-Apr	X	X
TRIMBLE-R10	001-60	5413460399	John Leary	16-Apr	X	X
TRIMBLE-R10	001-60	5413460788	Adam Cooper (Cage)	16-Apr	X	X
TRIMBLE-R10	001-60	5413460392	Josh Knicely	16-Apr	X	X
TRIMBLE-R10	001-60	5336442889	J. Dix (Beckley)			X
TRIMBLE-R10	001-60	5413460795	Fredricksburg Office	16-Apr	X	X
TRIMBLE-R10	001-60	5320436612	Mapping Dept.	16-Apr	X	X
TRIMBLE-R10	001-60	5302423142	Josh Oyley	16-Apr	X	X
TRIMBLE-R10	001-60	5324438763	Cage	16-Apr	X	X
TRIMBLE-R10	001-60	5408454957	Aaron Rowe	16-Apr	X	X
TRIMBLE-R10	001-60	5408454968	David Pitt	No Warranty	Removed	Removed

LEVELS

DESCRIPTION	MODEL	BRAND	S/N	ASSIGNMENT	CALIBRATION EXP. DATE	2015 PU LIST
Level	DNA03	Leica	344903	Fredricksburg Office	Needs Calibrated	
Level	AT-B3	Topcon	N03435	Austin Thrasher		
Level	AT-B3	Topcon	N03400	Mikey Brown (CH)	Needs Calibrated	
Level	AT-B3	Topcon	N01551	Kirk Wilson	Needs Calibrated	
Level	NA730	Leica	5368775	Josh Oyley (OH)	Needs Calibrated	
Level	AT-B4	Topcon	X57866	????????????????????		
Level	AT-B3	Topcon	N01549	Bob Lynch	Needs Calibrated	
Level	AT-B3	Topcon	487284	Eddie Westfall	Needs Calibrated	
Level	AE-7	Nikon	249205	Robert Stark		
Level	AT-B3	Topcon	486360	Cage		
Level	NA730	Leica	10812	Cage (Damaged)		
Level	AT-F2	Topcon	R10812	Andrew Middleton	Needs Calibrated	
Level	B21	SOKKIA	416773	Toby Paul (OH)	Needs Calibrated	
Level	AT-B3	Topcon	N01548	Aaron Rowe	Needs Calibrated	
Level	AP-8	Nikon	508124	Bryan Hudkins	13-Mar	
Level	NA730	Leica	5083760	Mike Walker (Canton OH)	Needs Calibrated	
Level	AT-B3	Topcon	N01530	Jarrett Lantz	Needs Calibrated	
Level	AT-B4	Topcon	N57833	Robert Stark		
Level	AP-8	Nikon	510890	James Howes	Needs Calibrated	
Level	AP-8	Nikon	510896	????????????????????		
Level	AP-8	Nikon	510894	Johnathon Denison	15-Oct	
Level	AP-8	Nikon	510786	????????????????????		
Level	DINI 12	Trimble	7000981	Rob Lynch		
Level	TS20A	Leica	D10163/13297	Cage		
Level	B2A	Leica	D10322/128330	Cage		
Level	AT-22A	Topcon	B12545	Mike Woodall		
Level	AT-S3	Topcon	D177	Joseph Lambert	Needs Calibrated	

TOTAL STATION INSTRUMENTS

DESCRIPTION	MODEL	BRAND	S/N	ASSIGNMENT	CALIBRATION EXP. DATE	2015 PU LIST
Robert	S3	Trimble	914110803	Jarrett Lantz	Needs Calibrated	X
Robert	S3	Trimble	91411109	Rob Lynch	5/15 "Past Due"	X
Robert	S3	Trimble	91411223	Johnathon Denison	15-Sep	X
Robert	S3	Trimble	91411258	Canton Office	Needs Calibrated	X
Robert	S3	Trimble	91411678	Drake Levo	15-Aug	X
Robert	S6	Trimble	93010708	Analy Skiff	16-Jun	X
Robert	S6	Trimble	93110269	Fredricksburg Office (VA)	No Date Supplied	X
Robert	YN	Trimble	99710432	Gregg Goodwin	15-Oct	X
Total station	TC-405	Leica	842490	Bryan Hudkins		
Total station	TC-405	Leica	754222	Cage		
Total station	TC-405	Leica	842490	????????????????????		
Total station	TC-405	Leica	843032	Kirk Wilson	16-May	
Total station	TC-405	Leica	698960	Out for Repair 8/26/15		
Total station	TC-405	Leica	854203	Gregg Goodwin	16-Apr	
Total station	TC-703	Leica	642516	Cage (Will not Connect)	16-Apr	
Total station	TCR 405	Leica	847890	Josh Knicely		
Total station	TCR 703	Leica	641383	BB		
Total station	TCR 405	Leica	847890	John Leary	15-Sep	
Total station	TS-02	Leica	1322649	Mikey Brown	4/15 Past Due	
Total station	TS-02	Leica	1322703	Cage		
Total station	TS-02	Leica	1322734	Schrader		
Total station	TS-02	Leica	1322739	Austin Gordon		
Total station	TS-02	Leica	1322785	Eddie Westfall	16-Jun	
Total station	TS403	Leica	757668	Bud Bary (MD)		
Total station	Nivo 3M	Nikon	A151353	Cage	15-Jun	X
Total station	Nivo 3M	Nikon	A152118	Earl		X
Total station	Nivo 3M	Nikon	D002726	Mike Walker-Canton		X
Total station	Nivo 3M	Nikon	A151846	Out for Repair 8/26/15		X
Total station	Nivo 3M	Nikon	A151846	Phil Odonell (Beckley)		X
Total station	Nivo 3M	Nikon	A152205	Drake Levo	16-May	X
Total station	Nivo 3M	Nikon	A150543	Tyler Riffle	16-Jun	X
Total station	Nivo 3M	Nikon	A152113	Joe Odonell (VA)	No Date Supplied	X
Total station	Nivo 3M	Nikon	A300613	????????????????????		X
Total station	Nivo 3M	Nikon	A151527	????????????????????		X
Total station	Nivo 3M	Nikon	A151531	Chris Baker	Needs Calibrated	X
Total station	Nivo 3M	Nikon	A152091	Toby Paul (OH)	"New" No Calibration date	X
Total station	Nivo 3M	Nikon	A150754	James Howes		X
Total station	Nivo 2M	Nikon	D093432	Chris DeJiro (PA)	No Date Supplied	X
Total station	Nivo 2M	Nikon	D093479	Cage	16-Aug	X
Total station	Nivo 2M	Nikon	D093438	Beckley Office (Bob Ruffner)	16-Jul	X
Total station	Nivo 2M	Nikon	D093515	Cage	16-Aug	X
Total station	Nivo 2M	Nikon	D093332	David Pitt	15-Dec	X
Total station	ES-103	Topcon	BR0487	Mark Gaudette (MS)	No Date Supplied	
Total station	ES-103	Topcon	BR0442	????????????????????		
Total station	ES-103	Topcon	070189	Canton Office	7/15 "Past Due"	
Total station	ES-103	Topcon	678833	Earl		
Total station	GPT3005LW	Topcon	40975	Beaver Office		
Total station	GPT3005LW	Topcon	41296	James Brown (VA)	No Date Supplied	
Total station	GPT3005LW	Topcon	41296	Josh Oyley (OH)	8/15 "Past Due"	
Total station	GTS-3000	Topcon	890301	Fredricksburg Office (VA)	No Date Supplied	
Total station	GTS-605	Topcon	350102	Cage		
Total station	SS0120	Topcon	550120	????????????????????		
Total station	GPT3005LW	Topcon	411342	Scott Whitehead	16-May	
Total station	GPT3005LW	Topcon	411391	Joseph Lambert	14-Nov	

HAND-HELD GPS UNITS

DESCRIPTION	MODEL	S/N	ASSIGNMENT	WARRANTY EXP. DATE	FIRMWARE	2015 PU LIST
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GEO-XH 6000	89100-80	5124018532	Cage	16-Apr	X	X
GEO-XH 6000	89100-80	5124018532	Office	Not Valid	Removed	Removed
GEO-XH 6000	89100-80	5124018532	Joe Lowther (Office)	16-Apr	X	X
GEO-XH 6000	89100-80	5124018532	David Boyd (VA)	16-Apr	X	X
GEO-XH 6000	89100-80	5124018532	James Howes	16-Apr	X	X
GEO-XH 6000	89100-80	5124018532	Joe Lowther (Office)	16-Apr	X	X
GEO-XH 6000	89100-80	5124018532	Fredericksburg Office (VA)	16-Apr	X	X
GEO-XH 6000	89100-80	5124018532	Cage	16-Apr	X	X
GEO-XH 6000	89100-80	5124018532	Cage	16-Apr	X	X
GEO-XH 6000	88950-00	5112401784	Cage			
GEO-XH 6000	88950-00	5126404960	Office	16-Apr	X	X
GEO-XH 6000	88950-00	5126404991	Environmental	16-Apr	X	X
GEO-XH 6000	88950-00	5207413191	Charleston		X	X
GEO-XH 6000	88950-00	5112401764	Environmental	16-Apr	X	X
GEO-XH 6000	88950-00	5126404990	Beckley Office-Inspection Dept		X	X
GEO-XH 6000	88950-00	5126404971	Inspection Dept	16-Apr	X	X
GEO-XH 6000	88180-04	5353437884	Bridgeport Environmental	16-Apr	X	X
GEO-7X	88180-04	5405439005	Bridgeport Environmental	16-Apr	X	X

RADIO AMPS

DESCRIPTION	MODEL	S/N	ASSIGNMENT	Warranty Exp. Date	2015 PU LIST
TDL-450H	74450-65	14049169	????????????????????	16-Apr	X
TDL-450H	74450-65	12504223	James Howes	16-Apr	X
TDL-450H	74450-65	13011212	Cage	16-Apr	X
TDL-450H	74450-65	12518904	Fredericksburg Office	16-Apr	X
TDL-450H	74450-65	12509042	John Leary	16-Apr	X
TDL-450H	74450-65	12507056	Mike Brown	16-Apr	X
TDL-450H	74450-65	12506347	Justin Gordon	16-Apr	X
TDL-450H	74450-65	12209947	Bryan Hudkins	16-Apr	X
TDL-450H	74450-65	12507359	Edie Westfall	No Warranty Sheet	X
TDL-450H	74450-65	14049168	Gregg Goodwin	16-Apr	X
TDL-450H	74450-65	12518666	Kirk Wilson	16-Apr	X
TDL-450H	74450-65	12460214	Jonathan Dennison	16-Apr	X
TDL-450H	74450-65	14052181	Chris Defino (PA)	No Warranty Sheet	X
TDL-450H	74450-65	12507172	Cage	16-Apr	X
TDL-450H	74450-65	12506090	Chris Baker	16-Apr	X
TDL-450H	74450-65	13011155	Drake Levo	16-Apr	X
TDL-450H	74450-65	12518398	Cage	16-Apr	X
TDL-450H	74450-65	14052186	Andrew Middleton	No Warranty Sheet	X
TDL-450H	74450-65	14052184	Joe Dodson (Va.)	No Warranty Sheet	X
TDL-450H	74450-65	12260006	Josh Amick	16-Apr	X
TDL-450H	74450-65	12506720	Fredericksburg (Damaged)	16-Apr	X
TDL-450H	74450-65	12312619	Andrew Barns (Damaged in Truck Fire)	No Warranty	Removed
TDL-450H	74450-65	11121047	Josh Barnett	16-Apr	X
TDL-450H	74450-65	12460552	Mike Walker (OH)	16-Apr	X
TDL-450H	74450-65	12507172	Mark Walker (PA)	16-Apr	X
TDL-450H	74450-65	12318729	Andy Stull	No Warranty Sheet	X
TDL-450H	74450-65	12312385	Josh Oyle (OH)	16-Apr	X
TDL-450H	74450-65	12506954	Josh Kline	No Warranty	Removed

DATA COLLECTORS

DESCRIPTION	MODEL	S/N	ASSIGNMENT	Warranty Exp. Date	FIRMWARE 5.01	2015 PU LIST
TRIMBLE	TS2C	SSA9CA6601	????????????????			
TRIMBLE	TS2C	SSB1C57078	????????????????			
TRIMBLE	TS2C	SSB1C57142	????????????????			
TRIMBLE	TS2C	RS08C0128	????????????????			
TRIMBLE	TS2C	RG15017909	Kyle Gay	No Warranty	Removed	Removed 4/15
TRIMBLE	TS2C	RS01C08772	Eddie Westfall	16-Apr	X	X
TRIMBLE	TS2C	RS08C00824	James Howes	16-Apr	X	X
TRIMBLE	TS2C	RS04C02944	Toby Paul (OH)	16-Apr	X	X
TRIMBLE	TS2C	RS08C09973	Cage	16-Apr	X	X
TRIMBLE	TS2C	RS08C06244	Bad Bargy	16-Apr	X	X
TRIMBLE	TS2C	RS08C06626	Beckley Office (Bob Ruffner)	16-Apr	X	X
TRIMBLE	TS2C	RS08C06691	Justin Gordon	16-Apr	X	X
TRIMBLE	TS2C	RS08C07768	Scott Whitlock	16-Apr	X	X
TRIMBLE	TS2C	RS08C08837	Aaron's Office Spar	16-Apr	X	X
TRIMBLE	TS2C	RS08C13548	Spar Unit			
TRIMBLE	TS2C	RS08C15365	Fredericksburg Office (VA)	16-Apr	X	X
TRIMBLE	TS2C	RS08C15829	Jarret Lantz	16-Apr	X	X
TRIMBLE	TS2C	RS13C19156	Cage	16-Apr	X	X
TRIMBLE	TS2C	RS13C19195	Cage	16-Apr	X	X
TRIMBLE	TS2C	RS13C19141	Bryan Hudkins	16-Apr	X	X
TRIMBLE	TS2C	RS16C20828	Kirk Wilson	16-Apr	X	X
TRIMBLE	TS2C	RS17C21230	Oakland (Spare)	16-Apr	X	X
TRIMBLE	TS2C	RS18C22272	Fredericksburg Office (Spare)	16-Apr	X	X
TRIMBLE	TS2C	RS18C22597	Joseph Lowther	16-Apr	X	X
TRIMBLE	TS2C	RS18C22634	Cage	16-Apr	X	X
TRIMBLE	TS2C	RS13C30814	Jonathan Dennison	16-Apr	X	X
TRIMBLE	TS2C	RS13C30923	Cage	16-Apr	X	X
TRIMBLE	TS2C	RS13C31944	Cage	16-Apr	X	X
TRIMBLE	TS2C	RS13C36477	Cage	16-Apr	X	X
TRIMBLE	TS2C	RS13C38161	Allegre????????			
TRIMBLE	TS2C	RS13C38272	Jonathan Dennison	16-Apr	X	X
TRIMBLE	TS2C	RS13C38276	Andrew Middleton	16-Apr	X	X
TRIMBLE	TS2C	RS13C38491	Mike Brown	16-Apr	X	X
TRIMBLE	TS2C	RS28C46310	Drake Levo	No Warranty	X	X
TRIMBLE	TS2C	RS1A00357	Cage	16-Apr	X	X
TRIMBLE	TS2C	RS1A00549	????????????			
TRIMBLE	TS2C	SS24A16373	????????????			
TRIMBLE	TS2C	SSA7C45985	????????????			
TRIMBLE	TS2C	SSB1C57166	????????????			
TRIMBLE	TS2C	RS08C05338	Joseph Lowther ?????	No Warranty	Removed	Removed 10/14
TRIMBLE	TS2C	RS13C18946	Fredericksburg Office (Va.)	16-Apr	X	X
TRIMBLE	TS2C	RS04C02360	Rob Lynch	16-Apr	X	X
TRIMBLE	TS2C	RS08C06724	Cage	16-Apr	X	X
TRIMBLE VX	TS2C VX	RS17C20669	Gregg Goodwin (VX)	16-Apr	X	X
TRIMBLE	TS2C	RS28C46472	Chris Defino (PA)	No Warranty	X	X
TRIMBLE	TS2C	RS29C45266	Canton Office		X	X
TRIMBLE	TS2C	RS29C56916	Joe Dodson (Va.)	16-Apr	X	X
TRIMBLE	TS2C	RS13C30244	Mike Walker (Ohio)	16-Apr	X	X
TRIMBLE	TS2C	RS13C34999	Andy Stull	No Warranty	X	X
TRIMBLE	TS2C	RS13C39246	Cage	16-Apr	X	X
TRIMBLE	TS2C	RS08C03732	Kirk Wilson	16-Apr	X	X
TRIMBLE	TS2C	RS1A000287	Cage	16-Apr	X	X
TRIMBLE	TS2C	RS13C30814	Jonathan Dennison	16-Apr	X	X
TRIMBLE	TS2C	RS13C38093	Cage	16-Apr	X	X
TRIMBLE	TS2C	RS13C36805	Cage	16-Apr	X	X

[illegible]

METAL DETECTORS

DESCRIPTION	MODEL	S/N	ASSIGNMENT	LAST INVENTORY DATE
Schönstedt	GA 52CX	283814	John Leary	16-Apr
Schönstedt	GA 52CX	307129	Chris Baker	16-Apr
Schönstedt	GA 52CX	297703	Kirk Wilson	16-Apr
Chicago Steel Tape	50122-5808	1001033032	Eddie Westfall	16-Apr
Schönstedt	GA 52CX	303762	Mikie Walker	16-Apr
Schönstedt	GA 52CX	292571	Josh Oyler	16-Apr
Schönstedt	GA 52CX	313695	Toby Paul	16-Apr
Schönstedt	GA 52CX	281600	Canton Office	16-Apr
Sub-Surface Instruments	ML-1M	6075754	Rob Lynch	16-Apr
Sub-Surface Instruments	ML-1M	10123608	Jarrett Lantz	16-Apr
Schönstedt	GA 52A	313697	Jonathan Dennison	16-Apr
Gai-Berger	Magna Track 100	456881608	Justin Gordon	16-Apr
Dunham & Morrow	DML-2000XR	123906	David Boyd	16-Apr
Schönstedt	GA 52CX	304480	Fredricksburg Office (VA)	16-Apr
Schönstedt	GA 52CX	304479	James Howes	16-Apr
Sub-Surface Instruments	ML-1	10123713	Mike Brown	16-Apr
Dunham & Morrow	DML-2000		Joseph Lambert	16-Apr
Dunham & Morrow	DML-2000		Scott Whitleck	16-Apr
Schönstedt	GA 52CX	302859	Andy Stull	16-Apr
Schönstedt	GA 52CX	307131	Drake Leno	16-Apr
Schönstedt	GA 52CX	304477	Chris Defino	16-Apr
Schönstedt	GA 52CX	307127	Mark Gallagher	16-Apr
			Bryan Hudkins	16-Apr

OLD DATA COLLECTORS

[illegible]

RADIO DETECTION UNITS

[illegible][illegible]

