AIRWORKS

Conceptual Maps at the Click of a Button

How You Can Get Better, More Accurate Data from the Get-Go with AirWorks.

Introduction

Construction and infrastructure expansion are booming, yet many AEC firms are struggling to meet deadlines and complete projects within budget.

When a company is trying to stay at the top of its field and remain competitive for work, along with delivering a quality product, time truly is money.

Fortunately, there is actually a way to turn time into money – employ the right technology.

Artificial Intelligence (AI) can help leaders make better decisions earlier in the construction process. **Better decision-making enables teams to win more projects, shorten project timelines, and meet budget goals.**

In fact, AEC firms estimate that AirWorks Automate **saves them 60 - 70% of plan drafting time while paying just 25% of what it would cost** to perform the same tasks in-house.

In other words, you can complete four days' work in one using AI.

Get ready to streamline:

- + Building Proposals for Project Bids
- + Site Planning
- + Master Planning
- + Permitting for Construction
- + Conceptual Design Studies
- + Estimating Project Costs for Pre-Construction and Bidding
- + GIS Site Deliverables

So how exactly does it work?

Over the course of this eBook, you'll get an in-depth understanding of the current challenges faced by AEC firms and how AirWorks' AI solves for these issues, ultimately improving your project ROI.

With this information at your disposal, you'll have a better grasp on how you can position your firm as the market leader for efficiency and reliablility and ultimately win more bids.

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Current Challenges Engineers Face

Challenges Faced by AEC Firms

For leaders at AEC firms, the ability to win a project often hinges on the very first stage of the project timeline – site feasibility studies.

The ultimate goal at this stage is to determine whether or not the proposed project is even viable. To do that, leaders need accurate information on site conditions so they can accurately predict the time, budget, and resources needed to bring the project to completion.

The problem?

There's a fine line to walk between generating detailed, accurate site plans and making sure you don't commit too much of your budget before the project even gets started.

AEC leaders have traditionally had two options to choose from:

A. Using publicly available and open source data, like Google Earth

B. Conducting a costly survey for manual assessment

With option A, you can get imagery that is 5 - 10 years old – and while cost-effective, this method often results in surprises later on in the project that could derail timelines and eat up budget.

With option B, you may face a waiting period for up to 8 weeks – and while accurate and detailed, this method can result in a missed project opportunity simply due to a lack of available labor resources.

In any event, **these methods aren't the ideal solution for your teams, nor are they the ideal solution for your clients.**

Now, leading AEC firms are turning to a new method – AirWorks Automate – so they can make better decisions, earlier on.

Jacobs Kimley»Horn CHA CEC Civil & Environmental Consultants, Inc. Colliers Engineering & Design MasTec PAPE-DAWSON ENGINEERS WOOLPERT

How Does AirWorks Solve These Problems?

With Artificial Intelligence (AI), it's easier to be faster.

AirWorks' AI algorithms are built on more than 50 thousand hours of data perpetration by processing and training thousands of acres of geospatial data at various GSD levels.

With AirWorks Automate, you can automate away the time-consuming processes in key project phases, empowering your team to deliver more projects, faster.

Speed

- AI data processing is fast
- Cut down on plan drafting time by 60 - 70%
- Shorten project timelines by completing four days' worth of work in one

Scalability

- AI scales instantly
- Enables you to work on many projects simultaneously
- Increase capacity without hiring
- Triple your workload without overloading your staff

Cost Savings

- Extremely competitive rates
- Predictable budgets
- Give resources back to firm
- Price reduction with scale
- Win more bids
- Drive revenue

Read on and we'll show you exactly how it works and how it's being used in AEC projects today.

