



Approved
Continuing
Education

**Professional
Development Series**
**INFORMED
INFRASTRUCTURE**

www.informedinfrastructure.com/v1education

**YOUR WEBCAST WILL
BEGIN SOON**



Hosted by:

**INFORMED
INFRASTRUCTURE**
The magazine for civil & structural engineers

Sponsored by:



A Whole New World - Leveraging AI to Gain Insights and Enhance Infrastructure Workflows

October 25, 2023



Approved
Continuing
Education

Introduction



Steven P. Santovasi, GISP
Director of Global Product Marketing
Nearmap

Agenda

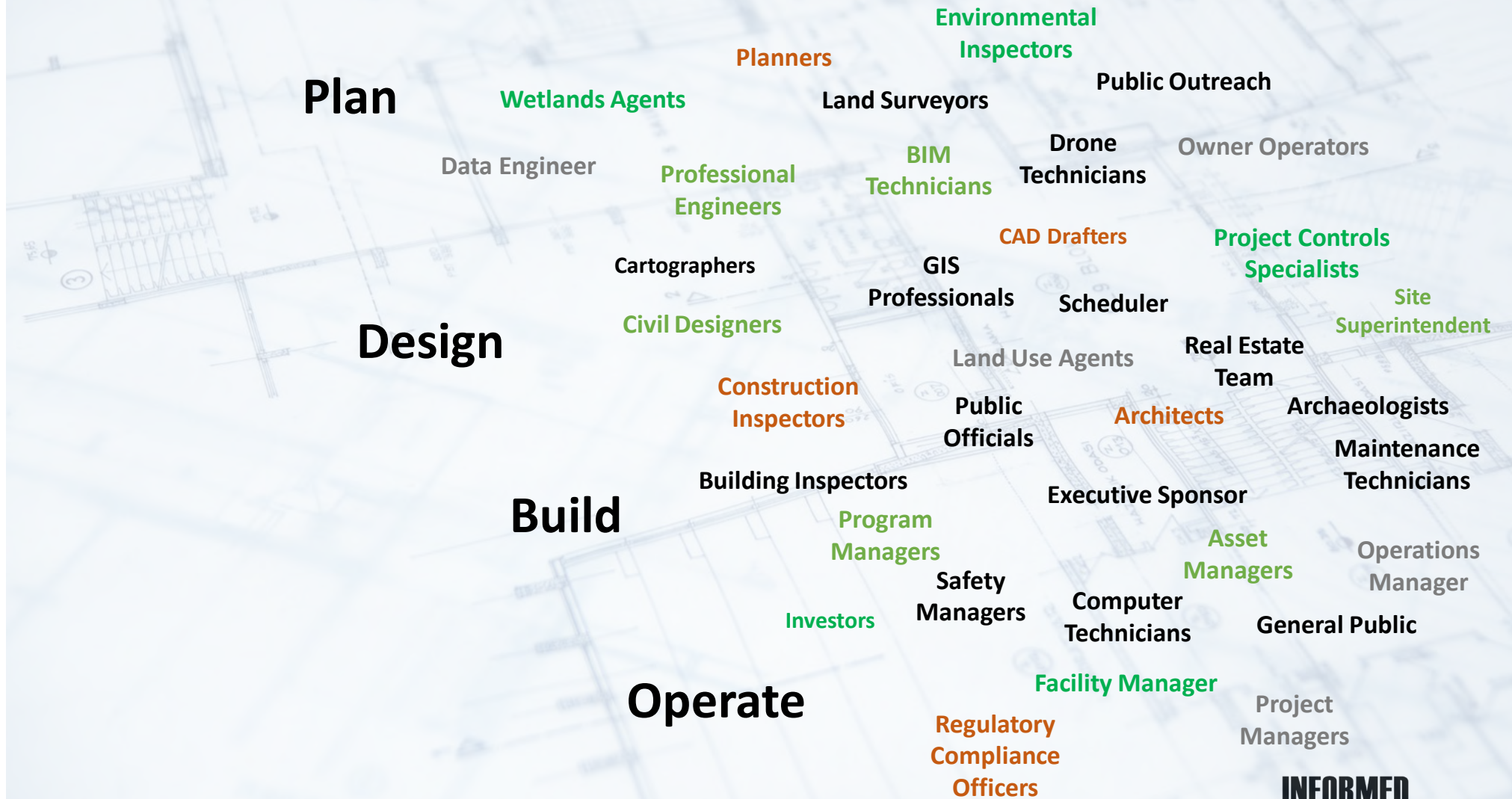
- Introductions
- What's In a Project
- Great Imagery Content Starts With the Camera System
- Imagery Based Products Set the Stage
- Applying Imagery Products to GIS and AEC Workflows
- The Big Picture
- Q +A