TRIMBLE GEO 7X	5351437884	PN. 88180-04	IMEI-99000218986772	SERP	7/14/2014
TRIMBLE GEO 7X	5405439005	PN. 88180-04	IMEI-99000218986644	CAGE	
FIXED TRIPOD	PLI-BASE	5119-01	CAGE		
FIXED TRIPOD	PLI-BASE	5119-02	CAGE		
QUICK CLAMP TRIPOD	BLACK W/ LOGO	60-ALQR120-BPL-01	CAGE		
QUICK CLAMP TRIPOD	BLACK W/ LOGO	60-ALQR120-BPL-02	ED WESTFALL	7/7/2014	
TRIPOD	CST WOOD/FIBERGLASS	60-WDF-20	CAGE		
PRISM POLE	SECO 8'	5500-11	CAGE		
SECO PRISM		6422-02-FLB	CAGE		
BATTERY	INT. RPL CELL	TRIMBLE HPB 450	DCM0035-01	CAGE	
BATTERY	INT. RPL CELL	TRIMBLE HPB 450	DCM0035-02	CAGE	
BATTERY CHARGER	PD/LHPB	PCC-A01509-01	CAGE		
BATTERY CHARGER	PD/LHPB	PCC-A01509-02	CAGE		
BATTERY BAG	PD/LHPB	PCC-A00644-01	CAGE		
BATTERY BAG	PD/LHPB	PCC-A00644-02	CAGE		
TDL 450H SDB GAIN ANT KIT		20130827	ED WESTFALL	RENTAL	7/7/2014
TDL 450H SDB GAIN ANT KIT		20140634	JOHN BRADY	RENTAL	7/18/2014
TDL 450H SDB GAIN ANT KIT					
TDL 450H SDB GAIN ANT KIT					
Fixed Height Tripod		20140626	JOHN BRADY	RENTAL	7/18/2014
Fixed Height Tripod		20140811			
Fixed Height Tripod					
Fixed Height Tripod					
Metal Locators	LASERTECH GA-52Cx	Schonesdet	65234 297703	Bostic	RENTAL
GEO 6000	ZLPHR ANT	5412118442		RENTAL	REMOVED
TBC #		1964316479			
		TBC-SA-1867581229	FLS-TBC.ADV-SW-RF	FREDRICKSBURG	EXPIRES MAY 2015
		TBC-SA-28320786	FLS-TBC.ADV-SW-RF	FREDRICKSBURG	EXPIRES MAY 2015
					PASSWORD:8709680032665
					PASSWORD: 314197375518906

Thrasher Equipment Matrix						
GNSS Equipment						
Description	Model		Options	SN	WARRANTY SHEET	Assignment
R8	Model 3	67250-66		4918170714	X	Cage
R8	Model 3	67250-66		4921173275	X	Cage
R8	Model 3	67250-66		4921173278	X	Cage
R8	Model 3	67250-66		4921173297	X	Cage
R8	Model 3	67250-66		4934400707	x	Cage
R8	Model 3	67250-66		4943404641	X	Cage with unit 5251421600
R8	Model 3	67250-66		4943404643	X	Mike Walker (OH)
R8	Model 3	67250-66		4943404660	X	Cage
R8	Model 3	67250-66		4943404666	X	Cage
R8	Model 3	67250-66		5026435651	X	Adam Cooper (Cage)
R8	Model 3	67250-66		5026435652	X	Cage with unit 5216485800
R8	Model 3	67250-66		5026435653	X	Cage
R8	Model 3	67250-66		5026435682	X	Chris Baker
R8	Model 3	67250-66		5026435701	X	Kirk Wilson
R8	Model 3	67250-66		5026435710	x	????????????????
R8	Model 3	67250-66		5044453844	X	Johnathon Dennison
R8	Model 3	67250-66		5046455633	x	Scott Whitlock
R8	Model 3	67250-66		5046455635	X	James Howes
R8	Model 3	67250-66		5046455656	X	John Leary
R8	Model 3	67250-66		5046455706	X	Rob Lynch
R8	Model 3	67250-66		5046455934	X	Mikey Brown (CH)
R8	Model 3	67250-66		5047456004	X	Oakland (Spare)
R8	Model 3	67250-66		5106461055	X	Cage
R8	Model 3	67250-66		5106461115	X	Toby Paul (OH)
R8	Model 3	67250-66		5106461136	X	Cage
R8	Model 3	67250-66		5114464687	X	Eddie Westfall
R8	Model 3	67250-66		5126468107	X	Canton Office
R8	Model 3	67250-66		5126468122	X	Rob Lynch
R8	Model 3	67250-66		5139473035	X	Cage
R8	Model 3	67250-66		5152479868	X	Kirk Wilson
R8	Model 3	67250-66		5215485600	X	Cage
R8	Model 3	67250-66		5216485800	X	Cage with unit 5026435652
R8	Model 3	67250-66		5216485819	X	Jarrett Lantz
R8	Model 3	67250-66		5220487390	X	Fredricksburg (Office)
R8	Model 3	67250-66		5220487415	X	Justin Gordon
R8	Model 3	67250-66		5220487748	X	Cage
R8	Model 3	87208-66		5225490460	X	Andrew Middleton
R8	Model 3	67250-66		5226491568	X	Bud Bargy (MD)
R8	Model 3	67250-66		5235494511	X	Bryan Hudkins
R8	Model 3	67250-66		5235494513	X	Cage
R8	Model 3	67250-66		5242498554	X	Oakland (Spare)

R8	Model 3		5243499198	X	David Pritt
R8	Model 3	67250-66	5243499233	X	Jason Garrett
R8	Model 3	67250-66	5243499332	X	Toby Paul (OH)
R8	Model 3		5247417232	X	Joseph Lambert (BE)
R8	Model 3	67250-66	5251421574	X	Cage
R8	Model 3	67250-66	5251421600	X	Cage with unit 49443404641
R8	Model 3		5316433917	x	Phil Odonell (BE)
R8	Model 4		5316434005	x	Cage
R8	Model 3	67250-66	5324438795	x	A. Stull (BE)
R8	Model 3		5335442476	x	Mark W
R8	Model 3		5133470499	x	?????? @ Work Station
R8	Model 4		5220487625	x	David Boyd (VA)
R8	Model 4		5316433917	X	Charleston (Office)
R8	Model 4		5316434313	X	Tyler Riffle
R8	Model 4		5329440601	X	Cage
R8	Model 4		5410457626	X	?????? @ Work Station
R8	Model 4		5411458728	X	Cage
R8	Model 4		5414461761	X	Mark Gallagher (MD)
R8	Model 4		5414461809	X	Mark Gallagher (MD)
R8	Model 4		5414461814	X	Josh Kniceley
R8	Model 4		5414461821	X	Cage
R8	Model 4		5414461847	X	(Mac. Fullmer)@ Work Station
R8	Model 4		5414461849	X	Drake Levo
R8	Model 3		5414462256	No Warranty	Joe Dodson (VA)
R8	Model 4		5414462260	NO WARRANTY	Chris DeFino (PA)
R8	Model 4		5423467764	x	Gregg Goodwin
R8	Model 4		5433475877	x	Josh Oyler (OH)
R8		67250-66	5220487626	NO WARRANTY	Fredricksburg David Boyd
R8	Model 3	67250-66	5215485743	NO WARRANTY	Found in the Cage 7/29/15
R8	Model 4		5329440537	NO WARRANTY	Andy Stull
				Updated w/5.01 Version	
				Not on Warranty Sheet	
				On Warranty Sheet &	Needs Updated w/ 5.01
				No Warranty	

FirmWare	Insured	Warranty Exp. Apr. 15
5.01		X
5.01	x	X
5.01	x	X
5.01	x	X
5.01	x	X
Will not Connect 5.01	x	X
	x	16-Apr
5.01	x	X
5.01	x	X
5.01	X	X
BOTH 5.01	X	X
5.01		
5.01	X	16-Apr
5.01	X	X
	X	Radio Bad, 4-9-15
5.01		16-Apr
	X	No Warranty
5.01	X	X
5.01		16-Apr
5.01	X	16-Apr
	X	16-Apr
5.01	X	X
	X	X
5.01	x	X
5.01	x	16-Apr
		X
5.01	x	16-Apr
5.01		X
5.01		16-Apr
5.01		X
5.01		X
		13-Oct
		X
5.01		X
5.01		X
5.01		16-Apr
		16-Apr
5.01		X
5.01		X
		16-Apr

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Thrasher Equipment Matrix						
GNSS Equipment						
Description	Model		Options	SN	WARRANTY SHEET	Assignment
Trimble GNSS	R10	001-60		5242498180	x	Cage
Trimble GNSS	R10	001-60		5252422269	x	Cage
Trimble GNSS	R10	001-60		5302423131	x	Joseph Lowther
Trimble GNSS	R10	001-60		5302423142	x	Josh Oyler (OH)
Trimble GNSS	R10	001-60		5308426305	x	David Boyd (VA)
Trimble GNSS	R10	001-60	x	5308426368	x	Jarrett Lantz
Trimble GNSS	R10	001-60		5308426549	x	Tyler Riffle
Trimble GNSS	R10	001-60		5308426566	x	Chris Baker
Trimble GNSS	R10	001-60		5311428820	x	Johnathon Dennison
Trimble GNSS	R10	001-60		5312430283	x	Scott Whitlock
Trimble GNSS	R10	001-60		5312430350	x	Cage
Trimble GNSS	R10	001-60		5312430356	x	Bryan Hudkins
Trimble GNSS	R10	001-60		5313432348	x	Cage
Trimble GNSS	R10	001-60		5313432363	x	Mike Walker (OH)
Trimble GNSS	R10	001-60		5313432433	x	Justin Gordon
Trimble GNSS	R10	001-60		5320436612	x	Mapping Dept.
Trimble GNSS	R10	001-60		5320436619	x	Andrew Middleton
Trimble GNSS	R10	001-60		5320436622	x	Cage
Trimble GNSS	R10	001-60		5322437945	x	Kirk Wilson
Trimble GNSS	R10	001-60		5324438746	x	Eddie Westfall
Trimble GNSS	R10	001-60		5324438761	x	Cage
Trimble GNSS	R10	001-60		5324438795	x	Andy Stull
Trimble GNSS	R10	001-60		5325438838	x	Jason Garrett
Trimble GNSS	R10	001-60		5335442476	x	Mikey Brown (CH)
Trimble GNSS	R10	001-60		5336442889	x	J. Dix (BE)
Trimble GNSS	R10	001-60		5408454953	x	(Mac. Fullmer) @ Work Station
Trimble GNSS	R10	001-60		5408454957	x	Aaron Rawe
Trimble GNSS	R10	001-60		5410456414	x	Scott Whitlock (BE)
Trimble GNSS	R10	001-60		5410458424	x	Joseph Lambert
Trimble GNSS	R10	001-60		5411458547	x	Drake Levo
Trimble GNSS	R10	001-60		5412460054	x	Bud Bargy (MD)
Trimble GNSS	R10	001-60		5413460397	x	Josh Kniceley
Trimble GNSS	R10	001-60		5413460399	x	John Leary
Trimble GNSS	R10	001-60		5413460447	x	Phil Odonell (BE) (Box in Cage)
Trimble GNSS	R10	001-60		5413460789	x	Cage (Adam Cooper)
Trimble GNSS	R10	001-60		5413460795	x	Fredricksburg (Office)
Trimble GNSS	R10	001-60		5430473543	NOT ON WARRANTY	Joe Dodson (VA)
Trimble GNSS	R10	001-60		5242498177	NOT ON WARRANTY	Chris DeFino (PA)
Trimble GNSS	R10	001-60		5435477234	x	Gregg Goodwin

Trimble GNSS	R10	001-60	5406453896	x	Brant Busdecker
Trimble GNSS	R10	001-60	5439479452	x	James Howes
Trimble GNSS	R10	001-60	5412459660	NOT ON WARRANTY	Cage
Trimble GNSS	R10	001-60	5413460395	NOT ON WARRANTY	Cage
Trimble GNSS	R10	001-60	5408454968	NOT ON WARRANTY	David Pritt
				Updated w / 5.01 Version	
				Not on Warranty Sheet	
				On Warranty Sheet &	Needs Updated w/ 5.01
				Out For Repair &	Needs Updated w/ 5.01
				No Warranty	

New Number		Warranty Exp. Ap14
	5.01	
	5.01	
	5.01	
OMNI STAR		16-Apr
OMNI STAR		14-Aug
	5.01	16-Apr
	5.01	
	5.01	
		16-Apr
		16-Apr
OMNI STAR	5.01	BROKEN BATTERY DOOR
	5.01	
	5.01	
		16-Apr
	5.01	
	5.01	
	5.01	16-Apr
	5.01	
	5.01	
	5.01	16-Apr
	5.01	16-Apr
RENTAL		16-Apr
	5.01	16-Apr
		16-Apr
		16-Apr
		16-Apr
		16-Apr
	5.01	16-Apr
	5.01	16-Apr
OWN		
OWN		
		15-May
		16-Apr
	5.01	16-Apr
	5.01	16-Apr
NO HEAD ???		15-Jun
	5.01	16-Apr
		15-Jun
	5.01	

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Thrasher Equipment Matrix									
GNSS Equipment									
Description	Make	Model	Options	SN	Assignment	Standard Software	Additional Software	Warranty Exp. Apr. 2015	Updated
Data Collector	Trimble	TSC3		RS1TC38161	Allegra		Roads, Robotic		
Data Collector	Trimble	TSC3		RS01C08772	Eddie Westfall	GS, AS,S,EM,IS,F,I,MP		x	26-Jan-15
Data Collector	Trimble	TSC3		RS01C08837	SPAR-Aaron's Office	GS, AS,S,EM,IS,F,I,MP	Roads, Utility	x	14-Jan-15
Data Collector	Trimble	TSC3		RS08C00824	James Howes		Radio, Utility	x	16-Apr-15
Data Collector	Trimble	TSC3		RS08C01028	Beckley Office (Bob Ruffner)		Radio, Utility	x	16-Apr-15
Data Collector	Trimble	TSC3		RS0AC02360	Rob Lynch	GS, AS,S,EM,IS,F,I,MP	Radio, Utility	x	16-Apr-15
Data Collector	Trimble	TSC3		RS0AC02944	Toby Paul (OH)			x	
Data Collector	Trimble	TSC3		RS0BC03732	Kirk Wilson		Road, Tunnel, Radio	x	
Data Collector	Trimble	TSC3	x	RS0BC03973	Cage			x	
Data Collector	Trimble	TSC3		RS0BC04145	Canton Office (Ohio)	GS, AS,S,EM,IS,F,I,MP	Radio, Utility	x	
Data Collector	Trimble	TSC3		RS0DC06243	Bud Bary			x	16-Apr-15
Data Collector	Trimble	TSC3		RS0EC06626	Beckley Office (Bob Ruffner)	GS, AS,S,EM,IS,F,I,MP		x	16-Apr-15
Data Collector	Trimble	TSC3		RS0EC06691	Justin Gordon	GS, AS,S,EM,IS,F,I,MP		x	27-Feb-15
Data Collector	Trimble	TSC3	x	RS0EC06724	Cage			x	
Data Collector	Trimble	TSC3		RS0FC07768	Scott Whitlock	GS, AS,S,EM,IS,F,I,MP		x	16-Apr-15
Data Collector	Trimble	TSC3		RS0PC13041	Gregg Goodwin	GS, AS,S,EM,IS,F,I,MP	Utility	x	
Data Collector	Trimble	TSC3		RS0TC15365	Fredricksburg Office (VA)			x	
Data Collector	Trimble	TSC3		RS0UC15829	Jarrett Lantz	GS, AS,S,EM,IS,F,I,MP	Radio	x	
Data Collector	Trimble	TSC3		RS13C18946	Fredricksburg Office (VA)	GS, AS,S,EM,IS,F,I,MP		x	
Data Collector	Trimble	TSC3		RS13C19156	Cage (Adam Cooper)	GS, AS,S,EM,IS,F,I,MP		x	
Data Collector	Trimble	TSC3		RS13C19195	Cage	GS, AS,S,EM,IS,F,I,MP		x	
Data Collector	Trimble	TSC3		RS13C19341	Bryan Hudkins			x	
Data Collector	Trimble	TSC3		RS16C20828	Kirk Wilson			x	
Data Collector	Trimble	TSC3		RS17C21230	Oakland (Spare)			x	
Data Collector	Trimble	TSC3		RS17C22069	VX Gregg Goodwin	GS, AS,S,EM,IS,F,I,MP		x	27-Feb-15
Data Collector	Trimble	TSC3		RS18C22272	Fredericksburg Office (Spare)	GS, AS,S,EM,IS,F,I,MP		x	
Data Collector	Trimble	TSC3		RS18C22597	Joseph Lowther	GS, AS,S,EM,IS,F,I,MP	Radio	x	13-Mar-15
Data Collector	Trimble	TSC3		RS18C22634	Cage	GS, AS,S,EM,IS,F,I,MP	Radio, Utility	x	
Data Collector	Trimble	TSC3		RS1JC30814	Johnathon Dennison	GS, AS,S,EM,IS,F,I,MP	Radio, Utility	x	4-Feb-15
Data Collector	Trimble	TSC3	x	RS1JC30923	Cage	GS, AS,S,EM,IS,F,I,MP	Radio, Utility, Roads	x	
Data Collector	Trimble	TSC3	x	RS1KC31944	Cage	GS, AS,S,EM,IS,F,I,MP	Utility, Roads	x	
Data Collector	Trimble	TSC3		RS1QC36477	Cage			x	
Data Collector	Trimble	TSC3		RS1QC36571	Josh Knicely	GS, AS,S,EM,IS,F,I,MP	Roads	x	
Data Collector	Trimble	TSC3		RS1QC36805	Cage	GS, AS,S,EM,IS,F,I,MP		x	11-Feb-15
Data Collector	Trimble			RS1RC37114	Mapping Dept.	GS, AS,S,EM,IS,MP		x	17-Mar-15
Data Collector	Trimble			RS1RC37355	J. Dix (BE)			x	
Data Collector	Trimble	TSC3	x	RS1TC38093	Cage	GS, AS,S,EM,IS,F,I,MP	Radio, Roads	x	14-Jan-15
Data Collector	Trimble	TSC3	x	RS1TC38272	Johnathon Dennison	GS, AS,S,EM,IS,F,I,MP	Radio, Roads	x	16-Apr-15
Data Collector	Trimble	TSC3	x	RS1TC38276	Andrew Middleton		5.01	x	
Data Collector	Trimble	TSC3		RS1TC38491	Mikey Brown (CH)			x	16-Apr-15
Data Collector	Trimble	TSC3		RS23C42041	Phil Odonell (BE)	GS, AS,S,EM,IS,F,I,MP		x	
Data Collector	Trimble	TSC3		RS26C43612	Aaron Rawe	GS, AS,S,EM,IS,F,I,MP	Radio, Roads	x	
Data Collector	Trimble			RS27C44085	David Pritt			x	16-Apr-15
Data Collector	Trimble			RS27C44156	Drake Levo			x	16-Apr-15
Data Collector	Trimble	TSC3		RS29C45516	David Boyd (VA)	GS, AS,S,EM,IS,F,I,MP		x	16-Apr-15
Data Collector	Trimble	TSC3		RS29C45637	Chris Baker	GS, AS,S,EM,IS,F,I,MP	Utility	x	
Data Collector	Trimble	TSC3		RS29C45781	Tyler Riffle			x	
Data Collector	Trimble	TSC3		RS28C46310	Drake Levo			x	

