FIRST AMENDMENT

This Amendment is made and entered into this 10 day of January 2025, 20XX, by and between Pinellas County, a political subdivision of the State of Florida, hereinafter referred to as "County," and SurvTech Solutions, Inc., hereinafter referred to as "Contractor," (individually referred to as "Party", collectively "Parties").

WITNESSETH:

WHEREAS, the County and the Contractor entered into an agreement on March 28, 2023, pursuant to Pinellas County Contract No. 22-0518-P (hereinafter "Agreement") pursuant to which the Contractor agreed to provide Street-Level LiDAR and Imagery Data Acquisition and Extraction for the County; and

WHEREAS, Section twenty-five (25) of the Agreement permits modification by mutual written agreement of the parties; and

WHEREAS, the County and the Contractor now wish to modify the Agreement in order to provide for a term extension, an additional scope of work, and an increase to the contract value, at the same terms, and conditions;

NOW THEREFORE, the Parties agree that the Agreement is amended as follows:

1. Exhibit A is hereby deleted in its entirety from the agreement and replaced with Exhibit A attached hereto.
2. Section 6 ("Compensation and Method of payment"), subsection B ("Spending Cap and Payment Structure"), is revised to reflect an increase in the amount of $84,000.00, for a new total not to exceed expenditure of $454,327.71.
3. Section 5 ("Term of Agreement"), subsection B ("Term Extension") of the Agreement is deleted in its entirety and replaced with the following:

   "The Parties may extend the term of this Agreement for one (1) additional thirty-six (36) month period(s) pursuant to the same terms, conditions, and pricing set forth in the Agreement by mutually executing an amendment to this Agreement, as provided herein."
4. In accordance with Section 5 ("Term of Agreement"), subsection B ("Term Extension"), the Parties agree to exercise the thirty-six-month extension term, and extend the Agreement from March 28, 2024, to March 27, 2027.

5. Except as changed or modified herein, all provisions and conditions of the original Agreement and any amendments thereto shall remain in full force and effect.

Each Party to this Amendment represents and warrants that: (i) it has the full right and authority and has obtained all necessary approvals to enter into this Amendment; (ii) each person executing this Amendment on behalf of the Party is authorized to do so; (iii) this Amendment constitutes a valid and legally binding obligation of the Party, enforceable in accordance with its terms.

IN WITNESS WHEREOF the Parties herein have executed this First Amendment as of the day and year first written above.

Pinellas County, a political subdivision of the State of Florida:	Contractor:
Signature	Signature
Barry Burton	David O'Brien
Printed Name	Printed Name
County Administrator	President
Printed Title	Printed Title
January 10, 2025	December 24, 2024
Date	Date

APPROVED AS TO FORM
By: *Keiah Townsend*
Office of the County Attorney

AGREEMENT

EXHIBIT A - STATEMENT OF WORK

A. Task 1 – Imagery and Data Capture

LiDAR and Imagery Hardware

The SurvTech team shall utilize a combination of a Riegl Vux 1 and Ladybug 5.0 360° camera system, collecting imagery and LiDAR data simultaneously. The Vux 1 system can acquire up to 1.8 million LiDAR data points per second, and motion is corrected with an Applanix AP60 IMU. Both SurvTech and Tetra Tech own and operate the Riegl Vux 1 sensor and Ladybug 5.0 camera, so, both firms have expertise in acquiring LiDAR and 360° imagery with this system. LiDAR and imagery data shall be downloaded daily and reviewed within 24 hours to determine any issues with the dataset, including scan density, pattern, drift, or imagery issues. SurvTech shall be performing data acquisition on the full 1863 miles of roadways.

Project Data Collection

Daily collection of Mobile LiDAR and 360° imagery will be approximately 65-100 miles a day depending on weather and local site conditions. The following collection methods will be utilized:

- Single-lane and 2-lane local streets that do not have any divided median will be collected in a single pass.
- Multi-lane and divided-lane roads will be collected by the outside lanes only. This will ensure the best possible collection of the adjoining buildings and minimize shadowing.
- In parks or gated communities only roadways adjacent to or leading to the identified building assets will be collected. (Where access is approved and available)
- Alleyways will not be collected. If requested, it will be on a per-site basis as the system will have access limitations to ensure no damage will be incurred by either the MLS or other utilities and trees in the roadway.
- Each day after the collection has been completed a KML of the total area covered will be generated and sent to the PM for review. This will also be used for project tracking to ensure all roadways have been collected.
- This data can also optionally be exported as a GeoTIFF file and imported into an ESRI platform for real-time project review by all parties.

- Data will be downloaded to the server every evening for processing the following day.
- Depending on the client's final deliverable requirements this data will either be housed locally in our Tampa Server or on our Azure cloud.
- Due to the size of the project and the processing power required it would be recommended to have this data stored on the Azure cloud and processed on Virtual machines.

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- It will be recommended that at the completion of the project all cloud-hosted data be transferred over to the client's instance.

Task 1 Assumptions

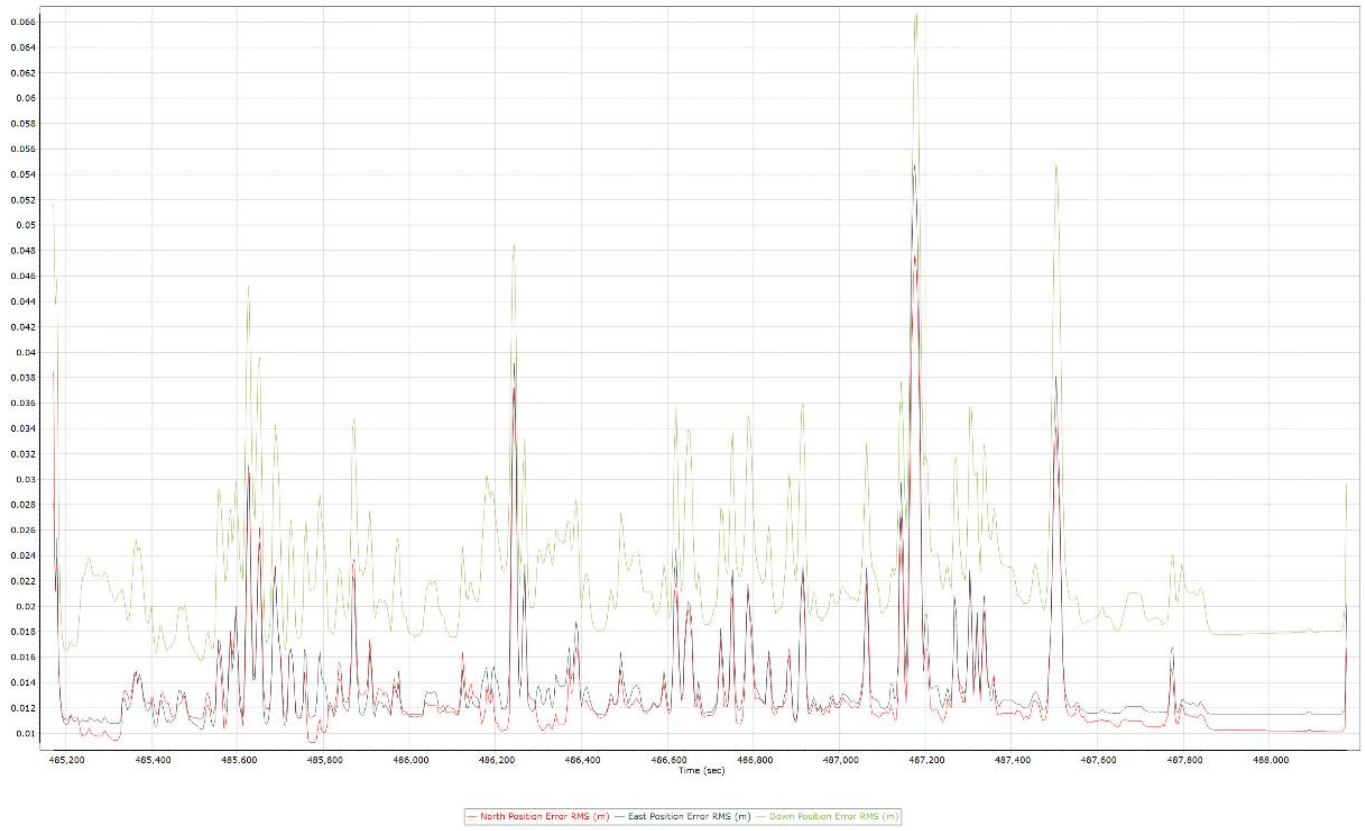
The SurvTech team shall be performing data acquisition on the full 1863 linear miles of roadways. It is assumed that we will have clear access to all roadways and parks to be able to complete the collection AOI as delivered.