What's In a Project

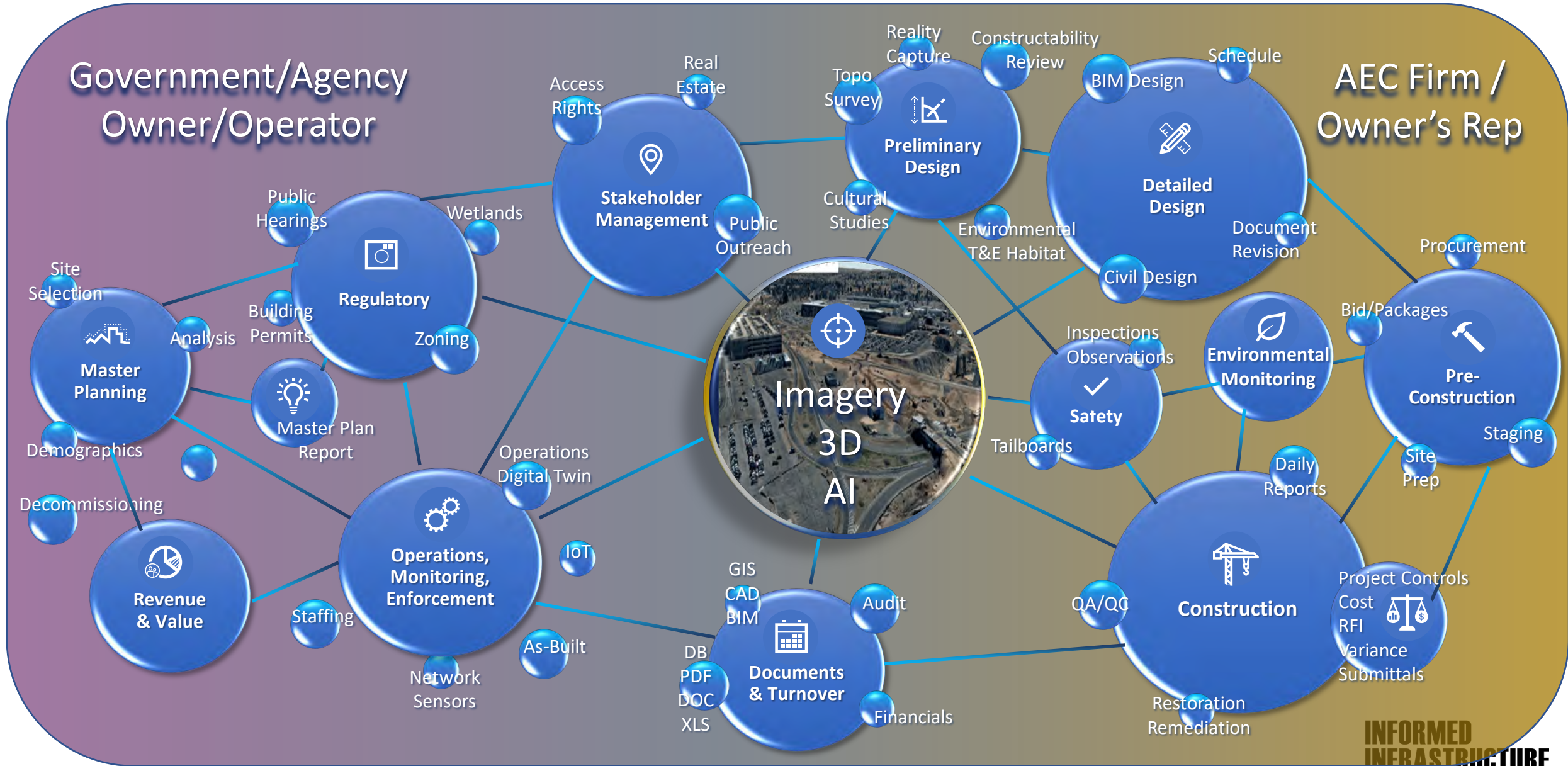
It takes many teams to successfully complete a large-scale infrastructure project



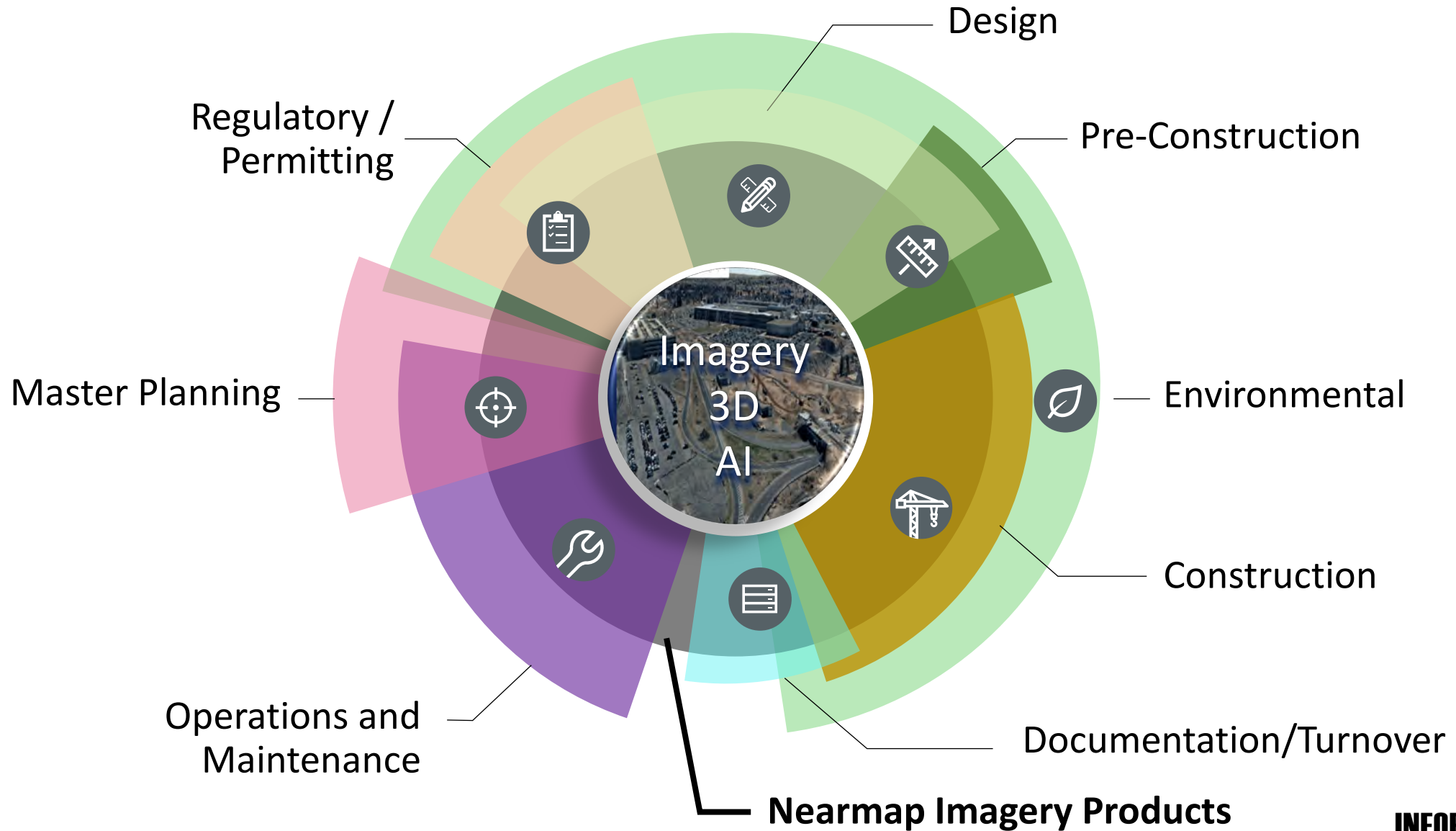
Who are the Project Stakeholders?