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AirWorks Automate: How it Works

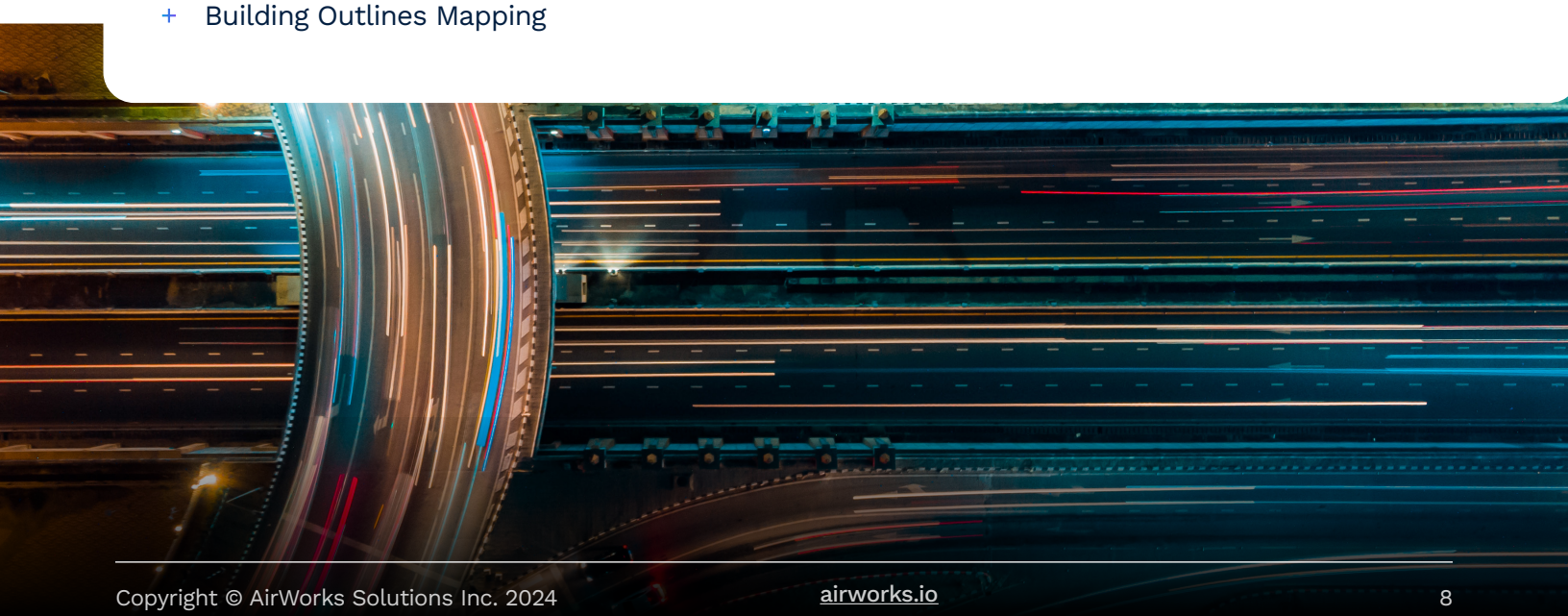
AI Uses Cases in AEC

The current applications of AI in AEC projects cover a wide range of project types and use cases.

Hand over the tedious-but-necessary work to our autonomous feature extraction software to boost efficiency throughout your project, **whether you're just getting started with site feasibility studies, drafting the RFP, or working out the conceptual design.**

See what you can get done – faster – with AirWorks Automate:

- Plan large-scale land development (commercial, industrial, or mixed-use)
- Preliminary site design & layout
- Building Proposals for Project Bids
- Site Planning
- Master Planning
- Permitting for Construction
- Conceptual Design Studies
- Estimating Project Costs for Pre-Construction and Bidding
- GIS Site Deliverables
  - Asset Management
  - Impervious Surfaces Mapping for Stormwater Fee Calculations
  - Building Outlines Mapping



The Impact of AI on AEC Timelines

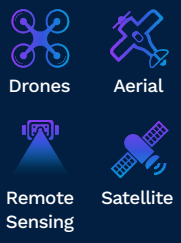
Each step in the AEC timeline is traditionally labor intensive and time consuming.

AirWorks Automate uses machine learning to reduce the amount of time needed for each step, slashing project timelines and increasing margins for firms who deploy it.

So how exactly does it work?

