



CAECD Board of Managers | Agenda

10:30 a.m. or upon adjournment of the Executive Committee
Wednesday, February 10, 2021

Access via Zoom

<https://zoom.us/j/95438422705?pwd=SWdHY1BYeXR5VGsrdlV4UkxOYzJFUT09>

Dial In: + 1 346 248 7799

Meeting ID: 954 3842 2705

Passcode: 842876

Judge Paul Pape, Bastrop County, **Chair**
Mayor Brandt Rydell, City of Taylor, **First Vice Chair**
Judge James Oakley, Burnet County, **Second Vice Chair**
Mayor Lew White, City of Lockhart, **Secretary**
Judge Ron Cunningham, Llano County, **Parliamentarian**
Mayor Jane Hughson, City of San Marcos, **Immediate Past President**
Mayor Pro Tem Lyle Nelson, City of Bastrop
Council Member Andrea Willott, City of Bee Cave
Judge Brett Bray, Blanco County
Commissioner Joe Don Dockery, Burnet County
Judge Hoppy Haden, Caldwell County
Judge Joe Weber, Fayette County
Mayor Pro Tem Kevin Pitts, City of Georgetown

Commissioner Debbie Ingalsbe, Hays County
Mayor Sandy Cox, City of Lakeway Council
Member Christine Sederquist, City of Leander
Council Member Mike Heath, City of Pflugerville
Council Member Matthew Baker, City of Round Rock
Council Member William Gordon, City of Smithville
Commissioner Ann Howard, Travis County
Commissioner Brigid Shea, Travis County
Commissioner Russ Boles, Williamson County
Commissioner Cynthia Long, Williamson County
Representative John Cyrier
Representative Celia Israel
Representative Terry Wilson
Representative Erin Zwiener

- 1. Call to Order and Confirmation of Quorum by the Chair**
- 2. Consider Approval of Minutes for the January 13, 2020 Board of Managers Meeting**
- 3. Consider Approving Purchase of Aerial Imagery**
Susan Cooper, GIS Program Manager
Andrew Hoekzema, Director of Regional Planning & Services
- 4. Staff Reports**
Betty Voights, Executive Director
- 5. Adjourn**

Persons wishing to provide comment on an agenda item during the CAECD Board of Managers Meeting may do so by emailing Mason Canales at mcanales@capcoq.org no later than 5 p.m., Tuesday February 9, 2021. Please include the participants first and last name, organization, county representing and the agenda item for which comment is being provided. Comments will have a time limit of three minutes each. Persons who join the CAECD Board of Managers Meeting will be provided a call-in number to participate remotely.



CAECD Board of Managers Meeting | Summary Minutes

10:30 a.m. or upon adjournment of the Executive Committee

Wednesday, January 13, 2021

Access via Zoom:

<https://zoom.us/j/92706715563?pwd=TXRvQnVXRHZ4L3hCU2Y5TnJ1T0p0QT09>

Dial in: +1 346 248 7799

Member ID: 927 0671 5563

Access Code: 971196

Present (22)

Judge Paul Pape, Bastrop County, **Chair**

Mayor Brandt Rydell, City of Taylor, **First Vice Chair**

Judge James Oakley, Burnet County, **Second Vice Chair**

Mayor Lew White, City of Lockhart, **Secretary**

Judge Ron Cunningham, Llano County, **Parliamentarian**

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Judge Hoppy Haden, Caldwell County

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Mayor Pro Tem Kevin Pitts, City of Georgetown

Commissioner Debbie Ingalsbe, Hays County
Council Member Christine Sederquist, City of Leander

Council Member Mike Heath, City of Pflugerville

Council Member Matthew Baker, City of Round Rock

Council Member William Gordon, City of Smithville

Commissioner Ann Howard, Travis County

Commissioner Brigid Shea, Travis County

Commissioner Russ Boles, Williamson County

Commissioner Cynthia Long, Williamson County

Absent (1)

Mayor Sandy Cox, City of Lakeway

1. Call to Order and Confirmation of Quorum by the Chair

Judge Pape called the meeting to order at 11:07 a.m. and confirmed the quorum.

2. Consider Approval of Minutes for the October 14, 2020 Board of Managers Meeting

A motion was made by Commissioner Ingalsbe to approve the October 10, 2020 meeting minutes.

Commissioner Long seconded the motion. The motion passed unanimously.

3. Consider Accepting the Annual Financial Report for the Period October 1, 2019 to September 30, 2020

Lisa Bowman, Director of Finance

Ms. Bowman stated that this was an unaudited report for the fiscal year for CAECD, for the twelve months for the period October 2019 to September 30, 2020. Total revenue for the year was approximately \$14.5 million. Total expenditures for the year was approximately \$13.2 million. Ms. Bowman stated at the last meeting the board approved to move \$3.6 million from the FY 2020 budget to finish out projects that had gotten started and did not get completed. Ms. Bowman pointed out that this was part of the reason why the expenditures were so much less than the budgeted amount. She went on to say revenues came in very close, within 4.1 percent of the budgeted amount. Expenditures were 35 percent under budget noting \$3.6 million of that was moved into the current year budget.

Judge Pape asked when the Executive Committee could expect to receive an audited financial report. Ms. Bowman stated the CAPCOG annual audit will begin in February and that an auditor will be present at the February officers meeting to answer questions.

4. Consider Adopting a Resolution Providing Signature Authority to Individuals for the Capital Area Emergency Communications District

Lisa Bowman, Director of Finance

Ms. Bowman presented this item for approval noting the item was identical to the Executive Committee resolution approved at the earlier Executive Committee meeting with the exception that this item was for the Capital Area Emergency Communications District.

A motion was made by Commission Shea to adopt a Resolution providing signature authority to individuals for the Capital Area Emergency Communications District. Mayor Pro Tem Nelson seconded the motion. The motion passed unanimously.

5. Receive a Presentation on ESINET & NG 911 Deployment Progress

Richard Morales, Director of Emergency Communications

Ms. Voights stated that a part of the reason for this agenda item was so the board would know that NexGen 911 is on schedule to deploy at some point next year. She went on to say it would be necessary to revisit the discussion on the accuracy of the GIS mapping and that the board can expect to hear more on this at the April meeting.

Mr. Morales presented a PowerPoint presentation on the Emergency Services IP Network (ESINET) and NexGen 911 deployment process. He explained that ESINET is the secure network on which NexGen 911 software and database functions operate on; CAPCOG began constructing the infrastructure in August 2019 necessary for the ESINET and is the backbone on which NextGen 911 is built.

Mr. Morales provided a status update on the implementations thus far and the overall progress of the regional project. He discussed GIS convergence effects on the routing of calls, project timeline for future migrations on the network and estimated dates of completion.