Support the AEC Project Lifecycle



Project Teams - Project Phases Overlap



It All Starts With the Camera: Aerial Captures

Leveraging Innovation in Camera System





Approved
Continuing
Education

Camera System Advantages

Industry's Continued Dedication to Innovation

OPPORTUNITY FROM IMPROVEMENTS

- Raise the bar for the quality of imagery offerings
- Greater aerial capture area per flight
- Improved efficiency and enhanced data

VALUE TO CUSTOMERS

- Improved 3D, especially in CBDs
- Clearer image at the same GSD
- Near-infrared to enable vegetation analysis
- Continuous expansion of AI feature layers
- Improved DSM, Smoother DTM
- Better serve increasingly sophisticated customers building Digital Twins



3D Mesh - Fort Worth , TX

Modern Imagery Capabilities

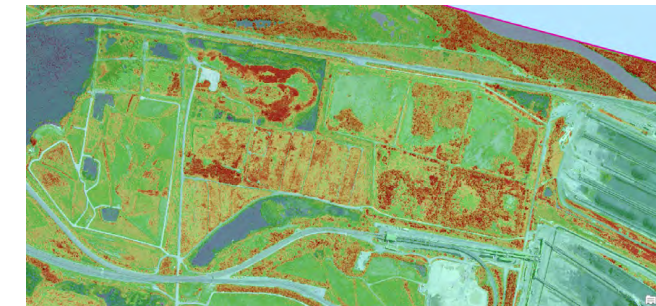
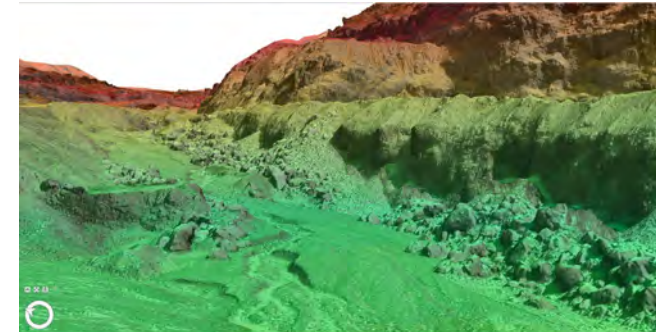
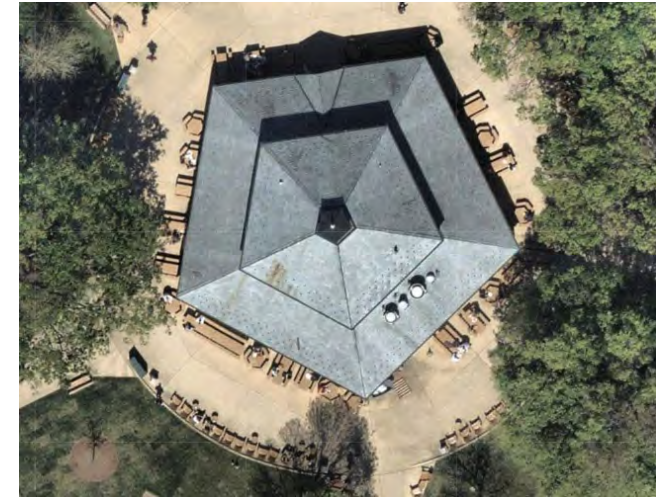
Clearer Imagery, Better Imagery Products

Opportunity - Imagery improves Workflows:

- Provide better content for Infrastructure workflows
- Improve user experience
- Improve solutions to help solve problems

Imagery Enables Customers:

- Gain Deeper Insights into their Built Environment
- Improve Visual Content for their area of interest
- Improve Locational Intelligence and Situational Awareness
- Make better decisions



