



CAECD Board of Managers | Agenda

10:30 a.m., or upon adjournment of the Executive Committee
Wednesday, January 14, 2026
6800 Burleson Rd, Bldg 310, Suite 165
Austin, Texas 78744

Judge Brett Bray, *Blanco County*, **Chair**
Council Member Doug Weiss, *City of Pflugerville*
1st Vice Chair
Judge Ron Cunningham, *Llano County*, **2nd Vice Chair
and Parliamentarian**
Mayor Pro Tem Steve Hougen, *City of Granite Shoals*,
Secretary
Mayor Lew White, *City of Lockhart*, **Immediate Past
Chair**
Mayor Kirk Watson, *City of Austin*
Commissioner Clara Beckett, *Bastrop County*
Council Member Kerry Fossler, *City of Bastrop*
Council Member Kevin Hight, *City of Bee Cave*
Commissioner Joe Don Dockery, *Burnet County*
Judge Bryan Wilson, *Burnet County*
Judge Hoppy Haden, *Caldwell County*

Commissioner Clint Sternadel, *Fayette County*
Council Member Ron Garland, *City of Georgetown*
Commissioner Walt Smith, *Hays County*
Council Member David McDonald, *City of Leander*
Commissioner Steven Knobloch, *Lee County*
Council Member Frank Ortega, *City of Round Rock*
Mayor Jane Hughson, *City of San Marcos*
Council Member Cathy Meek, *City of Smithville*
Judge Andy Brown, *Travis County*
Commissioner Ann Howard, *Travis County*
Commissioner Russ Boles, *Williamson County*
Commissioner Cynthia Long, *Williamson County*
Senator Pete Flores
Representative Vikki Goodwin
Representative Caroline Harris-Davila

- 1. Call to Order and Opening Remarks by the Chair**
- 2. Consider Approving Minutes for the October 15, 2025 Meeting**
- 3. Consider Adopting a Resolution Providing Signature Authority to Individuals for the Capital Area Emergency Communication District**
Silvia Alvarado, Director of Finance
- 4. Appoint Strategic Advisory Committee Members and Board Liaison**
Richard Morales, Jr., Director of Emergency Communications
- 5. Consider Approving Purchase of Aerial Imagery**
Charles Simon, Director of Regional Planning & Services
- 6. Executive Session in Accordance with Texas Government Code Section 551.072: Deliberations About Real Property.**
Chris Miller, Executive Director



CAECD Board of Managers | MINUTES

10:30 a.m., or upon adjournment of the Executive Committee
Wednesday, October 15, 2025
Lantana Conference Room
6800 Burleson Rd.
Building 310, Suite 365
Austin, Texas 78744

Present (16)

Judge Brett Bray, *Blanco County*, **Chair**
Council Member Doug Weiss, *City of Pflugerville*,
1st Vice Chair
Judge Ron Cunningham, *Llano County*, **2nd Vice Chair
and Parliamentarian**
Mayor Pro Tem Steve Hougen, *City of Granite Shoals*,
Secretary
Mayor Lew White, *City of Lockhart*, **Immediate Past
Chair**
Council Member Kerry Fossler, *City of Bastrop*
Commissioner Joe Don Dockery, *Burnet County*
Judge Hoppy Haden, *Caldwell County*
Commissioner Clint Sternadel, *Fayette County*
Commissioner Walt Smith, *Hays County*
Commissioner Steven Knobloch, *Lee County*
Council Member Frank Ortega, *City of Round Rock*
Mayor Jane Hughson, *City of San Marcos*
Council Member Cathy Meek, *City of Smithville*
Commissioner Ann Howard, *Travis County*
Commissioner Cynthia Long, *Williamson County*

Absent (11)

Mayor Kirk Watson, *City of Austin*
Commissioner Clara Beckett, *Bastrop County*
Council Member Kevin Hight, *City of Bee Cave*
Judge Bryan Wilson, *Burnet County*
Council Member Ron Garland, *City of Georgetown*
Council Member David McDonald, *City of Leander*
Judge Andy Brown, *Travis County*
Commissioner Russ Boles, *Williamson County*
Senator Pete Flores
Representative Vikki Goodwin
Representative Caroline Harris-Davila

1. Call to Order and Opening Remarks by the Chair

Judge Bray called the meeting to order at 11:22 a.m.

2. Consider Approving Minutes for the September 17, 2025 Meeting

Commissioner Long made a motion to approve the September 17, 2025 meeting minutes. Commissioner Howard seconded the motion. The motion passed unanimously.

3. Consider Accepting the Financial Report for the Period of October 1, 2024 to August 31, 2025

Silvia Alvarado, CAPCOG Director of Finance

Ms. Alvarado presented the Financial Report for October 1, 2024 – August 31, 2025. Commissioner Long made a motion to accept the Financial Report for October 1, 2024 – August 31, 2025. Mayor Hughson seconded the motion. The motion passed unanimously.

4. Adjourn

The meeting adjourned at 11:34 a.m.

A closed executive session may be held on any of the above agenda items when legally justified pursuant to Subchapter D of the Texas Open Meetings Act (Texas Government Code Chapter 551).

Mayor Pro Tem Steve Hougen, Secretary
Capital Area Emergency Communications District
Executive Committee

Date

**CAPITAL AREA EMERGENCY COMMUNICATIONS DISTRICT
BOARD OF MANAGERS MEETING**

MEETING DATE: January 14, 2026

AGENDA ITEM: 3. Consider Adopting a Resolution Providing Signature Authority to Individuals for the Capital Area Emergency Communications District

GENERAL DESCRIPTION OF ITEM:

This item provides a resolution to be submitted to Frost Bank as part of the process for updating the signature authority with CAECD’s designated depository bank.

The CAECD's Bylaws charge the Board of Managers with the responsibility to designate one or more depositories for the District's funds and specify the individuals authorized to sign, and countersign checks and other instruments for withdrawal of the funds.

The current banking arrangement with Frost Bank provides for two Board of Mangers positions, the Chairperson and Secretary, and three CAPCOG employees, the Executive Director, Director of Finance, and Director of Administration, to hold signature authority for signing and counter signing disbursements of CAECD funds.

As the officers have changed for the CAECD Board of Managers, this resolution provides for updating the change in officer positions for the District at the designated depository, Frost Bank.

THIS ITEM REPRESENTS A:

- New issue, project, or purchase
- Routine, regularly scheduled item
- Follow-up to a previously discussed item
- Special item requested by board member
- Other

PRIMARY CONTACT/STAFF MEMBER:

Silvia Alvarado, Director of Finance

BUDGETARY IMPACT:

Total estimated cost: N/A

Source of Funds: _____

Is item already included in fiscal year budget? Yes No

Does item represent a new expenditure? Yes No

Does item represent a pass-through purchase? Yes No

If so, for what city/county/etc.? _____

PROCUREMENT: N/A

ACTION REQUESTED:

Adopt and sign a resolution specifying the individuals authorized to sign and countersign checks and other instruments for withdrawal of funds from the designated depository, Frost Bank.

BACK-UP DOCUMENTS ATTACHED:

Resolution

BACK-UP DOCUMENTS NOT ATTACHED (to be sent prior to meeting or will be a handout at the meeting):

None

RESOLUTION

PROVIDING SIGNATURE AUTHORITY TO INDIVIDUALS FOR THE CAPITAL AREA EMERGENCY COMMUNICATIONS DISTRICT

WHEREAS, the Board of Managers (“Board”) of the Capital Area Emergency Communications District (“CAECD”) is charged with the responsibility to specify the individuals authorized to sign and countersign checks and other instruments for withdrawal of funds from designated depositories and,

NOW, BE IT RESOLVED BY the Board as follows:

1. The Board hereby specifies that the following individuals are authorized to sign and countersign checks and other instruments for withdrawal of funds from designated depositories:
 - a. Chairperson, CAECD Board of Managers
 - b. Secretary, CAECD Board of Managers
 - c. Executive Director of CAPCOG
 - d. Director of Administration of CAPCOG
 - e. Director of Finance of CAPCOG

2. The Board and the Executive Director are hereby authorized to take all steps necessary to enforce the provisions of this resolution.

Resolution adopted on this 14th day of January 2026.

Judge Ron Cunningham
Chairperson, Board of Managers
Capital Area Emergency Communications District

County Commissioner Joe Don Dockery
Secretary, Board of Managers
Capital Area Emergency Communications District

Capital Area Emergency Communications District Board of Managers Meeting

MEETING DATE: January 14, 2026

AGENDA ITEM: 4. Appoint Strategic Advisory Committee Members and Board Liaison

GENERAL DESCRIPTION OF ITEM:

The term of appointment for 9-1-1 Strategic Advisory Committee (SAC) members begins on the date of the appointment by the Board of Managers and ends on December 31st of odd numbered years. Every two years at this time, the Board of Managers must therefore appoint or reappoint the membership. The current list of 9-1-1 Strategic Advisory Committee members is attached.

THIS ITEM REPRESENTS A:

- New issue, project, or purchase
- Routine, regularly scheduled item
- Follow-up to a previously discussed item
- Special item requested by board member
- Other

PRIMARY CONTACT/STAFF MEMBER: Richard Morales, Jr., Director – Emergency Communications

BUDGETARY IMPACT:

Total estimated cost: N/A

Source of Funds: N/A

Is item already included in fiscal year budget? Yes No

Does item represent a new expenditure? Yes No

Does item represent a pass-through purchase? Yes No

If so, for what city/county/etc.? _____

PROCUREMENT: N/A

ACTION REQUESTED:

Appoint the 9-1-1 Strategic Advisory Committee and Designate a Board Liaison.