B. Task 2 - Data Processing and Finish Floor Extraction

LiDAR Processing

After data download and upload to Azure cloud storage the data processing will be completed on Virtual Machines (VM). These VMs will be used to extract and adjust the data to the control points and generate the final deliverables. The initial step will be to use the base station data to process the initial raw trajectory into a final Post Processed Kinematic (PPK) trajectory solution. During this step, the team will do an initial QA/QC of the processed trajectory to ensure that the data is meeting minimum requirements for adjustment and ensuring that the initial starting trajectory will be sufficient for adjustment. The processing technician will view the GPS positioning and IMU solution and determine the amount of divergence. If the solutions don't diverge the processing technician knows that the positioning (navigation) data is accurate. **See the Chart on the below:**

GPS and IMU Divergence Chart:



After the Trajectory has been processed and reviewed in PosPac software it will then be imported into the RiPROCESS software to start the processing and adjustment of the LiDAR and imagery data. In RiPROCESS we will be aligning the different passes together and also adjusting the entire collection area to the survey control points that have been laid out throughout the project limits. Lidar data will be adjusted to the defined control points in both horizontal as well as vertical adjustments. During this stage of the project, we will be reviewing the accuracy of the data to the surveyed control stations.

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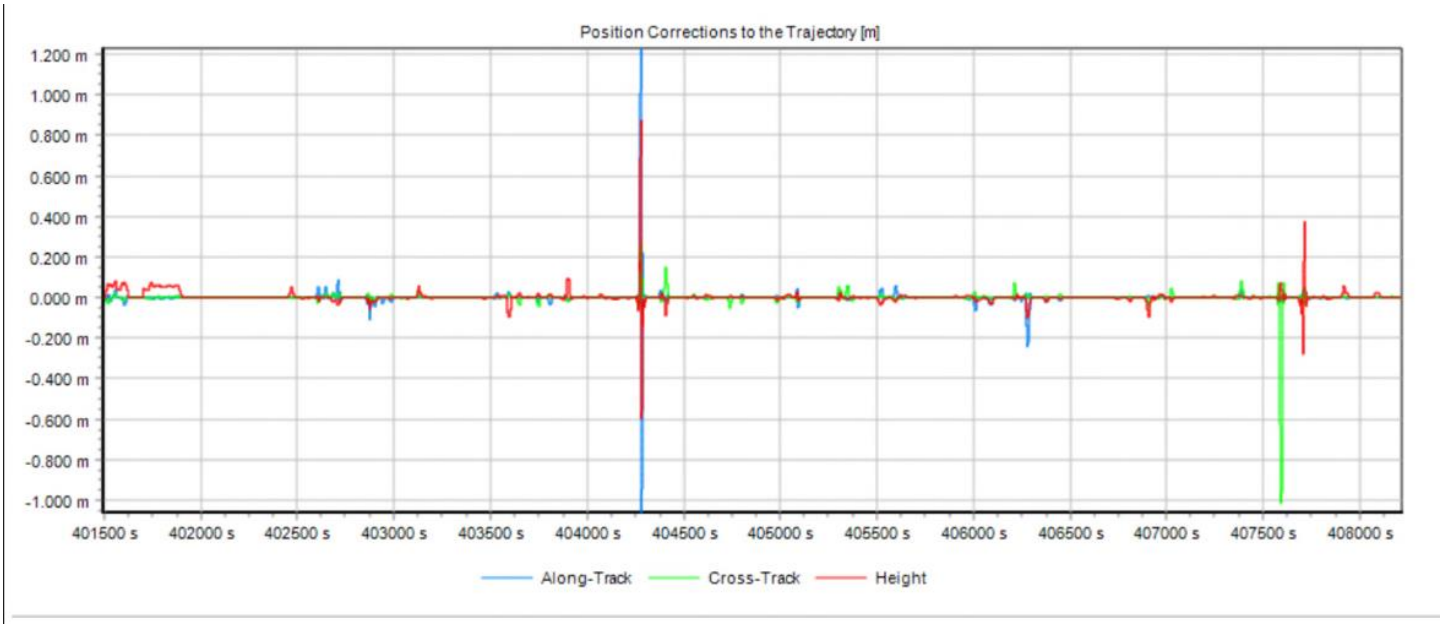
As part of the QA/QC process, we will perform additional check shots and if the overall registration values do not meet the standards of this project, we will mobilize the survey crews to collect supplemental control points to bring the data within tolerances. After the review and approval of the final registration, a complete registration report will be generated in the RiPROCESS software that will show final alignment values and individual Target values.

