Dewberry

LARIAC 7 Kickoff Meeting

Quality Assurance/Quality Control (QA/QC) and Additional Deliverables

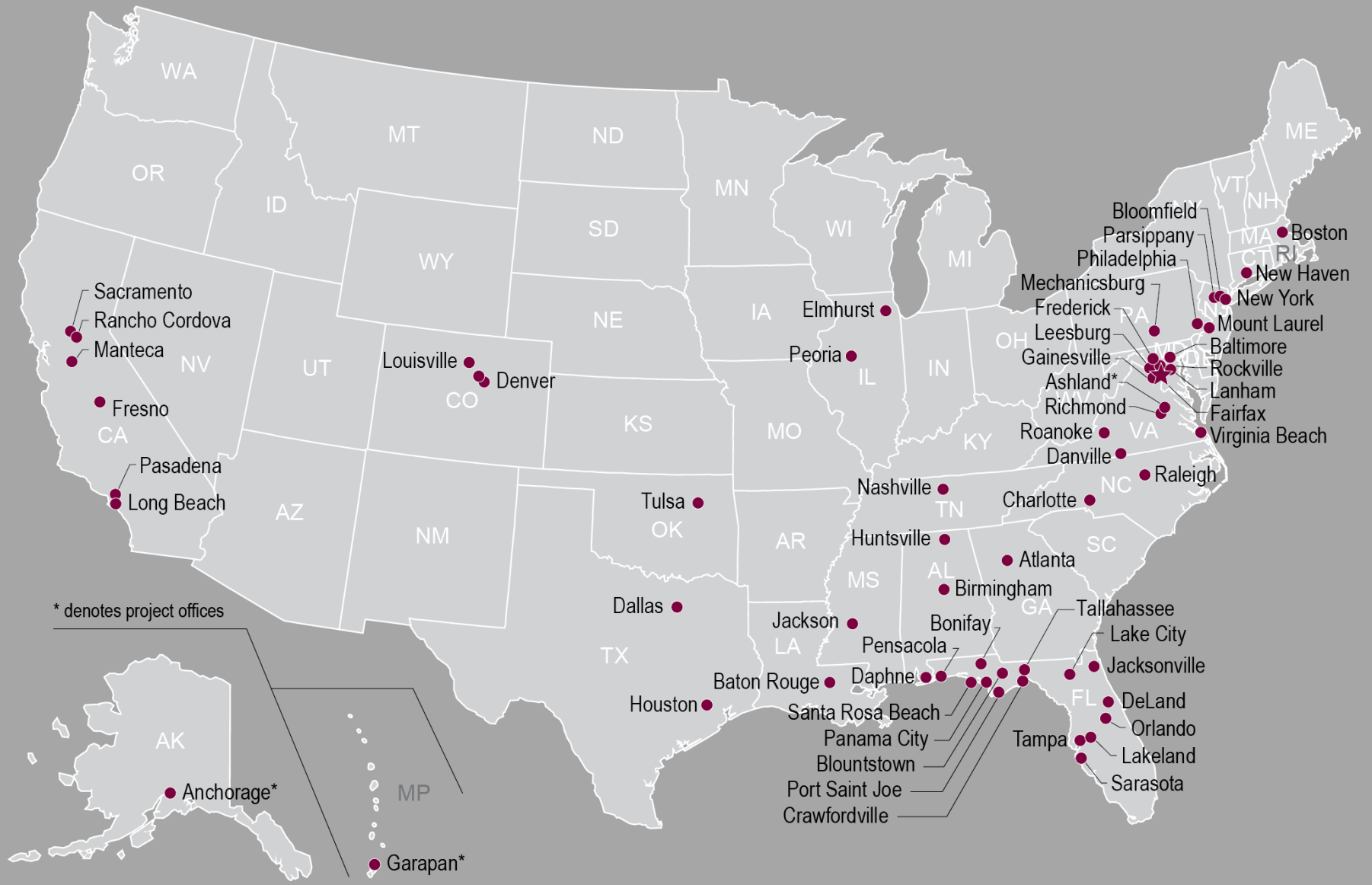
May 16, 2023 / LA County Public Works Headquarters