BACK-UP DOCUMENTS ATTACHED:

1. List of Current Strategic Advisory Committee Members
2. Current Member Attendance Roster

BACK-UP DOCUMENTS NOT ATTACHED: N/A

Capital Area Emergency Communications District Strategic Advisory Committee Roster

#	Category	Title / Salutation	First Name	Last Name	Organization	Position	Date of Appointment or Vacancy	2024 Attendance (P / EA / UA)	2025 Attendance (P / EA / UA)
1	City of Austin	Chief	Andrew	Chelf	Austin Fire Department	Fire Battalion Chief	11/1/2022	1/1/1	1/0/1
2	City of Austin	Chief	Brian	Bregenzer	Austin-Travis County EMS	Division Chief	1/1/2022	2/1/0	1/0/1
3	City of Austin	VACANT	VACANT	VACANT	VACANT	VACANT	5/11/2022	n/a	n/a
4	Bastrop County	Ms.	Julie	Sommerfeld	Bastrop County	GIS and Addressing Department Manager	1/1/2014	3/0/0	2/0/0
5	Blanco County	Commisioner	Chris	Leismann	Blanco County	Commissioner, Precinct 3	9/1/2014	3/0/0	2/0/0
6	Burnet County	Commisioner	Joe Don	Dockery	Burnet County	Commissioner, Precinct 4	1/1/2016	3/0/0	2/0/0
7	Caldwell County	Commisioner	Ed	Theriot	Caldwell County	Commissioner, Precinct 3	*8/1/2008	3/0/0	0/1/1
8	Fayette County	Ms.	Dawn	Moore	Fayette County	9-1-1 Addressing & GIS Coordinator	1/1/2014	3/0/0	2/0/0
9	Hays County	Ms.	Stephanie	Robinson	Hays County	Combined Communications Center	1/18/2025	n/a	2/0/0
10	Lee County	Mr.	Jason	Snelgrove	Lee County	Emergency Management Coordinator	5/14/2025	n/a	1/0/0
11	Llano County	Ms.	Doni	Whitecotton	Llano County	Emergency Communications Manager	5/1/2021	3/0/0	2/0/0
12	Travis County (excl. Austin)	Mr.	Adam	Johnson	Travis County	Wireless Communications Manager	1/1/2022	2/0/1	0/1/1
13	Williamson County	Ms.	Leigh	Carrico	City of Round Rock	Public Safety 911 Manager	10/1/2017	3/0/0	1/0/1
14	Williamson County	Ms.	Kate	Wolf	Williamson County	Emergency Communications Director	3/1/2023	2/1/0	1/1/0
15	Williamson County	Ms.	Janessa	Stephens	Williamson County	Public Safety Technology Director	1/1/2024	3/0/0	1/0/1
16	Board Liaison	Commisioner	Cynthia	Long	Williamson County	Commissioner, Precinct 2	1/1/2014	1/2/0	1/0/1

*Date reflects appointment to CAPCOG 9-1-1 committee, predating the CAECD SAC

Present =

Excused Absence =

Unexcused Absence =

P

EA

UA

CAPITAL AREA EMERGENCY COMMUNICATIONS DISTRICT BOARD OF MANAGERS MEETING

MEETING DATE: January 14, 2026

AGENDA ITEM: 5. Consider Approving Purchase of Aerial Imagery

GENERAL DESCRIPTION OF ITEM:

Staff is seeking approval to issue a purchase order (PO) to Surdex Corporation for 2026 aerial imagery for the region. The CAECD funds the annual purchase of aerial imagery to update public safety answering point (PSAP) mapping applications to ensure accurate public safety dispatch and response. Staff in the Regional Planning and Services division coordinate the procurement of this imagery, and since 2017, has conducted these procurements as cooperative purchases through the Texas Geographic Information Office (TxGIO) "StratMap" program. This program allows agencies to select pre-screened vendors that have already entered into contracts with the state, enabling a streamlined procurement process and discounts for participants.

Staff selected Surdex Corporation as the vendor for the 2026 contract based on past performance for CAPCOG in 2020, 2021, 2022, 2023, 2024, 2025 and their 2026 proposal is being offered at the same rates as CAPCOG paid in each of those years. The total cost of this contract includes \$185,640 for the acquisition and \$5,800 to host the data for 1 year after delivery. The amount budgeted for this item for FY2026 is \$215,000.

THIS ITEM REPRESENTS A:

- New issue, project, or purchase
- Routine, regularly scheduled item
- Follow-up to a previously discussed item
- Special item requested by board member
- Other

PRIMARY CONTACT/STAFF MEMBER: **Rob Buckhouse, GIS Program Manager**
Charles Simon, Director of Regional Planning & Services

BUDGETARY IMPACT:

Total estimated cost: \$191,440

Source of Funds: CAECD revenue

Is item already included in fiscal year budget? Yes No

Does item represent a new expenditure? Yes No

Does item represent a pass-through purchase? Yes No

If so, for what city/county/etc.? n/a

PROCUREMENT: Cooperative Purchase

ACTION REQUESTED:

Approve Issuance of Purchase Order to Surdex Corporation for 2026 Aerial Imagery

BACK-UP DOCUMENTS ATTACHED:

1. Procurement Memo
2. Surdex Technical Proposal



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BASTROP BLANCO BURNET CALDWELL FAYETTE HAYS LEE LLANO TRAVIS WILLIAMSON

MEMORANDUM

January 14, 2026

TO: CAPCOG Executive Committee

FROM: Charles Simon, Director of Regional Planning and Services

RE: 2026 Aerial Imagery Procurement

Staff seeks approval to issue a purchase order (PO) to Surdex Corporation to acquire 12-inch resolution aerial imagery for the entire extent of the CAPCOG region in May and June 2026 to support 9-1-1 mapping applications. GIS program staff procured this service through Section 3-207 of CAPCOG's procurement policy, which authorizes cooperative purchases, and the Texas Geographic Information Office's (TxGIO's) "StratMap" program (<https://tnris.org/stratmap/>).

GIS staff selected Surdex as the vendor based on past performance for 2020, 2021, 2022, 2023, 2024, and 2025 imagery and comparable pricing and services offered for 2026 imagery acquisition. CAPCOG staff have had good experiences working with Surdex staff over the past five years and have been happy with the results.

Surdex's base price of \$21.00 per "tile" for 12-inch orthoimagery for 2026 is identical to the price per tile CAPCOG paid in 2020, 2021, 2022, 2023, 2024, and 2025. The total budgeted for this item was \$215,000.

The price offered by Surdex includes a 27% discount for organizations acquiring the imagery through the StratMap program – it would otherwise cost \$28.76 per tile, for a total cost of \$254,238.

In addition to acquisition costs, staff are also seeking approval for \$5,800.00 to pay Surdex for hosting the data remotely for up to 12 months after final delivery (i.e., from Summer 2026 – Summer 2027). Hosting imagery remotely will be more cost-effective and contracted services have been determined to better meet CAPCOG's needs.

PROPOSAL

Capital Area Council of Governments

Orthoimagery in the Capital Area - 10 Counties

Submitted to:

Rob Buckhouse

GIS Program Manager

Capital Area Council of Governments

Submitted by:

Stefan White

Director, Remote Sensing

Office: 512.327.1180

Direct: 512.672.8963

Stefan.white@bowman.com

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Bowman

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Cover Letter

December 23, 2025



Rob Buckhouse
GIS Program Manager
Capital Area Council of Governments

REGARDING: 2026 Orthoimagery

Dear Capital Area Council of Governments,

Bowman Consulting Group, Ltd (Bowman) formerly Surdex, is pleased to submit our proposal to the Capital Area Council of Governments for the acquisition and production of orthoimagery in the Texas capital area. We have completed numerous successful projects in Texas over the past decade. Our ability to deliver orthoimagery requiring minimal client review has been acknowledged as providing a significant internal cost and time savings by the Houston-Galveston Area Council, Smith County Texas GIS Consortium, Texas Natural Resources Information System and Capital Area Council of Governments. Now as Bowman, we will again provide the same level of quality product for this project.

We have completed the 2020, 202, 2022, 2023, 2024 and 2025 orthoimagery projects for the Capital Area Council of Governments. These successful projects demonstrate our thorough understanding of the unique land cover and airspace issues in the region. We will be assigning Stefan White as your project manager to the 2026 project, backed up by our Director of Project of Production Wade Williams, who is a certified photogrammetrist. Stefan has over nine years of experience in remote sensing data acquisition and as Director he has proven leadership in guiding cross-functional teams from SOW review through project delivery.

Bowman was awarded its third Texas DIR contract in December 2025, allowing government entities within Texas to acquire geospatial products through a network of pre-approved contractors. This proposal contains a description of the base standard specifications for orthoimagery acquisition/production and accuracy within the State of Texas and a discount schedule consistent with Bowman’s Texas contract - [DIR-CPO-6000](#).

Our acquisition resources—eleven aircraft and eight imagery sensors—are critical to successful project execution, and they are supported by proven project manager communications and timely delivery of quality data by Bowman’s production staff. Additionally, our project manager and production staff understand the attention required to satisfy the unique requirements of the Capital Area Council of Governments up to and including delivery of ancillary products.

If you have any questions or if we may assist you in any way, please do not hesitate to contact us.

Sincerely,

Stefan White
Director, Remote Sensing
Direct: 512.672.8963
Stefan.white@bowman.com

Andy Dearing
Executive Vice President, Authorized Agent

Project Plan

The following documentation describes Bowman Consulting Group, Ltd (Bowman) understanding of the 2026 Capital Area Council of Governments project and scope of work.

A. Project Plan and Execution

SCOPE OF WORK	
CLIENT	
Capital Area Council of Governments	
GROUND SAMPLE DISTANCE (GSD)	APPROXIMATE AOI
12" Base Project	8,840 Do4qs

1. Project Design

The project design is based on the deliverable tile layout and a buffer around the exterior boundary. It includes a flight design and a control survey design. Flight planning is the responsibility of Bowman’s flight acquisition manager, and each flight plan is reviewed and approved by the project manager. The Triangulation and Survey staff design the ground control network under the direct supervision of a Certified Photogrammetrist and a Registered Land Surveyor.