Adjustment to Control to Control Reference Network	
Adjustment Mode:	non-rigid with Translation

Transformation to Control Reference Network			
	x [m]	y [m]	z [m]
Translation ECEF:	0.000	0.002	-0.001
Translation PRCS:	-0.001	0.000	-0.002
Total Translation	0.002 [m]		

Control Points		
Number of Control Points:	73	
Control Point	prior Separation [m]	estimated posterior Separation [m]
Control Point 31		
Tie Point 31	0.055	0.002
Tie Point 31	0.052	0.002
Mean	0.053	0.002
Control Point 32		
Tie Point 32	0.076	0.005
Tie Point 32	0.074	0.004
Mean	0.075	0.004



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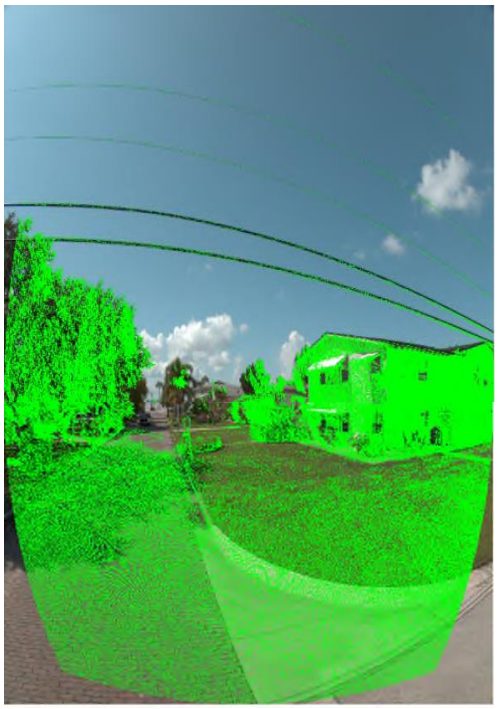
Imagery Processing

Once the LiDAR data is properly aligned and adjusted to the control the imagery will be brought in and converted from the raw LadyBug 5+ PGR files into individual JPG files and Pano imagery. In this step, we will define a 90% imagery quality to ensure a good overall resolution and optimize data size. This is critical for any web viewing software to ensure smooth visualization over a network. The imagery data is then checked to ensure proper alignment with the point cloud data. This is a critical step as any deviation here would cause variations in the visualization and point location when using the pick tools in the final web viewer. After the proper imagery alignment is completed then we will do a final colorization of the LiDAR data for each record to ensure that the final point cloud will have all RGB information.



Final Data Compilation and Export

At this step, we will again work with Pinellas County on a final approved tiling scheme for the project limits. This tiling scheme will be what is used to populate the final LAS files that will be delivered and used in the FusionMap viewer. From past experience, we recommend keeping the tiles under 5GB per tile. The ideal target size is closer to 2.5Gb per tile. For the sample area that equated to a 250ftX250ft tiling scheme

See the tiling scheme on the following page:

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Tiling Scheme:

The imagery export will be a 360° panoramic image in JPG format. This will also be accompanied by metadata in the form of a CSV file that will show the mapping projection and centroid point of the image. This file will be used to ensure a proper alignment in the web viewer and in other future uses later. As an optional additional export, a TopoDOT imagery file can also be generated to be used in the TopoDOT software if future complete 3D feature modeling is needed.

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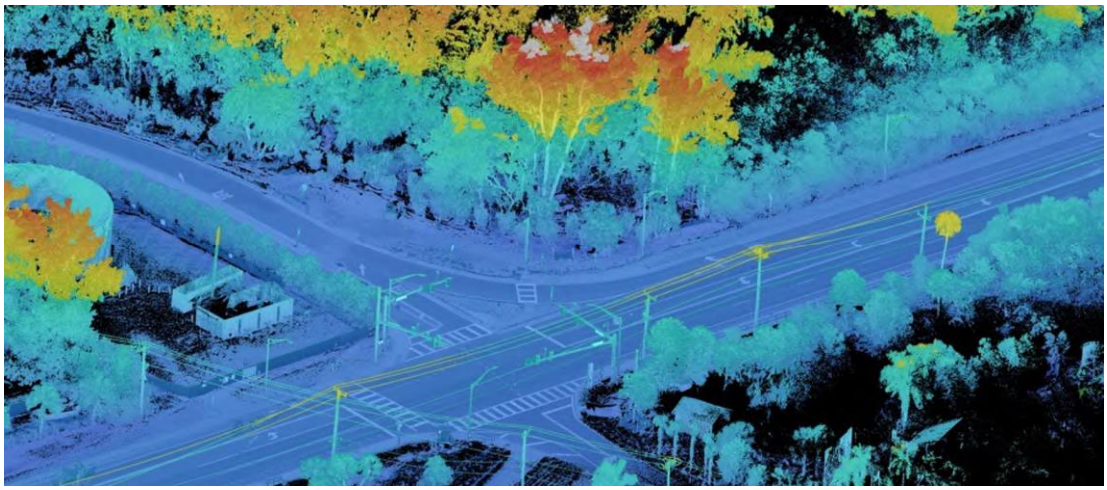
LiDAR Data Extraction

Once the data has been post-processed, Tetra Tech will utilize our experienced team of LiDAR extractors paired with in-house built machine learning programs to extract out the Finished Floor Elevations of each building as identified by Pinellas County. Tetra Tech will deliver an x,y,z (easting, northing, elevation) database with the finished floor elevations of structures as well as identifying the structure type. For the purposes of our cost estimation provided Tetra Tech based its assumptions on the following numbers provided by Pinellas County. Scope 1 – Countywide Flood Vulnerability Area contains 105,923 structures.

For the feature extraction every effort will be given to extract a finished floor elevation at the entryway to the building. If the primary entryway is not visible in the dataset an alternative elevation will be extracted. These alternative elevation points will need to be defined prior to the commencement of the feature extraction by the county. SurvTech and Tetra Tech will work with the county to properly define these alternative elevations and they will be delivered as separate layers of data.

For this methodology, we will be using a combination of software platforms. The main bulk of the data will be extracted using Bentley Microstation and the TopoDOT software platform. Both SurvTech and Tetra Tech have extensive knowledge using Microstation and TopoDOT software. This will allow us to quickly load data and identify the finished floor elevations. We are proposing that the majority of the extraction will be done manually to ensure the accuracy of final elevations. After the initial extraction, the data sets will go through a QA/QC process to ensure the final deliverables meet the required 4” vertical accuracy. To do this we will deploy conventional field crews to do random spot elevations on finished floor sites throughout the project limits. A final deviation report will be generated and delivered with final project submittals.



Sample Point Cloud Density (colorized by elevation).