2,000+ EMPLOYEES

>50 LOCATIONS nationwide

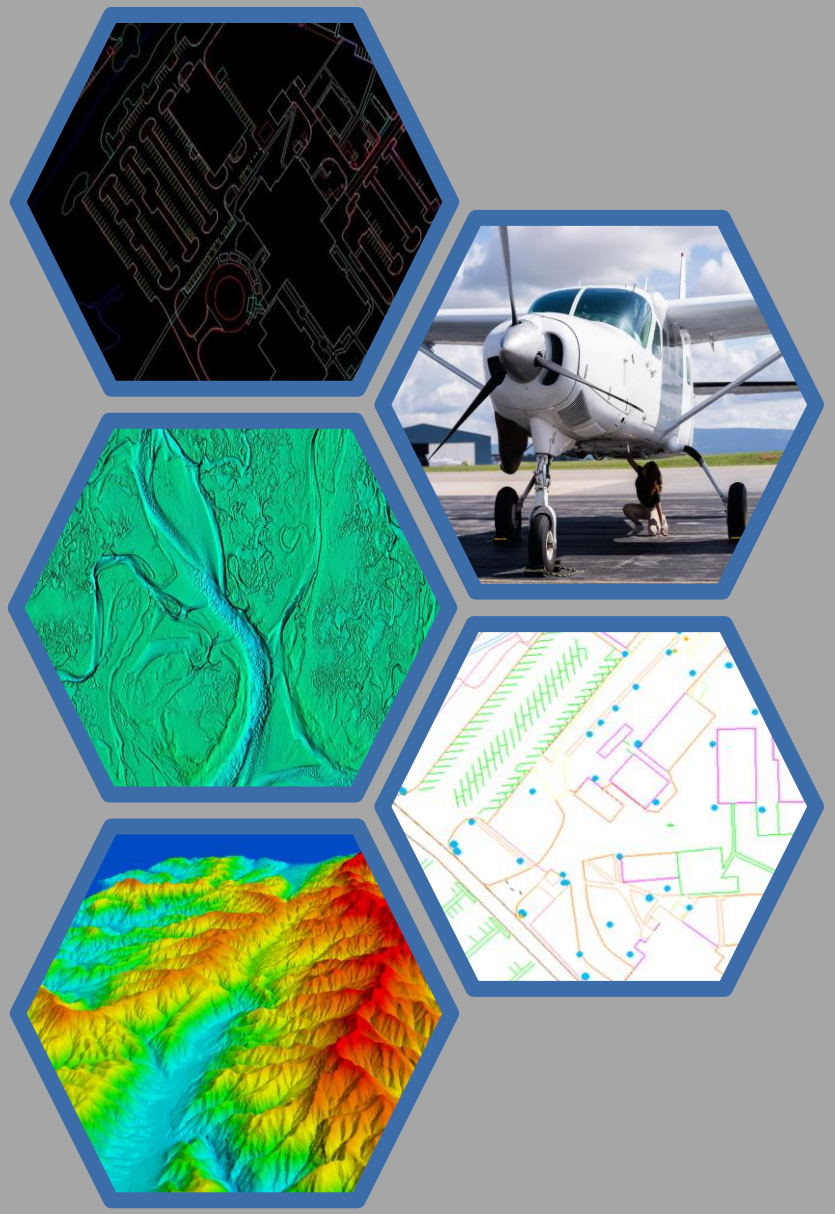
$488.10 MILLION in 2021 revenue

65+ YEARS helping clients build and shape communities



Our Services

- Geospatial, mapping, and survey
- Architecture
- Construction
- Engineering
- Environmental
- Planning, consulting, and advisory
- Technology