Imagery Flight Design

The flight design is based on the following parameters:

FLIGHT DESIGN PARAMETERS		
PARAMETER	SETTING(S)	COMMENTS
FLYING HEIGHT (AGL)	12" GSD: ~27,000' AGL	Based on sensor-specific parameters (height: GSD ratio is focal length divided by CCD pixel size). Planning software will ensure the target GSD is not exceeded (numerically larger) in rugged areas by using an elevation model.
COVERAGE	Stereoscopic	Extends to the buffered tile layout to ensure stereo coverage and to provide alternative orthoimagery during mosaicking.
MINIMUM SUN ANGLE	30°	
SIDELAP	Minimum 30%	For urban areas, sidelap is increased to reduce building lean in "urban canyons" and flight lines are oriented to capture small areas as close to the center of the strip as possible to maximize the nadir view.
FLIGHT LINE ORIENTATION	Optimized to the area of interest	Design may include diagonal flight lines for either acquisition efficiency or to align with major streets/avenues in built-up areas.
LENGTH OF FLIGHT LINE	Generally < 80 miles	To accommodate IMU drift limitations, flights and flight lines not to exceed approximately 20-30 minutes in duration.

Project Plan

Ground Survey Design

After the flight design is complete, Bowman will determine the number and placement of control points that will be required to ensure product accuracy and independent check points required for validation of the deliverables.

Ground control points are surveyed to provide a connection between the ground coordinate system and the imagery coordinate system. All imagery will be acquired with a geodetic grade GNSS receiver on the aircraft to reduce the number of ground control points needed. For this project, Bowman will select photo-identifiable point locations and (if needed) target ground control points in an evenly distributed pattern throughout the project area.

As a quality check process, Bowman will also photo-identify, target and survey QC check points. These points, independent of the control points, are to be used exclusively in the quality check process to evaluate the accuracy of the final digital orthoimagery. This QC process will ensure that the digital orthophotography meets ASPRS accuracy standards as outlined in the specifications.

Our design approach includes:

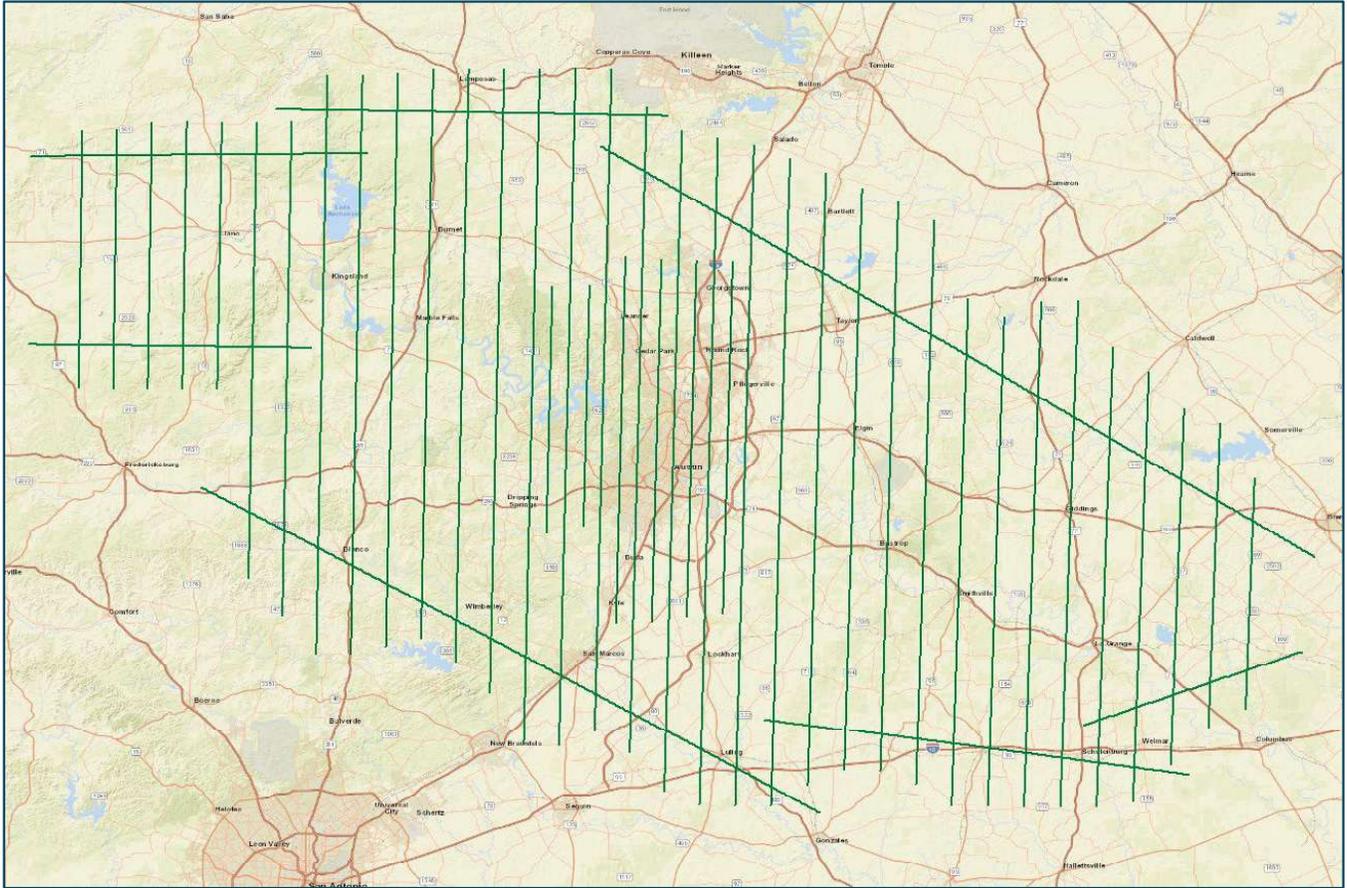
- Re-use of control and QC points from the 2025 project where possible
- Individual control/check points will be either paneled or photo-identifiable
- Overall uniform dispersion of control over the entire project
- Focus on placing control at junctions of strips, maximizing the number of observations of control points during triangulation to strengthen the solution

Preliminary Flight Diagram

The following page contains a preliminary flight diagram for 12" GSD imagery for the 10-county area of interest, 8,840 DO4Qs. The final flight plan and control layout will be selected based on the finalized 12" AOI and condition of prior project survey points.

Project Plan

Preliminary Flight Diagram: 12" GSD Capital Area Council of Governments



Bowman

Legend

— Flight Lines

0 15 30 60 Miles



Project Plan

2. Acquisition Equipment

Aircraft

Our fleet of 11 aircraft offers the flexibility and reliability needed to keep data collection on schedule—especially when weather or timelines shift. The fleet includes two Cessna Caravans, along with four premier twin-turbine Cessna 441 Conquests that provide strong performance and mission-ready capability for demanding survey work. All these aircraft can host any of our digital sensors. With this depth of resources, we can support multiple crews or concurrent project areas, reduce downtime by having backup aircraft available, and mobilize quickly from our home base to project locations across the lower 48 states—so we can capitalize on favorable weather windows and maintain consistent production throughout the project.

ACQUISITION AIRCRAFT		
MAKE AND MODEL OF AIRCRAFT		
CESSNA 441 CONQUEST II-10 (WITH RVSM*)	Number of Aircraft: 4 Engine: Twin-turbine pressurized Flight Range: 2,193 nm Operating Ceiling: 35,000' Cruise Speed: ~310 knots	
CESSNA CARAVAN 208A/208B	Number of Aircraft: 2 Engine: Single engine turbo prop Flight Range: 960 nm Operating Ceiling: 25,000' Cruise Speed: ~185 knots	

* RVSM: Reduced Vertical Separation Module. This FAA-certified equipment allows operation above 28,000' (MSL).

Sensors

IMAGE SENSORS					
SENSOR MAKE/MODEL	NUMBER AND TYPE	SERIAL NUMBER	CALIBRATION DATE	IMAGE DIMENSIONS (PIXELS)	IMU MAKE
PHASE ONE PAS PANA	4 – Large-format frame	OF000020	04/04/2023	14,000h x 46,000w	Applanix AP61
		OF000021	03/04/2023		
		OF000023	07/13/2023		
		OF000024	08/12/2025		
LEICA ADS100	4 – Large-format pushbroom	10510	07/14/2018	Forward: 16,000 Nadir: 20,000 Backward: 18,000	SPAN uIRS
		10522	01/24/2019		
		10530	03/13/2019		
		10552	01/25/2019		

Project Plan

3. Acquisition Plan with Assumptions for Weather

Movement of aircraft to and from project areas is done by Bowman's chief pilot in coordination with the project manager. This is a complex process aided by the vast experience in acquisition Bowman has gained in over a half-century of aerial data capture. It involves tracking short- and long-term weather patterns and the progress of each project. Weather data for each project area is automatically loaded into our central database for consultation and historical study. The Bowman project manager will keep the Capital Area Council of Governments apprised of aircraft movements into and out of the project areas.

Bowman's acquisition experience within the State of Texas in recent years will be invaluable to ensure successful capture. Our general assumption regarding "sit days" (awaiting weather or clearance to fly airspaces) is that we have approximately 1 sit day per 3 days of acquisition. Imagery will be captured when the sky is free from clouds, cloud shadows, high overcast clouds causing low illumination, haze, fog, smoke and dust. We understand that cloud/cloud shadow cover must be less than 5% per final uncompressed image tile and less than 5% of the entire AOI. Ground features will be free of excessive water due to rain or snow. Light conditions will ensure images are free from smear, blur, excessive glare or noise.

Flight Planning

Flight planning is the responsibility of Bowman's flight acquisition manager, and each flight plan is reviewed and approved by the project manager. Bowman uses the Leica MissionPro flight planning software for acquisition planning. This software utilizes an elevation model to rigorously check for adequate forward overlap and sidelap coverage as well as desired product GSD. Flights are planned against the buffered coverage for the desired seasonal window portion for the project area.