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Current Software Versions												
Access	Gen. Sur.	Eqt Man.	Acc. Sync	Settings	Market	EMA	Utility	Roads	Firmware			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3	1.06.0		5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3	1.06.0	2.60.141	5.01			
									5.01			
2014.1										5.01		
										5.01		
										5.01		
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3	1.05.7					
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3			5.01			
									5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3						
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3			5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3						
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3						
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.22	2.02.3		2.60.141				
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3			5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3			5.01			
									5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3			5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3						
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3						
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3						
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.22	2.02.3	1.06.0		5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.22	2.02.3	1.06.0	2.60.141	5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.22	2.02.3	1.06.0	2.60.141	5.01			
2013.2									5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3			5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3			5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3			5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3			5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.22	2.02.3			5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3			5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.22	2.02.3		2.60.141	5.01			
2014.01	2.40.86	2.01.26	1.70.96	2.40.86	1.00.1.16	2.01.77		2.40.86	5.01			
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3						
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3			5.01			
1.80.48												
2014.2 (7595)	2.60.141	2.02.1	1.90.152	2.60.141	1.00.1.20	2.02.3	1.06.0		5.01			
									5.01			

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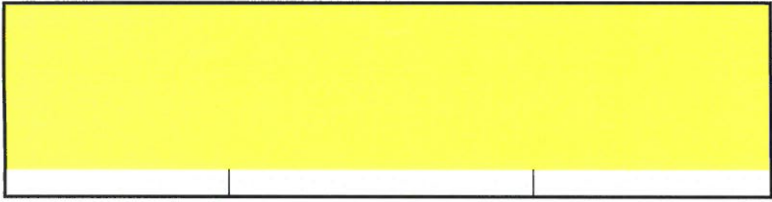
Thrasher Equipment Matrix						
GNSS Equipment						
Description	Model		Options	SN	WARRANTY SHEET 2015	Assignment
GEO-XR 6000	89100-80			5222418504	X	Cage
GEO-XR6000	89100-80			5222418551	X	David Boyd
GEO-XR6000	89100-80			5222418543	x	J.Pruett/Lowther's Office
GEO-XR6000	89100-80			5403438483	x	J.Dennison/Lowther's Office
GEO-XR6000	89100-80			5403438485	x	Fredricksburg Office
GEO-XR6000	89100-80			5403438524	x	Cage
GEO-XR6000	89100-80			5403438682	X	Cage
GEO-XR6000	89100-80			5403438487	X	James Howes
GEO-XH 6000	88950-00			5112401764	X	Environmental
GEO-XH	88950-00			5126404990	X	Beckley Office Inspections
GEO-XH	88950-00			5126404991	X	ENVIRONMENTAL
GEO-XH				5207413191	X	CHARLESTON
GEO-XH				5126404971	X	Inspections
TRIMBLE GEO 7X	88180-04			5351437884	X	BRIDGEPORT ENVIROMENTAL
TRIMBLE GEO 7X	88180-04			5405439005	X	BRIDGEPORT ENVIROMENTAL
Seafloor	Sonarmite	MILSPEC		SMIL060513		Cage
Intuicom	RTK Bridge			4076550		Cage

Antenna	SN	Warranty Exp. Ap14
Zephyr Model 2 5.01	1212118286	X
Zephyr Model 2	1912118603	X
Zephyr Model 2 5.01		
Zephyr Model 2	2212756499	
Zephyr Model 2	2012756928	
Zephyr Model 2	8000011256	
Zephyr Model 2 5.01		
TEI-GIS-1		X
TEI-GIS-2		X
7/14/2014		15-Mar
		15-Mar
	x	

Thrasher Equipment Matrix						
GNSS Equipment						
Description	Model		Options	SN	WARRANTY SHEET	Assignment
Radio Amps						
Trimble	TDL 450H	74450-65		11231847	X	Jason Garrett
Trimble	TDL 450H	74450-65		12203925	X	Jarrett Lantz
Trimble	TDL 450H			12203947	X	Bryan Hudkins
Trimble	TDL 450H	74450-65		12260006	X	Josh Knicely
Trimble	TDL 450H	74450-65		12312385	X	Josh Oyler (OH)
Trimble	TDL 450H	74450-65		12312619		Found (In Fire)
Trimble	TDL 450H	74450-65		12466214	X	Jonathan Denison
Trimble	TDL 450H	74450-65		12466552	X	Mike Walker (OH)
Trimble	TDL 450H	74450-65		12504223	X	James Howes
Trimble	TDL 450H			12504347	X	Justin Gordon
Trimble	TDL 450H	74450-65		12504390	X	Chris Baker
Trimble	TDL 450H	74450-65		12506720	X	David Boyd (VA)
Trimble	TDL 450H	74450-65		12506762	X	Mark Gallagher
Trimble	TDL 450H			12506942	X	John Leary
Trimble	TDL 450H			12506954		Tyler Riffle
Trimble	TDL 450H			12507066	X	Mikey Brown (CH)
Trimble	TDL 450H			12507159	X	Eddie Westfall
Trimble	TDL 450H	74450-65		12507172	X	Cage
Trimble	TDL 450H	7445-65		12518338	X	Cage
Trimble	TDL 450H			12518646	X	Kirk Wilson
Trimble	TDL 450H			12518904	X	Fredricksburg Office (VA)
Trimble	TDL 450H			13031155	X	Drake Levo
Trimble	TDL 450H			13031212	X	Cage
Trimble	TDL 450H			14049168	X	Goodwin
Trimble	TDL 450H			14049169	X	Cage
Trimble	TDL 450H			14332181	X	Chris DeFino
Trimble	TDL 450H			14332184	X	Joe Dodson (VA)
Trimble	TDL 450H			14332186	X	Andrew Middleton
Trimble	trimmark3			4438138264		Cage
Trimble	TDL 450H			12518739		Andy Stull
Trimble	HPB-450H	PDL4535		09085126		Cage
Trimble	HPB-450H	PDL4535		09085126		Cage
Trimble	HPB-450H	PDL4535		09366322		Cage
Trimble	HPB450	PDL4535		09366322		Cage
Trimble	HPB-450H	PDL4535		11126523	X	Cage
Trimble	HPB450	PDL4535		11126523	X	Cage
Trimble	HPB450	PDL4535		11147598	X	Cage
Trimble	HPB450	PDL4535		11200419	X	Cage
Trimble	HPB-450H	PDL4535		0931 6323		Cage
Trimble	HPB-450H	PDL4535		1024 8535		Cage

Trimble	HPB-450H	PDL4535	1049 5861			Cage
Trimble	HPB-450H	PDL4535	1114 7598		X	Cage
Trimble	HPB-450H	PDL4535	1116 6520			Cage
Trimble	HPB-450H	PDL4535	1120 0419		X	Cage
	HPB-450H	PDL4535				Cage
	HPB-450H	PDL4535				Cage
?	?	?		10302529	X	?

[illegible]



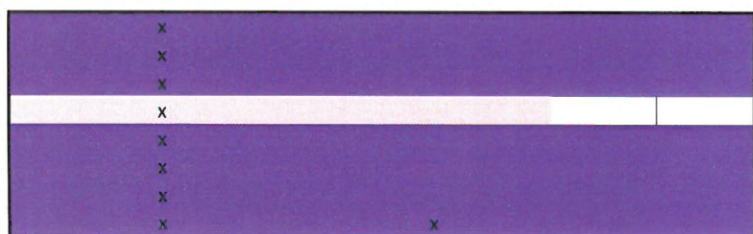
Thrasher Equipment Matrix					
GNSS Equipment					
<u>Description</u>	<u>Model</u>		<u>Options</u>	<u>SN</u>	<u>WARRANTY SHEET</u>
RADIO DETECTION UNITS					
<u>Description</u>	<u>Model</u>		<u>Options</u>	<u>SN</u>	<u>Assignment</u>
Radio Detection	RD4000	Receiver		11/4KRX-151624P0	FREDRICKSBURG
Radio Detection	RD4000	Receiver		11/4KRX-155088RE	K. Wilson
Radio Detection	RD4000T10	Transmitter		11/T10-I-6710TJ	FREDRICKSBURG
Radio Detection	RD4000T10	Transmitter		11/T10-I-6738UV	K. Wilson
SPAR 300	300RL1G1	dog bone		5107020075	Cage
SPAR 300	300RL1G1	dog bone		51070200076	Cage
SPAR 300	300RL1G1	dog bone		52070200066	Klayt
SPAR 300	300RL1G1	dog bone		52080400180	Cage
SPAR 300	300RL1G1	dog bone		52080400188	Cage
SPAR 300	300RL1G1	dog bone		52081200218	Jarrett Lantz
SPAR 300	300RL1G1	dog bone		52090400251	canton
Vivax	Metrotech	spar box		20003100167	Canton Office
Vivax	Metrotech	spar box		170712000218	J. Lantz
Vivax	Metrotech	spar box		171090600996	Cage
Vivax	Metrotech	spar box		171090600998	Klayt
Vivax	Metrotech	spar box		171090901741	Cage
	LASERTECH			65234	

[illegible]

Thrasher Equipment Matrix						
GNSS Equipment						
Description	Model		Warranty	SN	Assignment	Calibration Date Due
Leica	TC303	TS		681755	Cage	Sep-15
Leica	TC403	TS		756722	Cage	Jul-16
Leica	TC403	TS		757668	Bud Bargy (loaner)	Apr-16
Leica	TC405	TS		842490		
Leica	TC405	TS		843632	Kirk Wilson	Jun-16
Leica	TC405	TS		856203	Gregg Goodwin	Jun-16
Leica	TC703	TS		647516	Justin Gordon	Apr-16
Leica	TCR403	TS		698965	John Leary	Sep-15
Leica	TCR405	TS		698960	Out for Repair 8/28/15	Apr-16
Leica	TS-02	TS		1322649	Mikey Brown	Apr-15
Leica	TS-02	TS		1322703	Cage	Apr-16
Leica	TS-02	TS		1322739	Cage	Apr-16
Leica	TS-02	TS		1322785	Eddie Westfall	Jun-16
Nikon	Nivo 2M	TS	x	D093332	David Pritt	Dec-15
Nikon	Nivo 2M	TS	x	D093432	Chris DeFino (PA)	unk
Nikon	Nivo 2M	TS	x	D093438	Beckley Office (Bob Ruffner)	Jul-15
Nikon	Nivo 2M	TS	x	D093479	Cage	Aug-16
Nikon	Nivo 3M	TS	x	A150543	Tyler Riffle	Jun-15
Nikon	Nivo 3M	TS	x	A150754	Jimbo Howes	Apr-15
Nikon	Nivo 3M	TS	x	A151353	Cage	Sep-16
Nikon	Nivo 3M	TS	x	A151846	Phil Odonell (BE)	May-15
Nikon	Nivo 3M	TS	x	A152113	Joe Dodson (VA)	Sep-15
Nikon	Nivo 3M	TS	x	A152118	Cage	Jun-15
Nikon	Nivo 3M	TS	x	C120467	Out for Repair 8/28/15	
Nikon	Nivo 3m	TS	x	A152120	Drake Levo	May-15
Nikon	Nivo 3m	TS	x	A152091	Toby Paul (OH)	
Nikon	Nivo3m	TS	x	A151531	cage	unk
Nikon	Nivo3m	TS	x	A151527	Cage	unk
Nikon	Nivo3m	TS	x	A300613	Cage	
Nikon	Nivo 2m	TS	x	D093515	Cage	Aug-16
Nikon	Nivo 3M	TS	x	D002726	Mike Walker (OH)	May-15
Topcon	ES-103	TS		BR0437	Mark Gallegher	unk
Topcon	ES-103	TS		BR0442		
Topcon	ES-103	TS		GY0169	Mike Walker (OH)	
Topcon	ES-103	TS		GY0173	Cage "Suppose to go to Oakland"	
Topcon	GPT3005LW	TS		4J0692	David Boyd (VA)	unk
Topcon	GPT3005LW	TS		4J1296	Josh Oyler	Aug-15
Topcon	GTS-300	TS		NV0351	Fredricksburg Office (VA)	unk
Topcon	GPT3005LW	TS		4J0975	Beaver Office	May-14
Topcon	GPT3005LW	TS		4J1191	Joseph Lambert	14-Nov
Topcon	GPT3005LW	TS		4J1182	Scott Whitlock	16-May

Trimble	S3	Robotic	x	91410800	Jarrett Lantz	Aug-15
Trimble	S3	Robotic	x	91411109	Rob Lynch	May-15
Trimble	S3	Robotic	x	91411222	Jonathan Dennison	Sep-15
Trimble	S3	Robotic	x	91411253	Canton	
Trimble	S3	Robotic	x	91411678	Drake Levo	Aug-15
Trimble	S6	Robotic		93010708	Andy Stull	16-Jun
Trimble	S6	Robotic	x	93310269	Fredricksburg Office (VA)	Nov-15
Trimble	VX	Robotic	x	93710432	Gregg Goodwin	Aug-15

[illegible]



Thrasher Equipment Matrix					
Optical Instruments					
Description	Model	Make	Options	SN	Assignment
Level	DNA03	Leica		344903	Fredricksburg Office (VA)
Level	NA730	Leica		5083760	Mike Walker (OH)
Level	NA730	Leica		5368775	Josh Oyler (OH)
Level	NA730	Leica		5419284	CAGE
Level	AE-7	Nikon		249205	
Level	AP-3	Nikon		508124	Bryan Hudkins
Level	B21	SOKKIA		416773	Toby Paul
Level	AT-B3	Topcon		486363	
Level	AT-B3	Topcon		N01532	Jarrett Lantz
Level	AT-B3	Topcon		N01548	Aaron Rawe
Level	AT-B3	Topcon		N01549	Rob Lynch
Level	AT-B3	Topcon		N01551	Kirk Wilson
Level	AT-B3	Topcon		N03400	Mikey Brown (CH)
Level	AT-B3	Topcon		N03435	Scott Pacifico
Level	AT-B4	Topcon		N57833	Robert Stark
Level	AT-B4	Topcon		X57866	
Level	AT-F2	Topcon		R10812	Andrew Middleton
Level	AT-G3	Topcon		487284	Eddie Westfall
Level	AT-S3	Topcon		D177	Joseph Lambert
Level	AT-G3	Topcon		487284	
Level	DINI 12	Trimble		7000981	Rob Lynch
Level	AP8	Nikon		510890	James Howes
Level	AP8	Nikon		510886	Cage
Level	AP8	Nikon		510884	Jonathon Dennison
Level	AP8	Nikon		510786	Andrew Middleton

[illegible]

Thrasher Equipment Matrix						
GNSS Equipment						
Description	Model	Options	SN	WARRANTY SHEET	Assignment	
GEO-XR 6000	89100-80		5222418504	XX	Cage	
GEO-XR6000	89100-80		5222418532	XX	Office	
GEO-XR6000	89100-80		5222418543	XX	Office	
GEO-XR6000	89100-80	x	5222418551	XX	David Boyd (VA)	
GEO-XR6000	89100-80		5403438487		A. Middleton	
GEO-XR6000	89100-80		5403438483		D. Boyd (VA)	
GEO-XR6000	89100-80		5403438485		J. Howes	
GEO-XR6000	89100-80		5403438524		Cage	
GEO-XR6000	89100-80		5403438682		Cage	
GEO-XH 6000	88950-00		5112401784		Environmental	
GEO-XH	88950-00		5126404960	X	OFFICE	
GEO-XH	88950-00		5126404991	X	ENVIRONMENTAL	
GEO-XH			5207413191		CHARLESTON	
GEOXH	88950-00		5112401764			
ZEPHYR ANT	57970-00		5412118442			
TRIMBLE GEO 7X	88180-04		5351437884	IMEI:99000218986772	SERP	
TRIMBLE GEO 7X	88180-04		5405439005	IMEI:99000218986644	Cage	
Seafloor	Sonarmite	MILSPEC	SMIL060513		Cage	
Intuicom	RTK Bridge		4076550		Cage	
Metal Locators	GA-52Cx	Schonesdet	283814		Repair	
Metal Locators	GA-52Cx	Schonesdet	297703		RAWE	
Metal Locators	GA-52Cx	Schonesdet	304480		Fredricksburg	
Metal Locators	GA-52Cx	Schonesdet	306738		Oakland	
Metal Locators	GA-52Cx	Schonesdet	307127		B. Hudkins	
Metal Locators	GA-52Cx	Schonesdet	307129		Baker	
Metal Locators	GA-52Cx	Schonesdet	307131		C. DeFino (PA)	
Metal Locators	GA-52Cx	Schonesdet	307132		G. Goodwin	
Metal Locators	GA-52Cx	Schonesdet			A. Schrader	
Metal Locators	GA-52Cx	Schonesdet			J. Howes	
Metal Locators	GA-52Cx	Schonesdet			K. Wilson	
Metal Locators	GA-52Cx	Schonesdet			M. Gallagher	
Metal Locators	GA-52Cx	Schonesdet	313695		C. Whitacre (OH)	
Metal Locators	GA-52Cx	Schonesdet	313696		C. Mason (OH)	
Metal Locators	GA-52Cx	Schonesdet	313697		J. Dennison	
Metal Locators	GA-52Cx	Schonesdet	292571		S. Pacifico	

Metal Locators	GA-52Cx	Schonesdet	303672		M. Walker (OH)
Metal Locators	GA-52Cx	Schonesdet	292571		J. Oyler (OH)
Metal Locators	GA-52Cx	Schonesdet	313695		T. Paul (OH)
Metal Locators	GA-52Cx	Schonesdet	281600		L.Dillsworth (OH)
Clinometer	PM-5/SPC OPTI	Suunto	14281774		A. Cooper
Clinometer	PM-5/SPC OPTI	Suunto	14281772		OFFICE
Clinometer	PM-5/SPC OPTI	Suunto	14076328		R. Haveron
Clinometer	PM-5/SPC OPTI	Suunto	14281768		G. Goodwin
	TBC #		1964316479		
			TBC-SA-1867581229	EWLS-TBC-ADV-SW-RNST	FREDRICKSBURG
			TBC-SA-28320786	EWLS-TBC-ADV-SW-RNST	FREDRICKSBURG

[illegible]

	w/ leather case	
	w/ leather case	
	w/ leather case	
	w/ leather case	
EXPIRES MAY 2015	PASSWORD:8709680032665	
EXPIRES MAY 2015	PASSWORD: 314197375518906	

WV VRS - ROVER OPTIONS

RTK VRS(CMR)

VECTORS

ELEV MASK-10 DEGREES

PDOP MASK-6.0

ANTENNA

R-10 OR R-8 INTERNAL

MEASURE TO BOTTOM OF ANTENNA MOUNT ANTENNA HEIGHT- 6.56 6.562 or R10 Bottom of quick release