LARIAC 7 Overview

Milestone 1
Project Areas Identified

Milestone 2
Dewberry QA/QC Tasks

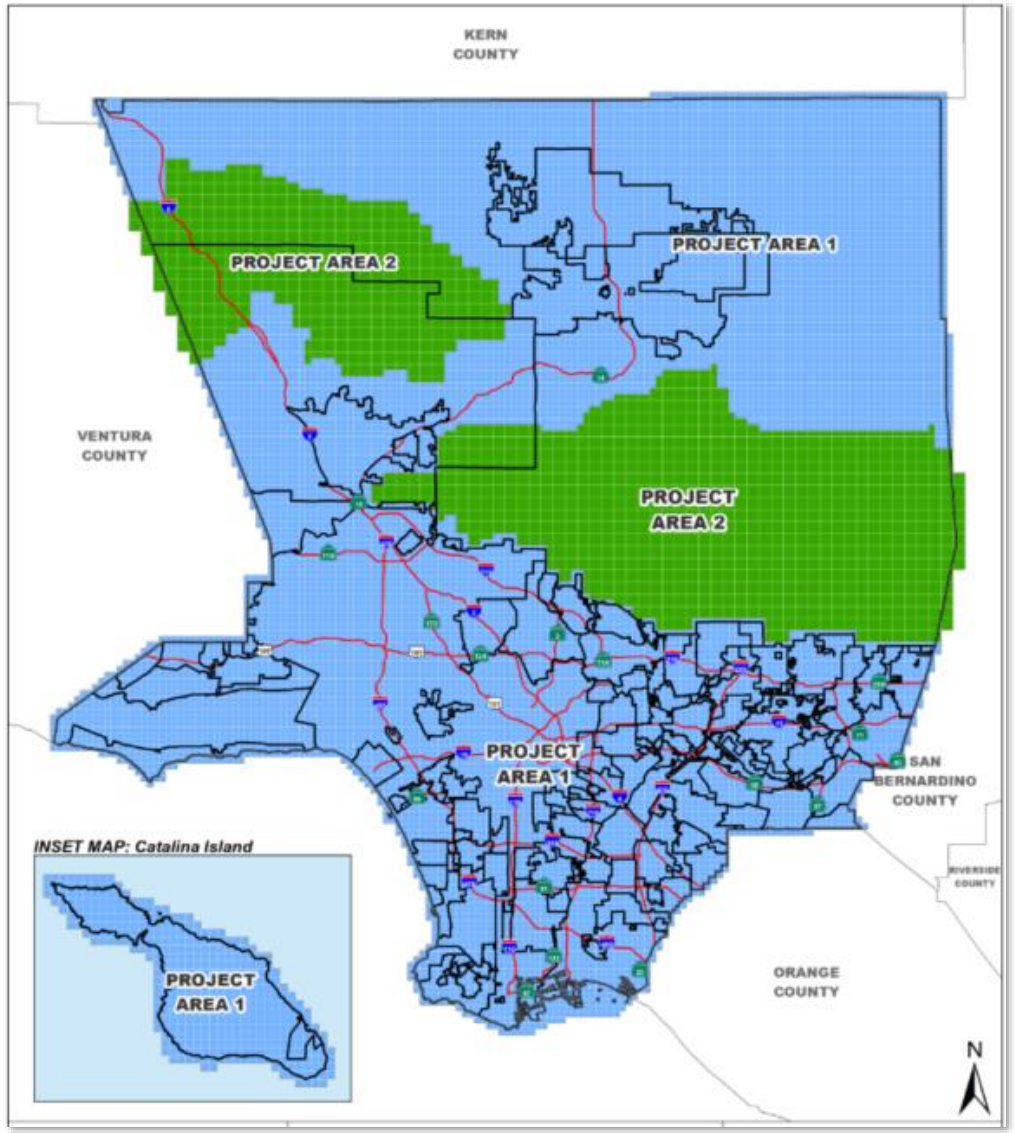
Milestone 3
Quality Plan Developed

Milestone 4
Project Tracking & Reporting

Milestone 5
Data Deliveries to Participants

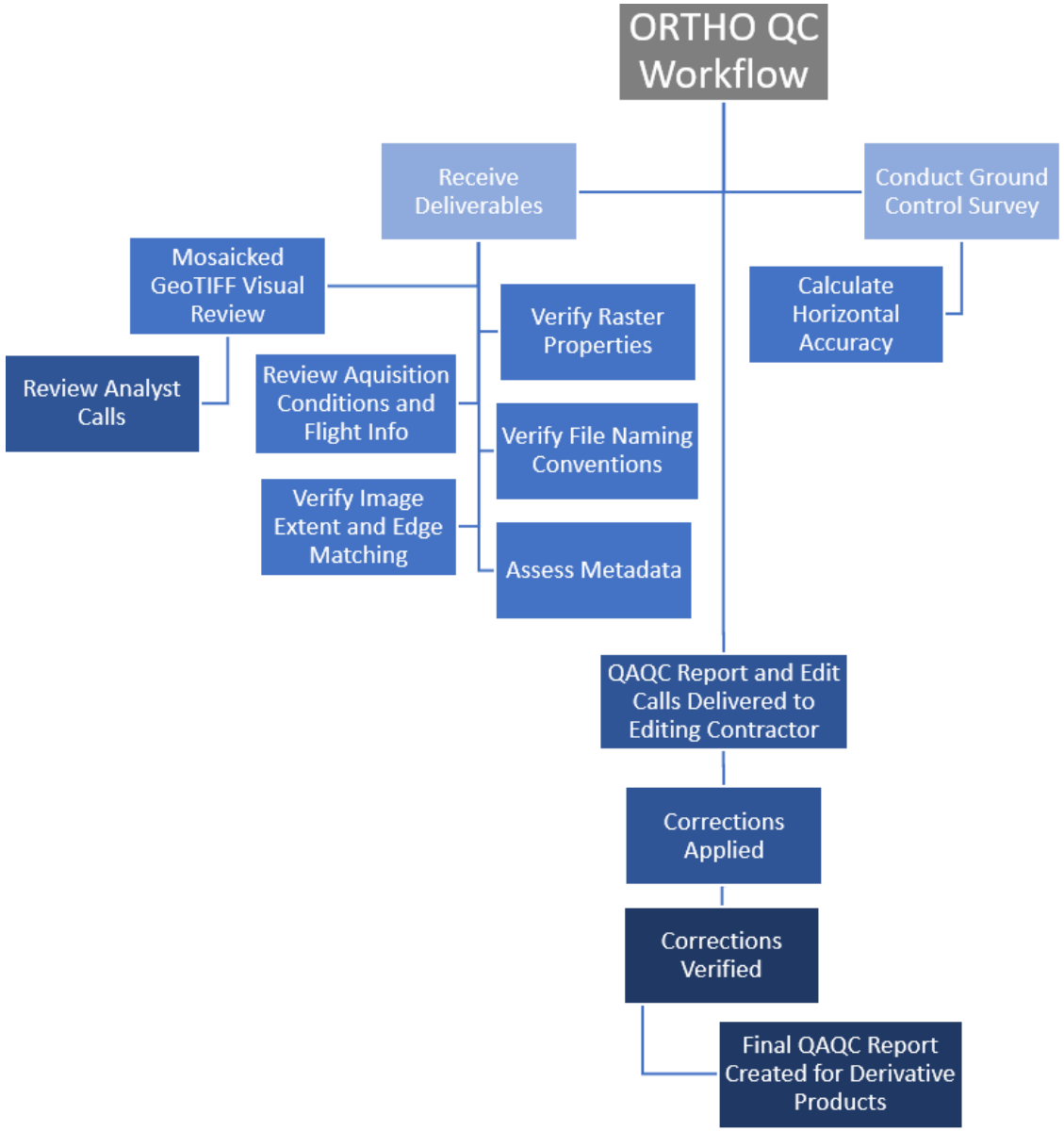
Project Areas

- Project Area 1
  - Urban Areas
  - 4 inch GSD orthoimagery
- Project Area 2
  - Forested Areas
  - 9 inch GSD orthoimagery



Dewberry QA/QC Tasks

1. QA/QC Management Tasks and Update of Quality Plan.
2. QA/QC of Aerotriangulation (AT) process/reports (subcontracted).
3. QA/QC of 4 inch pixel digital orthophotos (urban areas).
4. QA/QC of 9 inch pixel digital orthophotos (national forests).
5. QA/QC of photogrammetric breaklines and lidar DTMs (urban areas).
6. QA/QC of oblique aerial digital images.
7. Full delivery of countywide & SLDS datasets.
8. Production of additional data products (re-sampled, JPEG 2000,GeoTIFF, SDE or FGDB for SLDS).
9. Mosaic generation (ECW).



Ortho QA/QC Checklist Example

Ortho Checklist		
PROJECT ORGANIZATION, INITIAL CHECKS & REQUIRED		
Status	**Validation Step**	
	All data is save into the project **Received folder** on the **U drive** - Add the date received to folder name (follow: YYYYMMDD)	
	Initial project deliveries should include most if not all of the following:	
Delivered	**Stereo Imagery/Raw imagery (.tif/.tfw)**	
	-	
Delivered	**Tiled Orthomosaics**	
	-	Often are delivered in a compressed format (ex. MrSID)
N/A	**Oblique Imagery Warehouse**	
	-	Often delivered with software and license
Not Delivered	**Elevation Data/DEM/DTM**	
	-	A Digital Terrain Model (DTM) shall be developed to support orthoimage production.
Delivered	**Flight Diagram Information/Flight Lines/Image Polygon Shapefiles or**	
	-	
Delivered	**Tile Index**	
	-	Copy and rename tile index to tracking grid
Not Delivered	**Seamlines**	
	-	Copy shapefile
Delivered	**Project Boundary/Area of Interest (AOI)**	
	-	Optional county/sub block boundary may also be delivered with each dataset
Delivered	**Survey Data**	
	-	Survey report with images included
	-	Ground Control Points (GCP) and Check Points (CP) included
Delivered	**Calibration Report/AT Report**	
	-	Aerial Sensors/Camera(s) used to acquire project imagery shall have currect certification, or in the case of digital cameras a current Product Characterization Report.
Delivered	**Metadata** (one orthomosaic file and one raw/stereo imagery file per block)	
	-	Project and File (tile) level metadata describing orthoimagery production are present.
	Optional Project specific files:	