Ms. Voights pointed out some counties are still not doing accurate mapping and additional efforts are needed with those counties to get them deployed. She went on to say this presentation was a foundation for a more in-depth discussion in April about deploying county by county.

Judge Pape stated a copy of this presentation would be provided upon request. Mr. Morales provided his phone number in the chat for follow up questions.

No action was required for this agenda item.

6. Consider Revisions to the 9-1-1 Policies and Procedures Manual

Richard Morales, Director of Emergency Communications

Judge Pape asked Mr. Morales to review the significant changes and recommendation, highlighting those by reference to page numbers. A redline version of this document was provided to the board in the agenda packet.

Mr. Morales indicated significant changes:

- Amend title of document from 9-1-1 Policies and Procedures Manual to PSAP Procedures Manual
- Removal of section detailing 9-1-1 Database & GIS Coordination protocols
- Converted appropriate exhibit forms into fillable PDFs

- Added one exhibit (Use of 9-1-1 Address Database for Public Safety) into the body of the document

Judge Pape pointed out that any time the board is changing a policies he wants to give the board ample opportunity to discuss to ensure the board has a full understanding of why changes are being made and why those change are needed. He then asked if there were any questions.

Commissioner Long recommend a change to page 7; section B. Training; item number 1 from [notify CAECD of newly hired 9-1-1...] to [notify CAECD staff of newly hired 9-1-1...].

A motion was made by Commissioner Long to approve the revisions to the 9-1-1 Policies and Procedures Manual with noted changes. Council Member Baker seconded the motion. The motion passed unanimously.

7. Consider Appointing 9-1-1 Strategic Advisory Committee Board Liaison Betty Voights, Executive Director

Judge Pape stated Commissioner Long had been the 9-1-1 Strategic Advisory Committee board liaison for a while and asked Commissioner Long if she was willing to continue to serve in this capacity. Commissioner Long agreed to continue to serve as the 9-1-1 Strategic Advisory Committee liaison.

A motion was made by Council Member Heath to appoint Commissioner Long as the 9-1-1 Strategic Advisory Committee Board Liaison. Council Member Sederquist seconded the motion. The motion passed unanimously.

8. Staff Reports

Ms. Voights stated the possibility of legislation that would increase the 911 wireless fee is still in play; currently, the bill does not have a sponsor. She went on to say she would be working predominantly with officers on briefings for legislative items month to month and would include the Executive Committee as well.

9. Adjourn

The meeting was adjourned at 11:40 a.m.

Mayor Lew White, Secretary
Executive Committee
Capital Area Council of Governments

Date

Persons wishing to provide comment on an agenda item during the CAECD Board of Managers Meeting may do so by emailing Mason Canales at mcanales@capcoq.org no later than 5 p.m., Tuesday January 12, 2021. Please include the participants first and last name, organization, county representing and the agenda item for which comment is being provided. Comments will have a time limit of three minutes each. Persons who join the CAECD Board of Managers Meeting will be provided a call-in number to participate remotely.

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

MEETING DATE: February 10, 2021

AGENDA ITEM: #3 Consider Approving Purchase of Aerial Imagery

GENERAL DESCRIPTION OF ITEM:

The CAECD funds the annual purchase of aerial imagery to update public safety answering point (PSAP) mapping applications in order 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, CAPCOG staff have conducted these procurements cooperative purchases through the Texas Natural Resource Information Service (TNRIS) "StratMap" program. This process involves CAPCOG and other project participants providing specifications to TNRIS for the imagery, participating in the proposal scoring process, and then issuing purchase orders to the vendor once the vendor selection has been finalized. CAPCOG pays for 12-inch resolution imagery for whatever portion of the 10-county region is not covered by other project participants, and any higher-resolution imagery purchased by other participants within the region are used for the PSAPs covering those areas. Surdex Corporation was selected as the vendor for 2021 imagery, and was also the vendor for CAPCOG's 2020 imagery. CAPCOG's share of the 2021 imagery is \$164,619, which represents 50 percent of the total project cost, and is 35 percent below the \$255,000 budgeted for this item.

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:

**Susan Cooper, GIS Program Manager
Andrew Hoekzema, Director of Regional Planning & Services**

BUDGETARY IMPACT:

Total estimated cost: \$164,619.00

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 Purchase with Surdex Corporation for 2021 Aerial Imagery

BACK-UP DOCUMENTS ATTACHED:

1. Procurement Memo
2. Scope of Work

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

None



Capital Area Council of Governments

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BASTROP BLANCO BURNET CALDWELL FAYETTE HAYS LEE LLANO TRAVIS WILLIAMSON

DATE: 1/20/2021
TO: Betty Voights, Executive Director
FROM: Susan Cooper, GIS Program Manager
Andrew Hoekzema, Director of Regional Planning and Services
RE: 2021 Aerial Imagery Procurement

The GIS program is seeking approval to issue a purchase order (PO) to Surdex Corporation to acquire aerial imagery in partnership with the Texas Natural Resources Information Service (TNRIS), City of Austin, City of Bastrop, City of Bee Cave, City of Bryan, City of College Station, City of Horseshoe Bay, City of Kerrville, City of Round Rock, City of Smithville, Brazos County Appraisal District (BCAD), Texas A&M University, and Texas Municipal Policeman's Association (TMPA). The cooperative procurement was coordinated by TNRIS under its "StratMap" program with assistance from CAPCOG staff,¹ and is authorized under Section 3-207 of CAPCOG's procurement policy. This process saves each entity money and time that would otherwise need to be spent on separate procurement. The aerial imagery is engineering-grade, base-map data that will be helpful in developing infrastructure projects, such as roadways or waterlines expansions; assessing land use and development strategies, mapping transportation routes and more. CAPCOG will use this imagery to update public safety answering point (PSAP) mapping applications with the most up-to-date imagery available for public safety dispatch and response. This is the fourth year that CAPCOG has participated in the StratMap imagery acquisition program. Surdex was also the vendor of the 2020 imagery and CAPCOG was satisfied with the results.

Procurement Process

This was a cooperative procurement conducted by TNRIS under its "StratMap" program and relies on Surdex Corporation's contract with the Texas Department of Information Resources (DIR) Contract Number DIR-CPO-4496.² The following list identifies key milestones in the procurement process:

- *5/12/2020: TNRIS contacts CAPCOG regarding initiating process for 2021 imagery procurement
- *6/4/2020: CAPCOG hosts kickoff meeting with TNRIS and regional participants
- *7/31/2020: Deadline for participants to send specifications to TNRIS
- *10/22/2020: TNRIS releases scope of work to vendor pool
- *11/16/2020: Vendor proposal deadline
- *12/17/2020: TNRIS announces Surdex Corporation selected as vendor and releases final scope of work

¹ <https://tnris.org/stratmap/>

² <https://dir.texas.gov/View-Search/Contracts-Detail.aspx?contractnumber=DIR-CPO-4496>

CAPCOG's role in the procurement

Prior to the 6/4/2020 kickoff meeting, CAPCOG disseminated information to potential partner organizations for cost-sharing and area of interest (AOI). CAPCOG's portion of the purchase is the area of the 10-county region that falls outside of the areas identified by other participants, and will be at 12-inch resolution, whereas the other partner organizations are purchasing more expensive 6-inch resolution imagery. Once proposals were submitted to TNRIS, CAPCOG and each of the other project participants scored proposals based on cost, quality, and proposed scope of work. Now that vendor selection has been completed, CAPCOG staff are seeking approval to issue a purchase order to the selected vendor in order to proceed with this project.