The flight planning software addresses rugged or uneven terrain in two ways:

- The targeted GSD is treated as a "maximum" value by the software and is never exceeded when compared to the terrain model. This may require "line breaks" to alter the flying height in very rugged terrain.
- The sidelap setting is treated as a "maximum" value and the spacing between lines is modified to ensure the value is not exceeded.

Imagery acquisition is the most critical project phase. The most important facet of acquisition is the focus on an extremely high degree of communication between Bowman's chief pilot and all aircrews. Flight plans are updated each evening in the central database and re-distributed to aircrews via the internet and/or e-mail. Daily communication and coordination between the chief pilot and aircrews ensure that acquisition is maximized.

Bowman's chief pilot will inform the local Air Traffic Control (ATC) and/or military air traffic control authority in advance of flight operations. This includes providing aircraft tail numbers and flight designs to ensure the local authority is fully informed.

Before each acquisition day several activities are undertaken by the aircrew:

- Aircraft, GNSS, IMU, and camera are all inspected for proper operation.
- Final weather checks are made.
- Up-to-date flight plans are downloaded and reviewed.
- Flight plans are filed with the local airport/FAA.
- If required, base stations are set up.

Project Plan

At the end of each acquisition day:

- Aircraft, GNSS, IMU, and camera are all inspected for proper operation.
- Aircraft mission logs are completed.
- Data drives are shipped overnight to the production center.

To maintain a clear report on the remaining work, we combine the daily progress each plane has made with the results from inspection of acquisition from previous days. This is all done in the database, so an up-to-date view of the data is always available.

Aircrews generate a flight report for each mission that is used by the production center to appraise the results of each day's acquisition. For example, if extreme turbulence or cloud cover is cited by the aircrew for specific areas of the acquisition, prioritized attention is paid to these areas by the inspectors.

It is critical to collect GNSS/IMU data with the highest possible integrity, considering these primary factors:

- Operation of base stations to maintain a reasonable distance to the project area.
- Avoiding IMU drift by limiting the length of lines – generally less than 20 minutes.
- Using CORS (Continuously Operating Reference Stations) and/or local GNSS reference networks to provide multiple observations.

Geometric Processing

Geometric processing is the application of the most recent sensor calibration data to the imagery using the sensor manufacturer's software. This includes provisions for principle point offsets, focal length, lens distortion, and position of the CCD pixels.

Acquisition Inspection

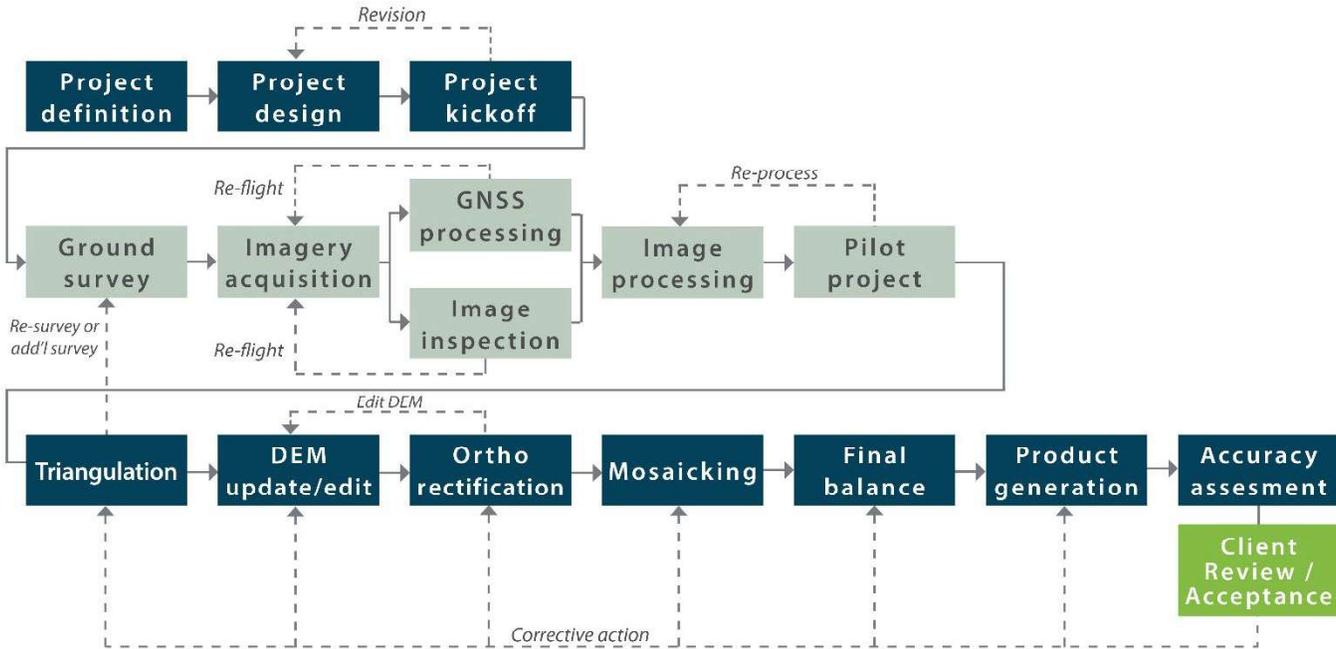
Rapid imagery inspection is critical to the overall success of a project, so all imagery is viewed and graded, and the inspection results are stored in our central database. This approach enables a qualified and timely determination to be made regarding the possible need for re-flights and guarantees proper image quality.

EXAMPLE IMAGERY INSPECTION ITEMS		
ITEMS INSPECTED VISUALLY	ITEMS INSPECTED ANALYTICALLY	ITEMS INSPECTED VISUALLY AND ANALYTICALLY
<ul style="list-style-type: none">• Clouds/cloud shadow• Smoke/haze• Excessive flooding/standing water• Excessive ice/snow• Image motion• Specular reflection	<ul style="list-style-type: none">• Verify acquisition parameters are met• Sun angle• Forward lap• Sidelap• Crab• Tilt	<ul style="list-style-type: none">• Trajectory processing• Pixel/band registration• Camera misfires• Image artifacts

Project Plan

4. Orthoimagery Production

The Bowman orthophoto workflow is best illustrated by the flowchart below followed by more detailed information on process steps.



Triangulation

Since triangulation provides the foundation accuracy for the project, it involves checks and balances to ensure accurate results are provided to the production process to avoid costly and time-consuming re-work. The inputs to triangulation include GNSS+INS data, sensor boresight data, sensor calibration data, ground control and check point data, and the imagery itself.

The triangulation process involves the following steps:

- Automated measurement of pass and tie points appearing in the overlaps of the imagery.
- Interactive editing of pass and tie points.
- Measurement of control and check points.
- Bundle adjustment yielding refined imagery position, attitude and all point positions.
- If required, re-measurement of points and repetition of the adjustment.

The triangulation solution is based on a sophisticated bundle adjustment employing a mathematical model of the imaging geometry. It relies on the use of far more observations (observed/recorded values such as GNSS+INS, ground control, and image measurements) than are required for a unique solution. Using a least squares optimization approach, the observations are refined for a best fit. Careful inspection is made of the various residuals (differences between observed and adjusted values of parameters) reported by the solution.

Project Plan

Analysis of the quality of the triangulation solution is performed by a Certified Photogrammetrist who is highly skilled and experienced with the process. Upon completion of the triangulation process, the results are stored in the central database and published for use in the following production steps.

Elevation Model Preparation

Bowman will use the most current version of LiDAR available for orthorectification, supplemented with surface data produced off new imagery for creation of the Digital Elevation Model (DEM). If LiDAR is unavailable, after flight/triangulation when dense image matching is created, large, elevated features (vegetation, buildings, etc.) are removed using a combination of automated and manual processes, with additional inspection. The master DEM is projected into the native projection and segmented into buffered extents of each accepted line segment for orthorectification in Bowman's distributed processing environment for file size efficiency of processing.

Orthorectification

Orthorectification will be performed using Leica XPro software, which operates in a highly distributed processing environment. All resampling is performed using bi-cubic resampling to ensure pixel location accuracy and to avoid aliasing effects commonly seen with nearest-neighbor or bilinear resampling techniques.

Radiometric Processing

Radiometric processing corrects defective pixels and adjusts the differing sensitivity of the pixels to a uniform result. It includes the application of all radiometric calibration information provided for each camera head from the supplier.

Bowman limits sensor-specific processing to the front end of the production chain, and all imagery is retained in 4-band and 12 bpp (bits/pixel) format until the final tiles are produced. This allows us to make localized adjustments to color, tone, contrast, etc. without compromising the overall quality of the deliverable product.

Using our own interface and database schema, image processing technicians organize large blocks of orthoimagery into groups with common characteristics, which do not necessarily coincide with individual flight missions. The tool can display images in ground space, allowing operators to see the relative image quality between neighboring images and imagery can be viewed in either color or CIR to ensure 4-band continuity. The atmospheric conditions during capture may result in imagery covering regions of differing degradation caused by haze.