The AirWorks Workflow

Data Agnostic



Upload Project Data

2D/3D Aerial Image
.tif .las / .laz .kml

Data is Processed

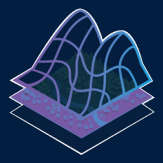
In our AI-Powered Software

Human QC/QA Process

Ensure standards are met

View and Download

Planimetric/topographic basemaps - 14+ Layers .dxf



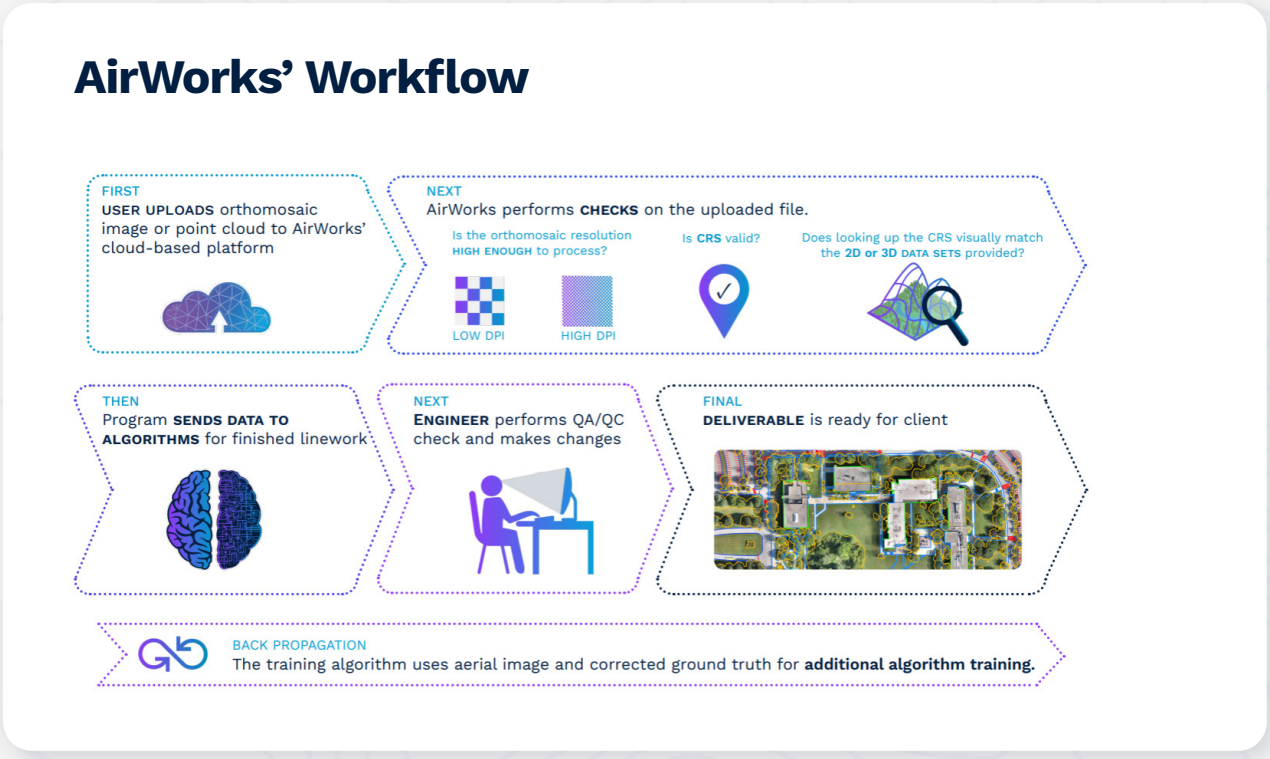
AirWorks' Workflow

At a very high level, AirWorks Automate takes data and then uses our trained algorithms to make sense of the mass amounts of pixels and points within that dataset.

It's fast and easy:

+ A user uploads their data set, whether that's sourced internally or from one of our data partners (more on that later).
+ AirWorks performs various checks, looking at things like the density of points, the resolution of pixels, and proper spatial references.
+ Then, our machine learning algorithms* start to look at the data and segment, classify, and rasterize all of these types of features into the final deliverables needed for the project.
+ Finally, we enter the QA / QC check to ensure the deliverable meets the needs of the client.