GNSS SIGNAL TRACKING-CHECK MARK GPS L2C AND GLONASS

ROVER RADIO

INTERNET CONNECTION GNSS CONTACT-WV VRS TAP ARROW TO PUT IN IP ADDRESS

Name WV VRS

Network connection V Wi-Fi,ActiveSync

NTRIP Configuration

Use RTX (TGIP) No

Use NTRIP Yes

Use NTRIP v1.0: No

Use proxy server:No

Connect directly to Mountpoint: No

NTRIP username:TE_1 thru 25 you choose

NTRIP password: 1234

IP address: 184.19.151.56

IP Port:2101

Send user Identity info: No

BASE OPTIONS

SURVEY TYPE-RTK&INFILL

BROADCAST FORMAT-CMRX

LOGGING DEVICE-RECEIVER

LOGGING INTERVAL-2SECS

ELV MAK-10 DEGREES

ANTENNA-R8GNSS/SPS88X

MEASURE TO BOTTOM OF ANTENNA MOUNT

GNSS SIGNAL TRACKING CHECK MARK GPS L2C AND GLONASS

BASE RADIO

TYPE-RECEIVER INTERNAL

SURVEY TYPE-FASTSTATIC

LOGGING DEVICE-CONTROLLER

LOGGING INTERVAL-1 SEC

ELEV MASK-10 DEGREES

PDOP MASK-6.0

ANTENNA-R-10 OR R-8 (DEPENDS ON UNIT)

MEASURE TO BOTT OF QUICK RELEASE OR ANTENNA MOUNT(AGAIN DEPENDS ON UNIT)

6.562

GNSS SIGNAL TRACKING- CHECK MARK GPS L2C AND GLONASS

ROVER OPTIONS

SURVEY TYPE-RTK BROADCAST FORMAT-CMRX

STATION INDEX ANY

SATELITE DIFF -OFF

ELEV MASK-10 DEGREES

PDOP MASK-6.0

ANTENNA TYPE -R10 INTERNAL OR R-8

MEASURE TO BOTT QUICK RELEASE OR BOTT ANTENNA MOUNT (DEPENDS ON UNIT)

6.562

GNSS SIGNAL TRACKING CHECK MARK L2C AND GLONASS

ROVER RADIO

RECEIVER INTERNAL

METHOD-TRIMBLE 450/900

BASE OPTIONS

SURVEY TYPE-RTK BROADCAST FORMAT-CMRX

STATION INDEX

ELEV MASK-10 DEGREES

ANTENNA

TYPE=R8GNSS/SPS88X

MEASURE TO BOTT ANTENNA MOUNT

GNSS SIGNAL TRACKING CHECK MARK GPS L2C AND GLONASS

BASE RADIO

TYPE-INTERNAL

METHOD-TRIMBLE450/900

ROVER OPTIONS

SURVEY TYPE-RTK BROADCAST-CMRX

BASE INDEX ANY

ELEV MASK 10 DEGREES

PDOP 6.0

ANTENNA- R-10 INTERNAL OR R-8 INTERNAL DEPENDING ON UNIT

MEASURE TO BOTT QUICK RELEASE OR ANTENNA MOUNT

GNSS SIGNAL TRACKING CHECK MARK L2C AND GLONASS

ROVER RADIO

TYPE-RECEIVER INTERNAL

METHOD-TRIMBLE 450/900

Topcon	GTS-605	TS	SS0120	Cage		
Trimble GNSS	R10	001-60	5220487390	Fredricksburg		
Trimble GNSS	90909-61		5320436678	CAGE		
Trimble GNSS	R10	001-60	5408454968	x		
Trimble GNSS	R10	001-60	5413460395	x		
Data Collector	Trimble	TSC3	RG15017909			
Data Collector	Trimble	TSC3	RS0CC05338			x
Data Collector	Trimble	TSC3	RS0QC13548	SPAR		
R8	Model 3	67250-66	5152479840		???	
R8	Model 3	67250-66	5215485599		???	
R8	Model 3	67250-66	5220487625		???	
R7	Model 4		4916K34898		Cage	
R8	Model 4		510xxxx1000		Cage	#####
Trimble	TDL 450H		12506954	X		
GEO-XR6000	89100-80		5222418532	X	Office	TEI-GEO-1
GEO-XR6000	89100-80		5222418543	X	Office	TEI-GEO-2
GEO-XR6000	89100-80		5403438487	X	Office	TEI-GEO-2

15-Mar
15-Jun

X
X

X

14-Aug
X
X
X

TYPE OF LIC	LICENSE NUMBER	ASSIGNED	WARRANTY
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HARDWARE	894393168	RAWE	X
	17661614	WOLF	X
	329878216	LOWTHER	X
	662117807	Canton	X
	1867581229	OGRIS	X
	1230549673	HOWES	X
	1311063987	MIDDLETON	X
	1964316479	ALLEGRA	X
	28320786	Richmond	X
	1296802387	DESK	X
	94440462	Semple	X
	1652903865	DESK	X

NETWORK	337112132242	HYMAN	
	371072472028	RUFFNER	X
	333112132242	OHIO	

LIMITED

ADVANCED

933396851	M.I.A
977651054	M.I.A

ADVANCED
ADVANCED



Calibration Protocol
DMC IIe 230 – 23522



Camera Calibration Certificate
No: DMC IIe 230 – 23522



For

Richard Crouse & Associates

467 Aviation Way
Frederick, MD 21701

USA

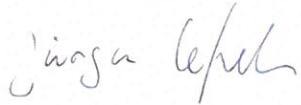
Camera: DMC IIe 230
Manufacturer: Z/I Imaging GmbH, D-73431 Aalen, Germany
Reference: PAN
Serial Number: 00123118 (PAN Head)
Date of Calibration: 20. November 2014
Date of Report: 26. November 2014
Number of Pages: 43

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: November 2014

Date of Certification: November 2014



Jürgen Hefe, Senior Software Developer

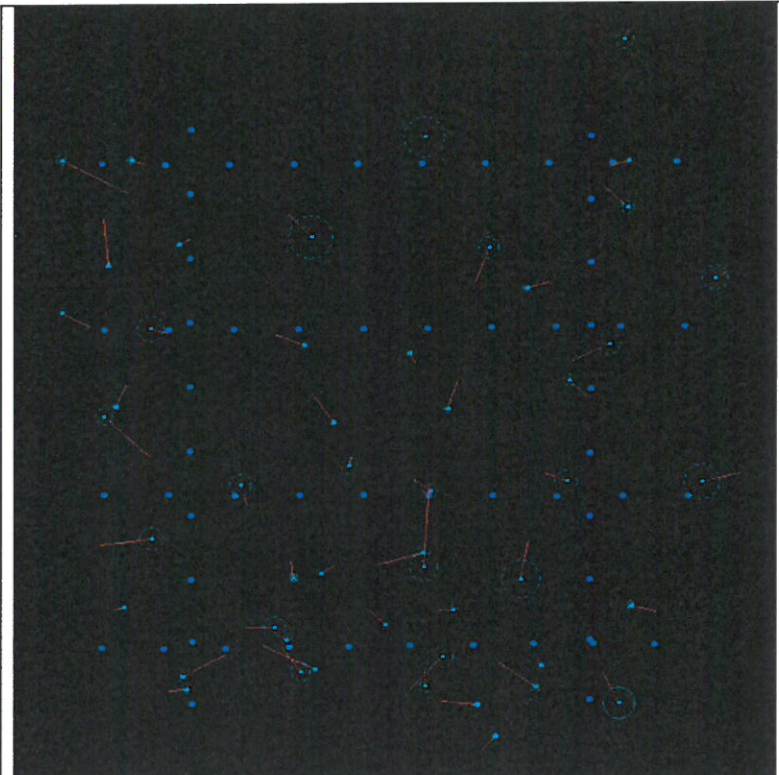
Dipl.Ing. Zoltan Poth, Workflow Support Engineer

Camera Serial Numbers and Burn-In flight

Camera Head	Serial Number	Calib. Date
PAN (reference)	00123118	20.11.2014
MS1 (NIR)	00118804	20.11.2014
MS2 (Blue)	00124736	20.11.2014
MS3 (Red)	00124693	20.11.2014
MS4 (Green)	00124739	20.11.2014

Burn-In flight performed: 03. October 2014

Test block configuration

	Photo Scale	1:9239.1
	Flying Height [m]	850 AGL
	Flying Altitude [m]	1300 AMSL
	Run-Spacing [m]	419.2
	Base-Length [m]	210.2
	Number of Exposures	55
	Side-lap [%]	70
	End-lap [%]	50
	Terrain Height [m]	450
	Number of strips	6
	Photos in one strip	2 x 9 N-S 4 x 9 W-E
	Photos Used	60
	Control Points Used	6
	Check Points Used	44
	GSD [cm]	5

Aerial triangulation statistic results:

Whole Block	Sigma relative :	1.903 μm
Whole Block	Sigma absolute :	1.689 μm

Photo Triangulation Results

Summary Stats

Photo Stats

Object Stats

Point Stats

Exterior Orientation

GPS

INS

Self-Calibration

Parameter	X/...	Y/Phi	Z/K...	XY
RMS Control	0.011	0.008	0.008	0.010
RMS Check	0.016	0.015	0.029	0.015
RMS Limits	0.030	0.030	0.050	
Max Ground Residual	0.016	0.018	0.012	
Residual Limits	0.050	0.050	0.070	
Mean Std Dev Object				
RMS Photo Position				
RMS Photo Attitude				
Mean Std Dev Photo Po...				
Mean Std Dev Photo Atti...				

Key Statistics

Sigma: 1.7 μm
RMS Image (x, y): 1.6, 1.3 μm
Number of iterations: 2
Degrees of Freedom: 46089
Gross Image Blunders: 0
Gross Control Blunders: 0
Image Blunders: 0

Solution Status: Solution Successful.

Current Count

Control Points Used: 6
Check Points Used: 44
Photos Used: 60
Photos Not Used: 0
Image Points Used: 31185

Cameras used: (1)

Camera Id	Len...	Grids
DMC_II_230	Off	Off

Project Settings

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

Options...

Control...

Groups...

Reports...

Exterior Orientation...

Compute

Apply

Reset

Graphics...

OK

Cancel

Help

The results of the aerial triangulation were generated with ImageStation Automatic Triangulation (ISAT), Version 2014, from Intergraph Z/I Imaging. 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. Z. Poth

26.11.2014

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	00123118	
Number of rows/columns [pixels]	15552 x 14144	
Pixel Size [μm]	5.600 x 5.600	
Image Size [mm]	87.0912 x 79.2064	
Focal Length [mm]	92.0064 mm	+ /- 0.002 mm
Principal Point [mm]	X= 0.0005 mm Y= -0.0032 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).

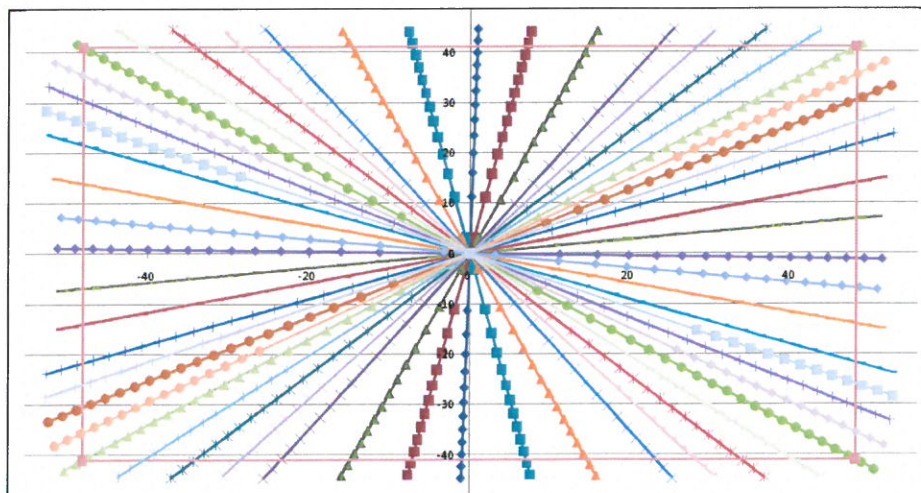


Figure 1: Light Target Pattern by Collimator

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.

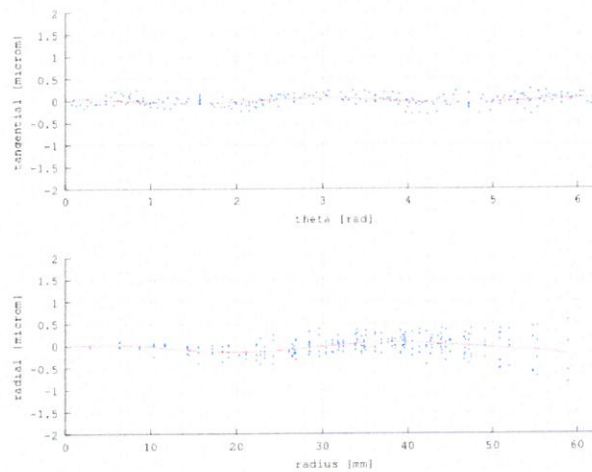


Figure 2: Tangential/Radial Distortion Residuals

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

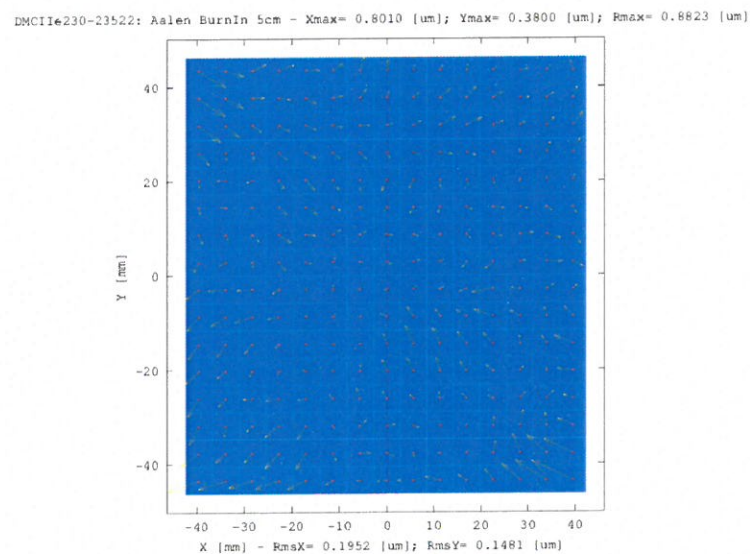


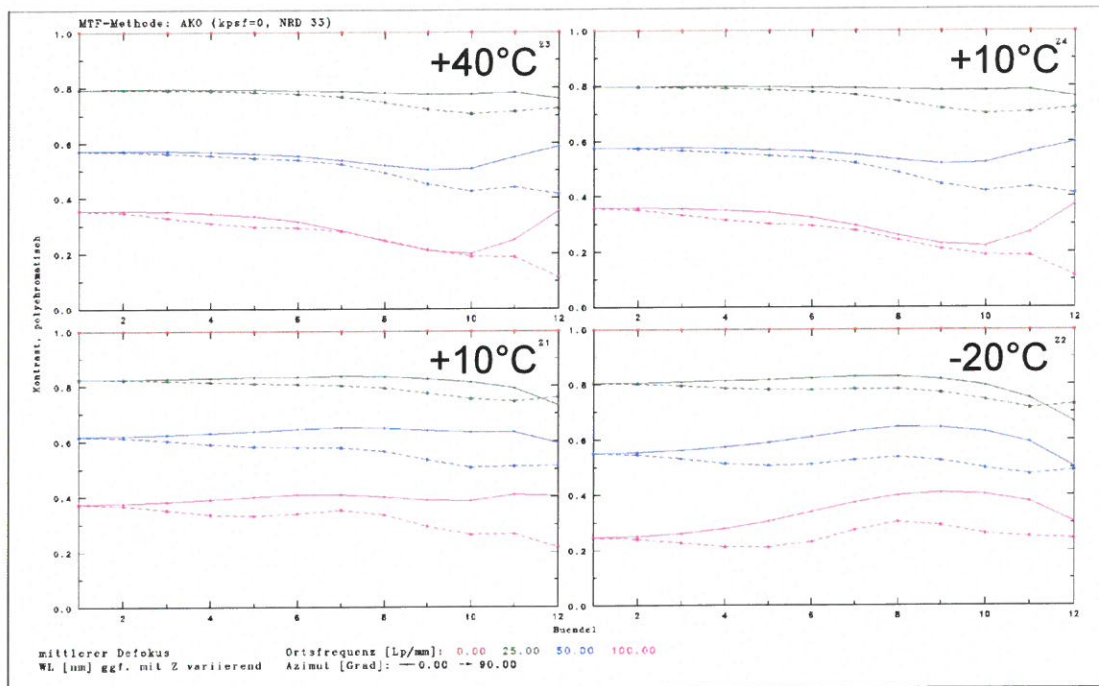
Figure 3: 2-D Image Residuals.

RMS < 0.20 um (maximum 0.88 microns)

Optical System

Modulation Transfer Function, MTF of PAN Camera (Reference)

DMC IIe PAN – MTF Polychromatic F/5.6 ; 92 mm – Temperature Stability

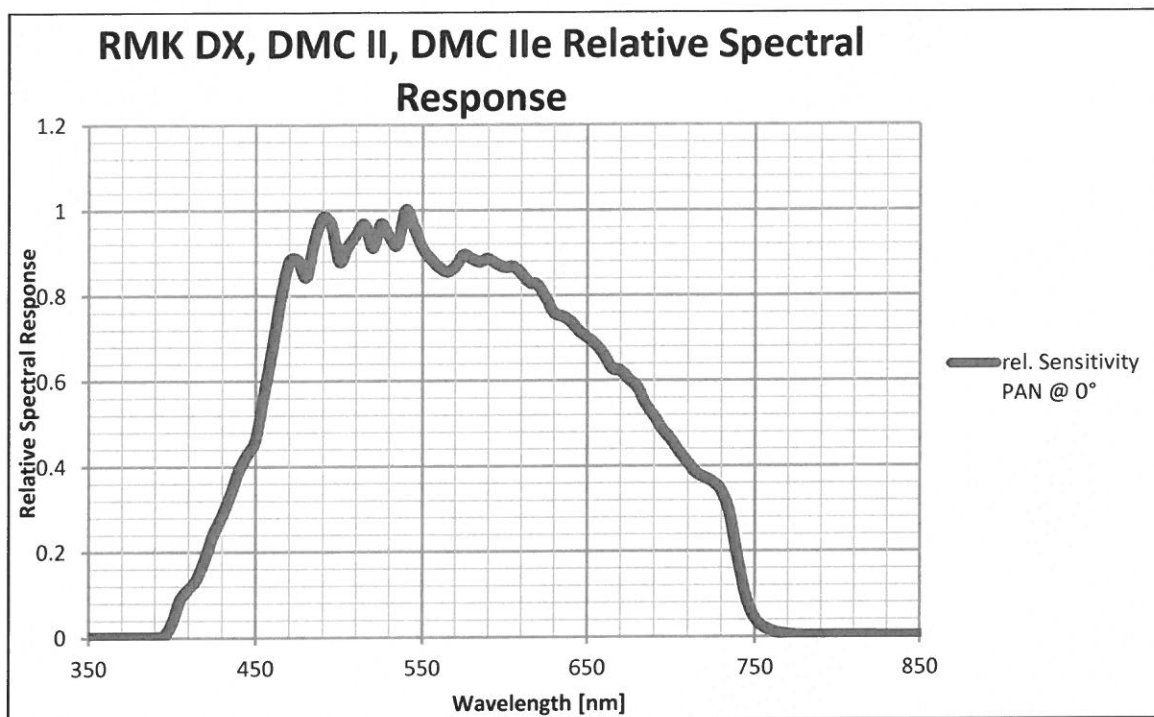


The MTF measurement is camera type specific and shows variation of the MTF within the specified temperature range.