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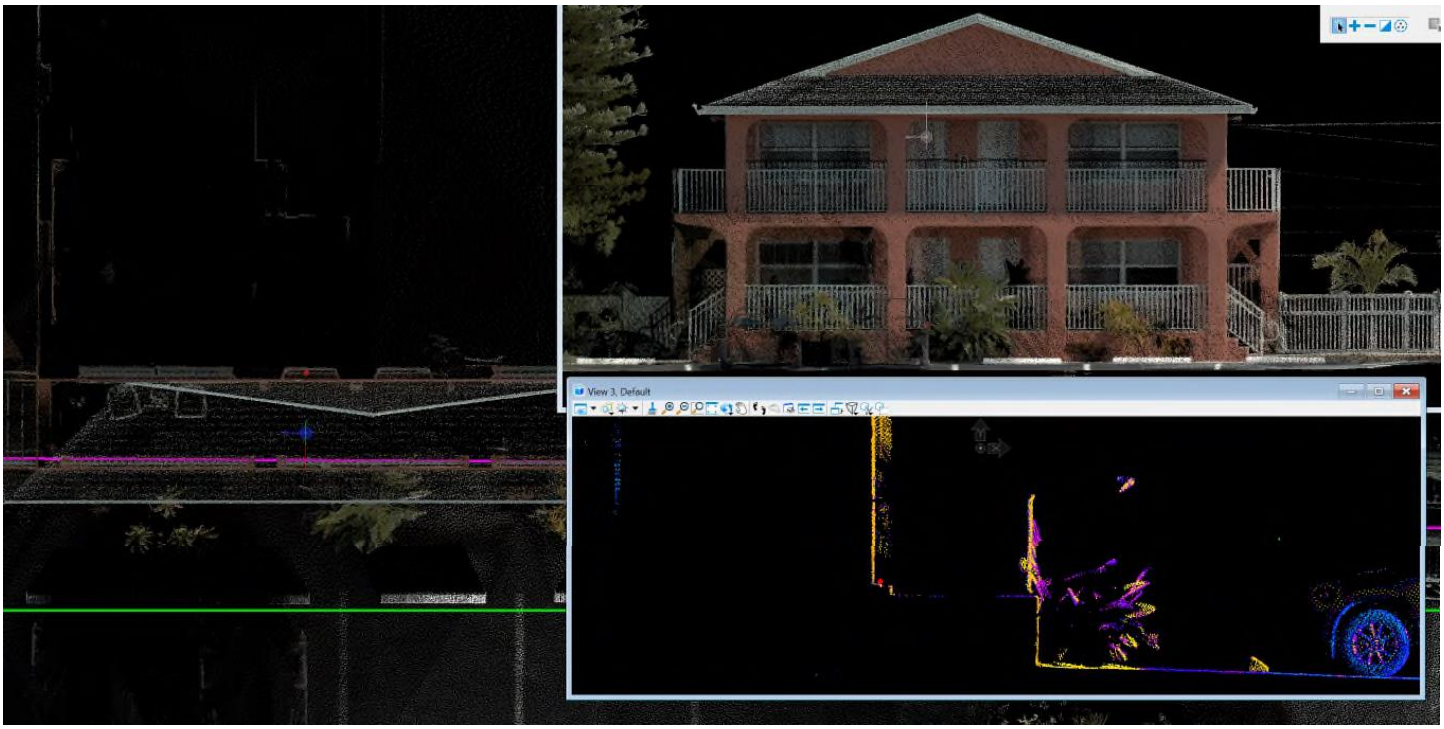

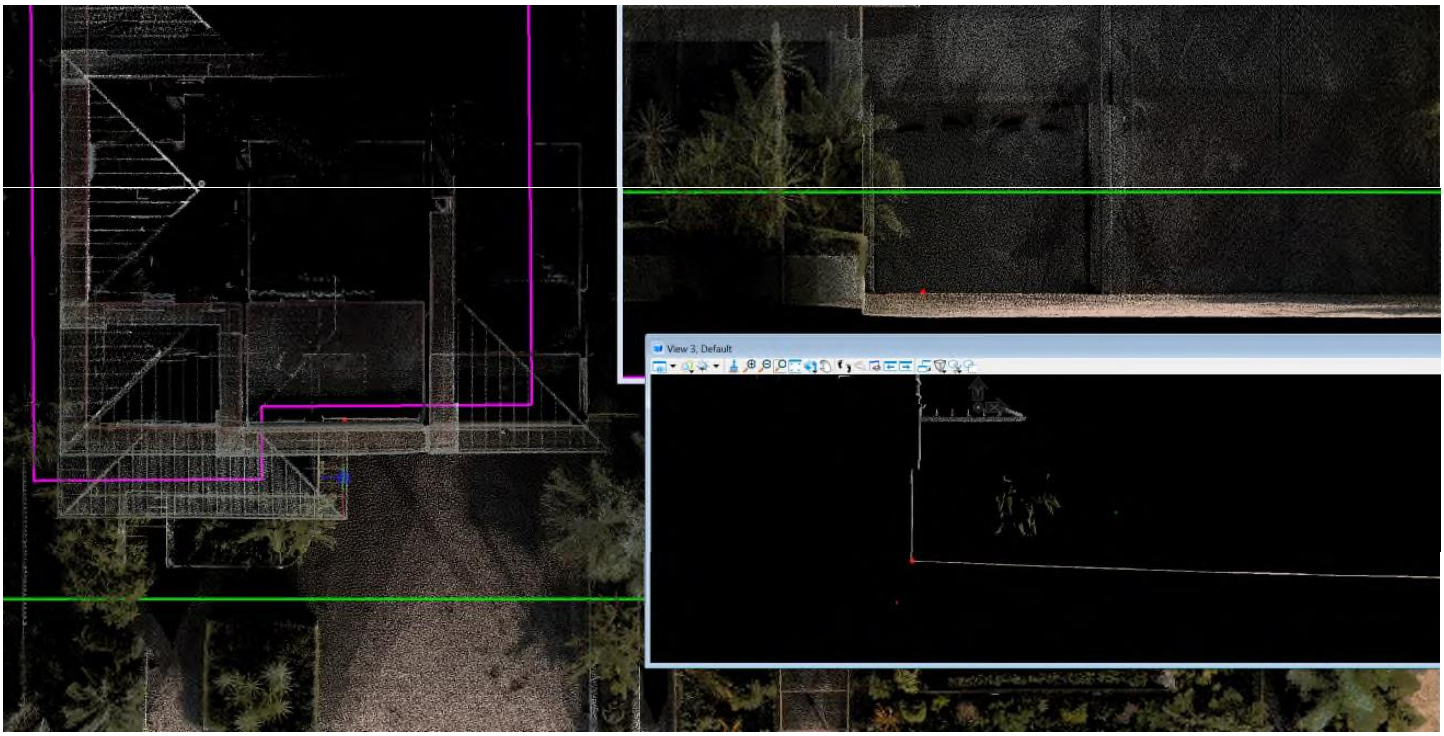

As these elevations are extracted points will go through another QA/QC process to ensure the accuracy and completeness of the dataset. As sections are completed and reviewed, they will be then uploaded to the project database and published online. As the data sets are reviewed and published, we will work to use machine learning to help increase productivity.

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Task 2 Assumptions

This task includes post processing of the LiDAR and imagery data, as well as the extraction of first floor elevation data for all buildings listed in the scope of work.