INITIAL CHECKS		
	All received data opens and displays properly in Arc/Global Mapper	
	Create a list using Comand Prompt of all contents on the hard drive	
	-	dir **[drive and folder name EXAMPLE f:\HamiltonCoIn_2020]** /s >f:\list.txt
N/A	**Stereo Imagery/Raw imagery (.tif/.tfw)**	
	-	Data is organized by block if multiple counties/sub blocks are delivered together.
Pass	**Tiled Orthomosaics**	
		Often are delivered in a compressed format (ex. MrSID)
Pass	**Flight Diagram Information**	
	-	The Contractor shall produce, in softcopy format, a Flight Diagram which illustrates the **project area outline, flight lines, image identification, and approximate location of image centers.**
	-	Flight lines shall be oriented in a generally **North-South** direction. No East-West lines shall be flown except when necessary to acquire image data for the 100% 'Street View' areas.
	-	All imagery within a single flight line shall be acquired with the same sensor, and with the sensor oriented in the same direction.
Pass	**Tile Index**	
	-	Tiling scheme and naming convention will be validated with respect to the provided tile index shapefile.
	-	The correct number of orthomosaics have been delivered/matches tile index delivered for each block
Pass	**Seamlines**	
	-	Shapefile extends across the entirety of the AOI (project or county-wide)
Pass	**Project Boundary/Area of Interest (AOI)**	
	-	Shapefile extends across the entirety of the AOI (project or county-wide)
Fail	**Metadata** (one orthomosaic file and one raw/stereo imagery file per block)	
	-	Project and File (tile) level metadata describing orthoimagery production are present.
	-	Open and review .xml file
	-	Use Metadata Parser (MP) software
Pass	**Sun Angle**	
	-	Calculate sun angle and compare using the Flight Plan.
	-	Imagery shall be acquired during minimal shadow conditions. Image acquisition shall occur when the sunangle is **greater than or equal to 30°** above the horizon.
Pass	**Acquisition Window**	
	-	The acceptable window for the leaf off acquisition portion of this task. Check SOW.

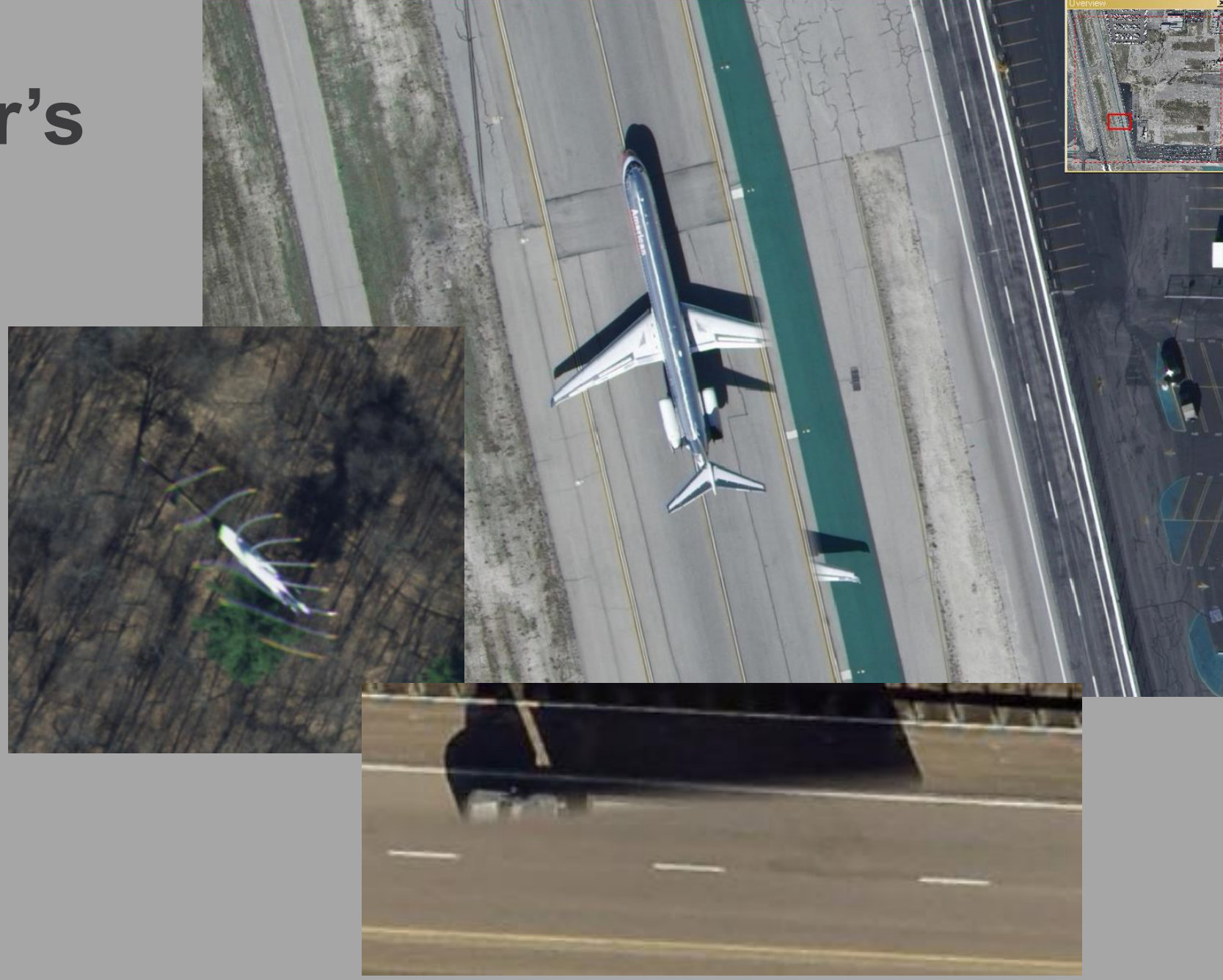
Imagery Examples

General Imagery Review Checks

- Image color, appearance and radiometry is acceptable.
- No artifacts or anomalies.
- Building lean is within limits (1.6’ per story).
- No blurring or smears.
- No warping or waviness in features such as bridges, sidewalks, walls.
- Seamlines correct.
- Shadows softened.

Fails “Governor’s Test”

“Seamline should not give a false appearance of unsafe conditions or create controversy.”