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.

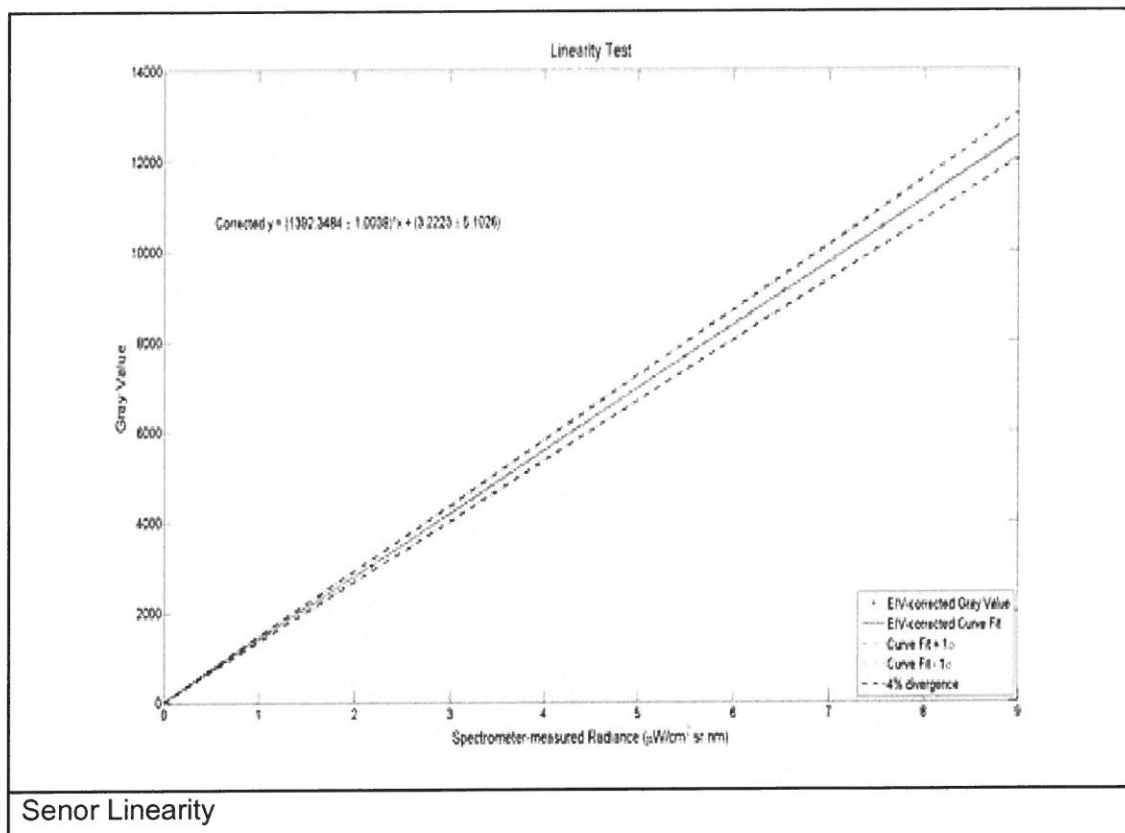
This is a camera type specific measurement.

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:



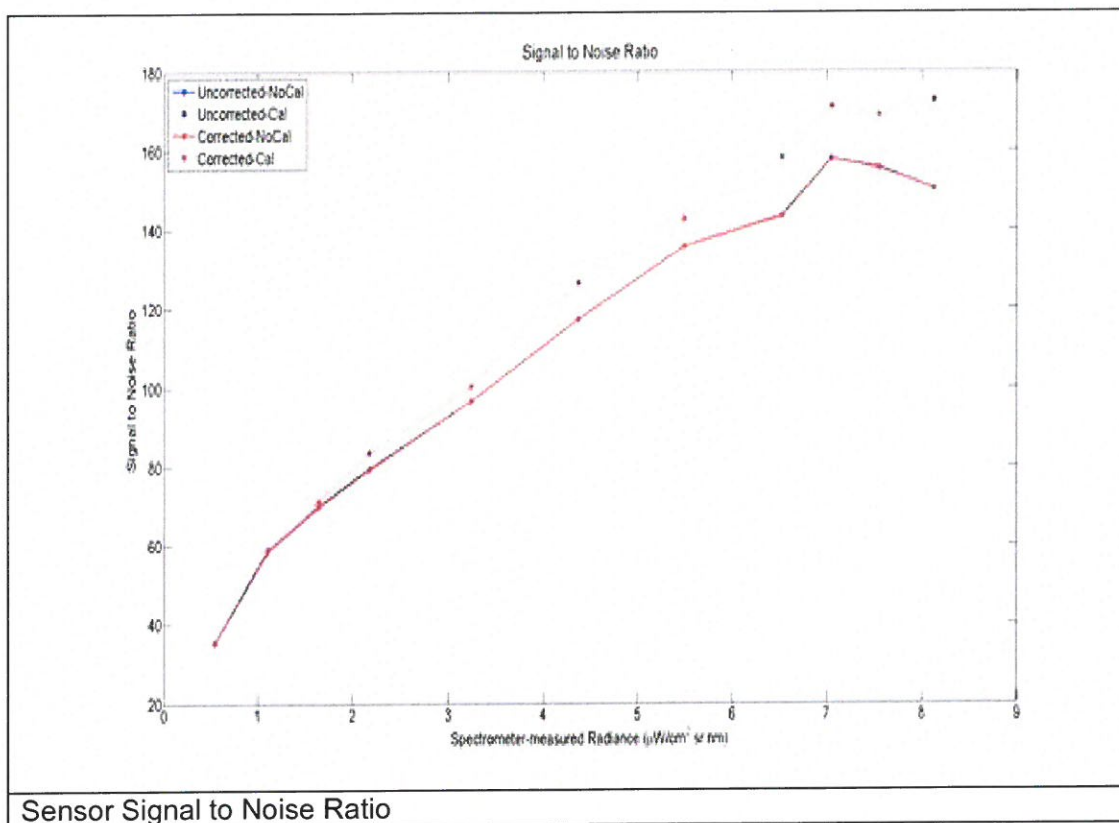
The deviation from the linearity is below 1%.

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.



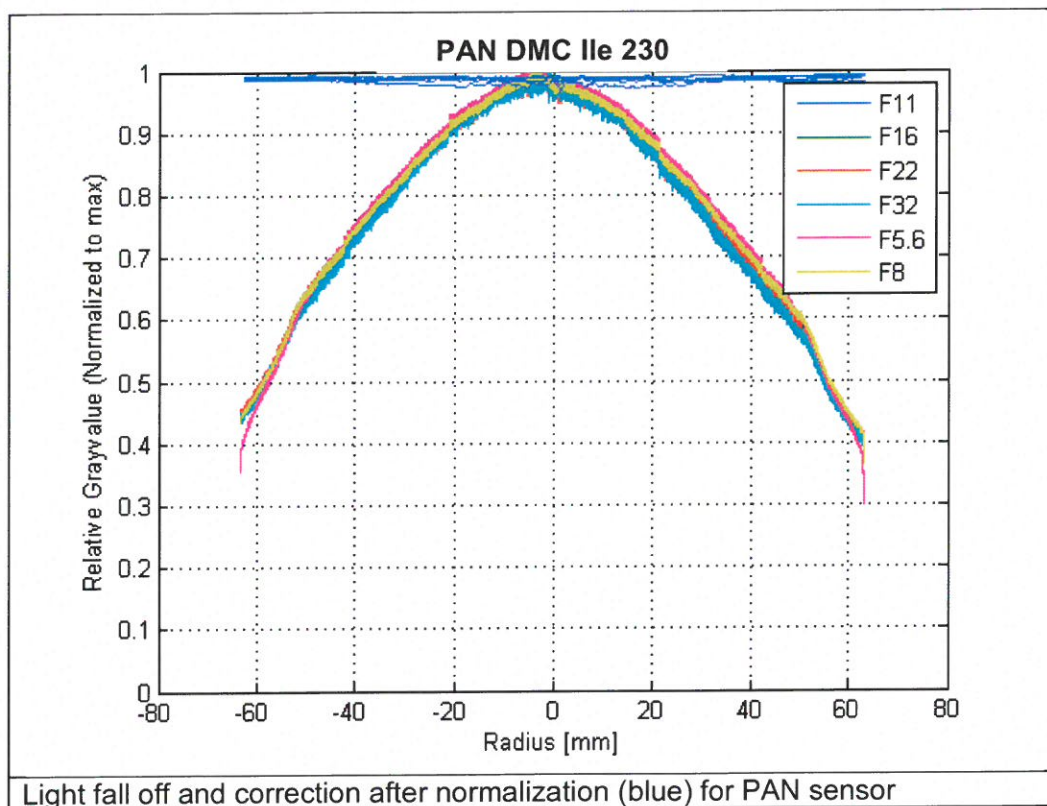
This is from a camera type specific calibration.

Radiometric Calibration

Aperture Correction (Reference)

Camera PAN (00123118)

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 (00123118)

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: 1407315066
 Date: 140806

Number of defect pixels: 118
 Number of defect clusters: 0
 Number of defect columns: 0

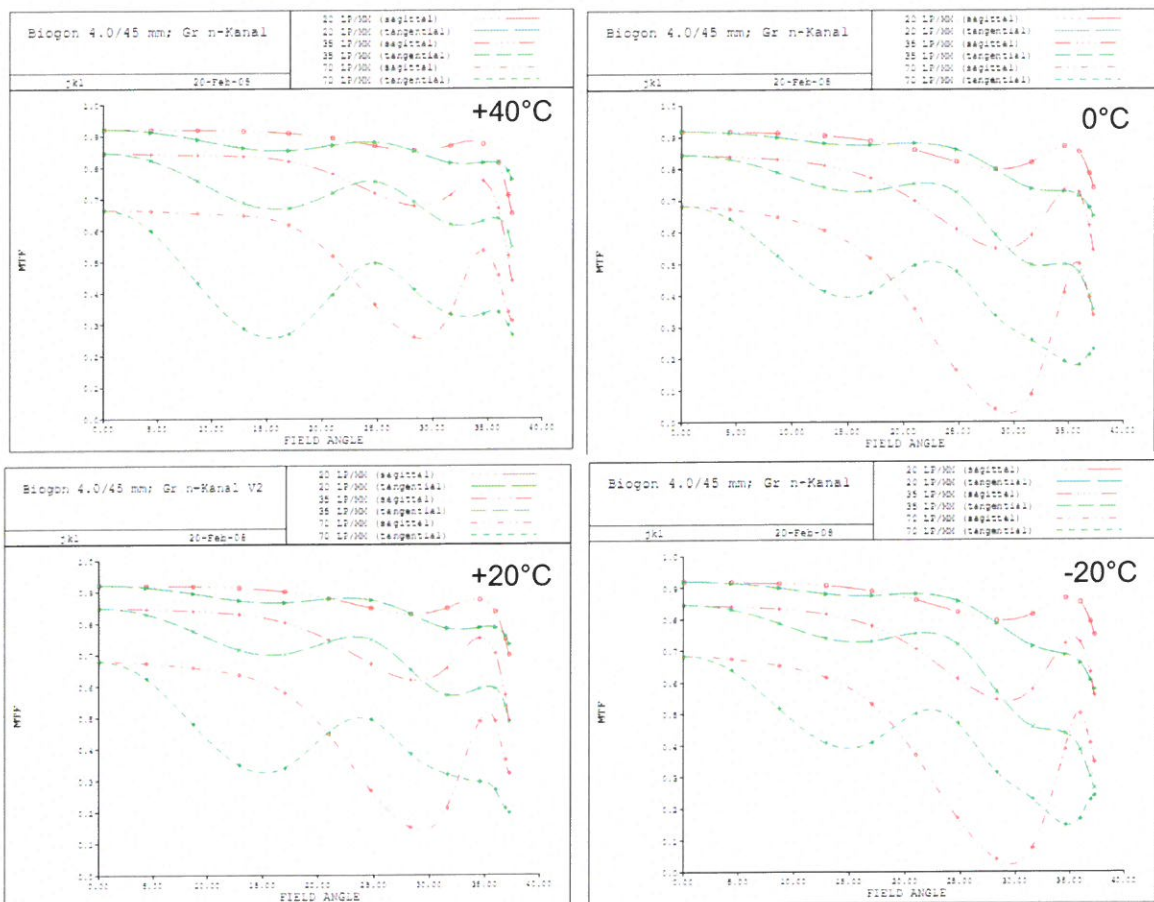
Nr	Row	Column
0	2159	93
1	2158	94
2	2159	94
3	2157	95
4	2158	95
5	2156	96
6	2157	96
7	2157	97
8	12217	131
9	12218	131
10	12219	131
11	12220	131
12	12217	132
13	12221	132
14	12217	133
15	12219	133
16	12221	133
17	12218	134
18	12219	134
19	12220	134
20	4621	193
21	12908	250
22	5697	293
23	11154	751
24	11155	751
25	11154	752
26	11155	752
27	11156	752
28	11157	752
29	11154	753
30	11155	753
31	11156	753
32	11157	753
33	11154	754
34	11155	754
35	11156	754
36	11157	754
37	11154	755
38	11155	755
39	11156	755
40	11154	756
41	11155	756
42	11154	757
43	11155	757
44	11156	758

45	9279	1269
46	5123	2255
47	5124	2255
48	5122	2256
49	5123	2256
50	5124	2256
51	5122	2257
52	5123	2257
53	5122	2258
54	4836	2639
55	7969	2678
56	68	3448
57	10630	3934
58	13817	4119
59	10453	5815
60	10455	5816
61	10452	5817
62	10455	5818
63	8091	7649
64	1181	8221
65	13832	8952
66	13832	8953
67	1927	9003
68	4099	9385
69	1795	9839
70	13968	10057
71	7581	10337
72	3857	11219
73	3857	11220
74	9	12030
75	10078	12177
76	284	12529
77	285	12529
78	284	12530
79	285	12530
80	12861	12642
81	720	12813
82	721	12813
83	718	12814
84	1764	13207
85	1766	13207
86	1763	13208
87	1764	13208
88	1765	13208
89	1766	13208
90	1763	13209
91	1764	13209
92	1765	13209
93	3946	13948
94	1468	14431
95	6574	15166
96	2366	15352
97	2366	15353
98	5173	15447
99	3110	15461
100	11876	15652
101	11876	15653
102	11876	15654
103	11875	15655
104	11875	15656
105	5	16119
106	25	16207
107	25	16208
108	594	16442
109	12112	16711
110	13160	16972
111	13604	16981
112	13605	16981
113	13605	16982
114	5025	17151
115	5025	17152
116	10037	17182
117	10036	17183
Defect Column RowStart ColumnStart RowEnd ColumnEnd		

Optical System

Modulation Transfer Function, MTF of Green camera

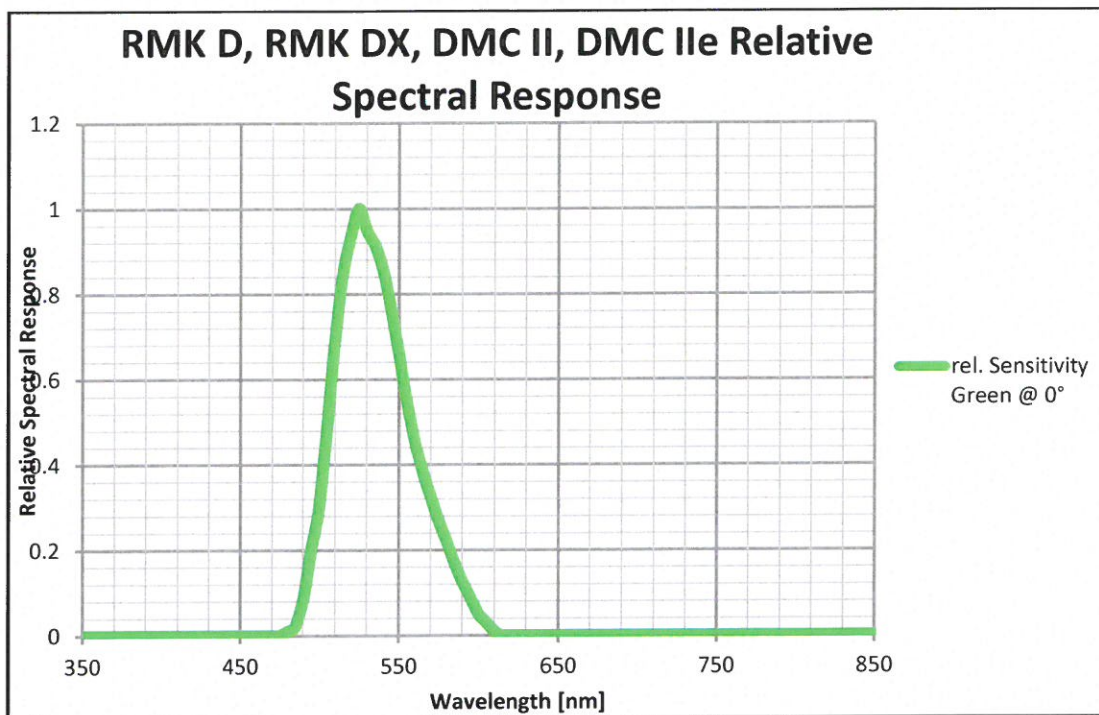
RMK D / RMK DX / DMC II / DMC IIe MS Green – MTF F/4.0 ; 45 mm– Temperature Stability



Radiometric Calibration

Sensitivity of Green camera

Spectral response curve of the single camera head.