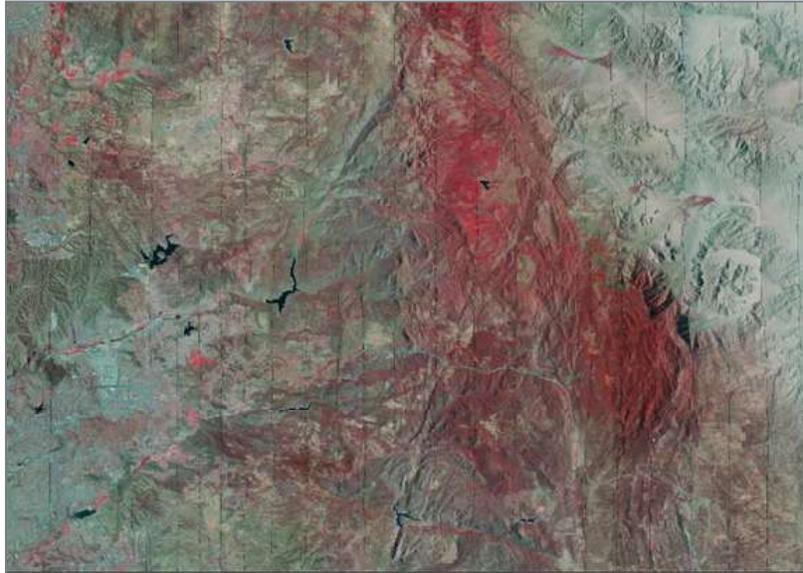
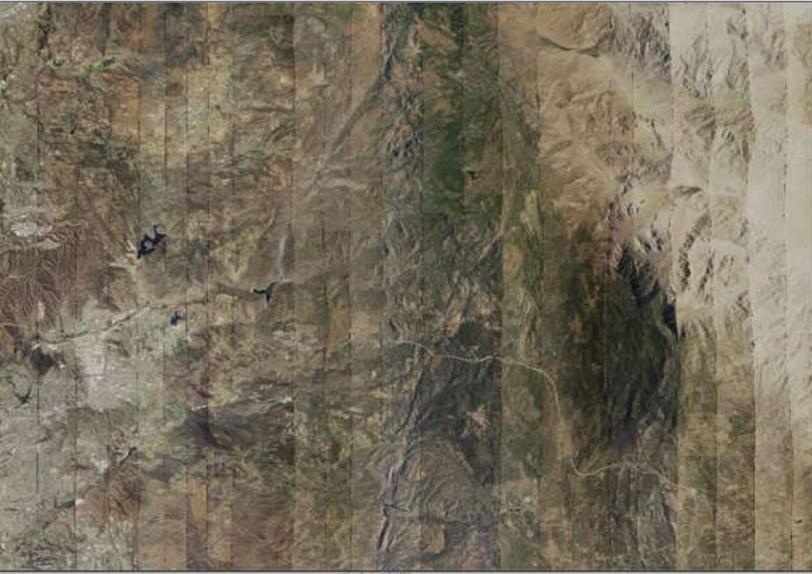
Bowman's custom-developed Block and Global Balance software eliminates any residual issues evident after application of Bi-Directional Reflectance Distribution (BRDF) and atmospheric corrections. This is handled by two functions:

- **Block Balance** fits correction models to each strip of images with a single simultaneous bundle adjustment.
- **Global Balance** is then run to correct local differences in illumination between strips, and the results can be previewed in Group Tool without the need to generate intermediate files.

Global Balance uses a "rigid body model" correction calculated for each orthoimage that best forms a normalized block fitting neighboring orthoimages.

Project Plan

Before and after global balancing for RGB and CIR



Project Plan

Infrared Processing

Bowman's image processing approach supports 4-band (R-G-B-NIR), color (R-G-B), and color infrared (CIR: NIR-R-G) products by retaining imagery in 4-band x 12 bpp form until generation of the final deliverables. Since the red and green bands are common to the color and CIR renditions within a 4-band file, care must be taken to ensure proper appearance of both. In general, this is accomplished by limiting changes to the NIR band as much as possible. The approach is to first lock down the color rendition (ordered R-G-B or bands 1-2-3) and then process the NIR band to achieve the CIR rendition (ordered NIR-R-G or bands 4-1-2).

Seamline Generation Process to Create Mosaics

There are three steps in the seamline process:

- Automatic generation of seamlines
- Editing of seamlines from within Group Tool
- Application of the seamlines to create the Master Tiles

After all imagery in a completed triangulation block is orthorectified, automatic seams are generated, and then technicians must review the results and correct, if necessary, prior to writing out the Master Tiles. Once an area of seams has been accepted, the user selects tiles to be generated and adds them to a distributed processing queue.

Bowman's custom ray trace module is used to detect potential occlusions and smearing that may occur in rugged terrain. This software creates a graphical overlay that directs technicians to examine pixels that may be incorrect, avoiding the manual task of inspecting imagery for such issues. If an occluded or smeared area is encountered, the corresponding imagery from an overlapping orthoimage is inserted to replace it during the mosaicking process.

Bowman will supply an ESRI shapefile that fully delineates the seamlines used to merge overlapping digital orthoimages during the mosaicking process. Bowman's custom software automatically generates the seamline data during production, made possible by the integration of automatic seamline generation and manual edit into a single application and interface.

After mosaicking, imagery is produced to an internal tile layout that encompasses the project area with adequate buffering. Master Tiles are 8,192 x 8,192 pixels in size, in 4-band x 12bit format, and in the dominant reference frame of the project. Once the Master Tiles are completed, they are used to generate all delivery tile layouts, a process that includes re-projection into final datum and re-mapping to the 8-bit depth for final product.

Project Plan

Bodies of Water in Imagery

Bowman attempts to avoid seamlines crossing water bodies where possible; however, it is possible that passing seamlines through some water bodies cannot be avoided. Tonal variations will be apparent due to several factors, including sun angle changes during acquisition, turbidity changes caused by rainfall and runoff and naturally changing water "color." In extreme cases, we have developed processes to drastically improve the quality of the water and to reduce the severity of the spectral reflectance. We will minimize the reflectance effect by patching in alternate views of the affected area from overlapping adjacent image data (either from within a line or an adjacent line). Should these alternative views not be available or are themselves affected by specular reflection, Bowman has also implemented a function to fill from surrounding areas.

Before (left) and after (right) extensive correction for specular reflection



Pilot Project

Shortly after orthoimagery production begins, Bowman will deliver a representative pilot area of >10% of the project area to the Capital Area Council of Governments. The intent of the pilot is to define the desired appearance of the orthoimagery prior to full-up processing and to check form and format of the deliverables. The initial orthoimages will be processed to image metrics defined by the SOW (contrast, clipping, brightness, tone, etc.) and provided to the Capital area Council of Governments for review.

The pilot project will consist of:

- An area greater than 10% of the size of the AOI
- At least four uncompressed orthoimage tiles

Project Plan

Assessment of image quality includes several factors, some of which are objective (i.e.: computed) and some of which are still of a subjective nature. When discussing the image metrics presented in this section, one must keep in mind that they are guidelines and must be applied – or modified – to fit the context of the project. For example, image metrics will provide deceiving results if gathered from an image covering barren ground, water, desert, etc. The key factors in image quality are:

- “Colorimetry” – the balance of colors
- Contrast, tone, balance
- Clipping of dynamic range
- Sharpness
- Noise

Bowman software compiles image metrics on all images processed and retains them in a central database.

Metadata

Bowman is completely familiar with metadata delivery requirements having had this standard delivery for nearly all of our projects, including numerous projects in Texas. We will provide fully compliant FGDC metadata for all data deliveries.

Horizontal Accuracy

As discussed in the project methodology text regarding project design, Bowman will incorporate industry, manufacturer, and empirical experience for acquisition parameters, establish sufficient ground control and take full advantage of available lidar data to meet required accuracies. We understand and will fully comply with the accuracy specifications as detailed requested and shown in the following table.

HORIZONTAL ACCURACY STANDARDS (INCHES)						
ACCURACY CLASS	PIXEL SIZE	RMSEX _Y	RMSE _R	ACCURACY _R 95% CONFIDENCE	MOSAIC SEAMLINE MAXIMUM MISMATCH	
ASPRS RECOMMENDED USE:						
“STANDARD MAPPING AND GIS WORK”	12.00	24.00	33.94	58.74	48.00	

Preliminary Orthoimagery

With years of web services hosting experience on the USDA National Agriculture Imagery Program (NAIP) and with our web-based inspection tool, Bowman is in a unique position to offer clients a web-based imagery preview service. This service provides a visualization of acquisition progress and allows clients to assess whether ground and atmospheric conditions for acquisition were appropriate. This display of production imagery is superior to textual reports and progress graphics for many users and is accessible on desktop workstations as well as on most smartphones and tablets.

The service can be implemented with username/password authentication to control access, or it can be implemented as an open-access service to the public. If desired, the interim imagery can also be incrementally updated with the final imagery as production progresses, maturing into the final imagery service at the completion of the project.

Project Plan

Preview orthoimagery is automatically processed to default imagery metrics, suitable for assessing ground conditions, cloud/cloud shadow cover, flooding, snow/ice, fog, smoke, etc. If re-flights are conducted, their result will overwrite any previous imagery, resulting in a view of the most current data. Bowman can post preview imagery within two weeks of completion of acquisition.

INTERIM IMAGERY VERSUS FINAL IMAGERY		
ITEM	INTERIM	FINAL PRODUCT
TRIANGULATION	None performed; based solely on trajectory processing	Triangulation supported by GNSS+INS, ground control
ORTHORECTIFICATION	To either existing (unedited) elevation surface or USGS NED	To final (edited) elevation surface
ACCURACY	Generally 2-4X less accurate than final product	To product specifications
IMAGE PROCESSING	BRDF and atmospheric corrections applied; default processing to basic metrics/appearance	Additional processing to desired final product appearance
MOSAICKING	SEAMLINES	Automated only
	BALANCING	Block balance only
		Automated with manual editing to final product specifications
		Block and global balance to final product specifications

We believe this approach will yield orthoimagery that will allow the Capital Area Councils of Governments to determine whether the imagery was acquired under the correct ground and atmospheric conditions.

Bowman is willing to host this imagery to a web image service for use by the Capital Area Council of Governments. This service is essentially the same approach as the image service underlying our web-based inspection tool, SurCheck, and will persist until all production imagery is finalized. This can be implemented as a username/password solution to control access or implemented as fully open access. Since this is an imagery service, it can be accessed easily as a Java application without a geospatial context, used in any common GIS package, and even accessed by smart phones, tablets, etc.