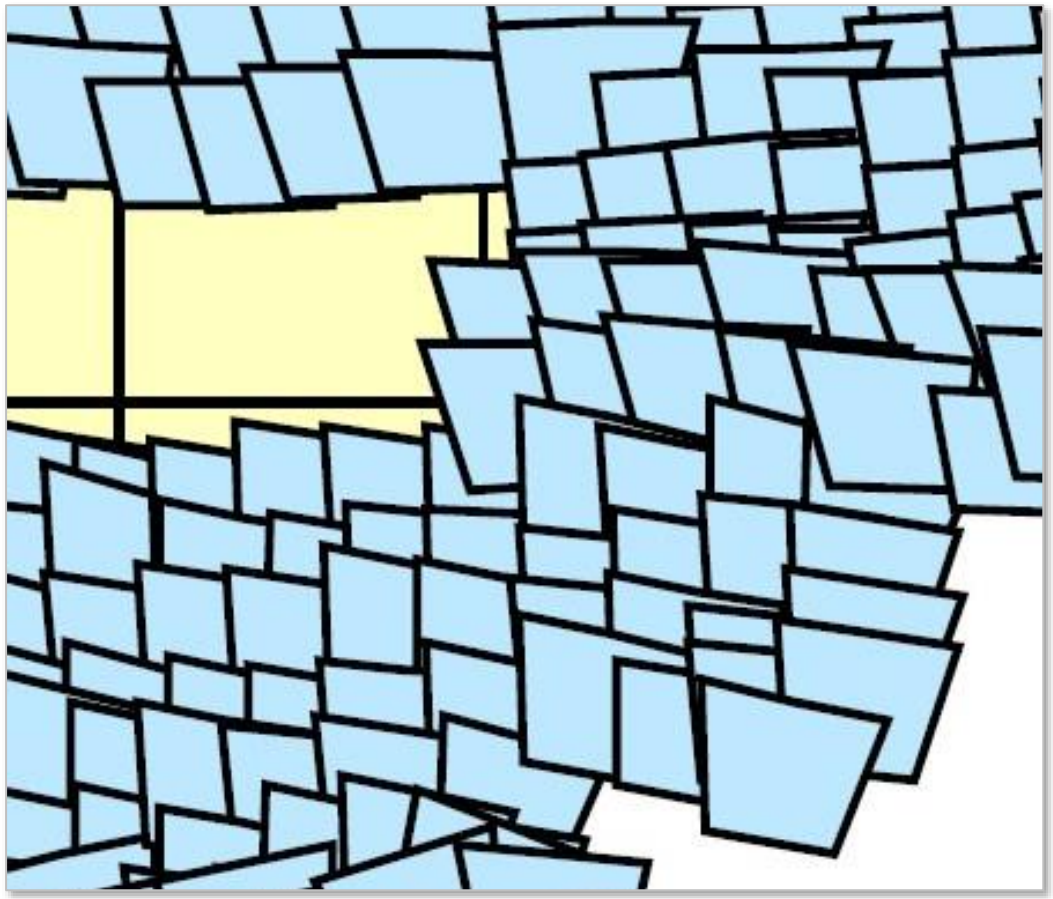
GSD Imagery Acceptance Criteria

Acceptance Criteria B: 9" GSD		
B	**9-inch GSD, equivalent to 1"=200' - scale (1:1800)**	**Measure of Acceptability**
B.1.	Ground Resolution	9 inch
B.2.	Tile Size	5280' x 5280'
B.3.	RMSE of known ground points measured on the image See ASPRS Class I Standards Page 8, Table 16, and NSSDA Part 3, Appendices 3-A and 3-D for explanation of formulas.	RMSEx = RMSEy = 2.65-ft RMSEr = = 1.4142*RMSEx = 1.4142*RMSEy = 1.41ft
B.4.	NSSDA radial accuracy	NSSDA accuracy (5-10 points) such that 1.73 * RMSEr < 2.5'
B.5.	Mismatch of features along mosaic lines and production block boundaries of equal scale	Equal to or less than 3 pixels on well-defined ground features (roads, sidewalks, curbs).

Acceptance Criteria C: 4-inch GSD		
C	**4 inch GSD, equivalent to 1"=100'-scale (1:1200)**	
C.1.	Ground Resolution	0.33 U.S. survey foot (2 decimals)
C.2.	Tile size	2640' x 2640' (8000 pixels x 8000 pixels)
C.3.	RMSE of known ground points measured on the image *See ASPRS Class I Standards Page 8, Table 16, and NSSDA Part 3, Appendices 3-A and 3-D for explanation of formulas.*	$RMSE_x = RMSE_y$ = 1.0-ft $RMSE_r$ = 1.4142*$RMSE_x$ = 1.4142*$RMSE_y$ = 1.41-ft
C.4.	NSSDA radial accuracy	NSSDA accuracy (20+ points) such that 1.73 * $RMSE_r$ < 2.5'
C.5.	Mismatch of features along mosaic lines between pixel resolution blocks of equal scale	Equal to or less than 4 pixels on well defined ground features (roads, sidewalks, curbs).
C.6.	Mismatch of features between 1-foot and 4-inch images	Equal to or less than the combination of the B.3. and C.5. criteria (4.3') on well defined ground features (roads, sidewalks, curbs).

Oblique Imagery Assessment

- Dewberry will evaluate EagleView's 4-view oblique imagery:
  - For complete coverage.
  - Evaluate the horizontal and vertical accuracy.
  - Generate all deliverables for countywide and spatially-limited datasets (SLDS).
- Dewberry will need to receive shapefiles showing any areas that are deliberately excluded for homeland security or other reasons.
- Use same survey control points to test and report accuracy.