Cost and Budget

CAPCOG's share of the program is \$164,619 for 12-inch resolution imagery "tiles" (\$21.00 per tile) represents 50 percent of the total project cost. \$255,000 was budgeted for imagery for 2021, so this procurement came in at 35 percent below the budgeted amount. Other project participants are acquiring more expensive 6-inch resolution tiles at a cost of \$75.00 per tile. These prices include a 27 percent DIR discount.

Additional Notes on Surdex's Imagery Acquisition Schedule & 2021 Procurement Schedule

At its own risk, and based on its prior work with CAPCOG, TNRIS, and other project participants in 2020, Surdex decided to initiate imagery acquisition at the beginning of January 2021 despite not yet having POs from all project participants, including CAPCOG. January 1 through February 28 is the timeframe for acquiring "leaf-off" imagery in the scope of work.

Surdex will need POs from CAPCOG and other project participants prior to initiating the "production" phase of the project (i.e., converting the raw imagery into the data products that will be delivered to project participants). At that point, CAPCOG will participate in a quality-control (QC) process to ensure that the data meets specifications. Surdex plans to submit the final imagery by July with final acceptance of the imagery by August. Following final acceptance, CAPCOG will send the imagery out to the PSAPs.

Typically, vendor selection could have occurred earlier (i.e., prior to the October board meeting), but TNRIS and DIR had to establish new multi-year contracts with the vendor pool, and DIR overhauled their own process in mid-2020, resulting in a delay in the finalization of our procurement by several months.



STATEMENT OF WORK (SOW) #580-21-SOW-0001

**Acquisition and Production of High Resolution Orthoimagery
in the Capital Area, Brazos County, and Kerr County, Texas**

**Proposal Closing Date and Time:
November 16, 2020, 2:00 PM Central Time**

Class-Item Codes:

- 905-05 – Aerial Photography and Videography Services
- 920-33 – Mapping & GIS Services, Digitized, Cartography
- 905-10 – Aerial Surveys and Mapping services

TEXAS WATER DEVELOPMENT BOARD

Purchaser: Angela Wallace

P.O. Box 13231

Austin, TX 78711-3231

Phone: 512 463 5077

Fax: 512-475-3009

Email: Angela.Wallace@twdb.texas.gov

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STATEMENT OF WORK

for the

Acquisition and Production of High Resolution Orthoimagery in the Capital Area, Brazos County, and Kerr County, Texas

Introduction

This Statement of Work is issued by the Texas Water Development Board (TWDB) on behalf of the following organizations to acquire **leaf-off** high resolution 6-inch and 12-inch orthoimagery and associated products from **airborne** digital camera systems.

- Brazos Central Appraisal District
- Capital Area Council of Governments
- City of Austin
- City of Bastrop
- City of Bee Cave
- City of Bryan
- City of College Station
- City of Round Rock
- City of Horseshoe Bend
- City of Smithville
- City of Kerrville
- Kerrville Public Utility Board
- Texas A&M
- Texas Municipal Power Agency

No State agency funds will be used for any deliverables from this project.

The 6-inch AOI includes approximately **2,204 DO4Q tiles**, and the 12-inch Area of Interest (AOI) includes approximately **7,839 DO4Q tiles** in the Capital Area. The AOI is directly affected by funding availability and interested parties and is subject to change.

The project area of interest is located in and around the Capital Area in Texas, Brazos County Texas to the east, and Kerr County Texas to the West. The Greater Austin area has a metropolitan population of over 2 million people. The natural region is characterized predominantly by oak and juniper woodlands, grasslands/savannah, and farmland.

Proposals should address local conditions and unique project considerations as well as fully explain project methodology. An innovative and cost-effective project approach is encouraged and TWDB welcomes alternate specifications, suggestions, and pricing.

The new orthoimagery will be used by a number of government agencies for city engineering and planning, 9-1-1 database updates and general mapping, infrastructure mapping, appraisal district valuations, university facilities management, transportation, and other applications. The products acquired by this contract will be available in the **public domain** through the Texas Natural Resources Information System (TNRIS) for use by government entities and the public.

Timeline Requirements

The Project Phase Table includes due dates for pilot and final orthoimagery. The selected data provider will emphasize meeting these deadlines in the proposal.

Texas Strategic Mapping Program Goals

It is the intent of the Texas Strategic Mapping Program (StratMap) to purchase geospatial data products that will provide direct savings, efficiencies, and cost duplication avoidance through inter-governmental collaboration and partnerships. The StratMap contracts are instrumental to these goals. Both the StratMap Program and the StratMap contracts are administered by TNRIS, a division of TWDB.

Accuracy and Quality of Products

The StratMap Program, through the StratMap contracts, uses prequalified commercial data providers to collect and process geospatial data and separately selects third party quality assurance consultants, as needed, to review products and processes. Each participant in the program is expected to maintain internal quality controls and assurances to minimize errors and document procedures to ensure the data will meet or exceed requirements.

INVOICES: RECEIPT AND PAYMENT

An invoice schedule and payment proportions will be determined at or before the kick-off meeting and adhered to throughout the life of a project, unless otherwise agreed upon by Contractor and/or Project Partner Point-of-Contact (PPPOC).

Contractor shall submit invoice(s) to each of the PPPOC's identified in the Contract according to the invoice schedule. Each invoice must identify work performed in accordance with the SOW. Contractor shall be paid within thirty (30) days from receipt of invoice, in accordance with the Texas Prompt Payment Act, Government Code, Chapter 2251. However, if any PPPOC disputes payment of an invoice, said PPPOC must notify Contractor of the existence of a bona fide dispute. Upon request by any PPPOC, Contractor shall provide detailed documentation in support of the invoice and to the degree necessary to resolve any dispute. Any PPPOC may take any legally authorized actions for purposes of enforcing a remedy or obtaining set-off against payments due. Any PPPOC may also limit payments of the proposed Contract.

PAYMENT DISPUTES

If any PPPOC disputes payment of all or any portion of an invoice from Contractor, PPPOC shall not pay any disputed amount before the dispute is resolved. Notwithstanding any such dispute, Contractor shall, unless otherwise notified by PPPOC, continue to perform the Services and produce deliverables in compliance with the terms of the Contract pending resolution of such dispute so long as all undisputed amounts continue to be paid to Contractor.