Imagery Based Products

Set the Stage for Success

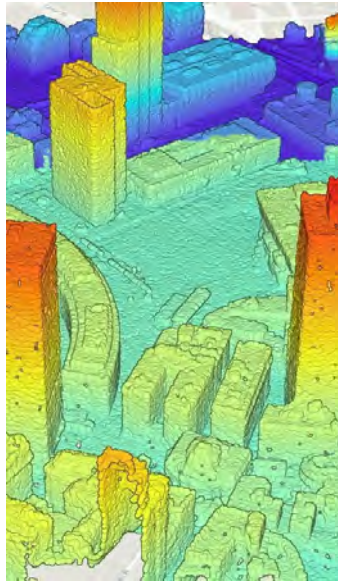


Plug and Play Geospatial Content

High Resolution, Foundational Data to Model, Design and Build Upon



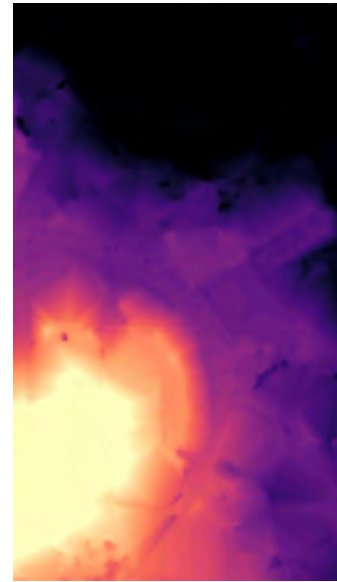
Textured Mesh



Point Cloud



Digital Surface Model



Digital Elevation Model



True Ortho



AI-Based Feature Extraction & Planimetrics



CAD

Civil Design

BIM

GIS

Simulation

Urban Planning



Approved
Continuing
Education

High Resolution Imagery - Worth a Thousand Words



Airport - Surface Damage

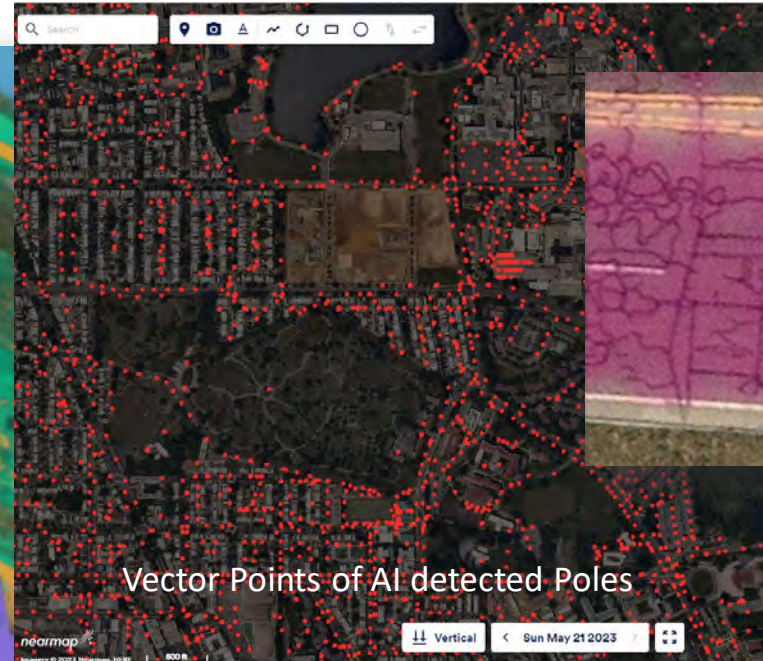


AI - Mature Machine Learning Models, Deeper Insight

Increasing number of feature types extracted from Imagery



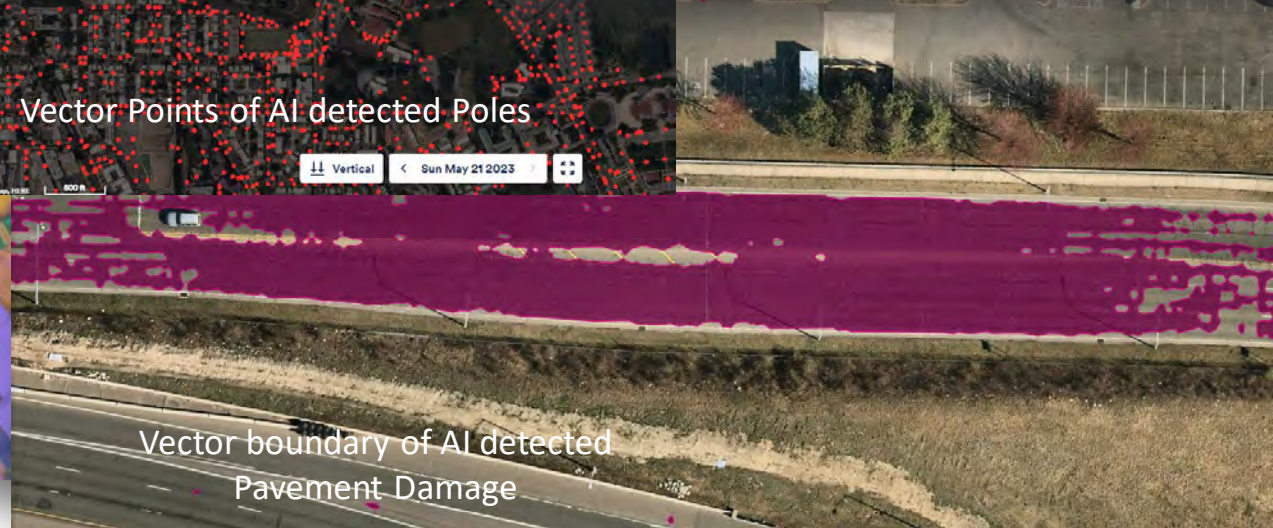
AI features for Buildings, Vegetation, Hard Surfaces