The interim imagery web service is an OGC-compliant WMS implementation:

- 4-band imagery viewable as natural color or color infrared (CIR).
- A vector overlay portrays the image bounds complete with acquisition time/date, aircraft tail number, camera make/model/serial number, etc.
- It is a REST (REpresentational State Transfer) service that can be viewed by a user in several ways, including but not limited to:
 - As an ArcGIS Java viewer for simple viewing
 - Within ESRI ArcMAP
 - Within ESRI ArcGIS.com
 - Google Earth

Project Plan

B. Quality Control Workflow

Our redundant quality control processes require inspection at every major production phase, assuring that no work proceeds to the next step until it is validated against project specifications and image quality standards. The result is a 98% first-time client acceptance rate.

Bowman has instituted extensive quality assurance (QA) and quality control (QC) procedures, modeled upon ISO processes, to provide premium quality products “first time right, on time.”

Our ISO processes continuously optimize quality control and efficiency. Our personnel have extensive experience that supports the quality control system, and our staff includes multiple Registered Land Surveyors (RLS) and several Certified Photogrammetrists (CP).

QUALITY CONTROL FEATURE BENEFIT	
FEATURE	BENEFIT
Use of Certified Photogrammetrists and Registered Land Surveyors at key steps in the process	<ul style="list-style-type: none"> Ensures quality and accuracy
100% image inspection – each and every raw image is reviewed, graded, and results retained in a central database	<ul style="list-style-type: none"> Ensures acquisition is completed and reviewed in a timely manner Ensures image quality
Staff mark data as ready for the next step	<ul style="list-style-type: none"> Ensures inputs are fully processed for each step
Use of custom-developed software at key steps	<ul style="list-style-type: none"> Not reliant upon 3rd party solutions Ability to quickly develop solutions to address problems that arise
Independent accuracy validation reporting	<ul style="list-style-type: none"> Objective results and reporting, can be duplicated by the client
Custom software to generate seamline shapefiles	<ul style="list-style-type: none"> Enables clients to inspect the predominant source of residual artifacts
Web-based inspection tool with call-outs and response retained in the central database	<ul style="list-style-type: none"> Streamlines inspection, acceptance, and delivery Complete record of all inspection and remedial actions

Project Plan

QUALITY CONTROL FOR ORTHOIMAGERY PRODUCTION

PHASE	APPROACH
PROJECT DESIGN	<ul style="list-style-type: none"> Internal design reviewed by project manager, Certified Photogrammetrist, and Registered Land Surveyor Reviewed by client
GROUND SURVEY OPERATIONS	<ul style="list-style-type: none"> Field survey operations and processing under the supervision and review of a Registered Land Surveyor
IMAGERY ACQUISITION	<ul style="list-style-type: none"> Aircraft inspection, maintenance, and repair performed prior to and during project Sensor calibrations updated as needed Boresighting of sensors prior to use and/or after installation/re-installation Reporting of detailed progress by each aircrew at end of acquisition day Nightly updating of flight plans incorporating acquisition and results of inspection
IMAGERY INSPECTION	<ul style="list-style-type: none"> Each image graded and reported in central database, including inspection against the following factors, at a minimum: <ul style="list-style-type: none"> Seasonal window(s) and client start/stop work orders Sun angle and/or timeframe specifications Project specifications for ground conditions (flooding, smoke, haze, etc.) GNSS+INS accuracy and quality Camera misfires Image motion/smear Agreement with flight plans Clouds/cloud shadows Specular reflection noted for technicians to correct Automated analysis of smear and/or occlusion in rugged terrain executed for use by technicians
TRIANGULATION	<ul style="list-style-type: none"> Trajectory processing reviewed by a Certified Photogrammetrist / Registered Land Surveyor Tailored triangulation reports for client review Dependent upon accuracy requirements, graded against: <ul style="list-style-type: none"> Ground control, GNSS+INS, and image residuals Agreement with checkpoints Distribution and placement of pass/tie points in final solution
ELEVATION MODELING	<ul style="list-style-type: none"> Visual review Comparison of triangulation points to the elevation surface to determine areas of change or problems
ORTHO/MOSAIC	<ul style="list-style-type: none"> Ortho technicians inspect one another's work and perform edits Depending upon resolution of imagery, planimetric data such as roads, bridges, rail lines, buildings, etc. may be used to focus guide seamline review/edit
PRODUCT QC	<ul style="list-style-type: none"> Use of Pilot Project(s) with client to assess: <ul style="list-style-type: none"> Color, tone, balance specifications/expectations of client Form/format of deliverables Metadata compliance Accuracy analysis performed using Esri ArcGIS and Excel

Project Plan

Project Planning

Project planning involves design of the imagery acquisition and control survey network which ensures accuracy requirements are met and guarantees total product coverage.

Flight plans are generally developed by Bowman's flight acquisition manager and are approved by the project manager, a Certified Photogrammetrist. When the flight plans are approved, the Triangulation and Survey staff design the ground control network against the flight plans. A Certified Photogrammetrist from Triangulation and a Registered Land Surveyor from Survey are responsible for the design. The design is approved by the project manager.

Ground Survey

Ground survey is performed by a Registered Land Surveyor (RLS) or technicians under the direct supervision of an RLS. All calculations are performed by an RLS and reviewed by a Certified Photogrammetrist from the Triangulation staff.

Sensor Calibration

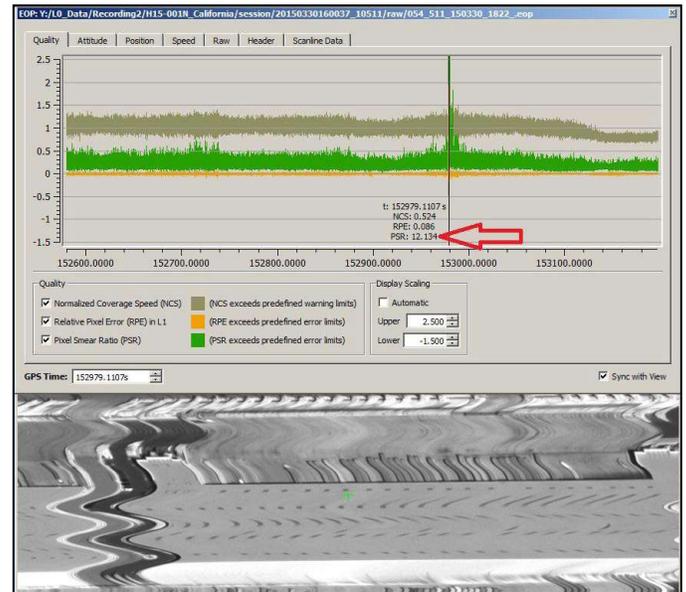
Prior to using a project, Triangulation personnel review all sensor calibration information to ensure all systems are up-to-date. The following is also prepared for each aircraft/camera combination prior to use in processing:

- GNSS antennas
- Dual-frequency receivers
- Surveys accurately portraying the relationship between the camera lens nodal point and the antennas
- Radiometric and geometric calibration files for each sensor

Image Inspection

Bowman employs 100% inspection, reviewing and grading all imagery and updating the central database with the results. If re-flights are isolated, they are immediately prioritized to the acquisition aircrews. Should any question arise about the quality of the imagery or adherence to project specifications, our project manager will consult with the COG's designated personnel on the proper course of action.

With any type of aerial digital sensor, care must be taken to inspect imagery for possible image blur caused by turbulence. In late 2014, Leica supplied us with a basic software tool that aids in locating areas of potential blur. We built upon this tool with customized software to better integrate it into the imagery inspection task. In addition, our air crews were trained on the effects of turbulence and we instituted flight reports that quantify any turbulence, allowing us to focus our imagery inspection to isolate and prioritize potential re-flights.



Leica/Bowman (Surdex) blur tool used during inspection, showing potential blur graph and corresponding image blur

Project Plan

Triangulation

Bowman employs numerous checks throughout the critical triangulation phase. These include, but are not limited to:

- Each triangulation block is independently reviewed by a Certified Photogrammetrist not involved in the specific block under review.
- Surveyed checkpoints are carried through the triangulation process as “floating” points (not constrained to their known positions), and these points are checked against the known (surveyed) positions.
- All residuals (sensor position, ground control points, image points) are inspected to ensure they are within the respective estimated precision of each.
- All triangulation points (pass, tie, control) are checked against the existing DEM data to search for obvious disjoints. This is sometimes helpful in finding errors in datums, projections, etc. associated with both the triangulation and the DEM.

Orthorectification and Mosaicking

Technicians review the orthoimagery for:

- Seamless appearance (against seamline shapefiles)
- Image processing artifacts
- Overall color balance against the target appearance from the pilot project

C. Contingency Plan

Contingency plans are implicit in the formal operation within Bowman. While we cannot control weather conditions, we can, and do, ensure more than the minimum acquisition and support resources. Some of the steps we take to ensure successful execution include:

- With up to five acquisition platforms, we will not hesitate to bring in an additional aircraft during good weather and/or access to difficult airspaces.
- Bowman has FAA-certified inspection, maintenance, and repair staff, independent of third-party support. This ensures maximum productivity for our aircraft and minimal reliance on the schedules of others.
- Bowman employs extensive cross-training of production technicians to address bursts of work or delays in schedule. For example:
 - Triangulation staff is supported by stereo compilation staff for the measurement and edit of points. Numerous Certified Photogrammetrists are also available to perform triangulation solutions and/or review.
 - Image processing personnel are cross trained to handle orthorectification/mosaic tasks.
 - Orthorectification personnel can perform many image processing tasks and can aid in image inspection.

Project Plan

- Finishing personnel perform independent review of orthoimage deliverables. Additionally, these technicians are trained to perform DEM/LiDAR editing to back up the compilation staff.
 - For the typical summertime burst of production, part-time employees have been hired to handle limited and focused ortho/mosaic tasks on an as-needed basis.
 - Project managers and supervisors are experienced in technical work and can support bursts of demand if required.
- Our computing and storage systems use redundant storage and a combination of automated and manual backup of data at critical junctures in the process. All backup data is stored in the hangar facility separate from the main office. Battery backups are employed to address power outages, allowing a safe shutdown of all servers and drives.
 - All critical equipment and software are under maintenance agreements.
 - Our production facility has a diesel-powered generator that can be re-fueled indefinitely, ensuring production is not affected in the instance of a power failure.
 - If weather conditions prohibit use of certain airports, we can re-locate our aircraft to other airports.
 - We have several acquisition subcontractors from our USACE, GPSC, and USDA work available to assist in acquisition if necessary.