Project Phase Table		Orthoimagery Data Provider	TNRIS/Partners QA/QC
Phase I	PRE-FLIGHT PLANNING		
	Kick-Off Meeting		
	Tasks	Develop flight operations plan	
		System calibration and geodetic control validation	
	Deliverables	Schedule	
		Flight plan	
Ground control plan			
Sensor calibration report(s)			
Due date: TBD*	Review and comment		
Phase II	DATA ACQUISITION		
	Tasks	Perform flight setup and geodetic control process	
		Fly project area to acquire data	
		Verify data after each flight mission	
	Deliverables	Ground control table/points	
		Ground control survey reports	
Data acquisition status updates			
Due date: TBD*	Review and comment		
Phase III	DATA PROCESSING		
	Tasks	Generate raw image data	
		Inspect raw image data and determine re-flights	
		Aerotriangulation	
		Initial radiometric adjustments	
		Orthorectification	
		Generate & QC mosaics	
		Rework problem areas	
	Deliverables	Orthoimagery Production Sample PILOT: area > 10% of the entire project AOI	
		Re-submit Phase III deliverables as necessary	
Data processing status updates			
Due date: 60 days** after last day of acquisition	Review Pilot and comment		

Phase IV			FINAL PRODUCT DEVELOPMENT	
Phase IV	Tasks	Create final uncompressed orthoimagery		
		Create final compressed orthoimagery		
		Create compressed county mosaic(s)		
		Generate vector index		
		Generate metadata		
	Deliverables	Final uncompressed orthoimage tiles	Review and comment	Approve or reject deliverables
		Final compressed orthoimage tiles		
		Final compressed county mosaic(s)		
		Vector index		
		Seamline file(s)		
		Metadata		
		Online data review tool access		
		Re-submit Phase IV deliverables as necessary		
		Data processing status updates		
Project Closeout				

*Due dates will be finalized at the kick-off meeting based on proposed schedule.

**Calendar days

Specification for Orthoimagery

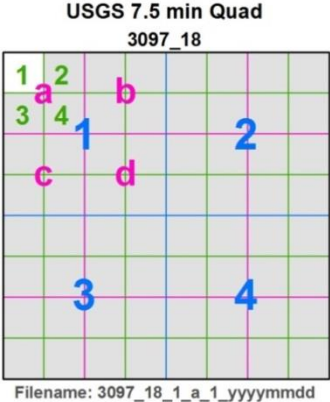
Phases I & II: Orthoimagery Pre-Flight Planning and Data Acquisition	
Requirement	Description
Camera type	<p>Digital camera sensor system onboard fixed wing or helicopter airborne platforms. The digital camera sensor system shall be a tested, stable (maintained), geometrically calibrated system with appropriate documentation, suitable for use in the acquisition and production of precision photogrammetric orthoimagery.</p> <p>The contract administrator shall be notified of all camera malfunctions within 72 hours with a written report of the malfunction. A malfunction is defined as a failure in any element or process of the camera that causes an interruption of the normal operations of the camera system which includes any key components, such as camera mount, airborne global positioning system, inertial measurement unit, and on-board data storage.</p> <p><u>Example</u> airborne digital camera systems:</p> <ul style="list-style-type: none"> • Leica Geosystems ADS series (ADS100 or ADS80) --- Pushbroom Camera • Microsoft Vexcel’s UltraCam Eagle --- Frame Camera • Intergraph’s Z/I Imaging Digital Mapping Camera (DMC) --- Frame Camera <p>The use of more than one type or brand of digital camera in the acquisition is NOT allowed.</p>
Acquisition time frame	<p>For the Brazos County AOI imagery shall be captured between January 1, 2021 and February 15, 2021 AND as close to January 1, 2021 as possible AND during leaf-off conditions.</p> <p>For Capital Area AOI and Kerr County AOI imagery shall be captured between January 1, 2021 and February 28, 2021 AND during leaf-off conditions.</p>

Sun angle and time of day of capture	Imagery will be acquired during a time of day to minimize shadows due to sun angle. Target sun angle should be > 30 degrees above the horizon. See USNO table .
Airspace	The AOI may contain areas of controlled or restricted airspace. It is the responsibility of the imagery provider to obtain all approvals necessary for all required clearances to cover the AOI.
Tilt	The axis of the camera should be in a vertical position. The tilt (departure from the vertical) should not exceed four degrees (4°) or the relative tilt between images or strips exceed six degrees (6°). Tilt shall not average more than two degrees (2°) in any 16km (10 mile) section of a flight line and shall not average more than one degree (1°) for the entire project.
Conditions during acquisition	Imagery shall be captured only when the sky is free from clouds, cloud shadows, high overcast clouds causing low illumination, haze, fog, smoke, and dust. Ground features should be free of excessive waters due to rain or snow. Other environmental factors causing non-manmade obstruction of the ground surface should be minimal. Light conditions should be such that images are free from smear, blur, excessive glare, or noise.
Cloud cover	Less than 5% cloud cover per final uncompressed image tile AND less than 5% of the entire AOI. "5%" includes cloud shadows.
Forward overlap	60% or greater
Sidelap	Min 15% Max 45% Average 20-30% over entire flight line
Flight altitude	Flying height in accordance with specified orthoimage spatial resolution. There should be a 1:1 ratio between captured pixel size and ground resolution.
Coverage	No voids due to cloud cover (< 5%), instrument failure, or water bodies.
Airborne GPS	Camera position (latitude, longitude, and elevation) shall be recorded with airborne GPS. Airborne GPS data shall be differentially corrected and organized as individual datasets grouped by corresponding flight line. Differentially corrected airborne GPS positional data shall be stored on portable media, in a nonproprietary format. The horizontal root-mean-square error (RMSE) of the airborne GPS control data shall not exceed 0.2m . The vertical RMSE of the airborne GPS control shall not exceed 0.3m .
IMU exterior orientation	Inertial Measurement Unit (IMU) is included as a component of the camera station control. The RMSE of the <u>adjusted</u> IMU data shall not exceed 0.3m and must be used to ensure accuracy.
Geodetic control	Orthoimagery provider must collect ground control to meet the absolute geometric accuracy specified in the Horizontal Accuracy Standards table. The project will be controlled using the latest available National Geodetic Survey (NGS) control adjustment of the project area plus additional new ground control needed for the project. Orthoimagery provider shall submit a ground control report that contains a narrative, computations, and field notes & photos for all points used in the ground control solution. The check points are to be collected by the orthoimagery vendor for the purpose of internal QC of image horizontal accuracy. The specification and amount are to be determined by the orthoimagery vendor. Check point specifications for horizontal accuracy listed in the ASPRS Positional Accuracy Standards for Digital Geospatial Data are encouraged.