*To better understand the mechanics of AI-powered feature extraction, please see the appendix.



Data Input Types

Different projects require different data input types, which require tailored algorithms and processing techniques.

AirWorks Automate processes a wide range of imagery and point cloud data – whether collected via drone, manned aircraft, satellite, or mobile methods.

This increasingly diverse data builds an increasingly stronger machine learning model with increasingly more accurate output.

So if you're uploading your own data, you can rest assured knowing that we're "data agnostic" and can manage a whole host of remote sensing sources.

And if in-house data collection isn't possible or efficient, we've got plenty of options of off-the-shelf geospatial data for you to choose from – read on to learn more about our data marketplace.

Input Data Sources

AirWorks' Data Marketplace

Some projects may benefit from using commercially available data over a technology like Google Earth. If you're conducting feasibility or conceptual design studies, you need up-to-date data that contains the necessary layers – and Google Earth just can't quite cut it.

The good news is there are a host of companies working to make widespread, high-quality geospatial aerial imagery and LiDAR data available to all.

Off-the-shelf geospatial repositories are saving AEC firms time and money and broadening their reach by allowing them to reduce or even skip the hassle of fieldwork and stream or download the geospatial data they need.

AEC firms are turning more frequently to these types of repositories because of the benefits gained when compared to technology like Google Earth.

Quality

Get higher-resolution data for precision mapping

Variety

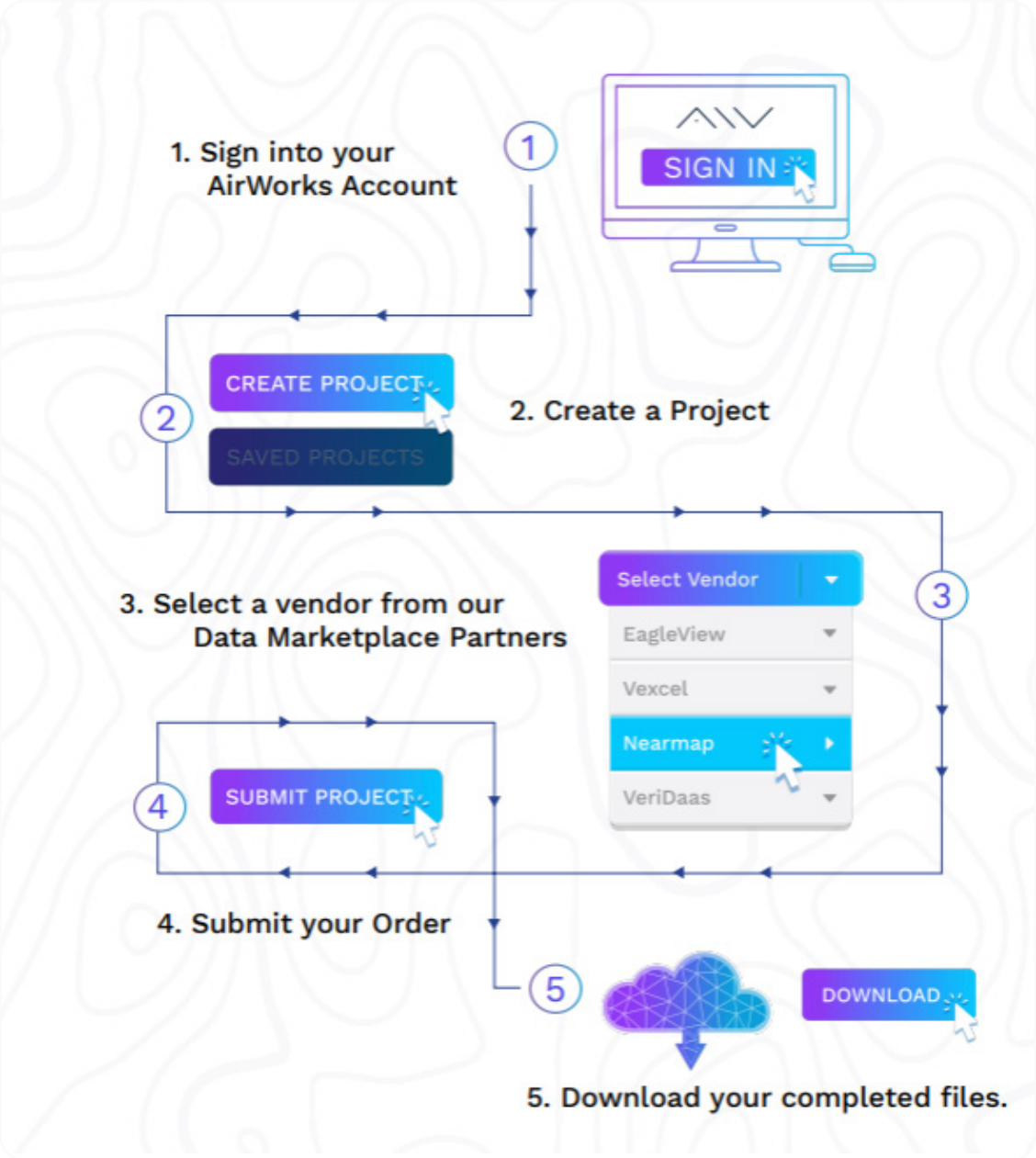
Select the most suitable data type for your specific project needs