Not all finished floor elevations will be viewable due to obstructions in the filed collected data. Every effort will be made to collect the elevations but there will be some areas that are not accessible, and a finished floor elevation will not be generated for.

C. Task 3 – Software and Application Support for Web-Based Imagery and LiDAR Point Cloud Viewer

SurvTech is NOT creating a custom API that links ArcGIS to FusionMap, so there is no API for this purpose in this scope of work. Tetra Tech has developed a solution to integrate the various collected data into one single viewer. This web-based viewer can host 3D point clouds and panoramic imagery and allow for cross-referencing between the different data. This solution is beneficial to Pinellas County as it allows for collaboration and easy sharing of data without the need to have the data locally saved or any specific software installed. The point cloud viewer allows the user different functionality including measurements within the point cloud.

Pinellas County will have the ability to view a location by entering a roadway segment and mile chainage or by simply entering latitude and longitude coordinates.

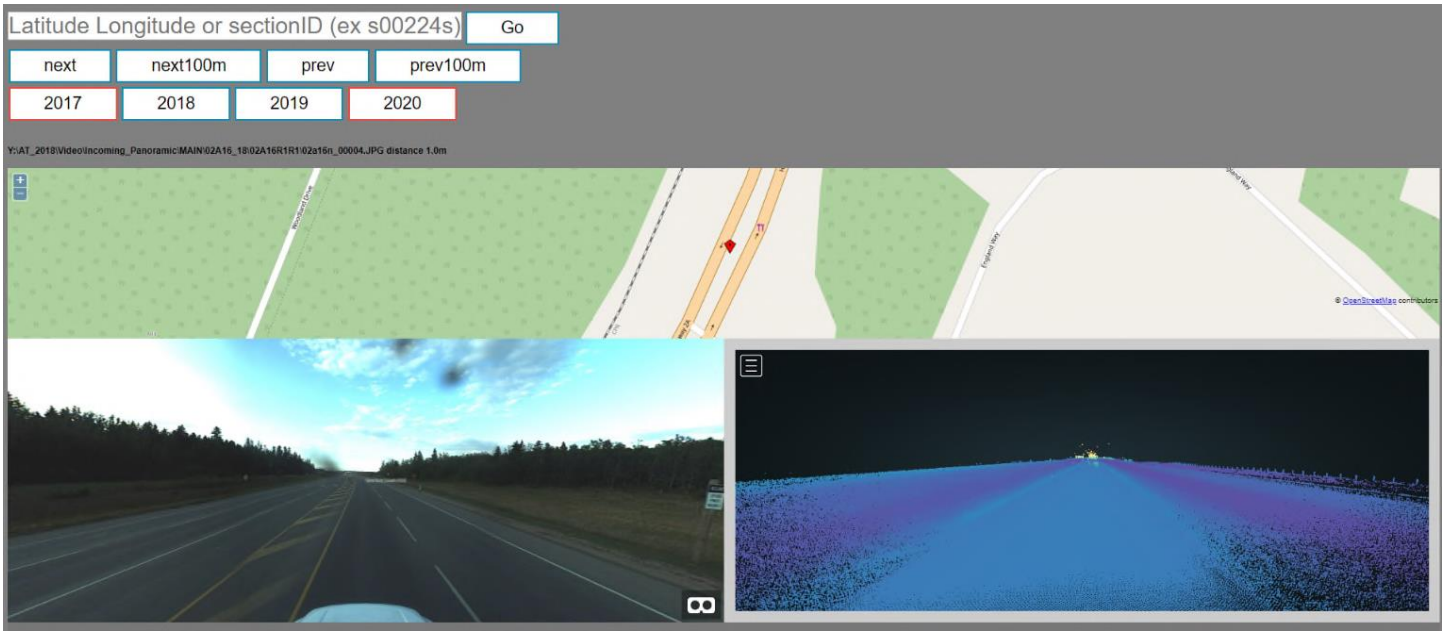

Figure 4: Sample Web-Based Viewer

As this platform is completely designed in-house, we can work with the county to ensure it is tailored to their direct needs and even overlay their logos and other items to make It public facing if that is desired. All data can be hosted locally on their servers, or we can work with the county to have the data hosted on our secure servers or on an AWS or Azure server service.

Task 3 Assumptions

Cost includes PM costs, web hosting setup, and file structuring. Pinellas County can choose to host data itself, so $36,000.00 each year is "optional" and $28,000.00 each year is "required" for FusionMap license and support. **SurvTech shall host the dataset, and Pinellas County shall own the data. The cost of hosting the dataset is included in the increased contract amount.**

See the cost breakdown in the table below.

Task 3 Cost Breakdown (Required and Optional Services)

Task 3 - Software and Application Breakdown				
Cost per TB (Estimate Only - Unit Cost)	Assumed	Total Annually	Optional	Required
$3.000.00	12		Removed per County	
Fusion Map License		Total Annually		
$18,000.00	1	$18,000.00		$18,000.00
Web Hosting Support		Total Annually		
$10,000.00	1	$10,000.00		$10,000.00
Combined Annual Cost for Fusion Map and Web Hosting				
		$28,000.00		$28,000.00

D. Task 4 - ESRI ArcGIS Integration

SurvTech's team will be actively working during the entire project on integrating the LiDAR and imagery data with Pinellas County's ESRI ArcGIS platforms. Information that is extracted from LiDAR data, such as finish floor elevations (FFEs) shall be imported into the ESRI geodatabases of the county's GIS platforms. This feature data will be provided as a Web Feature Service (WFS) via a REST endpoint during the collection & analysis (C&A) phases. The LiDAR/Imagery viewer shall be connected to ArcMap, ArcGIS Pro desktop software, and ArcGIS Online. At which time it is deemed appropriate by the county, the final version of the data will be provided for direct input into their data warehouse for County use. Additional features the county wants to collect, beyond the finish floor elevations, can be extracted for an additional cost.

LiDAR and Imagery information shall be available to GIS users by external links to the dataset inside the GIS platform and by different user groups within the County. A separate feature class, provided in a similar way as those stated above, shall be made available to show the 'photo bubbles' and the routes they occur on, which will trigger a browser window to the viewpoint selected in the map. The viewer endpoint during the C&A phases will be a Tetra Tech Virtual machine, with logins given to all users in need. The data viewer will function similar to 'street view' in other products, with the added enhancement of measuring and feature-marking. Marked features are collected in a queue for further attribution and placed in their appropriate feature classes. The viewer will be hosted on Tetra Tech servers for the collection and analysis phases and moved to a server of the County's choosing at final delivery. At this point, the viewer can be hosted on Pinellas County servers, Tetra Tech servers, or 3rd party cloud servers, such as Amazon, Google, or Microsoft.