Phases III & IV: Orthoimagery Data Processing and Product Development		
Spatial resolution	6-inch	12-inch
Example Applications	CBD mapping, Public works management, Transport engineering, Urban forestry	Urban municipal mapping, Traffic control management
Example identifiable & measurable features	Road centerlines Tennis/Basketball court line markings Fence posts Culverts Bus shelters Manholes Train tracks	Communication towers Road turning lane and pedestrian crossing markings Road speed bumps Fences Park benches
Image Tile Scheme – USGS Grid Standard	0.9375' DO4Q	0.9375' DO4Q
Image Tile Buffer	300 feet	300 feet

Requirement	Description
Spectral resolution	<p>4-Band (R,G,B,NIR) Bands will be ordered 1-Red 2-Green 3-Blue 4-Near Infrared. Mis-registration between any bands shall not exceed 1 pixel. All bands (R,G,B,NIR) shall be captured simultaneously or near simultaneously (< 500 milliseconds difference) using a single camera.</p>
Radiometric resolution	<p>Unprocessed (raw) data should have a bit depth of > 8, such as 12 or 16. Final tiled uncompressed and compressed orthoimagery should be 8-bit unsigned per band. The original bit depth at data acquisition should remain the same throughout all image processing steps. Conversion to 8-bit should only occur during the mosaic step.</p>
Radiometric adjustments	<p>Histogram Clipping - Imagery shall have a tonal range that prevents the clipping of highlight or shadow detail.</p> <p>Brightness – the mean pixel count shall be within $\pm 7.5\%$ of the middle DN value allowed for 8-bit data (min. 108, max. 147). Images should not appear too dark or too bright.</p> <p>Contrast – Images should not be faded or washed out.</p> <p>Color balancing should be performed so that no color shift (one dominant color) exists within an image. Overall tonal quality should be rich, not dull.</p> <p>Features should exhibit their true color in a natural color composite. In a color infrared composite, dominant red/pink tones should not be present in non-infrared sensitive features.</p> <p>Seamlines – Localized adjustment of the brightness and color values will be done to reduce radiometric differences between seamline join areas. Changes in color balance across the project, if they exist, shall be gradual. Abrupt tonal variations between image files are not acceptable.</p> <p>Shadows should not be too dark. Features in shadow should retain a maximum level of detail without compromising other components of the image.</p> <p>Sharpening – Minimally sharpened imagery is preferred, however, processes that highly sharpen data should be avoided in order to maintain absolute accuracy.</p> <p>Artifacts – Image data shall be free of artifacts and blemishes that obscure ground feature detail. Feature ‘blooming’ or oversaturation should be minimal.</p> <p>Noise – Image data shall be free of noise caused by camera sensor abnormalities.</p> <p>As a guideline only, see target values in NAIP Suggested Best Practices - Final Report for histogram clipping, contrast, saturation, sharpness, and noise.</p>
Formats and compression	<p>For All Areas - GeoTIFF DO4Q tiles, 4-band – Uncompressed (see further detail below)</p> <p>For Capital Area and Kerrville Area - JPEG2000 DO4Q tiles & mosaics, 4-band – Compressed, 8:1 optimal ratio for tiles, 50:1 for mosaic dependent on area and final file size.</p> <p>For Brazos Area – JPEG2000 & ECW DO4Q tiles & county mosaic – Compressed, 4-band, 8:1 optimal ratio for tiles, 50:1 for mosaics dependent on area and final file size.</p> <p>Orthoimage data must have quality compression (lossless or lossy) for achieving a visually lossless result and manageable file size.</p> <p>Compression should be the last step in the image processing chain.</p>

	<p>-----</p> <p>GeoTIFF – Uncompressed detail: GeoTIFF Format Specification and TIFF Specification Revision 6</p> <p>Required minimum TIFF and GeoTIFF Tags and GeoKeys: ImageWidth – “Example: 6720” ImageLength – “Example: 7620” BitsPerSample – “Example: 8,8,8,8” Compression – “Example: None or 1” PhotometricInterpretation – “Example: RGB or 2” Orientation – “Example: Top Left or 1” StripOffsets SamplesPerPixel – “Example: 3 or 4” RowsPerStrip – “Example: 1” StripByteCounts ExtraSamples* – “0” *Required only if SamplesPerPixel is >3. See <i>TIFF Revision 6.0</i>. GeoPixelScale aka ModelPixelScaleTag GeoTiePoints aka ModelTiepointTag GTModelTypeGeoKey – <i>ModelTypeProjected</i> GTRasterTypeGeoKey – <i>RasterPixelArea</i> ProjectedCSTypeGeoKey PCSCitationGeoKey – “A free text file for describing the projection and datum as <datum>/<projection>format. Example: NAD83 / UTM zone 15N” ProjLinearUnitsGeoKey – “A coded value for the linear units used by the projection. Values are listed in section 6.3.3.1 of the GeoTIFF 1.0 standard. Examples: Linear_Meter, Linear_Foot, Linear_Foot_US_Survey”</p>
Compressed mosaics	<p>Compressed mosaics (entire Capital Area, entire Kerrville Area, and entire Brazos Area). Mosaic(s) shall be color balanced to give a consistent and uniform image quality appearance that eliminates a checkerboard effect. The mosaic should maintain as much of the color and appearance of the original color corrected tiles as practical. The file format will be Capital Area and Kerrville Area - JPEG2000 4-band and for Brazos Area – JPEG2000 & ECW 4-band formats. The compressed county mosaics will have background values (0,0,0).</p>
Orthorectification method and elevation datasets	<p>A rigorous orthorectification model in combination with the highest quality elevation datasets available should be employed. See map of existing lidar DEMs available from TNRIS. Other suitable elevation datasets must be supplied by the orthoimagery provider. The elevation datasets used should be documented in the metadata. Elevation datasets must be North American Vertical Datum of 1988 (NAVD88). The geometric solution should use the most recent geoid from the National Geodetic Survey.</p>
Interpolation method	<p>Bicubic or Lagrange – Both methods use 4x4 neighbors. Interpolation and resampling processes should be minimal to preserve absolute accuracy.</p>
Image coverage and non-image pixels	<p>Image DO4Q tiles shall be covered in full with image data pixels. Partial DO4Q tiles with background values are not acceptable. Image DO4Q tiles should have no collars/borders, background values, artifacts or other non-image items around the edges. The compressed county mosaics will have background values (0,0,0).</p>
Image tile buffer	<p>All final orthoimage DO4Q tiles will have a buffer around all four sides of the image tile. See Image Tile Buffer section for extents. All final orthoimage tiles should have 90 degree corners, not rounded.</p>