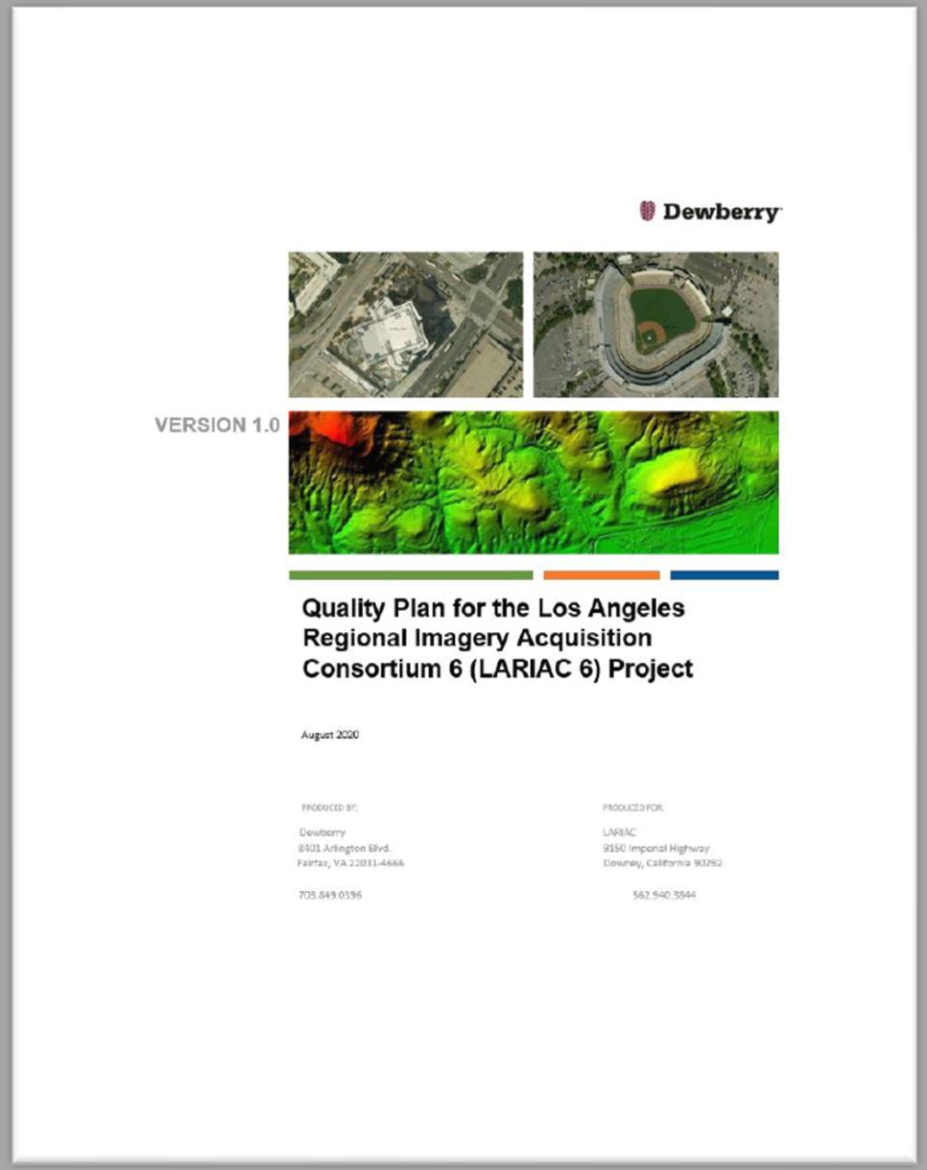


Quality Plan

Acceptance Criteria for Digital Orthophotos:

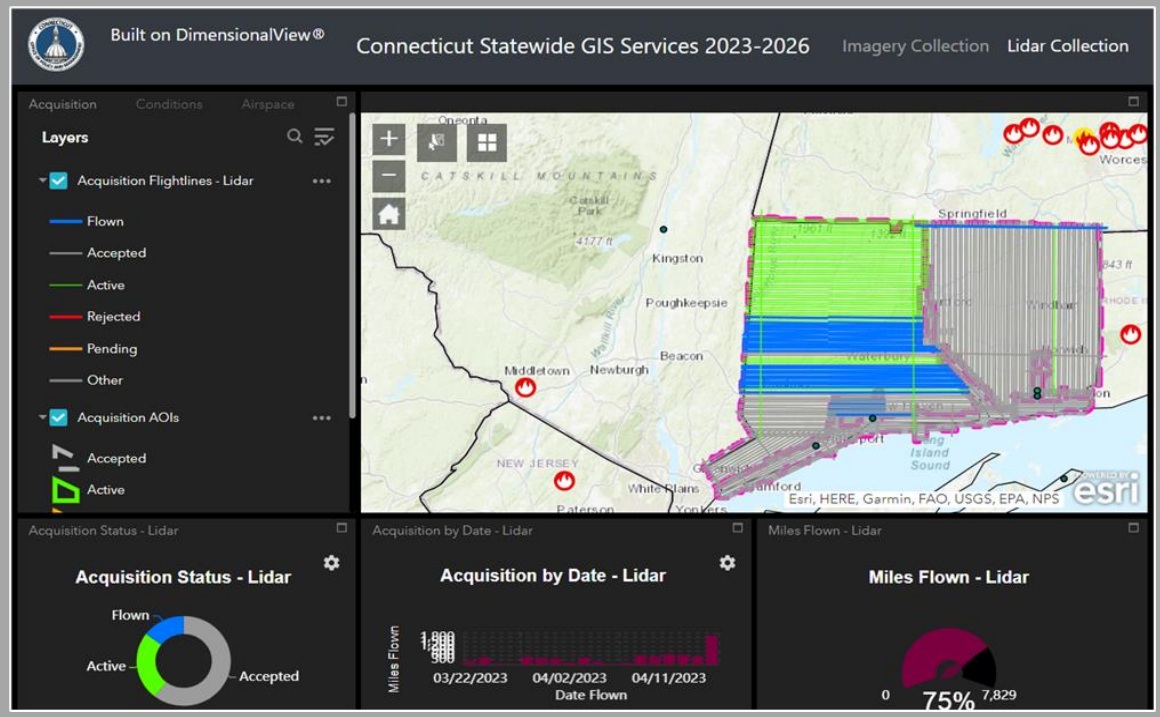
- Completeness and Aesthetics
- 9 inch and 4 inch GSD
- Aerotriangulation (AT)