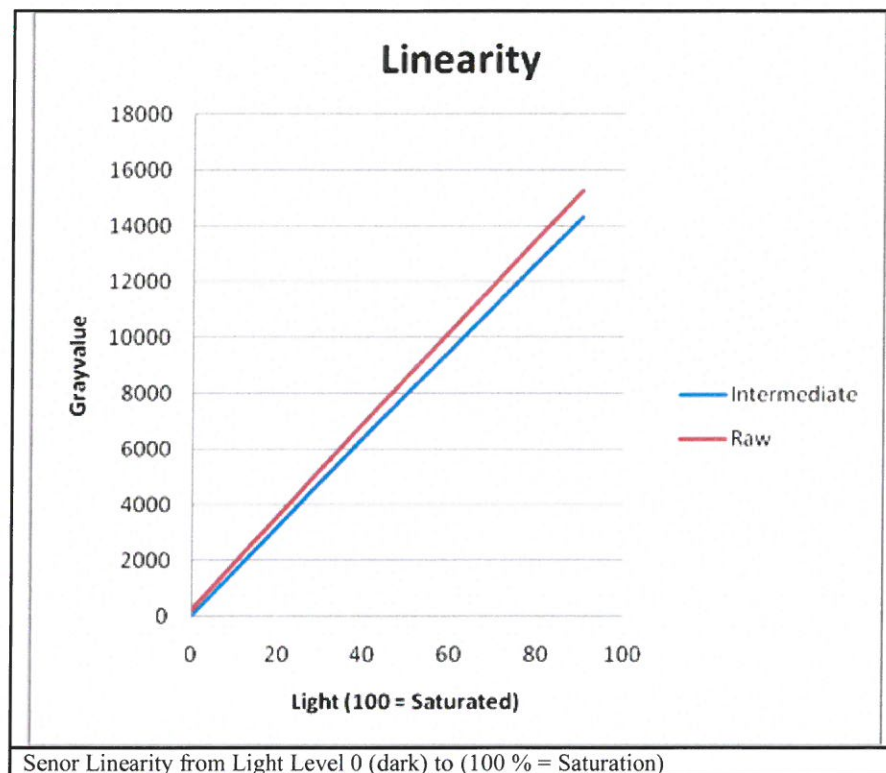
The sensitivity shows the spectral response curve of the single camera head including the optical system (optics, filter) and the sensor response. The DMC IIe 230 is calibrated with respect to the absolute spectrometer. This allows computing pixel radiance values from pixels digital numbers and is a 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.

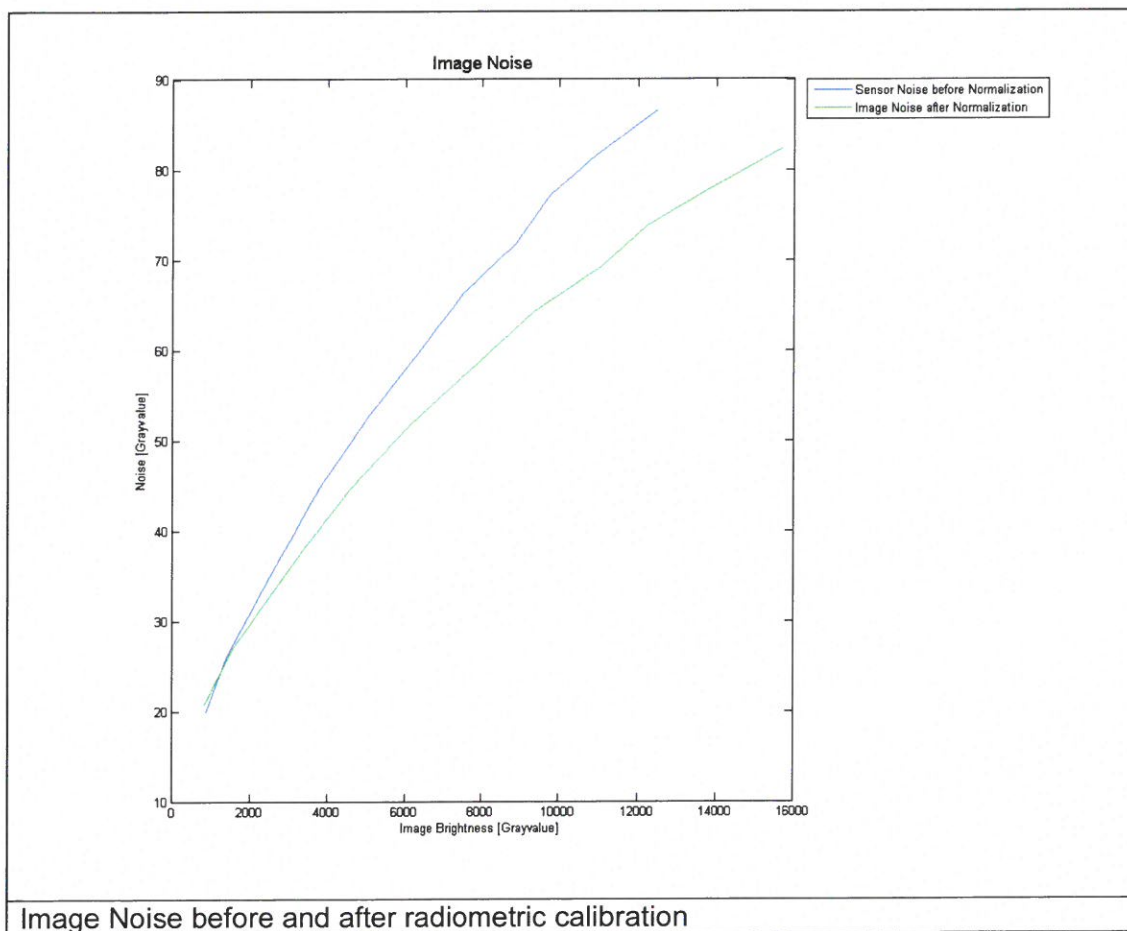


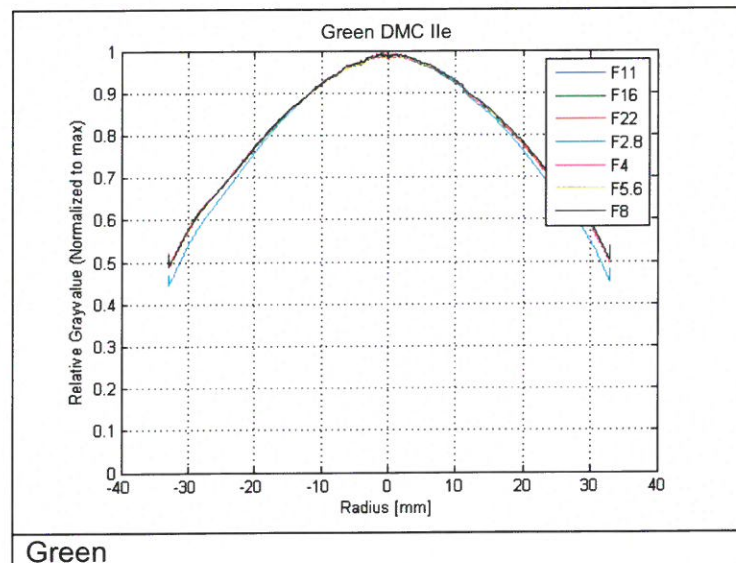
Image Noise before and after radiometric calibration

Radiometric Calibration

Aperture Correction

Green (00124739)

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 (00124739)

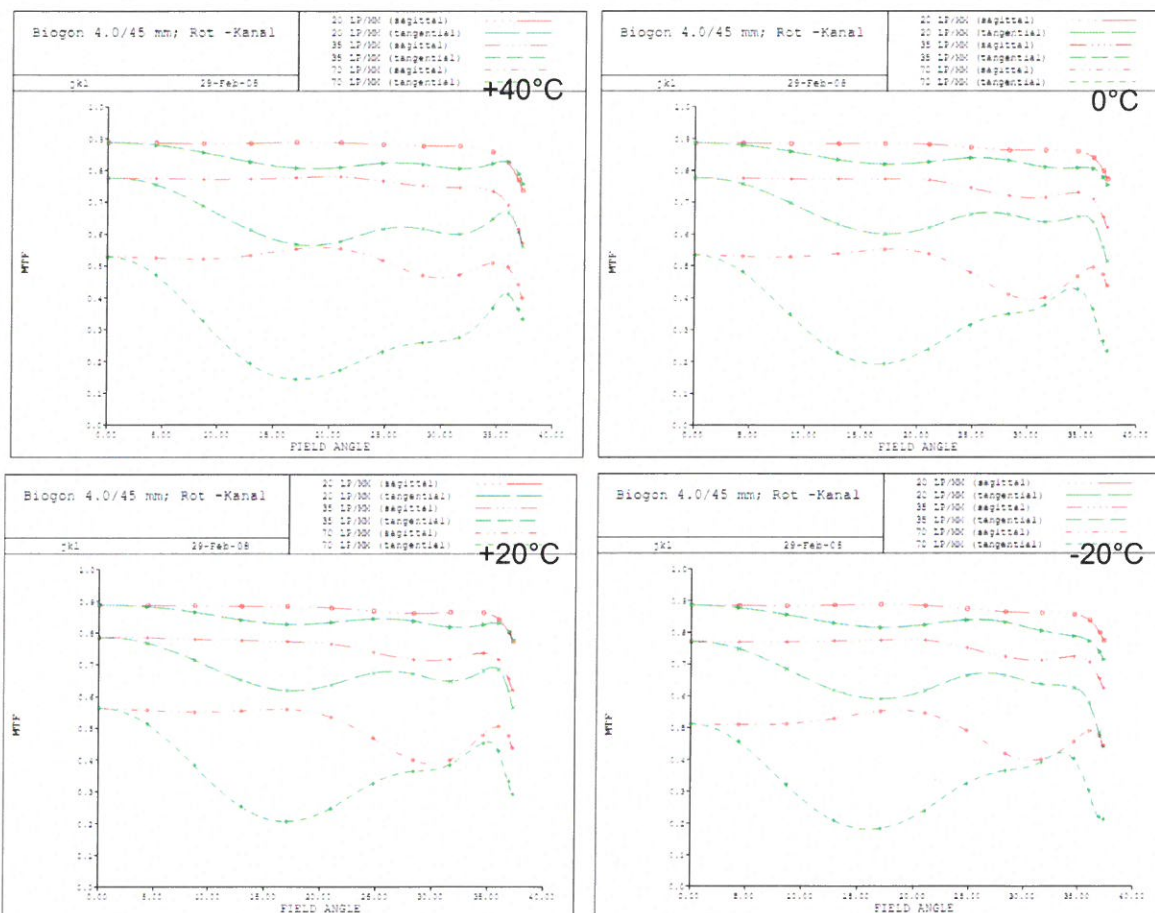
Defect pixels are detected during radiometric calibration and will be corrected during radiometric processing of the images. The quantity and cumulative percentage and specification of defects is described in Appendix "Defect Pixel Recognition".

Revision of calibration:	131073			
CCDRevision:	1			
Date Number:	1412091251			
Date:	140930			
Number of defect pixels:	2			
Number of defect clusters:	0			
Number of defect columns:	0			
Nr	Row	Column		
0	2233	1176		
1	4612	4473		
Defect Column	RowStart	ColumnStart	RowEnd	ColumnEnd

Optical System

Modulation Transfer Function, MTF of Red camera

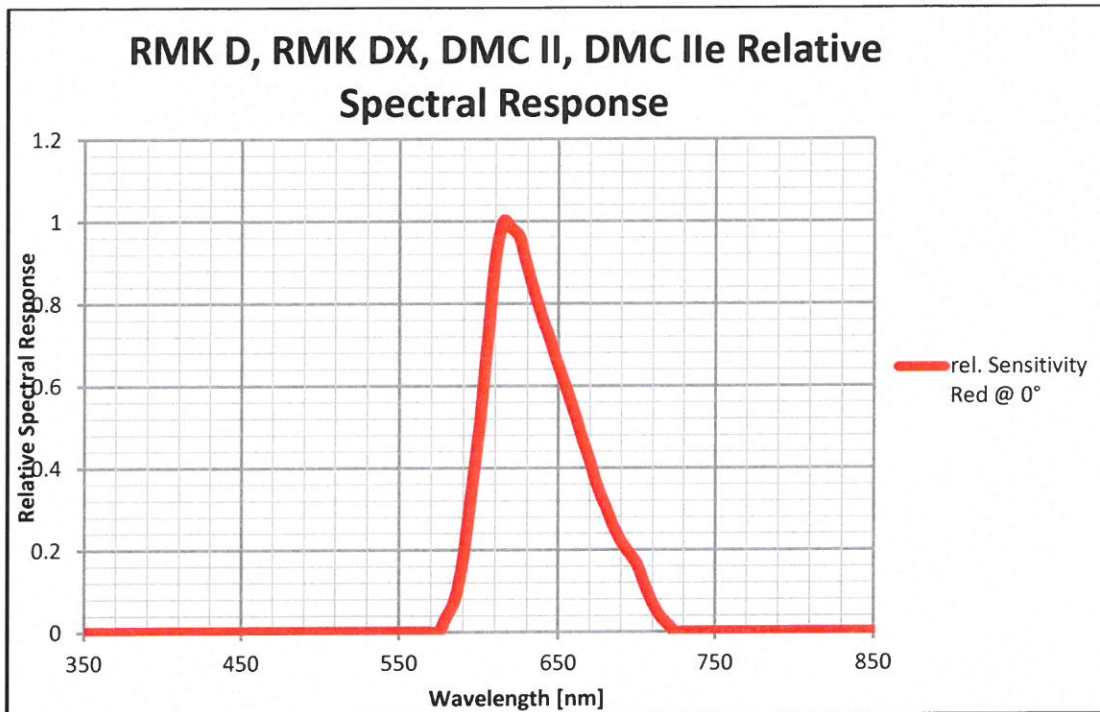
RMK D / RMK DX / DMC II / DMC IIe MS Red – MTF F/4.0 ; 45 mm– Temperature Stability



Radiometric Calibration

Sensitivity of Red camera

Spectral Response Curves of the single camera head.



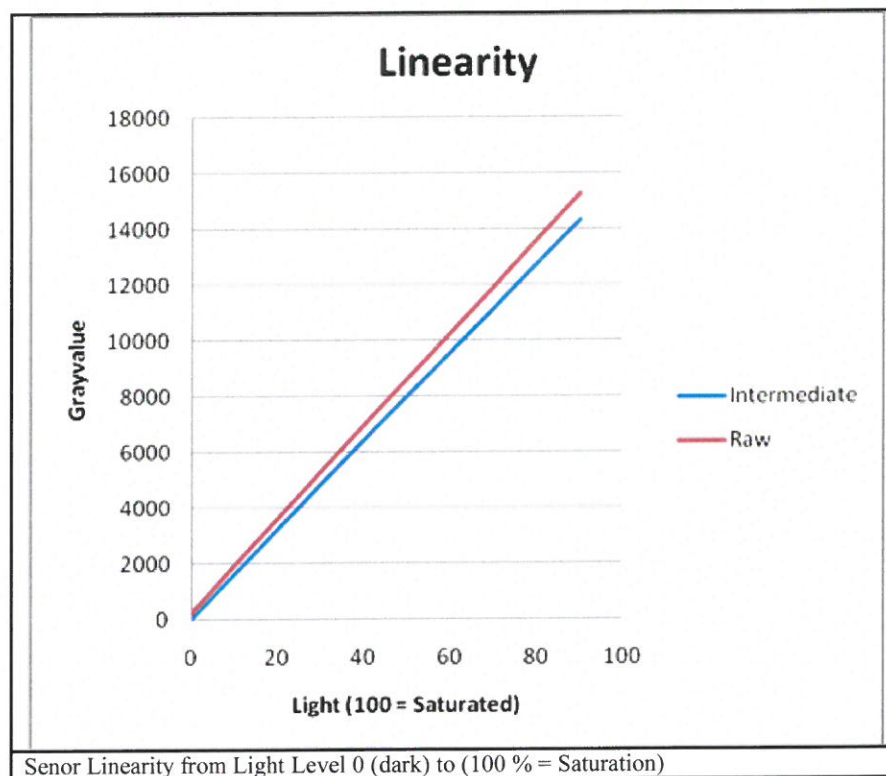
The sensitivity shows the spectral response curve of the single camera head including the optical system (optics, filter) and the sensor response. The DMC IIe 230 is calibrated with respect to the absolute spectrometer. This allows computing pixel radiance values from pixels digital numbers and is a 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:

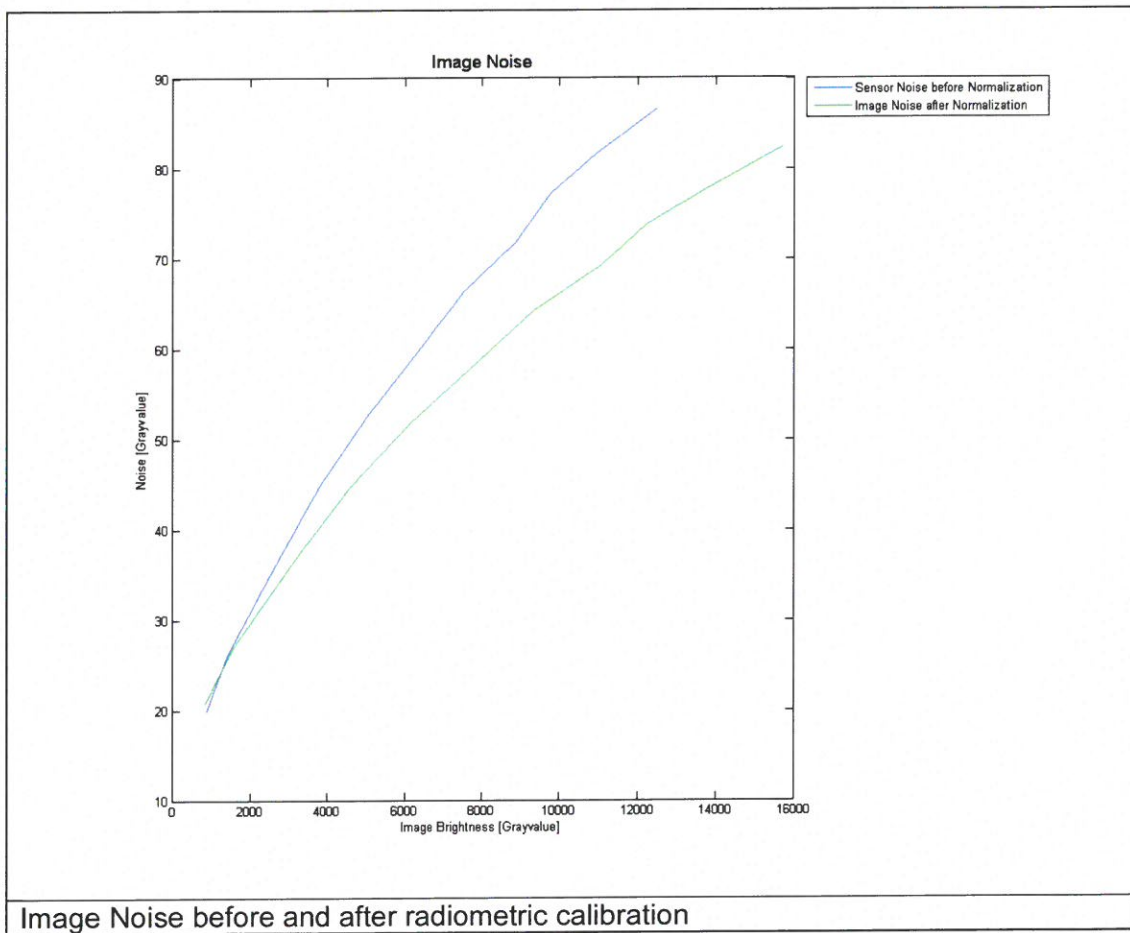


The deviation from the linearity is below 1%.

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.