Vector Points of AI detected Poles



Raster AI Detection of Pavement Damage



Vector boundary of AI detected Pavement Damage

Improved 3D Mesh

Leverage Massive Scale 3D Mesh to Build your Digital Twin



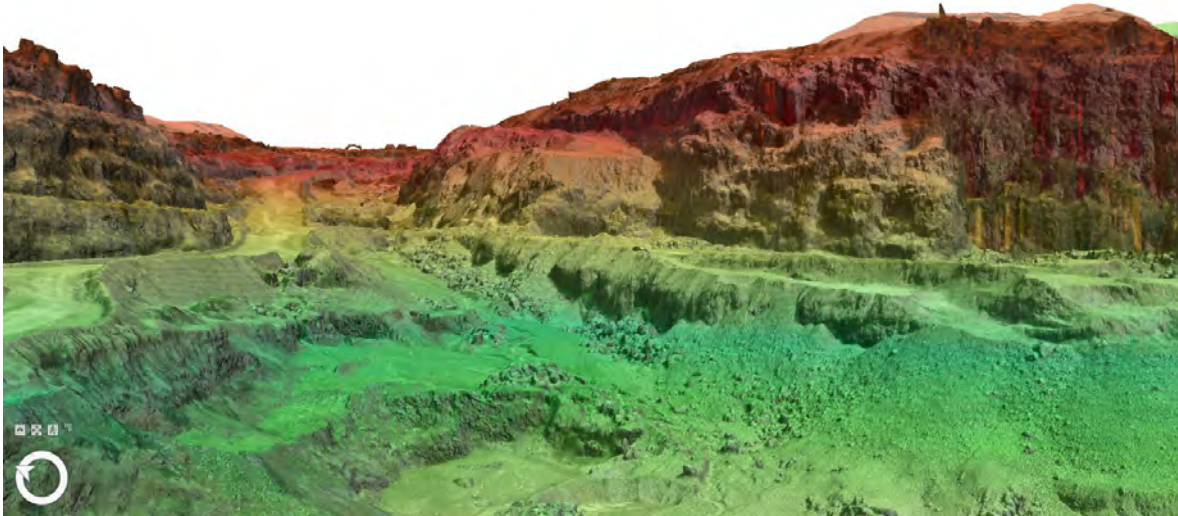
3D Mesh – Project Site



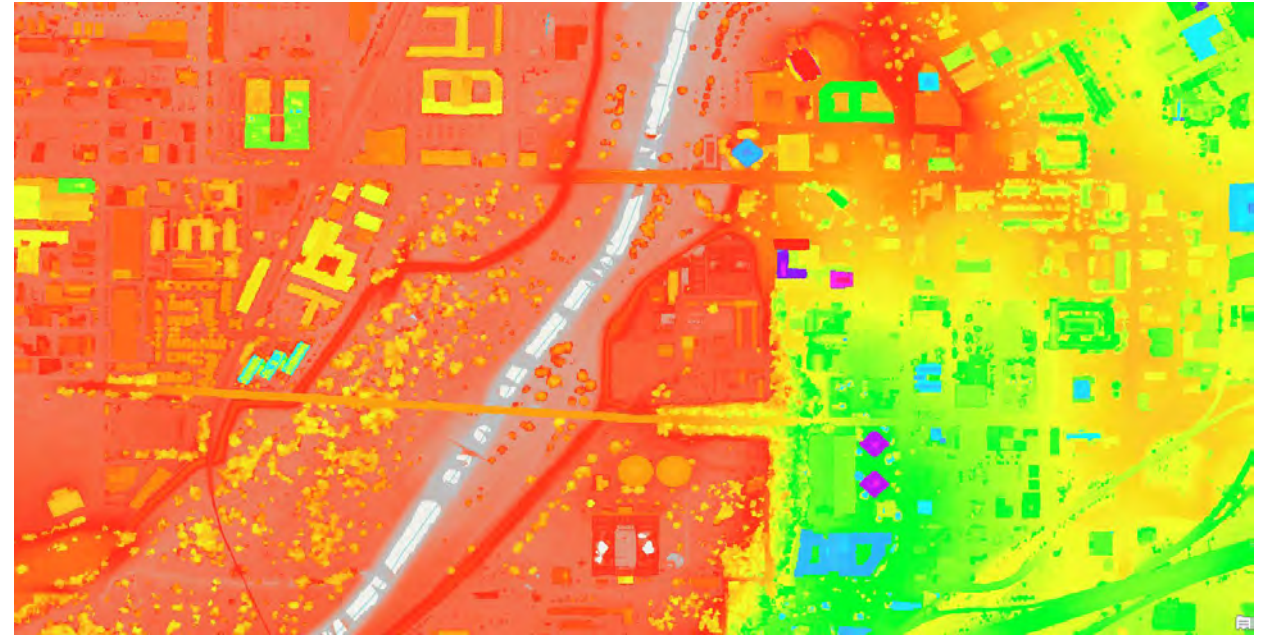
3D Mesh – Central Business District

Digital Surface Model

Insights from Digital Surface Models



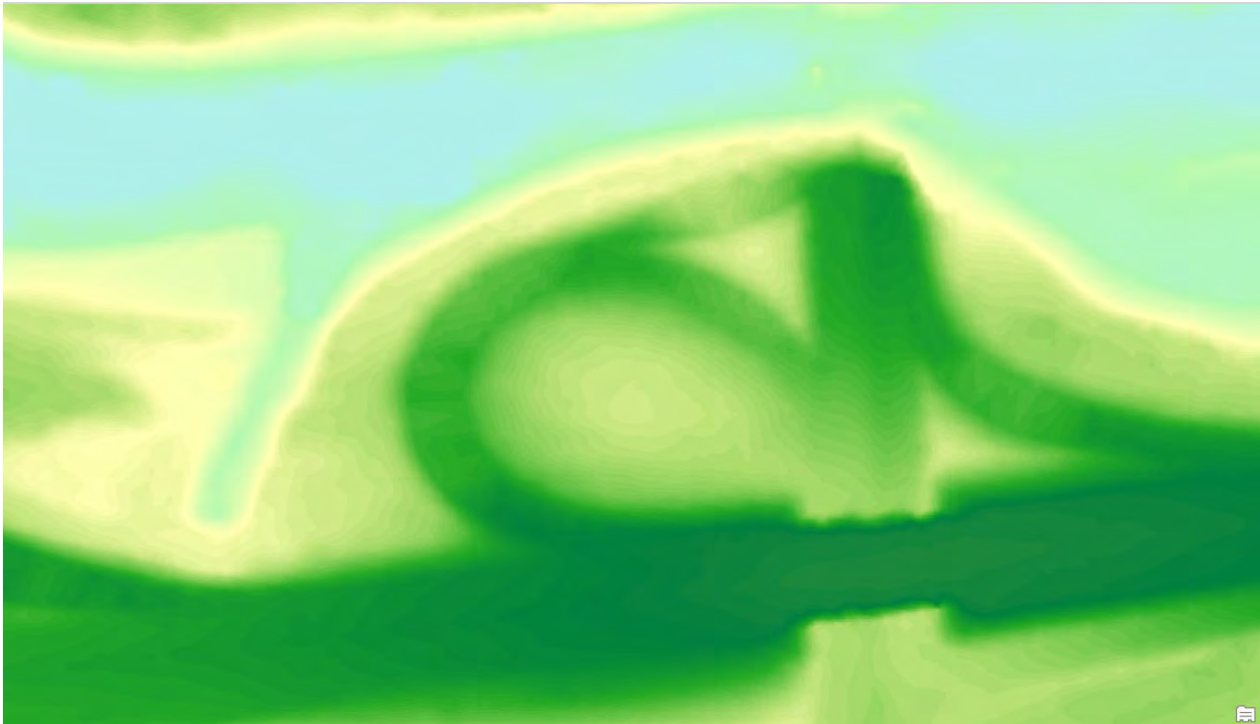