Accuracy

Ensure you have the most recent, up-to-date data

The best part? These files can be uploaded directly to AirWorks for fast and accurate AI feature extraction and linework.

The Process



Our Data Partners

Whether you're in need of data to quickly assess existing conditions, estimate project risk, or determine an accurate project schedule, our off-the-shelf geospatial data marketplace is ready to help.

Our data partners give clients the option to use their imagery directly in-app, enabling them to seamlessly submit projects with the best, most up to date data.

Included in our growing list of data providers are:

Nearmap Vertical

If you're looking for high-resolution, frequently updated orthomosaic aerial imagery in major urban areas, look no further than Nearmap Vertical.

EagleView Reveal

Eagleview Reveal's coverage is impressive, touting 1 billion images in both urban and rural areas, covering 98% of the US population.

At our core, we remain data-agnostic. We can process data from any commercially available data provider, such as Vexcel Imaging, Hexagon, and others.

Flexible Features and Layers

We offer different options for features, layers, and attributes that our clients can select depending on the project's specific needs – get the features you need to make your project successful with AirWorks Automate!

We have the **flexibility to work within everyone's needs** – whether that's creating custom processing bundles or customized layers.

Plus, our a-la-carte option lets you handpick only the layers you need so you can get your project back even faster and save on costs in the process.

All of the layers you need for your project are created by our AI and QC'd by our team of humans in Boston.

Take a look at just some of the layers we can include in your order:

- + Pavement markings
- + Manholes
- + Breaklines
- + Solar panels
- + Fire hydrants
- + Decks

And more! **If you can see it, we can extract it.**

The Summary B below depicts what our core AI covers; for instance, when we work with aircraft imagery.

The best part? AirWorks offers **special pricing packages to ensure that you maximize cost savings.**

Summary B:

Layer	Type	Attributes	Description
Roads	Polyline		2D
Building	Polyline		2D
Sidewalk	Polyline		2D
Curb	Polyline		2D
Manholes	Point		2D
Catch Basin	Point		2D
Water	Polyline		2D
Vegetation	Polyline		2D
Concrete Pad	Polyline		2D
Pavemark Lines	Polyline		2D