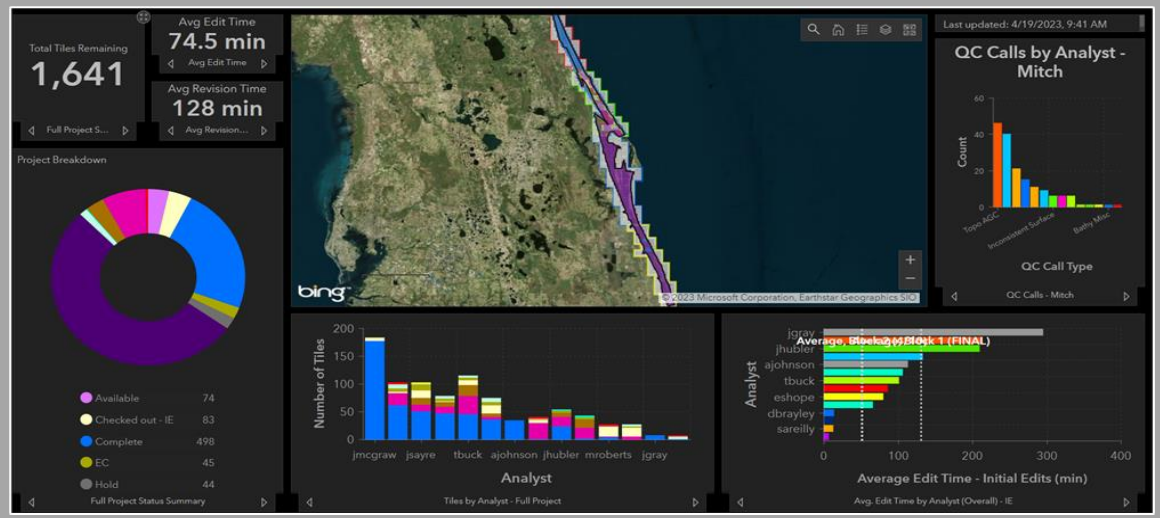
***Dewberry will deliver the updated Quality Plan within 2 weeks of the kickoff meeting



Project Tracking

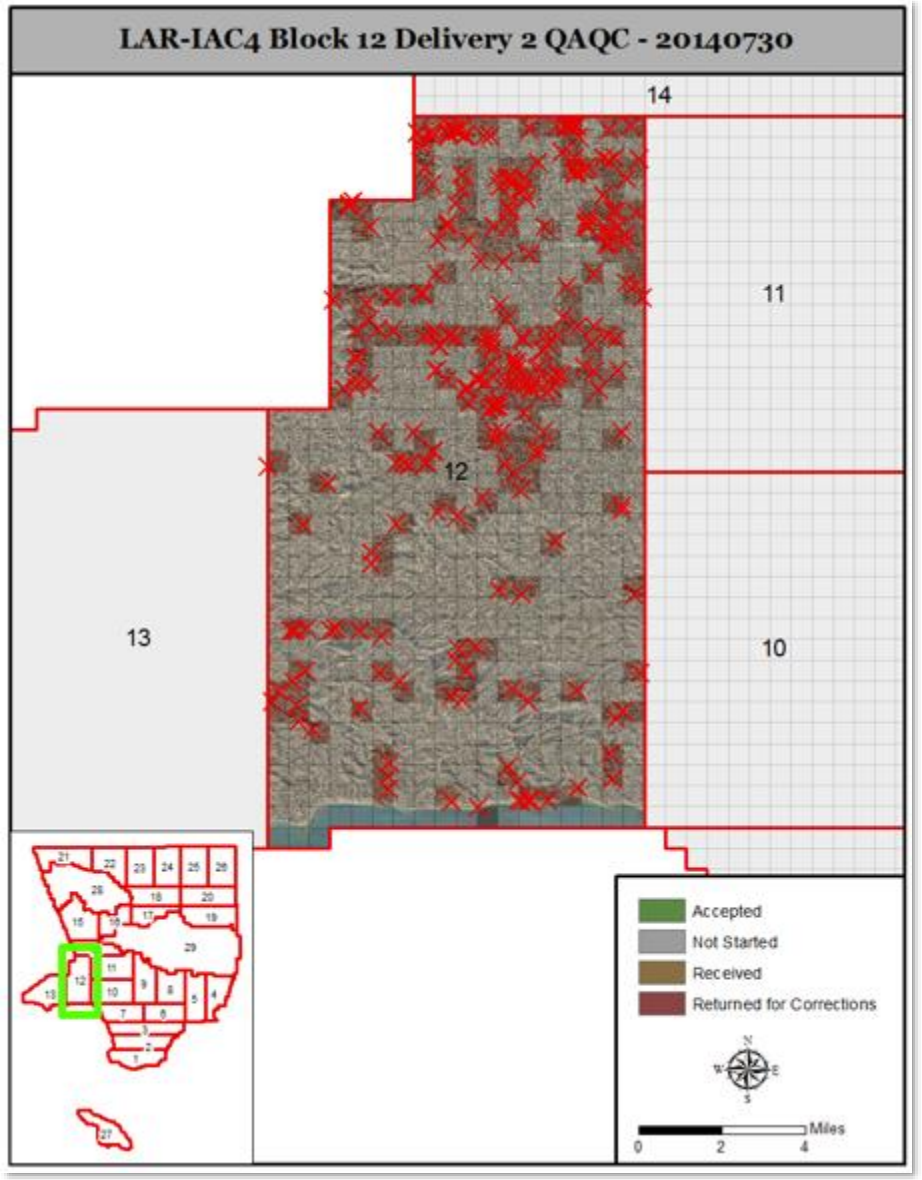
- Dewberry will develop a QA/QC project tracking spreadsheet (or dashboard) showing:
  - Status of all EagleView product tiles by delivery area:
    a) Delivered to Dewberry.
    b) Reviewed by Dewberry with edit calls provided to EagleView.
    c) Corrected by EagleView and delivered to Dewberry.
    d) Accepted by Dewberry.
    e) Delivered by Contractor to LARIAC and/or its stakeholders and communities.





Project Reporting

- General QA/QC Report for each block.
- GDB of edit calls.
- Shapefile of the tile index with tile status shown:
  - Accepted.
  - Returned for Corrections
    - If edit call intersects tile.
  - Held – Adjacent to correction
    - Tiles that intersect the rejected tile (those surrounding it).