DSM draped over 3D Mesh



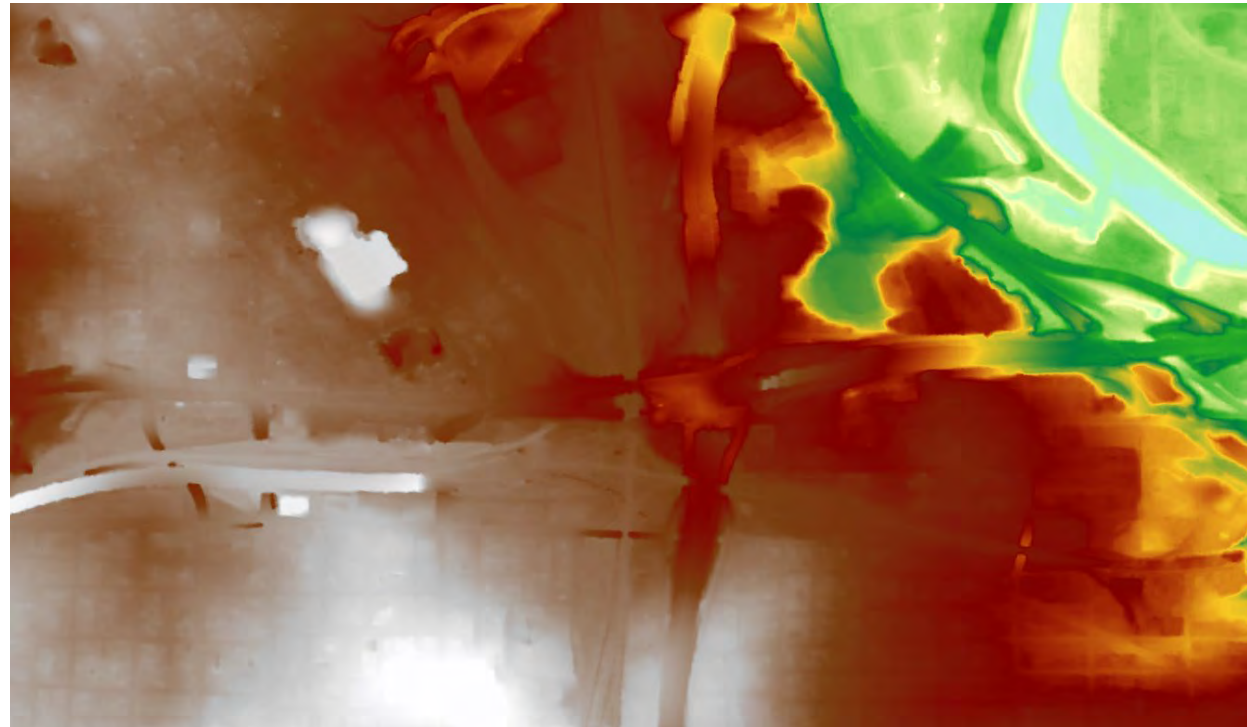
Raster DSM

Digital Terrain Model

Smooth Digital Terrain Models



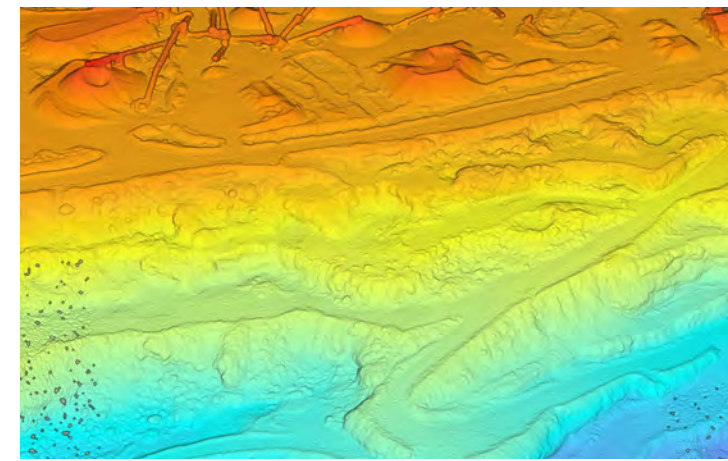
DTM showing exit ramp surface



Raster DTM showing terrain change to river

3D Point Clouds

Valuable, Dense, Colorized, Georeferenced



Project-wide Point Cloud (Elevation)



Georeferenced Point Cloud over Imagery

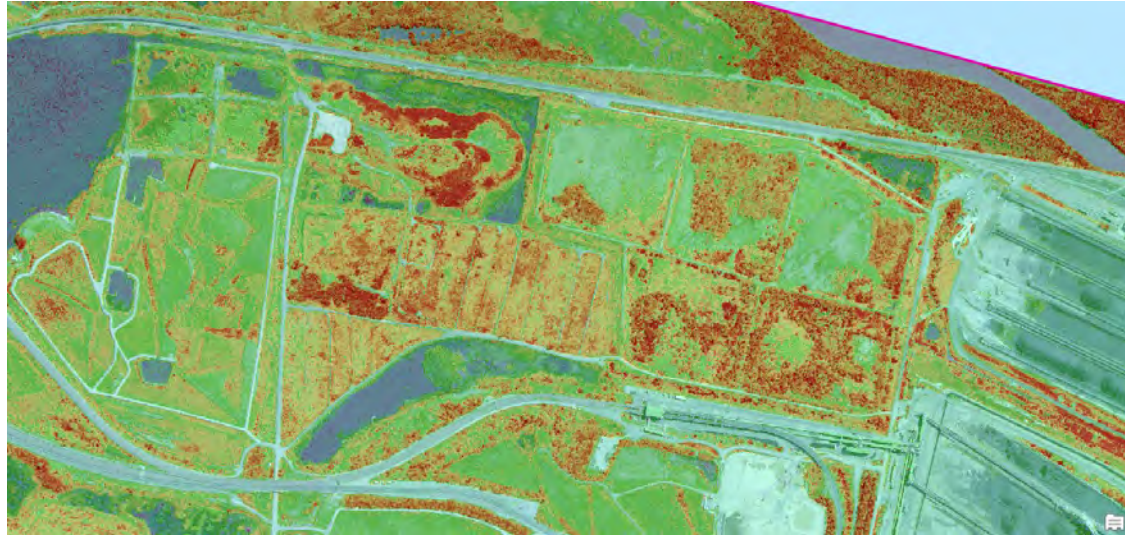


High Resolution Point Cloud (Colorized)