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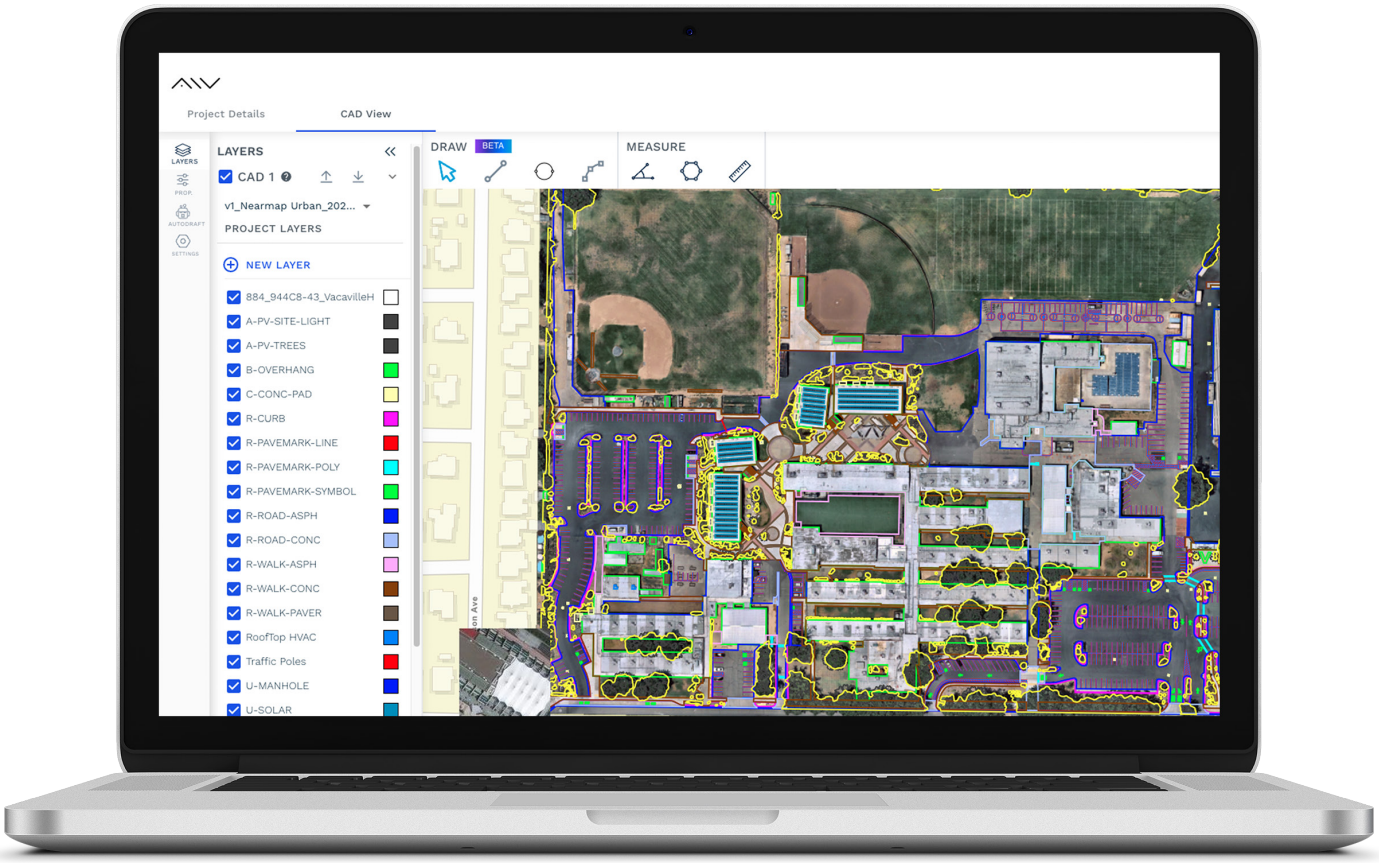
Project Examples

Feasibility Study for Electric Vehicle (EV) Charger Installations

MMPV Design, a California-based architecture firm specializing in renewable energy projects, recently used Nearmap data + Airworks to quickly conduct a feasibility study for a local high school that was interested in installing EV chargers onsite.