	<p>The extents shall be computed by projecting the geographic corners and side midpoints to the required projection, then adding the buffer on each side of the resulting minimum bounding rectangle.</p>
<p>File naming convention</p>	<p>Each image name and label should include the date the image was captured. If a tile includes pixels from more than one flight line, the <u>date of capture</u> should be the acquisition date of the majority of the DO4Q tile's pixels.</p> <p>File naming convention: USGS Sixty-fourth Quad (DO4Q): “DDDD_Q_QQ_3Q_4Q_yyyymmdd” D = Degree block Q = Quad # QQ = Quarter-Quad # 3Q = 16th Quad letter 4Q = 64th Quad # y = acquisition year m = acquisition month d = acquisition day</p>  <p>USGS 7.5 min Quad 3097 18</p> <p>Filename: 3097_18_1_a_1_yyyymmdd</p>
<p>Orthoimage index</p>	<p>Digital indices of the final uncompressed and compressed orthoimage tile products in Shapefile format. One polygon per DO4Q tile. At a minimum, the indices should include date of capture and filename fields.</p>
<p>Metadata</p>	<p>All deliverables will include file and dataset level metadata documentation consistent with the Federal Geographic Data Committee’s Content Standard for Digital Geospatial Metadata FGDC-STD-001-1998.</p> <p>Metadata should include all processing steps and software used.</p> <p>All image corrections should be well documented in the metadata.</p> <p>Compiled RMSE and CE both at 95% should be reported.</p> <p>Additionally, these topics should be addressed in the metadata:</p> <ul style="list-style-type: none"> • Aircraft type and tail number • Average flying/acquisition height (AGL) • Camera manufacturer and model • Camera calibration process • Camera footprint description • Raw capture pixel resolution and bit depth • Final pixel resolution of product • Total bands of data acquired and spectral ranges (µm) • Use of ground control and/or GPS/IMU and associated internal validation or inspection processes • Elevation data used and detail (e.g. date Elevation obtained from NED or TNIRIS, resolution, did it require repair, etc.) • Quality control – Tests for accuracy <p>Metadata documentation will consist of separate files paired with each image raster file in extensible markup language (.xml) format.</p> <p>Although not required for metadata production, files designed to define and support production of FGDC-compliant metadata are available from the USGS XMLInput Application.</p>

	In addition to external metadata, 'user' metadata such as simple process steps, could be stored internally for each orthoimage raster as tag fields, GML, etc.				
Spatial Reference Framework					
Projection	<p>Tiles: Capital Area and Brazos County AOI in StatePlane TX-Central 4203; except Hays, Caldwell, & Fayette Counties in StatePlane TX-South Central 4204 Kerrville Area AOI in StatePlane TX-South Central 4204</p> <p>Mosaics: Capital Area and Brazos County AOI in StatePlane TX-Central 4203 (all counties) Kerrville Area Mosaic in StatePlane TX-South Central 4204</p>				
Horizontal datum	NAD 1983 (2011) + version in NAD 1927 for 120 DO4Q tiles in Grimes County				
Horizontal units	US_Foot				
Defined projection – The projection must be defined (readable in stakeholder software) for every uncompressed and compressed orthoimage raster file.					
World files are only required if geographic coordinates are not stored within a 'spatially aware' orthoimage, such as GMLJP2 for JPEG2000 data.					
Accuracy					
Horizontal Accuracy Standards					
Accuracy Class ASPRS Recommended use: "Standard Mapping and GIS work"	Pixel Size (inches)	RMSE_{xy} (inches)	NSSDA Specifications		Mosaic Seamline Maximum Mismatch (inches)
			RMSE_r (inches)	Accuracy_r 95% Confidence (inches)	
			6.00	12.00	
12.00	24.00	33.94	58.74	48.00	
Orthoimagery provider will report <i>compiled</i> absolute horizontal accuracy	<p>According to the National Standard for Spatial Data Accuracy (NSSDA):</p> <ol style="list-style-type: none"> 1) Report RMSE_r in metadata in inches 2) Report Accuracy_r in metadata as "Compiled to meet ____ inches horizontal accuracy at 95% confidence level" 				
Radiometric accuracy	<p>Orthoimagery should have acceptable tonal balance across the entire project area. Tonal balance will be optimized for a natural color composite, unless otherwise specified, and will not deviate significantly from approved pilot data samples.</p> <p>Orthoimagery should be free of color artifacts and missing data values. Images should be cloud free or < 5% (includes shadows) per final image DO4Q tile.</p> <p>Orthoimagery should be free of smears and contain no warped features.</p> <p>Mis-registration among bands should be minimal and not exceed one (1) pixel.</p>				

	The natural content of the orthoimagery should be maintained as close as possible barring any radiometric adjustments necessary for the orthophoto production process, unless otherwise requested during pilot review.
Radial distortion	Buildings six (6) stories and taller should have minimal lean. These features should not extend over adjacent roadways, sidewalks, or parking lots.
Wavy or mismatched features	Roads (including overpasses) should not deviate from their path by more than three (3) pixels. Excessive horizontal displacement along seamlines or at image file boundaries is not acceptable.
Seamlines	Mosaic seamlines should not run through buildings, overpasses, water towers or radio towers. Seamlines should not be noticeable on the imagery at the viewing scale for which the orthoimagery were produced or generally 1.5 times that viewing scale. Visible seamlines are acceptable over large bodies of water. Building roof tops, water towers, and radio towers, shall not be clipped at seamlines or between individual image files.
List of Project Deliverables	
Phase I – PRE-FLIGHT PLANNING	
Schedule	Project schedule with projected milestones should also include due dates for ALL project phases. Timeline may be in any style or format suitable to Contract Administrator.
Flight plan	Flight plan for each AOI shall include: planned aircraft flight lines and GPS base stations on a graphic map and delivered in Esri File Geodatabase or alternately .shp/shapefile if FGDB is not obtainable.
Ground control plan	Planned ground control and checkpoints on graphic map(s) and delivered in shapefile or kmz/kml format.
Sensor calibration report(s)	Most recent calibration report for the orthoimagery camera system(s).
Phase II – DATA ACQUISITION	
Ground control table	All ground control and checkpoints collected by the acquisition vendor shall be provided in an electronic table (.xlsx and File Geodatabase) including coordinates (X,Y) to three (3) decimal places and point ID at a minimum. GPS control report should include network parameters with base station IDs and location.
Ground control survey report	Along with control table, orthoimagery provider shall submit associated survey report including at a minimum on-the-ground photos (JPEGs) and selected geodetic control network and spatial parameters (i.e. coordinate system, geoid model).
Data acquisition status updates	Daily project progress reports. Email communication is sufficient.
Phase III – DATA PROCESSING	
Orthoimagery Production Sample PILOT: area > 10% of AOI	Production samples of compressed orthoimage tiles covering an area > 10% of the entire project AOI will be submitted for review along with at least four (4) uncompressed orthoimage tiles. The samples must meet all contractual requirements. Contract representatives will provide approval or disapproval with comments no later than five (5) business days after receipt.
Data processing status updates	Weekly progress reports. Email communication is sufficient.