Near Infrared Imagery

Adding Insight Beyond Visible Light

Leveraging Red / Green / Blue / Near Infrared bands



NDVI over Imagery

NIR SENSOR AND RESOLUTION

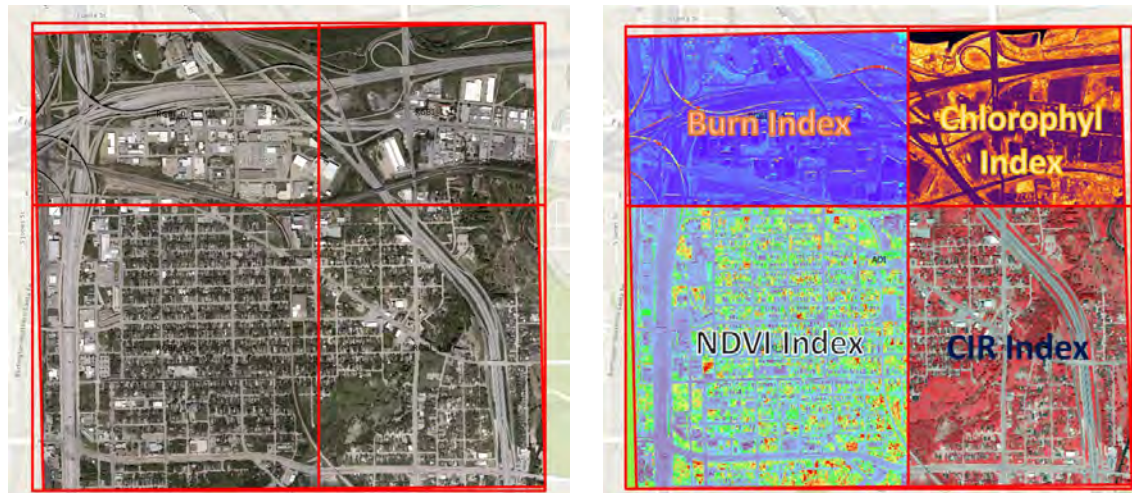
Multi-band remote sensors

- NIR sensors simultaneously capture 4 bands (RGBN)
- Sensor resolution does not need to match the high-res Aerial Imagery, typically 30cm / 12"
- Typically used independently of other imagery products
- Combination of 4 Bands used for index analysis

NIR USE CASES

From Data to Information to Solutions

- Vegetation Health – Park and Rec, Golf, Campus, Green Cities
- Improved Fire Index Scores – Insurance Underwriting
- Vegetation Growth – Assess growth patterns over time
- Veg Management Program – Utility Corridors, Access Roads
- Agricultural – Crop Yield, Water, Fertilization
- Fire Risk Assessment – Government, Utility, Fire Dept



Applying Imagery Products

Create Streamlined AEC and GIS Workflows



Digital Twins

LEVERAGING IMAGERY DATA FOR YOUR PROJECT, SMART CITY, AND DIGITAL TWIN

Nearmap AI - Building Footprint Change Detection
Operations Dashboard Comparing 2022 to 2019 Building Footprints

Total Building Count: **39,445** (September 2022)
Total Building Count: **37,899** (September 2019)
Buildings Added: **2,967**
Buildings Removed: **1,507**

Crosby 3D Base Map WAB
Find address or place

57 EDGECOMB RD

Wetland/Watercourse Inspection
Monthly (NPDES)
Site Inspection
Cultural Inspection
Monthly (NPDES)

Nearmap AI Feature Extraction Dashboard

AI Extractions: 16
Construction Areas: 16
Building Footprint Count: **351**
Roofs with Tree Overhang: 199
Swimming Pools: 22
Solar Panels: 39
Trampoline Count: 1

Roofing Material

Roofing Material	Count
Metal Roof	25
Other	279
Shingle Roof	62
Unlabeled	0

property_id
survey_date: 2018-04-22

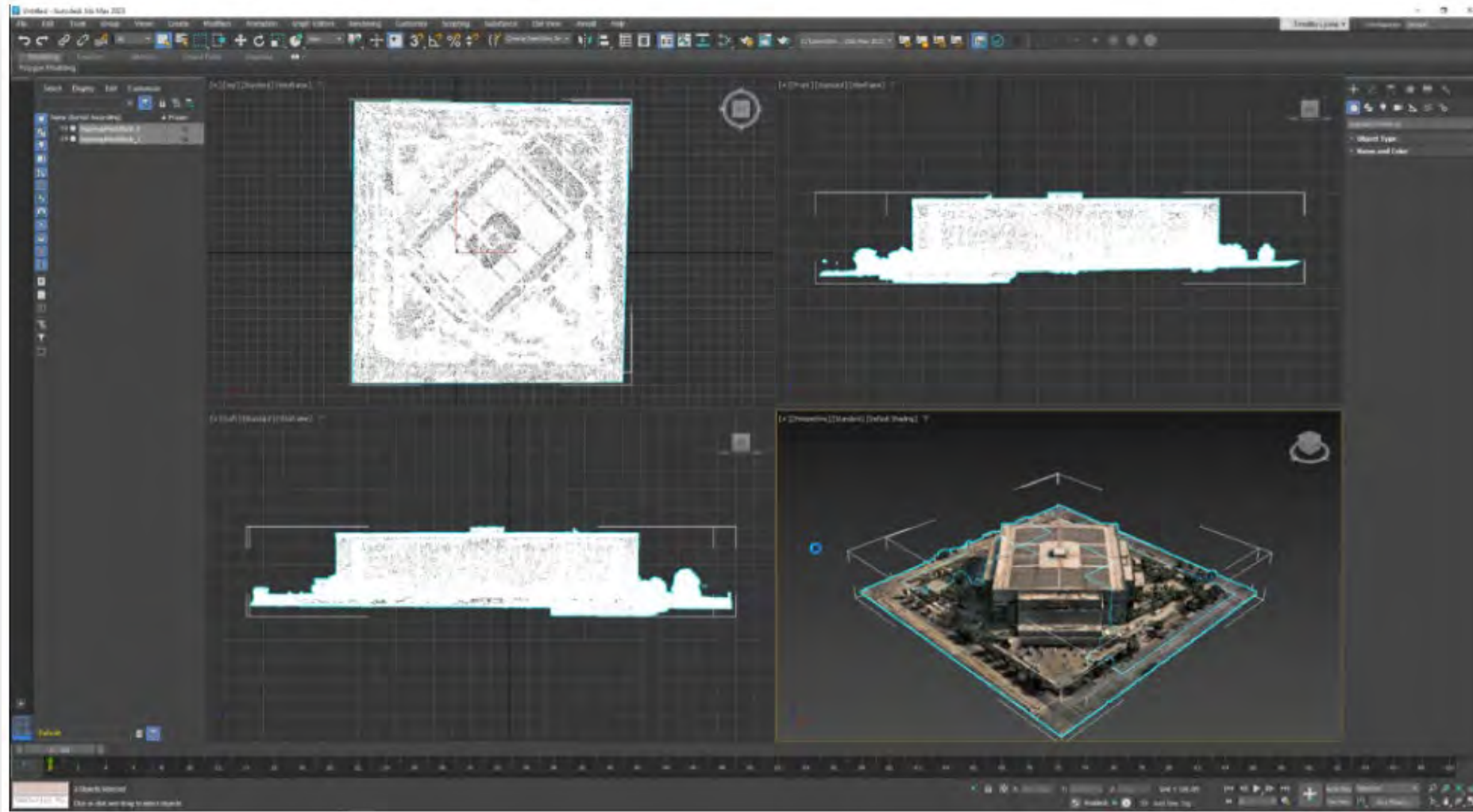
- Swimming Pool - Survey Date 2018-04-22 -72.973719 41.541576
- Swimming Pool - Survey Date 2018-04-22 -72.973356 41.541517
- Swimming Pool - Survey Date 2018-04-11 -72.970762 41.549888