D. Localized and Unique Issues

With years of experience capturing imagery in the State of Texas, Bowman has gained valuable insight relating to the proper process for imagery acquisition in the state. Bowman has worked for TNRIS and the Houston-Galveston Area Council on numerous projects, and over the course of this work we have dealt with border access issues, coastal area weather, and snow cover in the East Texas Upland area during the main acquisition window. Bowman was also awarded a contract in 2014 to acquire 50 cm GSD orthoimagery of the entire state. We have become very familiar with localized and unique issues across Texas. Bowman's successful completion of the CAPCOG 2020, 2021, 2022, 2023 and 2024 orthoimagery projects and prior projects with Brazos County in 2015, 2017 and 2021 is evidence we understand localized and unique issues.

E. Production Centers and Associated Work

Our headquarters and production facility are based in the greater metropolitan St. Louis, Missouri area. Approximately 100 employees work at our headquarters building and hangar complex at the Spirit of St. Louis Airport in Chesterfield, Missouri.

Bowman believes that there is no substitute for experience. Our workers' experience on numerous projects in Texas, including a statewide project, resolving difficulties and streamlining processes enables them to apply their knowledge on your project, saving time, avoiding potential problems, and improving quality.

Our senior staff has an average of 25 years of experience. We have 8 ASPRS Certified Photogrammetrists, 1 ASPRS CMS-Lidar, 1 ASPRS CMT-GIS, 1 GISP, 2 Registered Land Surveyors and 1 Project Management Professional (PMP) certification. Many of our staff have degrees in mapping or engineering fields. With this depth of experience, our senior staff understands how to analyze projects, develop the best approaches, avoid potential problems, and quickly resolve them if they do arise.

Project Plan

Bowman's aircraft are housed in our 18,000 square foot hangar at Spirit of St. Louis Airport, only blocks from Bowman's geospatial production office in the St. Louis area. Bowman's full-time aircraft maintenance staff is certified for A&P (Aircraft and Powerplant) with Inspection Authorization (IA) to support our fleet. This staff is qualified and licensed to perform FAA-mandated inspections, maintenance, and repair. We are therefore not reliant on the schedules and costs of third parties. We have even transported maintenance personnel to project areas to perform inspection, maintenance, or repair in the field.

F. Commitment of Resources

Mr. Stefan White will be assigned as the dedicated project manager. Stefan will be the single point of contact and will easily be able to work with Capital Area Council of Governments and make sure all needs are met.

- For the acquisition phase, we will have up to three aerial acquisition platforms. Each includes either a Cessna Caravan or a Cessna Conquest hosting a digital image sensor.
- Bowman will provide the necessary ground surveying resources for field operations and office processing.
- Bowman commits the necessary production resources for image processing, triangulation, ortho/mosaic steps, project QC, and product delivery.
- The Bowman web-based SurCheck inspection tool is offered free of charge for the Capital Area Council of Governments for orthoimagery inspection.

G. Web-Based Inspection Tool (SurCheckSM)

To assist our clients with the inspection of their orthoimagery, Bowman provides – *at no additional cost* – our web-based image inspection tool, SurCheck. This tool is the result of years of continuous improvement and responses to user requests for enhancement. It is implemented in HTML5, JavaScript, php, and the ArcGIS API for JavaScript, providing flexibility for enhancements in the future.

SurCheck streamlines the inspection, remedial action, and delivery timelines. As call-outs are reported by reviewers, Bowman resolves each and notifies reviewers so they may confirm the correction. When all call-outs are resolved for the project, the data can be shipped for final delivery. In many cases, clients choose to have orthoimagery added to SurCheck incrementally, further expediting inspection and allowing leveling of inspection resources.

Project Plan

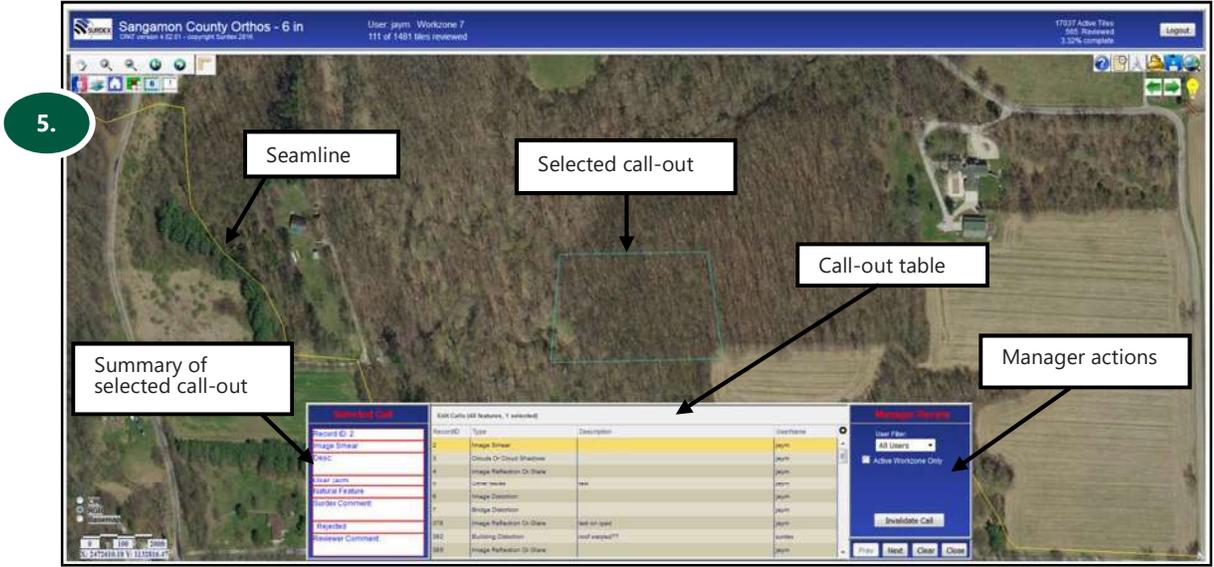
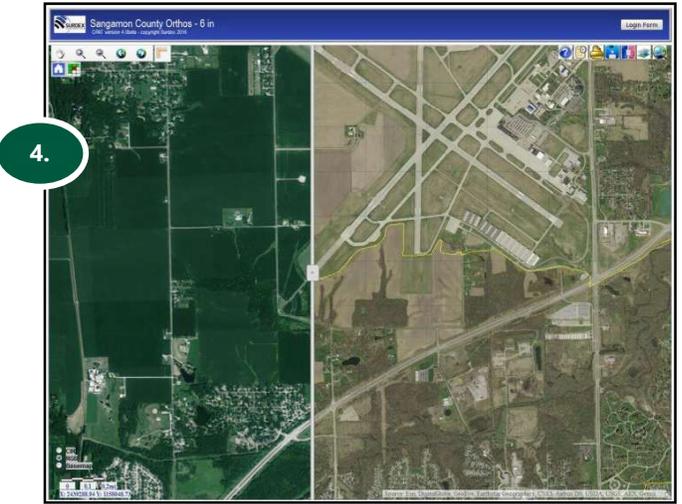
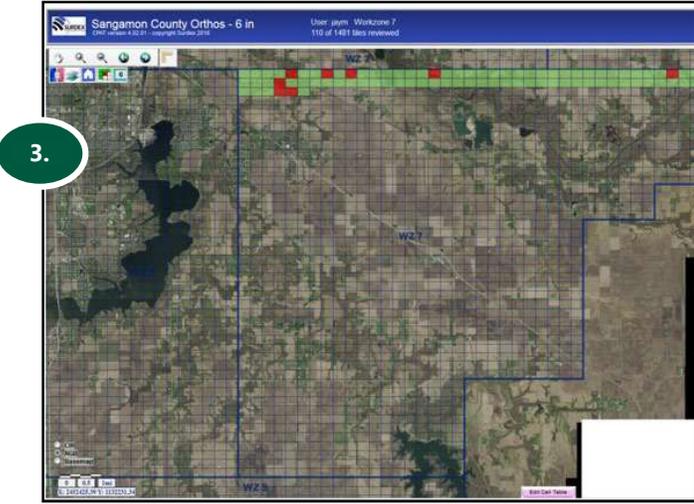
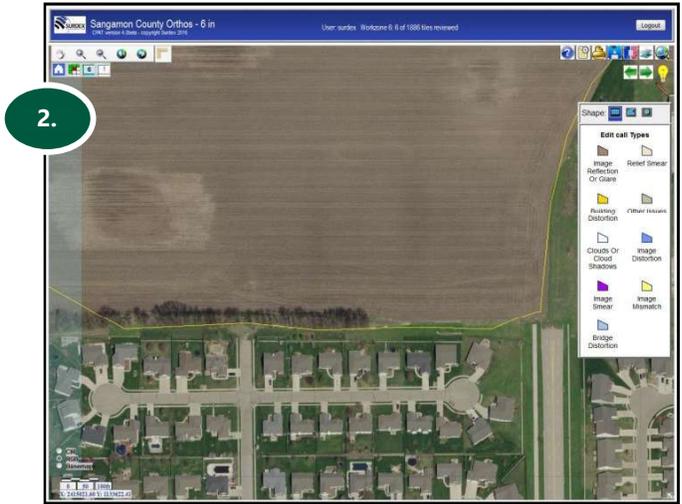
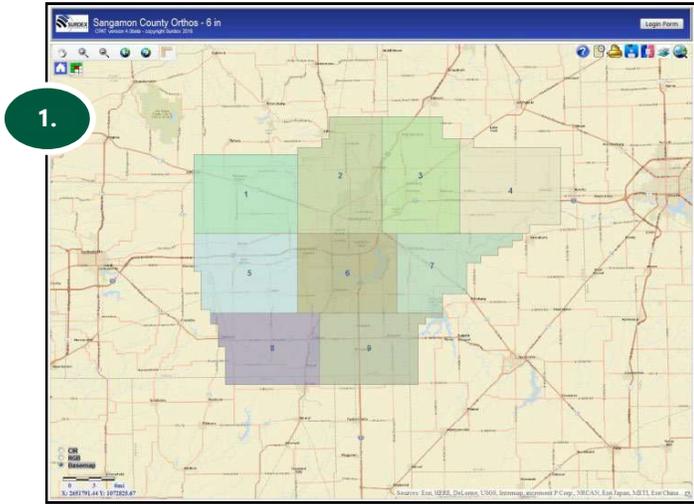
SURCHECK SM	
FEATURE	BENEFIT
ADMINISTRATIVE	
Username and password login access	Protected access
Client manager can assign reviewers to separate work zones within a project	Ability for multiple reviewers increases inspection rate, supports multiple partners
Four tiers of reviewers: <ul style="list-style-type: none"> • Standard inspector • Client manager • Bowman reviewer • Final client reviewer 	Covers entire lifecycle of inspection and resolution process, ensuring product is fully inspected and accepted
Help menu for most options	Online assistance with operation eliminates the need for a training guide, allowing inspection sessions to continue uninterrupted
GENERAL INTERFACE	
Browser-based	Works on any computer without the need to install software
Simple one-page design	Simple interface makes training easy, maximizes screen real estate for viewing imagery
Bowman-provided overlay of seamlines	Assists in searches for potential artifacts
Swipe function with user-selectable layer	Provides a quick comparison to other imagery
Ability for users to add their own map layers	Enables use of desired datasets for comparison—examples include historical imagery, vector overlays, control point overlays, parcels, ArcGIS Online layers, etc.
Magnifier window	Quick toggling between magnifier and standard view allows reviewers to retain scale with close-up inspection of potential artifacts
Histogram	Aids in determining adherence to project-specific image metrics
Progressive inspection	Methodical approach streamlines inspection and portrays status
Save call-outs to a shapefile or CSV files	Export call-outs for non-SurCheck users for review (can view in other applications i.e. Esri ArcMap, AutoCAD); CSV easily imported into Excel
Measurement tool	Supports investigation of call-outs against specifications (such as seamline shear, size of artifact, etc.)
Print current screen to printer or PDF	Simplifies creation of samples, bug reporting, etc.