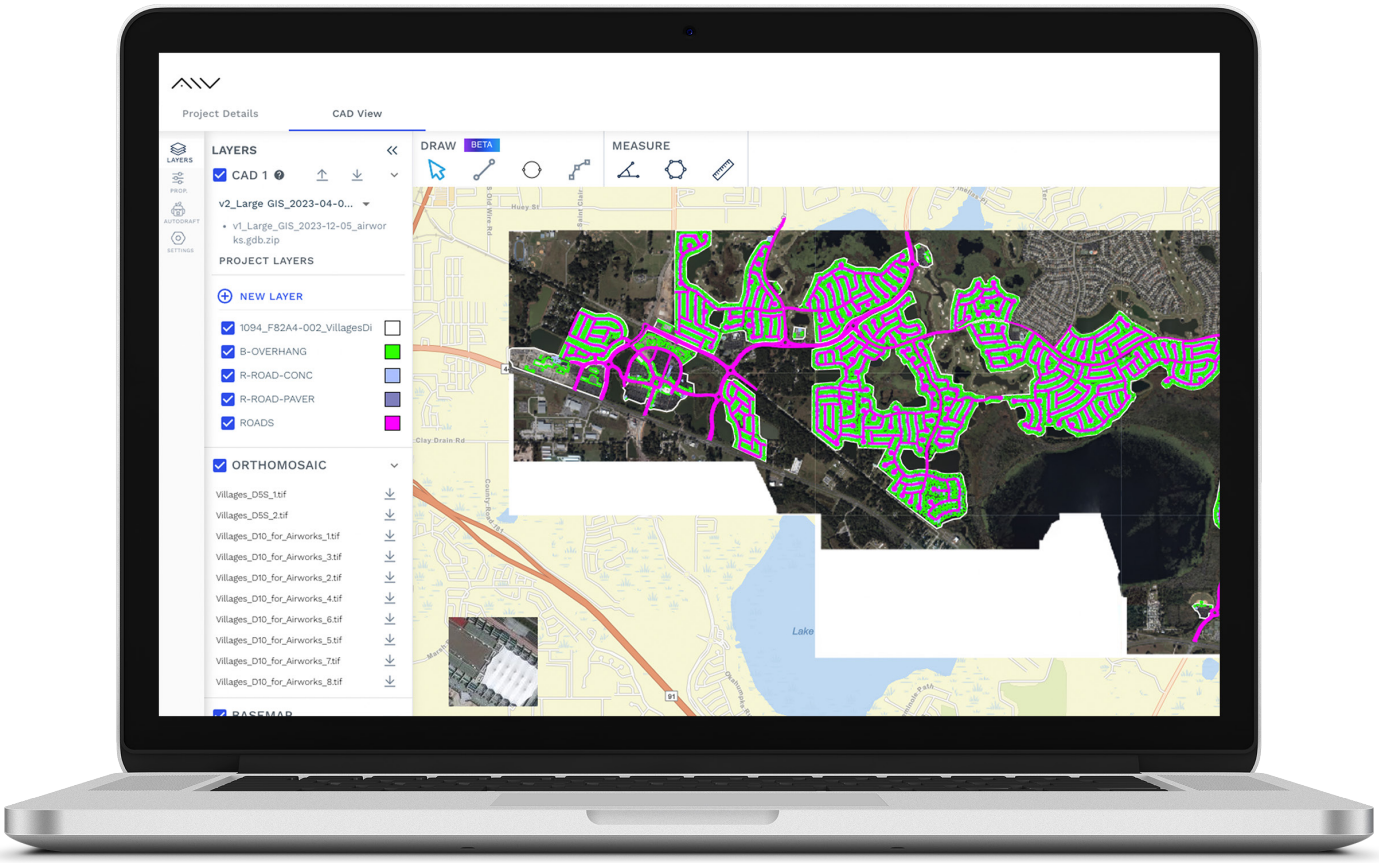
Thanks to AirWorks, **MMPV Design was able to avoid commissioning an expensive survey for a project that was only in its conceptual stage – a win / win for time and cost savings**, as the client ultimately determined that the installation would not be feasible.



Large-Scale Mapping for GIS Asset Management

Jacobs, the top firm in the ENR 500 recently used its own manned aircraft dataset + AirWorks to work on a GIS asset management project in Florida.

Using AirWorks' a-la-carte feature to quickly extract the specific layers needed, **Jacobs was able to complete the 1000 acre project in just a few weeks** – slashing the original timeline of 6 months after upgrading beyond manual methods only.



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Get Started Today

Summary: AirWorks Automate

By putting reliable and actionable data in your hands, we give you the tools to deliver more projects, faster.