Phase IV – FINAL PRODUCT DEVELOPMENT																																		
Final uncompressed orthoimage tiles	Final uncompressed orthoimage DO4Q tiles as 4-band GeoTIFFs .																																	
Final compressed orthoimage tiles	Final compressed orthoimage DO4Q tiles from final uncompressed orthoimage tiles as Capital Area and Kerrville Area 4-band JPEG2000 & Brazos Area 4-band JPEG2000 & ECW formats.																																	
Final compressed county mosaics	Final compressed county mosaics from final uncompressed orthoimage DO4Q tiles as Capital Area and Kerrville Area 4-band JPEG2000 & Brazos Area 4-band JPEG2000 & ECW formats.																																	
Vector index	Vector index file of the final uncompressed and compressed orthoimage DO4Q tiles in shapefile format.																																	
Seamline file(s)	<p>The seamline vector file will contain a polygon for each exposure or image strip used to create the final orthoimage DO4Q tiles.</p> <p>Attributes:</p> <table border="1"> <thead> <tr> <th>ATTRIBUTE DATA</th> <th>COLUMN NAME</th> <th>EXAMPLE</th> </tr> </thead> <tbody> <tr> <td>Image acquisition date</td> <td>IDATE</td> <td>20120723</td> </tr> <tr> <td>Polygon start date/time¹</td> <td>SDATE</td> <td>20120723 13:52</td> </tr> <tr> <td>Polygon end date/time¹</td> <td>EDATE</td> <td>20120723 13:53</td> </tr> <tr> <td>Spectral resolution²</td> <td>SPEC</td> <td>M4B</td> </tr> <tr> <td>Camera manufacturer</td> <td>CAM_MAN</td> <td>Leica Geosystems</td> </tr> <tr> <td>Camera model</td> <td>CAM_MOD</td> <td>ADS-80</td> </tr> <tr> <td>Sensor or lens serial number</td> <td>SENSNUM</td> <td>30029</td> </tr> <tr> <td>Aircraft type³</td> <td>AC_TYPE</td> <td>C441</td> </tr> <tr> <td>Aircraft tail number</td> <td>ACTAILNUM</td> <td>N12345R</td> </tr> <tr> <td>Average flying altitude (feet)</td> <td>ALT</td> <td>10,000</td> </tr> </tbody> </table> <p>¹ Local 24-hour clock. Start/end time is for the individual polygon and will be the same for frame-based systems.</p> <p>² Possible values: NC (natural color), CIR (color infrared), and M4B (4-band)</p> <p>³ ICAO designator (e.g. use C441 for a Cessna 441 Conquest II)</p>	ATTRIBUTE DATA	COLUMN NAME	EXAMPLE	Image acquisition date	IDATE	20120723	Polygon start date/time ¹	SDATE	20120723 13:52	Polygon end date/time ¹	EDATE	20120723 13:53	Spectral resolution ²	SPEC	M4B	Camera manufacturer	CAM_MAN	Leica Geosystems	Camera model	CAM_MOD	ADS-80	Sensor or lens serial number	SENSNUM	30029	Aircraft type ³	AC_TYPE	C441	Aircraft tail number	ACTAILNUM	N12345R	Average flying altitude (feet)	ALT	10,000
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Metadata	<p>Project level metadata file (.xml) – FGDC-compliant.</p> <p>File level metadata per final uncompressed and compressed image tile and mosaic (.xml) – FGDC-compliant.</p>																																	
Online data review tool access	<p>TNRIS and Smith/Gregg partners should have access to an online tool to review and markup/comment on final orthoimagery free of charge and included with the project. The tool must be reliable, have no significant image refresh delays (> 5 seconds), and be available 24/7 for up to 20 users.</p> <p>Hosting of compressed imagery (at the optimal ratios listed under Formats and compression) is preferred for faster refresh rates.</p> <p>The imagery are expected to be available online for the review and markup of pilot and final orthoimagery until Final Orthoimagery QA is complete. This is expected to be approximately months after the last final orthoimagery deliverable is received.</p> <p>Additional time for hosting the imagery beyond the completion of final orthoimagery QA is not required.</p>																																	
Data processing status updates	Weekly project reports. Email communication is sufficient.																																	

DELIVERY OF PRODUCTS

All orthoimage products are to be delivered to the **Texas Natural Resources Information System (TNRIS)** and all partners listed in the **Introduction** (according to their specific areas of interest) no later than **150 days after the last day of acquisition**.

All final orthoimage products will be delivered on portable external hard drives supplied by the provider. File compression such as ZIP or RAR should not be applied to the products; this requirement should not be confused with image compression (JPEG2000, JPEG, etc.).

Sample pilot products may be delivered via FTP.

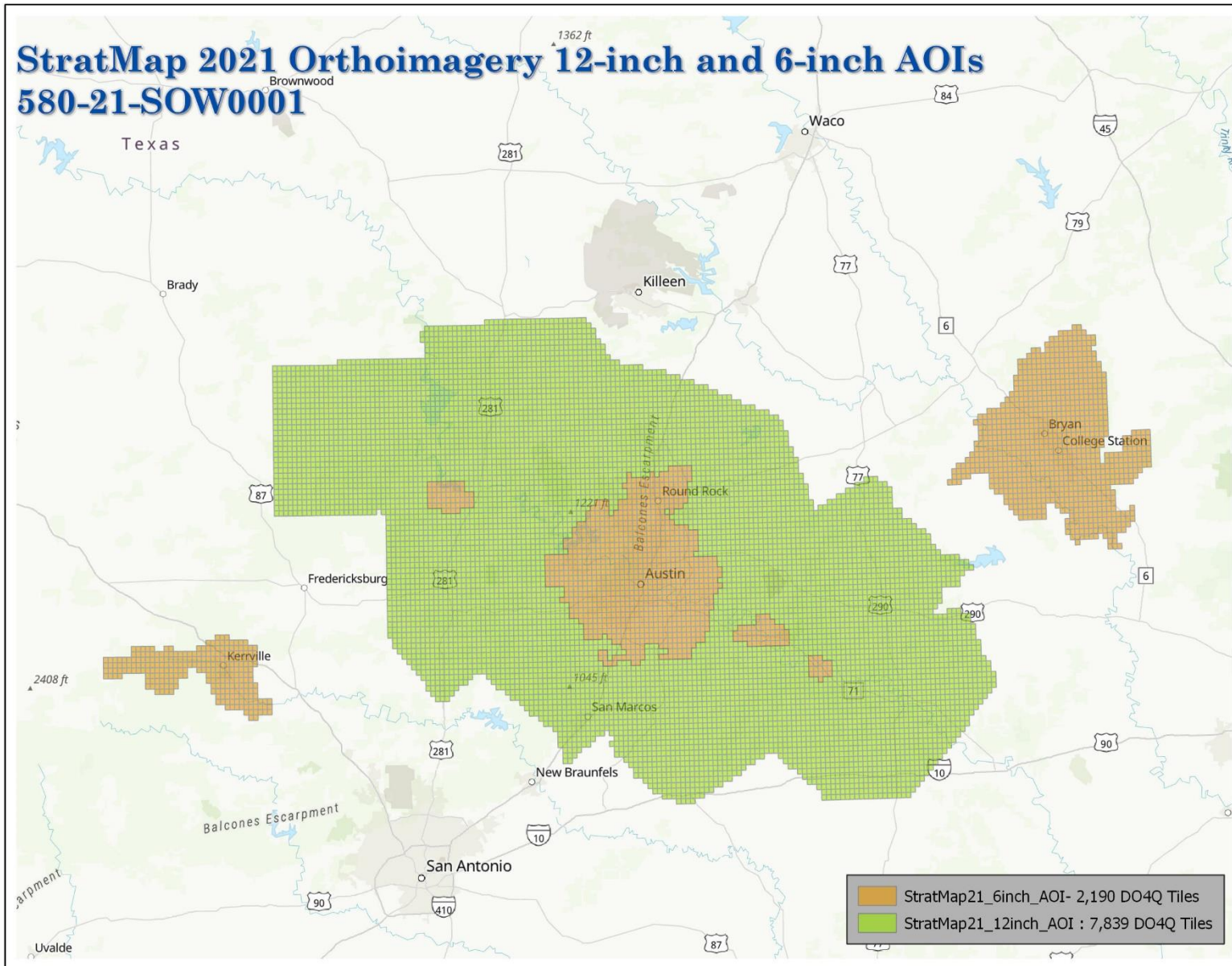
Intellectual Property Rights | Ownership and Accessibility