Because of the base in which the viewer is built, nearly any change can be made in the way the data is presented to fit the need of the end-users. This allows the County to achieve exactly the look and feel they are going after, with a great base and framework to start from in the stock Tetra Tech viewer. There is not an Out-of-the-Box (OOTB) product that ESRI provides to handle this sort of, and amount of, data. The 'Oriented Imagery' story map feature provides the photographic portion of what we are doing with this project but does not include lidar. Cyclomedia provides similar functionality but is locked into its sensors and servers (hardware specific). It is the teams' position that once this project has gone through the collection, analysis, and final delivery phases, ESRI will be interested in collaborating to further develop ESRI fully native tools to handle future datasets to provide the industry with an OOTB solution. It is exciting and an honor to work on a project like this that pushes the boundaries of what current software can achieve, and be a voice in what software should do, going forward. Pinellas County has chosen to advance into previously, as far as the SurvTech team knows, un-accomplished territory in the industry. Documented and presented properly, it could change the face of how lidar, 360 photography, and GIS/point cloud feature extraction is accomplished using the BYOD (bring your own device) mindset.

Task 4 Assumptions

SurvTech is providing ESRI Products and support **without** custom API. SurvTech is **NOT** providing a custom API for communication between ArcGIS and FusionMap.

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E. Task 5- Training

On-Site Training

After delivery of the mobile LiDAR dataset, SurvTech and Tetra Tech personnel shall provide onsite training to the system administrators and end users. With SurvTech being a local firm, the training shall consist of a minimum of 6 hours of onsite instruction for each group unless safety prevents onsite training classes. The first hour of training shall be an introduction to mobile (roadway) LiDAR and 360° and potential uses of the datasets. All training shall be recorded to ensure that county employees can rewatch the training later on demand, and SurvTech and Tetra Tech trainers shall be available for questions.

SurvTech shall create a training plan with implementation steps. The training plan shall consider the following requirements.

- Number of users requiring training.
- Level of technical ability of users?
- Subjects for training?
    - Introduction to mobile (roadway) LiDAR and 360° datasets.
    - GIS
    - LiDAR and Imagery Viewer
- Location of training
- In-person or virtual training
- Creation of training documentation, including manuals, videos, an online help menu, and an orientation program for new users.

All training under this initial offering will be “formal training”, following a designed form. Informal training and support are not included in this initial offering. The formal training will include goals for designed results. Benchmarks that ensure users meet a certain level of proficiency at the end of the training session, including testing, and/or hands-on operation of the software products. SurvTech shall allow all the formal training sessions to be recorded for in-house “informal” training by Pinellas County personnel or end-user study.

Task 5 Assumptions

Software support and training: Includes two six-hour training sessions. One for system administrators and one for end users. The onsite or virtual setting of the training shall be dependent on COVID protocols. Any additional training will be at additional expense. SurvTech shall include 1-hour in each session for an introduction to mobile LiDAR and 360° imagery data and the potential uses of said data.

F. Task 6 – Annual Maintenance Fee

SurvTech’s team member Tetra Tech shall utilize Fusion Map to host the 360° imagery and LiDAR data. There shall be annual maintenance fees for updating and maintaining Fusion Map.

Task 6 Assumptions

Annual Azure Hosting/Costs: Includes Web Server - Standard_D3_v2 - 4 CPU 14 MB RAM, GIS Server - Standard_D12v2 - 4 CPU 28 MB RAM, File Server - Standard F4s_v2, as well as time to maintain and update the software.

G. Task 7 – Technical Memorandums, Deliverables, and Final Report

Deliverables

The project will produce a comprehensive geospatial dataset for all the county's transportation corridors. SurvTech shall present the county with the following deliverables per Pinellas County standards.

1. Horizontal and vertical control, ASCII format.
2. Discovery Workshop
3. Detailed project manual
   a. Consultive feedback on the collection/extraction methodology used and the
   b. database design criteria.
   c. Integration with ESRI Enterprise GIS
   d. QA/QC plan creation and implementation
   e. Training materials and in-class training.
   f. Project schedule
4. Weekly status reports during the acquisition phase.
5. Monthly status reports during the data processing phase.
6. Data delivery and Technical Memorandum
   a. Metadata
   b. Generalized 3D Surface/Streetscape Point Data
   c. LAZ/LAS files with RGB colorized point data.
   d. Finish Floor Elevation (FFE) of first floors of buildings adjoining and visible from roadways.
7. Elevation Visualization Application
8. API coding for GIS integration and other County information systems.
9. Final Report outlining the methodology used, problems encountered, solutions offered, and final deliverables.

Task 7 Assumptions

The technical memorandums and final report task shall include weekly status reports during the acquisition phase and monthly status reports during the data processing phase.

H. Project Schedule

A. Detailed Timeline – 24 Weeks from Notice to Proceed to Completion

All timeframes listed hereon are in calendar days and weeks. Below are each of the phases of work.

1. Research and Planning – 1 Week (Week 1)
SurvTech shall research and recover horizontal and vertical control stations throughout Pinellas County for quality control and quality assurance (QA/QC). SurvTech plans on using the Florida Permanent Reference Network (FPRN) for establishing targets, so existing control points shall be for accuracy verification purposes, or in areas where the FPRN may not be available. The SurvTech team shall plan the daily mobile LiDAR mapping routes.

2. Establishing Mobile LiDAR Targets – 5 Weeks (Begin Week 2, ending Week 6)
SurvTech personnel shall start establishing targets a week prior to the mobile LiDAR acquisition begins. This will give the targeting crews a two-week head start on the mobile mapping crew. SurvTech shall be required to set approximately 3800 targets across the project limits. SurvTech shall be required to run 3-crews setting 50-targets per day, working a 10-hour day. Targets are being surveyed using the FPRN, so all data collected will have real-time values. Data shall be processed and organized daily so that the control file can be given to the mobile LiDAR processing department the following day.

3. Performing Mobile LiDAR Data Acquisition – 9 Weeks (Begin Week 4, ending Week 12)
There exist 1863 miles of roadway to be acquired in Pinellas County. Our LiDAR acquisition vehicle can acquire approximately 65-100 miles per day which equates to approximately 30 business days or 1.5 calendar months with acquisition taking place on business days. However, due to situations such as rain, accidents, equipment failure, or other unforeseen circumstances, SurvTech is budgeting a 20% overage factor into the schedule for these circumstances.

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4. Data Processing Mobile LiDAR Data – 11 Weeks (Begin Week 5, ending Week 16)
The mobile LiDAR shall be processed daily to catch any issues or inconsistencies immediately and continue after data collection is completed, for another 4 weeks with the final delivery of the complete LiDAR point cloud and 360° imagery by the end of week 16.

5. Street Level Imagery Licensing (Data & Apps/APIs) – 11 Weeks (Begin Week 5, ending Week 16)
The street-level imagery shall be loaded into Tetra Tech's web-based imagery and LIDAR viewing system, Fusion Map by the end of week 16. This web-based viewer will host the 3D point clouds and front-facing and panoramic imagery and allow for cross-referencing between the imagery and point cloud datasets. The point cloud viewer shall allow the user different functionality including measurements within the point cloud. Pinellas County will have the ability to view a location by entering a roadway segment and mile chainage or by simply entering latitude and longitude coordinates.