90+
Customers

3,500+
Projects Delivered

40%
Projects Delivered Ahead of Schedule

4 Days
Average Turnaround Time

Leverage aerial data for your AEC projects:

+ Conceptual Design
+ Permitting
+ Feasibility Studies

Upload

Bring your own data or easily source it from one of our Data Marketplace partners.

Process

Reduce project costs with better resource allocation by letting AirWorks automate do the tedious work for you.

Deliver

View and download completed, QC'eed files and quickly move on to other project stages.

Flexible Pricing Options

Build the plan you need to get started.

Pay-Per-Project Pricing

Leverage the power of AI & machine learning without the commitment of an annual subscription. Instead, purchase credits as you need them to get the deliverables you need to complete your project.

Pre-Paid Packages

Ideal for teams looking to maximize cost-savings and benefit from a dedicated support team. Get prices as low as $20/credit by committing to a set number of credits and paying in advance.

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Appendix

AI Basics

Artificial Intelligence (AI) lies at the core of Airworks' feature extraction software, enabling firms to compress delivery timelines, increase capacity without additional hires, and win more bids.

In a broad sense, AI describes any computer function that mimics human behavior and logic.

We think it's important for you to see what happens in that blackbox so that you can better understand the mechanics of AI-powered feature extraction.

It's not magic. It's not a robot. At the end of the day, it's mathematics and data.

We train our algorithms to break down images into numbers and recognize patterns. When it comes to output, we are committed to delivering the highest level of quality and completeness per your project guidelines. We understand the varied nuances of accuracy requirements and work with you to get your project where it needs to be.

Computer vision, machine learning – all of that is super important to what we do. But at the end of the day, how does it matter to the industry that we serve?

From the start, we wanted to make sure that we were building products that mattered to our clients. Our mission continues to be to provide the data intelligence that powers the built world.

That's what we started out with, and that's what's leading us through. We hope this eBook helps shed some light on how AI can revolutionize the traditional AEC project timeline.

Here's to building a more livable world.

Feature Extraction Basics

Feature extraction is the process of **recognizing** and **categorizing** individual components within an image to convert complicated **raw data** into an **understandable** and **manageable** representation.

This method takes a busy image, filters out distractions, connects the dots, and reduces the data down to the critical elements of the original image.

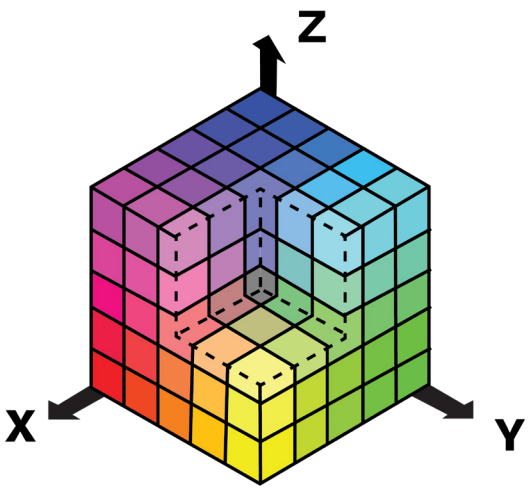
Feature extraction can be done **manually** or through **artificial intelligence (AI)**.

AI feature extraction relies on pixel representation in **RGB color space**. Images are broken down into pixels, and each pixel is one color (some mixture of red, green, and blue). The color is **translated to numbers** in the RGB color space so it can be **interpreted by the algorithm**.

Algorithms are **trained to recognize** groups of pixels as **specific features**. As the program sees more and more data, it begins to recognize a wider range of features within the category and **make connections on features** that are often seen together.

Eventually, the goal is for the **deep learning algorithm** to correctly make predictions about features it may have never specifically seen.

The Human Eye Sees



Digitally, this can be broken down into a 3d coordinate space, with red, green, and blue on separate axes and having a range of 0 to 255 (one byte).

Setting the value of all color channels to 0 creates black (no light emitted), while setting the value of all color channels to 255 creates white (maximum light emitted).

Combinations in between create the variety of colors we see and make these colors recognizable to algorithms through numbers.