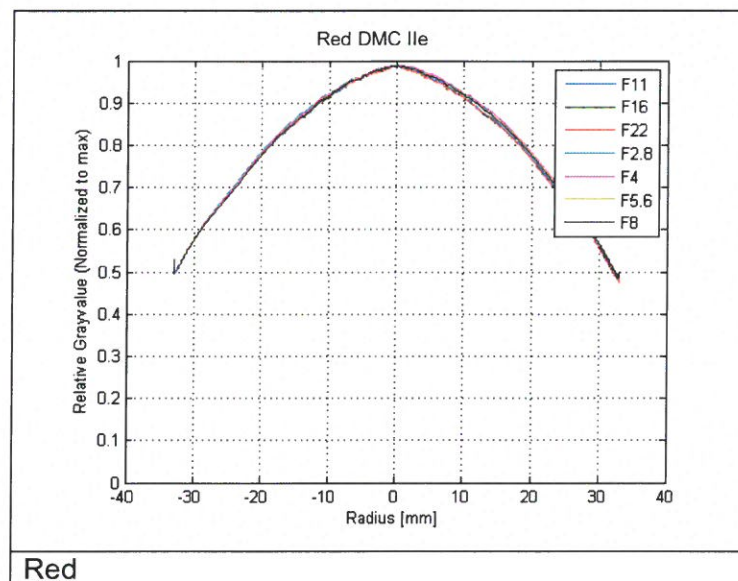


Radiometric Calibration

Aperture Correction

Red (00124693)

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 (00124693)

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:	1412093373
Date:	140930
Number of defect pixels:	4
Number of defect clusters:	0
Number of defect columns:	0

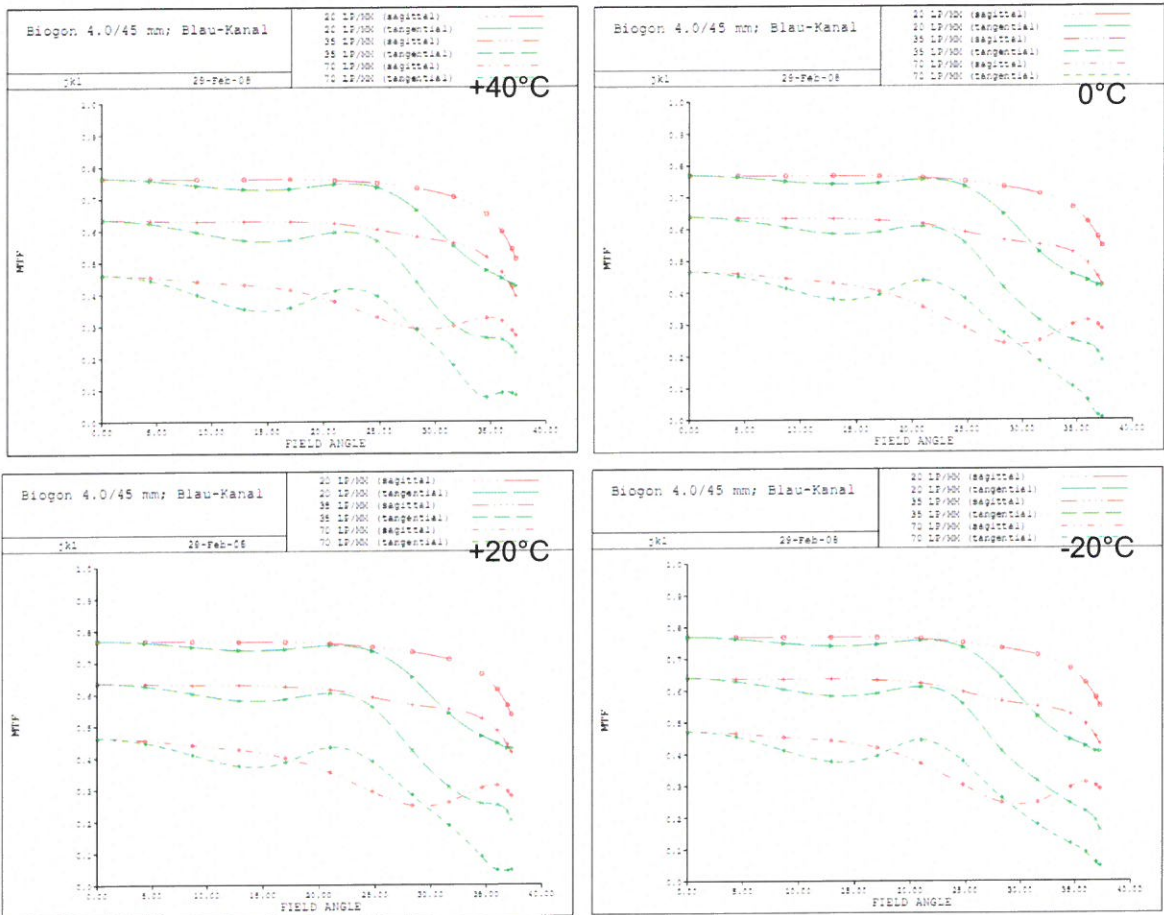
Nr	Row	Column	
0	1906	69	1905
1	1908	68	1906
2	2011	716	2008
3	3302	1189	3298

Defect Column	RowStart	ColumnStart	RowEnd	ColumnEnd
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Optical System

Modulation Transfer Function, MTF of Blue camera

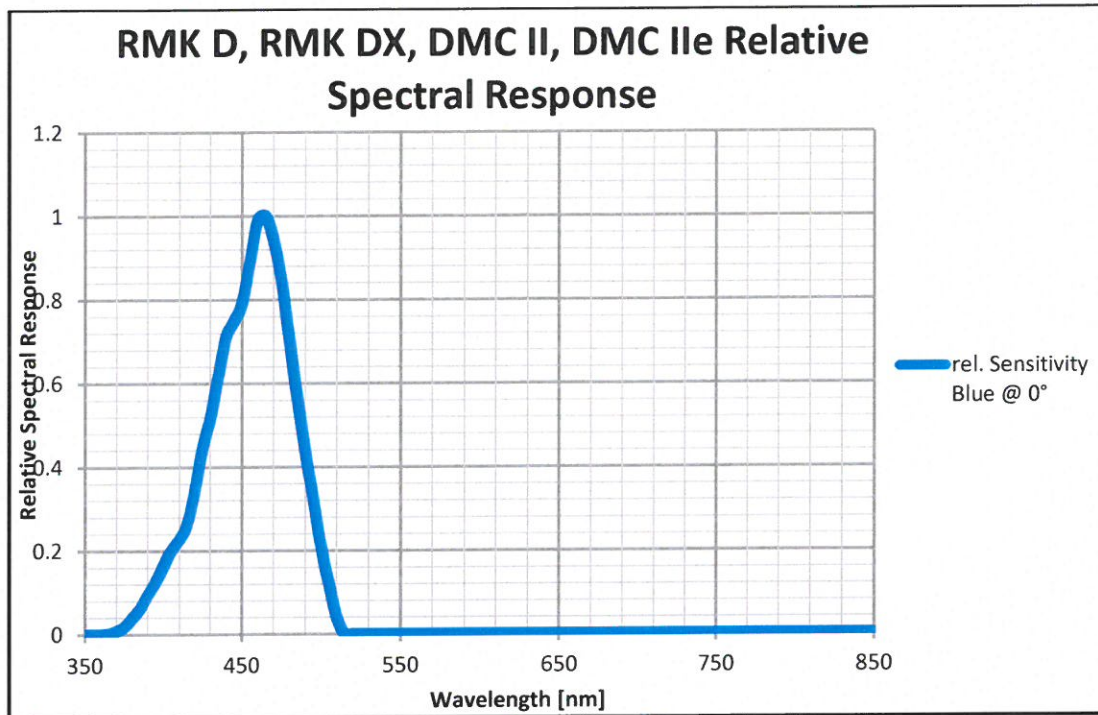
RMK D / RMK DX / DMC II / DMC IIe MS Blue – MTF F/4.0 ; 45 mm– Temperature Stability



Radiometric Calibration

Sensitivity of Blue camera

Spectral Response Curves of the single camera head.



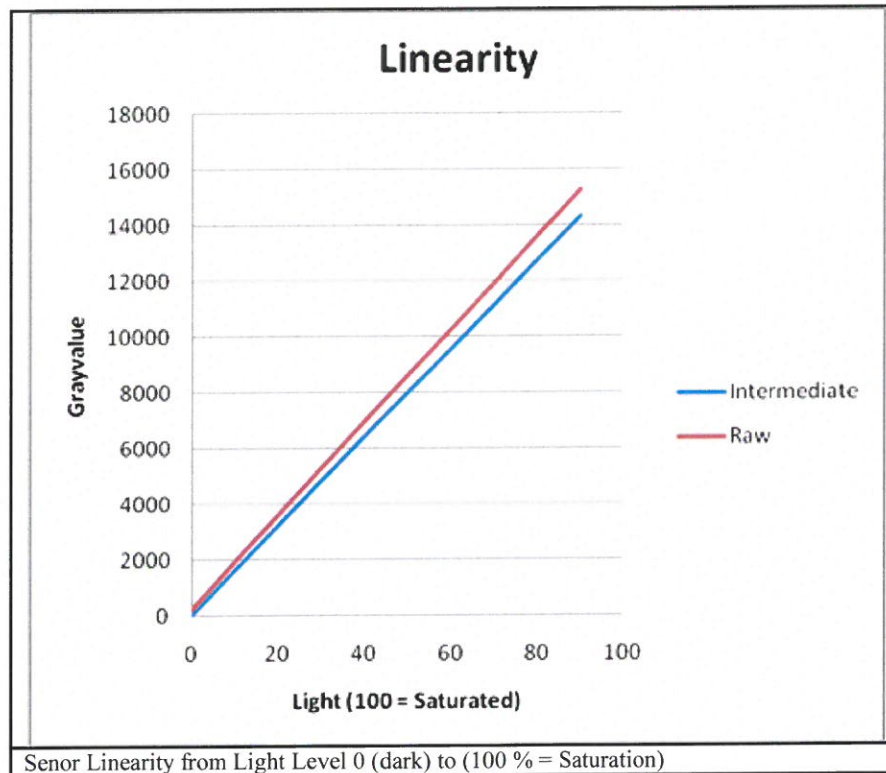
The sensitivity shows the spectral response curve of the single camera head including the optical system (optics, filter) and the sensor response. The DMC IIe 230 is calibrated with respect to the absolute spectrometer. This allows computing pixel radiance values from pixels digital numbers and is a 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:

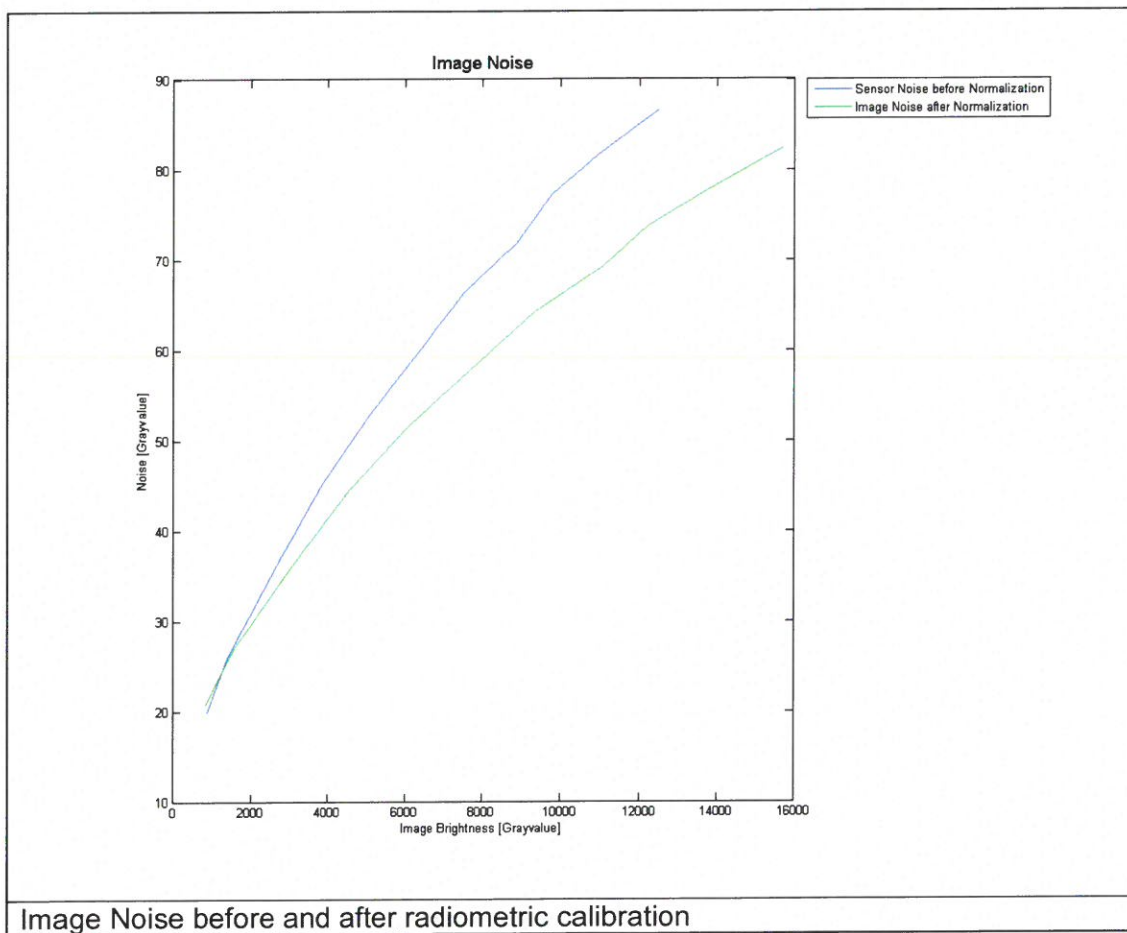


The deviation from the linearity is below 1%.

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.

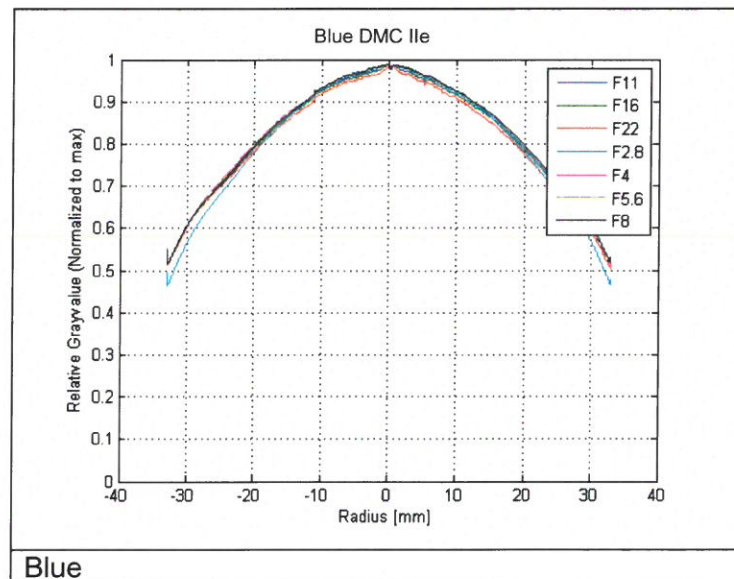


Radiometric Calibration

Aperture Correction

Blue (00124736)

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 (00124736)

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:	1412092319
Date:	140930
Number of defect pixels:	6
Number of defect clusters:	0
Number of defect columns:	0

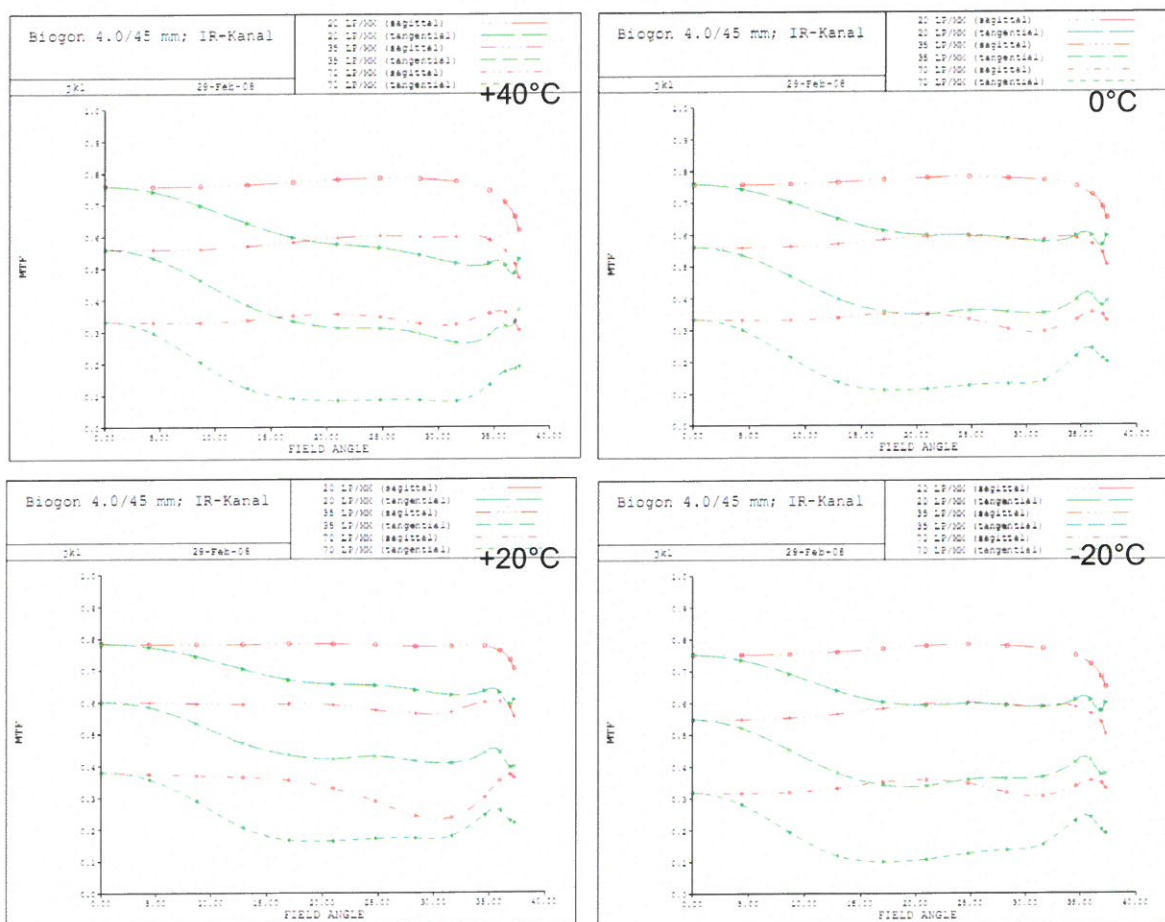
Nr	Row	Column
0	5491	104
1	5492	104
2	3577	541
3	3578	541
4	6134	6030
5	6135	6030

Defect Column	RowStart	ColumnStart	RowEnd	ColumnEnd
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Optical System

Modulation Transfer Function, MTF of IR camera

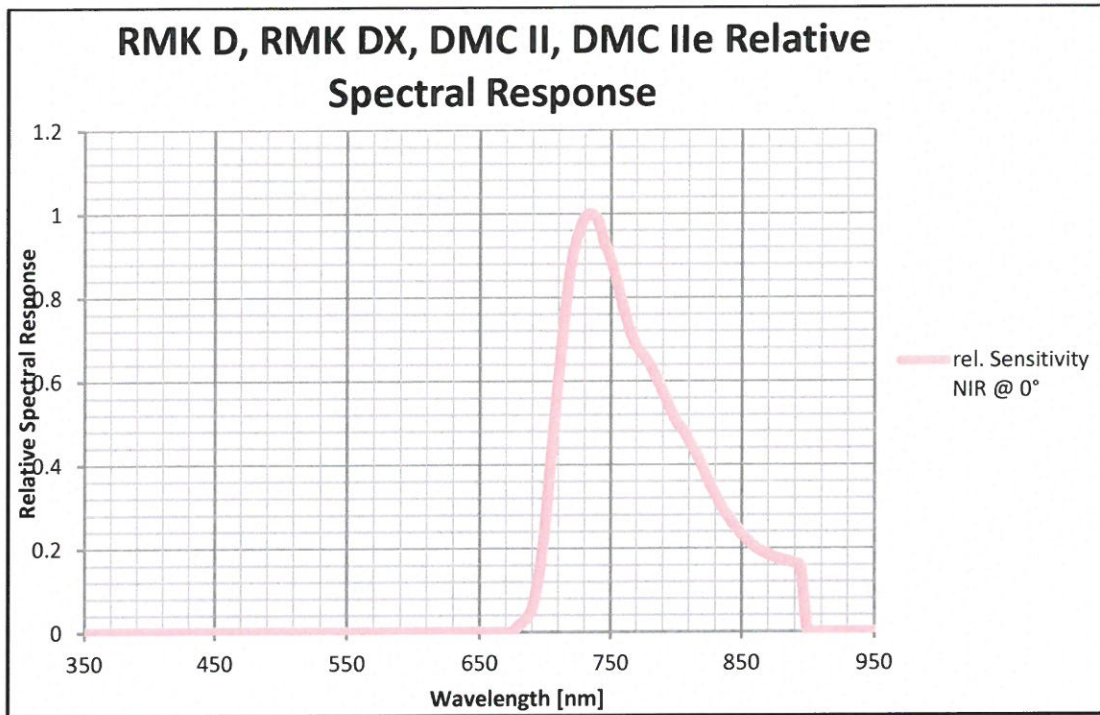
RMK D / RMK DX / DMC II / DMC IIe MS IR – MTF F/4.0 ; 45 mm– Temperature Stability



Radiometric Calibration

Sensitivity of NIR camera

Spectral Response Curves of the single camera head.