The contracting agency shall have unrestricted rights to all delivered reports and data. All orthoimagery products will become the property of all partners listed in the **Introduction**. All orthoimage products will be put in the public domain and be accessible from the **Texas Natural Resources Information System**, a division of the Texas Water Development Board.

REFERENCES

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<http://partners.adobe.com/public/developer/en/tiff/TIFF6.pdf>
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<http://www.fgdc.gov/metadata/csdgm>
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<http://www.remotesensing.org/geotiff/spec/geotiffhome.html>
- U.S. Geological Survey. Base Orthoimagery Specification (draft) – Version 3.1. 23 August 2010.
- U.S. Geological Survey. XMLInput Application. 23 August 2002.
<ftp://ftpext.usgs.gov/pub/cr/mo/rolla/release/xmlinput/>
- U.S. Naval Observatory. Sun or Moon Altitude/Azimuth Table. 22 April 2013.
<http://aa.usno.navy.mil/data/docs/AltAz.php>

AREA OF INTEREST MAP



PRICING TABLE

Electronic table available online (see **Supplemental Information**)

Orthoimagery Pricing Table			
TWDB 580-21-SOW0001			
Company Name:	Surdex Corporation		
Spectral resolution	4-Band (R,G,B,NIR)		
Unit Cost Per 6-inch DO4Q*		DIR Discount	Unit Cost Per 6-inch DO4Q Tile* with DIR Discount**
<i>DO4Q Tiles:</i>	\$ 102.74	27%	\$ 75.00
6-inch = 2,190 DO4QTiles			
GeoTIFF			
JPEG2000			
Unit Cost Per 12-inch DO4Q*		DIR Discount	Unit Cost Per 12-inch DO4Q Tile* with DIR Discount**
<i>DO4Q Tiles:</i>	\$ 28.76	27%	\$ 21.00
12-inch = 7,839 DO4Q Tiles			
GeoTIFF			
JPEG2000			
Total Cost For Capital Area Mosaic*		DIR Discount	Total Cost for Capital Area Mosaic* with DIR Discount**
<i>Capital Area Mosaic:</i>	\$ 0.00	N/A	\$ 0.00
JPEG2000			
Total Cost For Brazos Area Mosaic*		DIR Discount	Total Cost for Brazos Area Mosaic* with DIR Discount**
<i>AOI B Mosaic:</i>	\$ 0.00	N/A	\$ 0.00
JPEG2000			
ECW			
Unit Cost Per 6-inch Optional DO4Q*		DIR Discount	Unit Cost Per 6-inch DO4Q Tile* with DIR Discount**
<i>DO4Q Tiles:</i>	\$ 102.74	27 %	\$ 75.00
6-inch = 403 DO4QTiles			
GeoTIFF			
JPEG2000			
Unit Cost Per 12-inch Optional DO4Q*		DIR Discount	Unit Cost Per 12-inch DO4Q Tile* with DIR Discount**

DO4Q Tiles:			
12-inch = 7,438 DO4Q Tiles	\$ 28.76	27 %	\$ 21.00
GeoTIFF			
JPEG2000			
Total Cost For Kerrville Area Mosaic*		DIR Discount	Total Cost for Kerrville Mosaic* with DIR Discount**
AOI B Mosaic:			
JPEG2000	\$ 0.00	N/A	\$ 0.00
<i>*One unit cost to include all formats listed and mobilization fees.</i>			
<i>**Includes DIR 0.75% administrative fee</i>			
TWDB and partners have the option to select any combination of proposed unit and total product costs.			

580-21-SOW0001 Partner Costs				
Partners	DO4Q Tiles		6-inch Cost	12-inch Cost
	6-Inch	12-Inch	at \$75 per DO4Q Tile	At \$21 per DO4Q tile
City of Austin	749		\$56,175.00	
City of Round Rock	90		\$6,750.00	
City of Bee Cave	42		\$3,150.00	
Horse Shoe Bay	50		\$3,750.00	
Smithville	19		\$1,425.00	
Bastrop	50		\$3,750.00	
City of Kerrville	265		\$19,875.00	
CAPCOG		7,839		\$164,619.00
BCAD	340		\$25,500.00	
City of Bryan	341		\$25,575.00	
City of College Station	131		\$9,825.00	
A&M	55		\$4,125.00	
TMPA	72		\$5,400.00	
Total	2,204	7,839	\$165,300.00	\$164,619.00
			Total	\$329,919.00

Execution of Offer
Texas Water Development Board

Company Name: Surdex Corporation
Address: 520 Spirit of St. Louis Blvd.
Chesterfield, MO 63005
Phone Number: 636-368-4400
E-Mail Address: edt@surdex.com

Vendor Identification Number: _____
Federal Tax Identification Number: 43-0690641

I, Ronald C. Hoffmann, am the above-referenced company's representative and I am authorized to submit this response and sign future contract documents.



Authorized Signature

11/13/2020

Date