6.* Web-Based Visualization Application Specifications – *11 Weeks (Begin Week 10, ending Week 20)
The web-based visualization platform has already been constructed by Tetra Tech and includes the following tools.

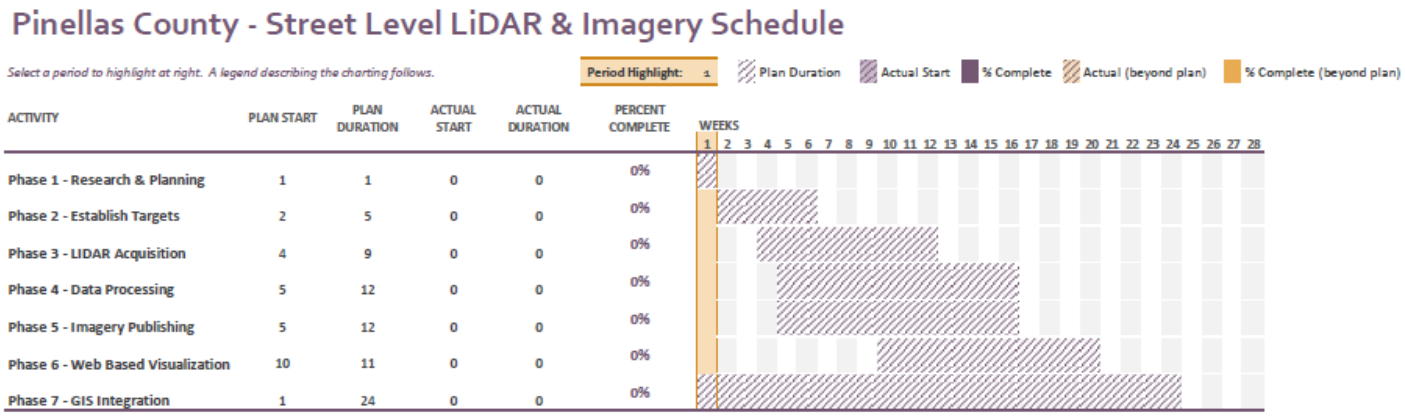
- Measuring tools, including distance and area calculations, and unit control.
- Pan and zoom controls
- Elevation tool.
- Unlimited user logins for web-based clients and GIS clients. It is however limited to six (6) active user licenses at one time, but multiple people can login with the same "user" instance.

Since the web-based visualization tool is already constructed, the deadline to have the data loaded and ready to utilize shall be by the end of the 20th week.

7.* Complete GIS Integration – *Delivery by 24 weeks (with exceptions below)
The web-based visualization platform shall be integrated with the County's ESRI-based ArcGIS platform. The SurvTech team will be actively working during the entire project on integrating the LiDAR and imagery data with Pinellas County's ESRI ArcGIS platforms. The finish floor elevations (FFEs) shall be imported into the ESRI geodatabases of the county's GIS platforms. Fusion Map will be integrated with ESRI ArcGIS as a Web Feature Service (WFS). The LiDAR/Imagery viewer shall be connected to ArcMap, ArcGIS Pro desktop software, and ArcGIS Online. The county shall determine if it will host the data in-house, on its cloud storage, or on cloud storage supplied by SurvTech. See the cost breakdown for Item 3 on Exhibit "C – Payment Schedule".

8. See Project Schedule Chart below:

Project Schedule:



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I. Workflow & Geodesy

A. Project Workflow

SurvTech Team

Project Principal and Professional Surveyor: David J. O'Brien Jr., PSM
Project Manager: Ray Brouillette
Project Surveyor: Stacy Brown, PSM
Survey Technician (Data Processor): To be determined (TBD)
Survey Party Chief: TBD
Survey Party Chief: TBD
Survey Party Chief: TBD
Mobile Mapping Manager: Bret Bienkowski
Mobile Mapping Technician: Devin Smith
Data Extraction and AI Manager: Reza Malehmir, Ph.D.
GIS Manager: Jon Douglas

Team Roles and Responsibilities

Project Principal: This individual shall be responsible for all the contracting responsibilities concerning the contract, as well as the final oversight of project costs, schedules, and client relations.

Project Manager: This individual shall be responsible for the overall project management, including each phase of the project, including horizontal and vertical control, targeting, imagery, and LiDAR acquisition, imagery licensing and application and API creation, web-based visualization application creation, final deliverables, and meeting budgets and project timelines. The project manager shall report to the project principal and oversee the entire project team.

Project Surveyor: This individual shall be responsible for the vertical and horizontal accuracy of all project data, which includes establishing horizontal and vertical control (targets) for georeferencing the LiDAR point cloud and 360° imagery. The project surveyor shall report to the project manager and oversee the survey team, which includes the survey party chiefs and survey technicians who are performing the field and office work to georeference the LiDAR point cloud and 360° imagery.

Survey Technician: This individual is experienced with processing RTK GPS and mapping on the NAD 1983 state plane projection, and NAVD 1988 vertical datum. The survey technician shall report to the project surveyor and perform data processing on the survey files collected by the survey party chiefs.

Survey Party Chiefs: This individual is experienced with utilizing RTK GPS, specifically the FPRN and Listen/Listen base/rover RTK with a cellular broadband connection, and mapping on the NAD 1983 state plane projection, and NAVD 1988 vertical datum. The survey party chief shall report to the project surveyor and perform data collection that shall be uploaded to the SurvTech cloud daily.

Mobile Mapping Manager: This individual shall oversee all the mobile LiDAR and 360° collection and processing. This individual shall report to the project manager and be responsible for the schedule, budget, and quality of the LiDAR and imagery acquisition and processing, including QA/QC of final mobile mapping deliverables. The mobile mapping manager shall also oversee the street-level imagery licensing, including the creation of applications and APIs for viewing and manipulating the imagery data, and the creation of a web-based visualization application.

Mobile Mapping Technician: This individual is experienced with collection and processing Mobile LiDAR data. This technician is experienced in adjusting MLS data to control networks and aligning data to ensure a complete registration. The mobile mapping technician shall report to the Mapping Manager and perform data processing on the Mobile LiDAR data collected.