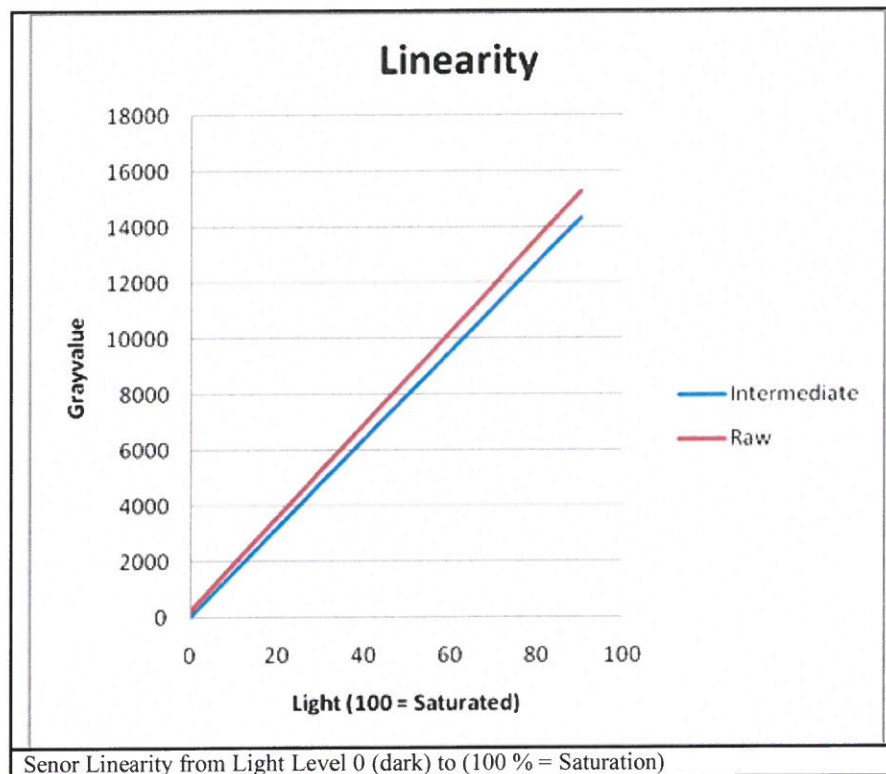
The sensitivity shows the spectral response curve of the single camera head including the optical system (optics, filter) and the sensor response. The DMC IIe 230 is calibrated with respect to the absolute spectrometer. This allows computing pixel radiance values from pixels digital numbers and is a 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:

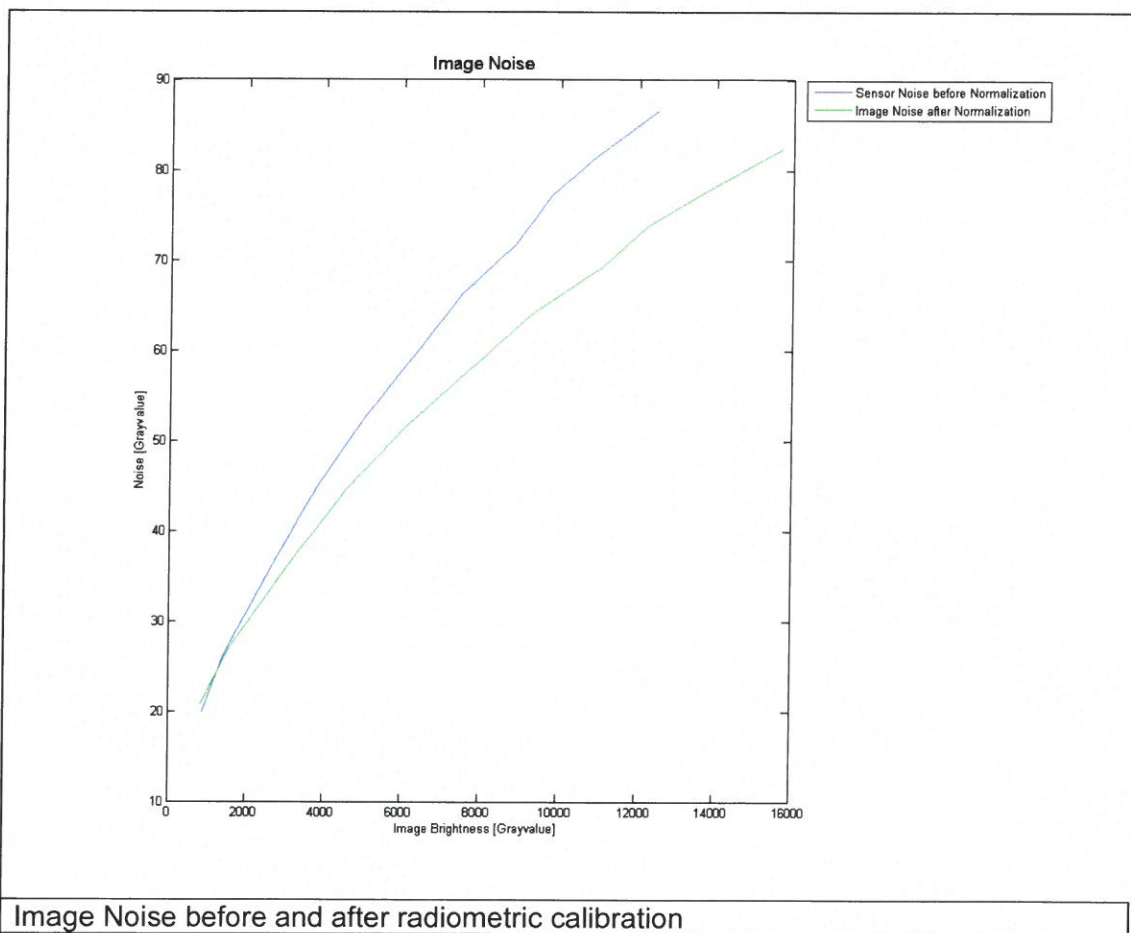


The deviation from the linearity is below 1%.

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.

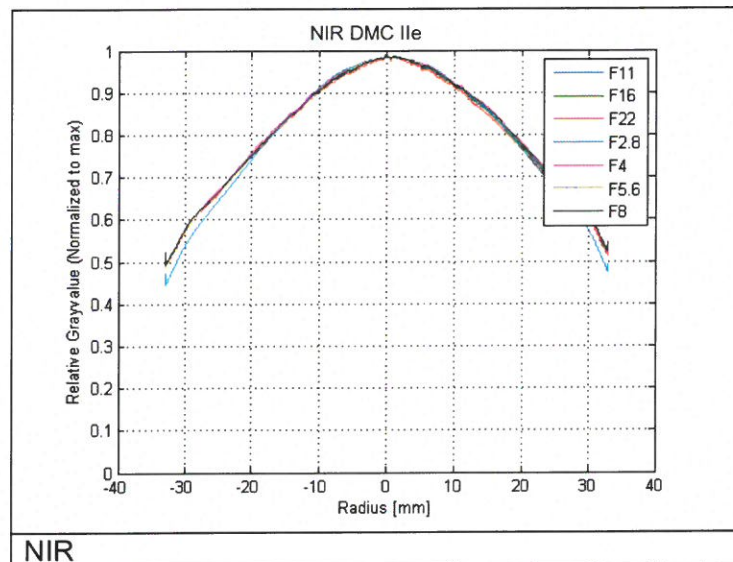


Radiometric Calibration

Aperture Correction

NIR (00118804)

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 (00118804)

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:		1418230290
Date:		141210
Number of defect pixels:	236	
Number of defect clusters:	0	
Number of defect columns:	0	
Nr	Row	Column
0	2516	4988
1	30	773
2	81	5346
3	99	2568
4	100	4557
5	160	3924
6	161	3154
7	319	3355
8	377	617
9	409	5164
10	411	5155
11	634	4946
12	658	302
13	695	5362
14	775	5479
15	918	4606
16	1024	1833
17	1184	1331
18	1189	5350
19	1213	1381
20	1226	3741
21	1231	830
22	1282	5470
23	1282	4383
24	1298	1852
25	1350	2496
26	1455	4483
27	1458	1475
28	1458	2528
29	1519	1174
30	1589	5290
31	1613	2570
32	1614	2566
33	1636	5967
34	1706	5005
35	1736	4601
36	1767	4569
37	1776	5934
38	1784	3836
39	1852	6059
40	1855	4146
41	1892	1566
42	1902	3591
43	1957	2926

44	2012	1083
45	2015	6080
46	2043	4346
47	2123	750
48	2124	791
49	2151	3473
50	2162	4454
51	2205	1068
52	2295	476
53	2327	5169
54	2354	4722
55	2524	2030
56	2567	2606
57	2804	4915
58	2806	4258
59	2817	2693
60	2829	5095
61	2830	5019
62	2859	1877
63	2878	3616
64	2885	971
65	2888	4685
66	2927	3534
67	3018	5347
68	3037	2915
69	3096	3155
70	3199	5615
71	3250	5987
72	3251	5987
73	3270	317
74	3320	4513
75	3350	1101
76	3376	4158
77	3381	3580
78	3416	1723
79	3490	725
80	3553	6054
81	3565	2889
82	3591	5317
83	3639	5841
84	3645	4247
85	3646	4513
86	3646	4549
87	3757	6090
88	3783	532
89	3870	3159
90	3889	3980
91	3896	5055
92	3954	4639
93	4022	3409
94	4028	4660
95	4123	5622
96	4164	5004
97	4165	3110
98	4167	1878
99	4178	337
100	4275	4660
101	4301	5494
102	4363	3689
103	4387	4723
104	4404	4766
105	4438	6056
106	4442	2374
107	4476	5080
108	4489	3059
109	4627	4233
110	4645	4259
111	4655	2144
112	4670	5171
113	4701	335
114	4704	3645
115	4712	3499
116	4731	1731
117	4737	2332
118	4749	5879
119	4752	1342
120	4764	4945

121	4777	3462
122	4790	5196
123	4805	2251
124	4826	1827
125	4853	4011
126	4859	2488
127	5075	2739
128	5108	3954
129	5110	3865
130	5138	1019
131	5142	2654
132	5142	5974
133	5233	2227
134	5243	902
135	5284	2860
136	5289	869
137	5294	2742
138	5314	5077
139	5373	4781
140	5397	2013
141	5408	2335
142	5436	238
143	5442	1958
144	5443	1957
145	5481	793
146	5495	5489
147	5540	1759
148	5595	5447
149	5602	4827
150	5622	5112
151	5637	6013
152	5670	4639
153	5676	2638
154	5731	4110
155	5741	4712
156	5830	5779
157	5832	5196
158	5835	1188
159	5836	2627
160	5849	2492
161	5856	1032
162	5863	5554
163	5863	3874
164	5876	1355
165	5930	5414
166	5959	4501
167	5962	5895
168	5964	5230
169	5966	3821
170	5969	3867
171	5975	3793
172	5977	5705
173	5983	3889
174	5990	3832
175	6023	4699
176	6082	2916
177	6086	4173
178	6121	3006
179	6126	4280
180	6128	2954
181	6142	2260
182	6142	4551
183	6146	4412
184	6153	3309
185	6156	4577
186	6220	5917
187	6221	3046
188	6232	5835
189	6240	732
190	6245	3335
191	6255	5783
192	6263	4349
193	6275	179
194	6279	4157
195	6280	549
196	6285	3469
197	6332	3355

198	6332	3355
199	6333	3134
200	6340	3102
201	6351	5669
202	6351	5454
203	6369	5918
204	6389	5248
205	6417	4218
206	6422	5892
207	6424	4681
208	6434	683
209	6436	2044
210	6442	3310
211	6451	5294
212	6452	1295
213	6464	2809
214	6467	4938
215	6484	3303
216	6549	3861
217	6554	5988
218	6572	3970
219	6600	3817
220	6608	667
221	6646	5523
222	6657	3102
223	6735	1753
224	6761	5934
225	6765	4628
226	6770	4055
227	6772	2680
228	6786	5345
229	6788	4513
230	6799	5611
231	6803	206
232	6809	4615
233	6819	1407
234	6832	296
235	6835	3973
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 ≤ 3500 MS < 500

	Description	CCD Spec
Column	Definition	A column which has more than 8 pixel defects in 11x12 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 ≤ 140 MS ≤ 20
	Max double Column	PAN ≤ 40 MS ≤ 6

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

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

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

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Fraser C., Digital Camera self calibration. ISPRS Journal of Photogrammetry and Remote Sensing, (997, 5284): 149-159

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Ryan R., Pagnutti M. (2009): Enhanced Absolute and Relative Radiometric Calibration for Digital Aerial Cameras, in: Fritsch D. (Ed.), Photogrammetric Week 2009, Wichmann-Verlag, pp. 81-90.

Doering D., Hildebrand J., Diete N. (2009): Advantages of customized optical design for aerial survey cameras, in: Fritsch D. (Ed.), Photogrammetric Week 2009, Wichmann-Verlag, pp. 69-80.

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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: The Thrasher Group Inc. Signed: Chad Beller

Date: 10/28/2015 Title: PTC

RFQ No. 16000000017

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 exceeds 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: The Thrasher Group, Inc.

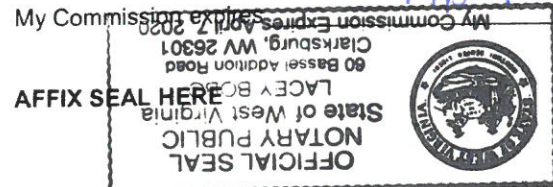
Authorized Signature: Chad Biller Date: 10/28/2015

State of West Virginia

County of Harrison, to-wit:

Taken, subscribed, and sworn to before me this 28 day of October, 2015.

My Commission Expires April 7, 2020.



NOTARY PUBLIC

[Signature]

Purchasing Affidavit (Revised 07/01/2012)

CERTIFICATION AND SIGNATURE PAGE

By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; understand the requirements, terms and conditions, and other information contained 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.

The Thrasher Group, Inc.
(Company)

Chad Bellan, PIC
(Authorized Signature) (Representative Name, Title)

304-624-4108 304-624-7831 10/28/2015
(Phone Number) (Fax Number) (Date)

ADDENDUM ACKNOWLEDGEMENT FORM

SOLICITATION NO.: 16000000017

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.

The Thrasher Group, Inc.

Company

Chad Belle

Authorized Signature

10/28/2015

Date

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

CERTIFICATE OF *Authorization*

STATE BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS

*The West Virginia State Board of Registration for Professional Engineers
having verified the person in responsible charge is registered in
West Virginia as a professional engineer for the noted firm, hereby certifies*

THE THRASHER GROUP, INC.

C00517-00

Engineer in Responsible Charge: H. WOOD THRASHER - WV PE 009478

*has complied with section §30-13-17 of the West Virginia Code governing
the issuance of a Certificate of Authorization. The Board hereby notifies you of its
certification with issuance of this Certification of Authorization for the period of:*

July 1, 2014 - June 30, 2015

providing for the practice of engineering services in the State of West Virginia.

IF YOU ARE REQUIRED TO REGISTER WITH THE SECRETARY OF STATE'S OFFICE,
PLEASE SUBMIT THIS CERTIFICATE WITH YOUR APPLICATION.



IN TESTIMONY WHEREOF, THE WEST VIRGINIA STATE BOARD OF
REGISTRATION FOR PROFESSIONAL ENGINEERS HAS ISSUED THIS COA
UNDER ITS SEAL, AND SIGNED BY THE PRESIDENT OF SAID BOARD.

BOARD PRESIDENT



WEST VIRGINIA
BOARD OF PROFESSIONAL SURVEYORS

Certificate of Authorization

ISSUED TO:

THE THRASHER GROUP, INC.
Bridgeport, West Virginia

2015

CERTIFICATE OF AUTHORIZATION No. **15-5433**

This certificate is issued by the West Virginia Board of Professional Surveyors in accordance with West Virginia Code § 30-13A-20
The person or organization identified on this certificate is licensed to conduct professional surveying and mapping services
in the State of West Virginia for the period

January 1, 2015 through December 31, 2015

This certificate is not transferrable and must be displayed at the office location for which issued.

In witness whereof I have put my hand, this 18th day of November, 2014

ROY E. SHREWSBURY, II, Chairman



MARK H. HORNISH



R. MICHAEL SHEPP

NELSON B. DOUGLASS, Secretary

ANTHONY J. SPARACINO