Upon request, Bowman can provide a video and PowerPoint presentation to familiarize and train users on the tool's use, as well as access to a sample project.

The following page portrays selected aspects of SurCheck.

Project Plan

SurCheck online user views: 1. Initial screen showing AOI, 2. Call-out template, 3. Work zone progress, 4. Swipe between color and ArcGIS.com imagery and 5. Manager call out view



Project Plan

H. Communication

1. Reporting

Bowman understands the importance of regular communication throughout an orthoimagery project. Project Manager Stefan White will attend the kick-off meeting as well as all subsequent meetings with the Capital Area Council of Governments and provide the necessary reports. Key production staff will also attend the kick-off meeting. The reporting plans are detailed in the table below.

SUMMARY OF REPORTING PLANS FOR THE PROJECT	
KICK-OFF MEETING	To be scheduled with Capital Area Council of Governments after project scope is finalized. Proposed agenda includes: <ul style="list-style-type: none">• Identify points of contact for all aspects of project• Review scope and specifications• Discuss project design (flight and ground survey) presented by Bowman prior to meeting• Provide sensor calibration reports• Finalize invoice schedule and payment proportions
SUBSEQUENT MEETINGS	Bowman is willing to meet with the Capital Area Council of Governments at any time to address specific issues and/or progress
REPORT ON MOBILIZATION	Bowman will appraise and discuss with the Capital Area Council of Governments of plans to mobilize to/from the project area on an as-needed basis
ACQUISITION PROGRESS	<ul style="list-style-type: none">• Daily updates provided via real-time status graphics and reports during acquisition• Available for weekly telecons/webcast at the request of the Capital Area Council of Governments.
POST-PROCESSING	
DELIVERY OF PRODUCTS AND PERCENTAGE OF COMPLETION OF PROJECT PHASES	

2. Project Management

Mr. Stefan White will be the project manager and always serve as the primary point of contact with your designed representative(s). Stefan has over nine years of experience in remote sensing data acquisition and as Director he has proven leadership in guiding cross-functional teams from SOW review through project delivery. Stefan will be backed up by our Director of Project of Production Wade Williams, who is a certified photogrammetrist and has extensive experience managing project in Texas.

Bowman's project management approach is founded on frequent communication. Each of our project managers has experience in nearly all phases of production. They are guided by the philosophy that they must support the objectives of their clients by efficiently managing internal resources and maintaining schedules as well as quality and accuracy standards.

Communication can take the form of face-to-face meetings, e-mails, telephone calls, and webcasts. Our project managers are required to communicate with each of their clients at least once a week and must respond to a client's communication within 24 hours of receipt. The following graphic is an example of the Project Overview section of a Project Status Report.

Project Plan

Sample Project Status Report illustrating percent of progress by phase and area

Project Overview						
Status by Phase						
Project Area	Survey	LiDAR Flown	LiDAR processed	Imagery Flown	Digital Orthos Produced	Plan/Topo Mapping
6 inch – West	100%	-	-	100%	0%	-
6 inch – East	100%	-	-	100%	N/A	-
12 inch	100%	-	-	100%	0%	-
Status by Task	100%	-	-	100%	0%	-
Legend	Not Started	In Progress	Complete	Issues/Concerns		

Each of our project managers is required to:

- Complete a Project Scope document that fully details the project specifications
- Conduct a client kickoff meeting to ask questions and arrive at a consensus on all project details
- Host internal meetings:
 - Kickoff meeting with department heads to review all project requirements, evaluate resources, and establish schedules
 - Weekly internal status meetings with all applicable department heads and senior management
 - Project close-out meeting that assesses our performance in detail and results in “lessons learned” to improve future performance
- Maintain information in our central database:
 - Weekly status updates of project schedules (external and internal)
 - QA/QC results to ensure quality expectations are met
 - Review project costs and generate invoices

Bowman tracks real-time status of acquisition design, acquisition progress, production steps and inspection results for both imagery and lidar to ensure projects remain on schedule. Acquisition progress is reported in our daily flight planning meeting via graphical and textual reports, as this is an extremely critical phase of the project. Raw data inspection occurs immediately after acquisition, and the database is updated with inspection results, triggering re-flights in a timely manner. This ensures that any re-flights occur as close to the original acquisition date as possible, minimizing differences from temporal changes.

Project Plan

I. Project Schedule

PROPOSED SCHEDULE		
TASK	START DATE	END DATE
PROJECT PLANNING / SURVEY CONTROL	April 15, 2026	May 1, 2026
IMAGERY ACQUISITION	May 1, 2026	May 30, 2026
AERO TRIANGULATION	June 3, 2026	June 14, 2026
ORTHO PRODUCTION	June 14, 2026	September 30, 2026
ORTHO PILOT	July 15, 2026	
ORTHOIMAGERY POSTED TO SURCHECK	September 30, 2026	
CLIENT REVIEW ON SURCHECK	September 1, 2026	September 15, 2026
ORTHO CORRECTIONS	September 16, 2026	September 30, 2026
ORTHO FINAL DELIVERABLES	October 30, 2026	
<i>*Final Deliverables will include compressed 4-band mosaics for the Capital Area in JPEG2000 format.</i>		

J. Warranty

Imagery is covered by warranty for two years after delivery.

Approved DIR Contractor

Bowman is an approved Texas DIR Contractor for Geospatial Products and Services: DIR-CPO-6000.

Pricing

Project Cost

PRICING	
PRODUCT	PRICE
12-INCH DIGITAL ORTHOIMAGERY	\$185,640
12 MONTHS OF DATA HOSTING	\$5,800
TOTAL	\$191,440

Bowman Consulting Group Ltd.
Andy Dearing, Executive Vice President &
Authorized Agent

Capital Area Council of Governments



Signature

Date December 24, 2025

Signature

Date _____

**CAPITAL AREA EMERGENCY COMMUNICATIONS DISTRICT
BOARD OF MANAGERS MEETING**

MEETING DATE: January 14, 2026

AGENDA ITEM: 6. Executive Session in Accordance with Texas Government Code Section 551.072:
Deliberations About Real Property

GENERAL DESCRIPTION OF ITEM:

In accordance with Texas Government Code, Section 551.072, the Capital Area Emergency Communications District (CAECD) Board of Managers may conduct a closed meeting (otherwise known as an Executive Session) to deliberate the purchase, exchange, lease, or value of real property if deliberation in an open meeting would have a detrimental effect on the position of the governmental body in negotiations with a third person. In accordance with this law, only CAECD's board members have a right to attend this portion of the meeting. Staff will provide an update on the status of the search and request guidance on next steps.

THIS ITEM REPRESENTS A:

- New issue, project, or purchase
- Routine, regularly scheduled item
- Follow-up to a previously discussed item
- Special item requested by board member
- Other

PRIMARY CONTACT/STAFF MEMBER: Chris Miller, Executive Director

BUDGETARY IMPACT:

Total estimated cost: n/a

Source of Funds: n/a

Is item already included in fiscal year budget? Yes No

Does item represent a new expenditure? Yes No

Does item represent a pass-through purchase? Yes No

If so, for what city/county/etc.? n/a

PROCUREMENT: n/a

ACTION REQUESTED:

None

BACK-UP DOCUMENTS ATTACHED:

None

BACK-UP DOCUMENTS NOT ATTACHED (to be sent prior to meeting or will be a handout at meeting):

None