SLDS Participant Deliveries

- 72 Total Participants:
  - 33 City Participants
  - 28 County Department Participants
  - 5 Local, State, and Federal Agencies
  - 3 Educational Institutions
  - 2 Research Institutions participants
  - 1 NGO participant

- SLDS Delivery Schedule:
  - Approximately 2 weeks to produce SLDS deliverables after acceptance of all tiles within the SLDS.
  - Approximately 4 weeks to produce county-wide deliverables after acceptance of all tiles.

- ***All participant deliveries to be done through cloud-based data transfer.

SLDS Deliverable Structure

- **Ortho Deliverables**
  - ECW Mosaic – 20 to 1 mosaic for SLDS Participants
  - GeoTIFF
    - 4 inch
    - 9 inch
  - JPEG2000 – 10 to 1 compression on JPEG Images
    - 4 inch
    - 9 inch
  - Raster Dataset – File Geodatabase Containing:
    - Mosaic of SLDS tiles stored as ESRI raster layer w/pyramids

SLDS Deliverable Structure Cont.

- **Oblique Deliverables**
  - Documentation and Training – Typically contains information sent by EagleView as part of the oblique deliverable.
  - Software – Contains copies of the oblique software and other data submitted as part of the oblique delivery.
  - Warehouse
    - Area Mosaics
    - DEMs
    - Maps and GIS
    - Ortho Mosaic Tiles
    - SubWarehouse

SLDS Deliverable Structure Cont.

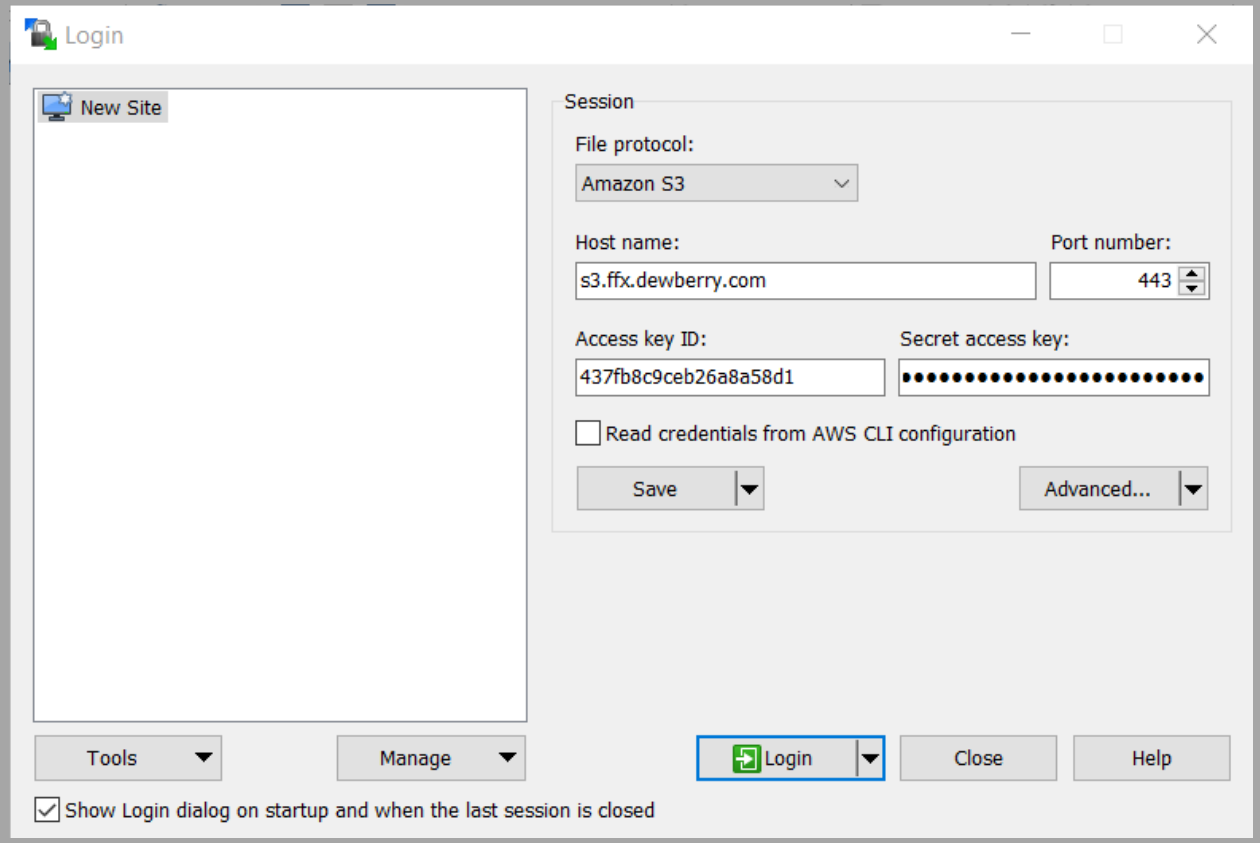
- **Building Footprints** – Are these expected to be complete prior to starting SLDS deliverables or will these be available only on the LARIAC website.
- **GIS Deliverables**
  - Accuracy Assessment Checkpoints – Typically only available on request (we have an empty folder with a readme to request from the LARIAC program)
  - FGDC Metadata
  - Oblique Image Polygon Shapefile
  - Ortho Seamlines
  - SLDS Boundary
  - SLDS Tile Index

S3 Cloud Storage

- Each participant will need:
  - S3 compatible file manager:
    - Dewberry recommends WinSCP. https://winscp.net
    - Alternatives: CyberDuck, FileZilla, Amazon S3, CloudBerry Explorer, TagSpaces, DragonDisk, CrossFTP, S3cmd, Rclone, etc.
  - Access Key ID: Generated by Dewberry PM
  - Secret Access Key: Generated by Dewberry PM
  - Server: s3.ffx.dewberry.com

S3 Cloud Storage Cont.

- The user only needs the Access and Secret Key as shown in image.
- User can use any S3 native client to make connections
  - WinSCP is a free tool we recommend for those that do not have an S3 client.



S3 Cloud Storage Demo