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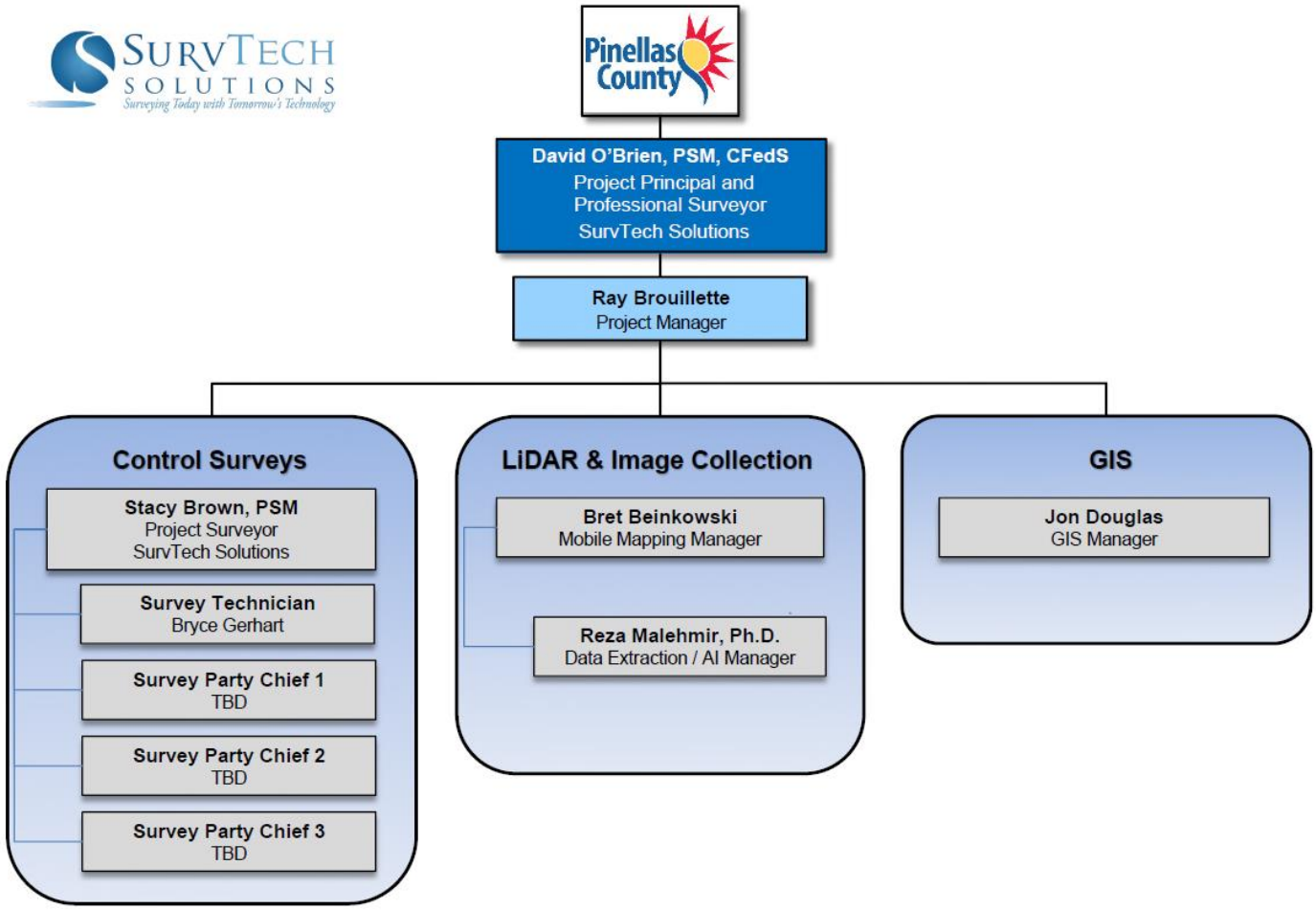
Data Extraction and Artificial Intelligence (AI) Manager: This individual shall be responsible for overseeing the manual extraction of vector and symbol data and georeferenced data, including attribution. They shall also be responsible for overseeing the automatic extraction of data from the LiDAR point cloud utilizing artificial intelligence. This individual shall report to the mobile mapping manager and oversee the manual and AI data extraction team, which will include finishfloor elevations and unspecified data later.

GIS Manager: This individual shall be responsible for overseeing the integration of the mobile LiDAR and 360° imagery data into the ESRI GIS platform, including ArcGIS Desktop, ArcGIS Pro, ArcGIS Server, Arc GIS Online, and Widgets for ArcGIS Web AppBuilder. They shall report directly to the project manager and oversee the GIS team that is designing the GIS integration.

See Organization Chart Below:



B. <u>Horizontal And Vertical Control</u>

<u>Standards of Practice Statement</u>
All Surveying and Mapping will be performed per "The Florida Standards of Practice for Surveying and Mapping" and signed and sealed by a Florida Professional Surveyor and Mapper. The data collection methods for this project shall follow the standards for Terrestrial Mobile LiDAR (chapters 35-40) in the FDOT Survey Handbook, dated February 18, 2021. This project shall be classified as a Type "C" – Lower Accuracy Mapping (36.1) project. Deliverables shall meet Pinellas County CAD Standards. All surveying and mapping on this project shall be overseen by a Florida professional surveyor and mapper.

AGREEMENT

Horizontal Datum
West Zone of the Florida State Plane Coordinate System, North American Datum (NAD) 1983_2011 Adjustment (NAD 83/2011), U.S. Survey feet.

Vertical Datum
North American Vertical Datum 1988 (NAVD 88), U.S. Survey feet.

Vertical Accuracy
Vertical Accuracy shall be +/- 0.333 feet (4 inches) with a 95% confidence level.

Establishing Horizontal and Vertical Control Stations
Horizontal and vertical control stations shall be established approximately every 2500 feet along the scan route on alternating sides of the roadway. These control stations shall be targeted for visualization in the LiDAR and imagery data and shall consist of “x’s” or the exterior tip of a chevron. The control station and targets shall be placed on flat, non-sloped surfaces and painted or colored in such a way to stand out from the underlying surface. On dark surfaces, the targets shall be white, but on faded-out surfaces, there may be a need for black and white targets for contrast. Each target shall be established with network RTK (real-time kinematic) GPS, utilizing the Florida Permanent Reference Network (FPRN), and/or Carlson Listen/Listen cellular base rover. There are two FPRN base stations in Pinellas County, one located at Albert Whitted Airport and the other at Pinellas Counties McKay Creek Reclaimed Water Pump Station in Largo. Data shall be acquired with RTK and post-processed (PPK) with numerous other base stations for redundancy. SurvTech shall add additional control stations in areas of high vegetation and structures (buildings), such as in downtown St. Petersburg.

To ensure quality data, SurvTech shall utilize standardization of equipment for all GPS collection. Identical GPS receivers with fixed height two-meter poles shall be utilized. Published control stations shall be checked into at the start of the day and at the end of the day, including redundancy of measurements spaced out more than 6 hours apart for different satellite configurations. All control station/target coordinates shall be supplied to Pinellas County in ASCII format (northing, easting, elevation, feature code) per Pinellas County standards. All survey control shall be established by SurvTech Solutions, as the professional surveying and mapping company on the project. SurvTech shall utilize as much existing published control as possible, only setting new control stations when absolutely necessary.