Box Store Construction Site

OBJECTID	23
Name	Box Store Construction Site
A0 Program	East Main Development
A1 EIR Number	115241
A2 Project Name	Home Improvement Site A
A3 Date of Inspection	10/26/2022, 7:34 AM
A4 Type of Inspection	Wetland/Watercourse Inspection
A4a EIR Category	Wetland Construction & Restoration
A5 Inspector	Roy Johnson
A6 Other Inspector	
A8 Construction Stage	Restoration
A8a Other Construction Stage	
A9 Construction Spread	Loop 1
A11 Facility Type	Other
B1 Site Activity	Reclamation

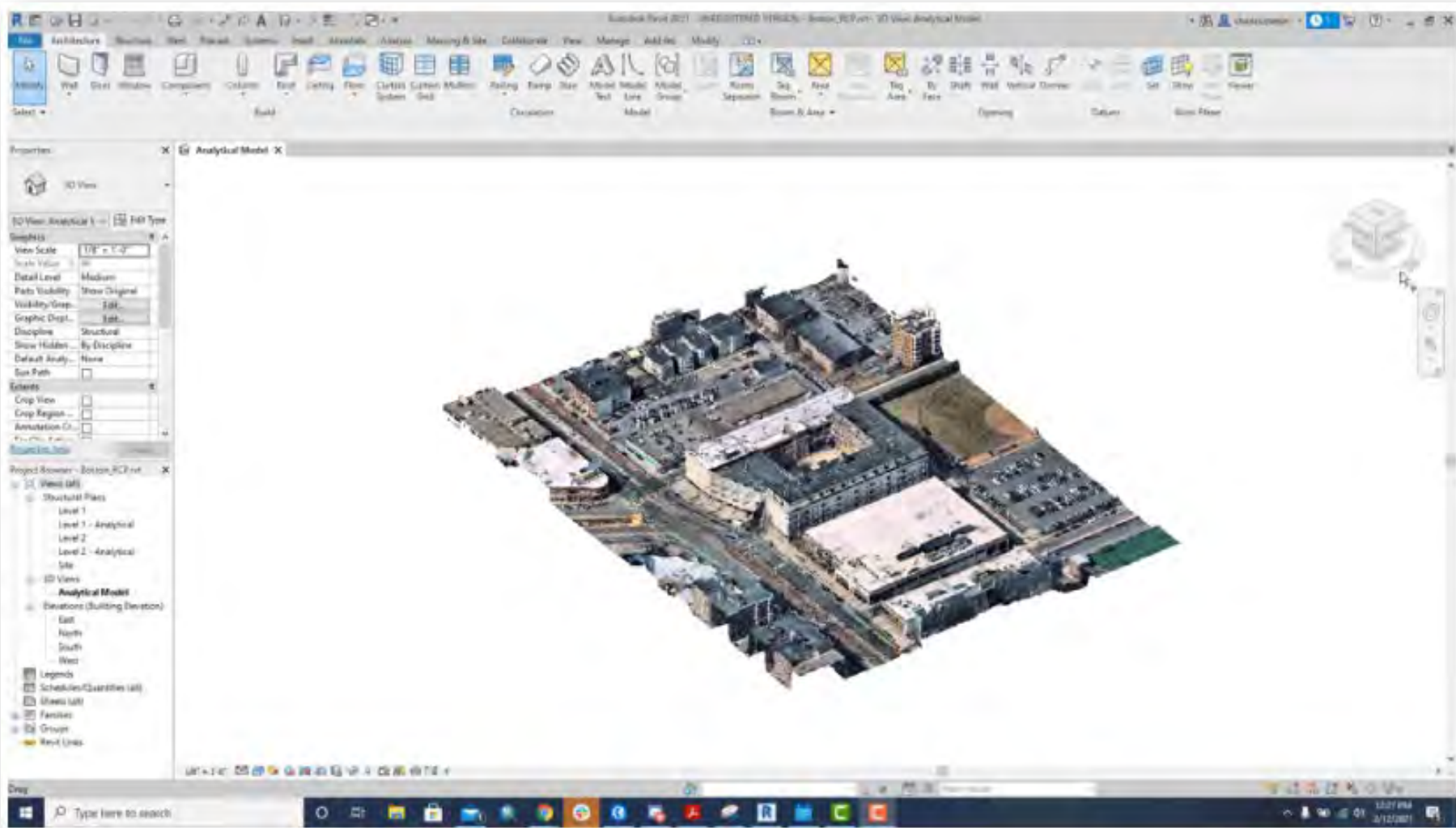
Incorporate Imagery Data into Visualizations

3DS MAX



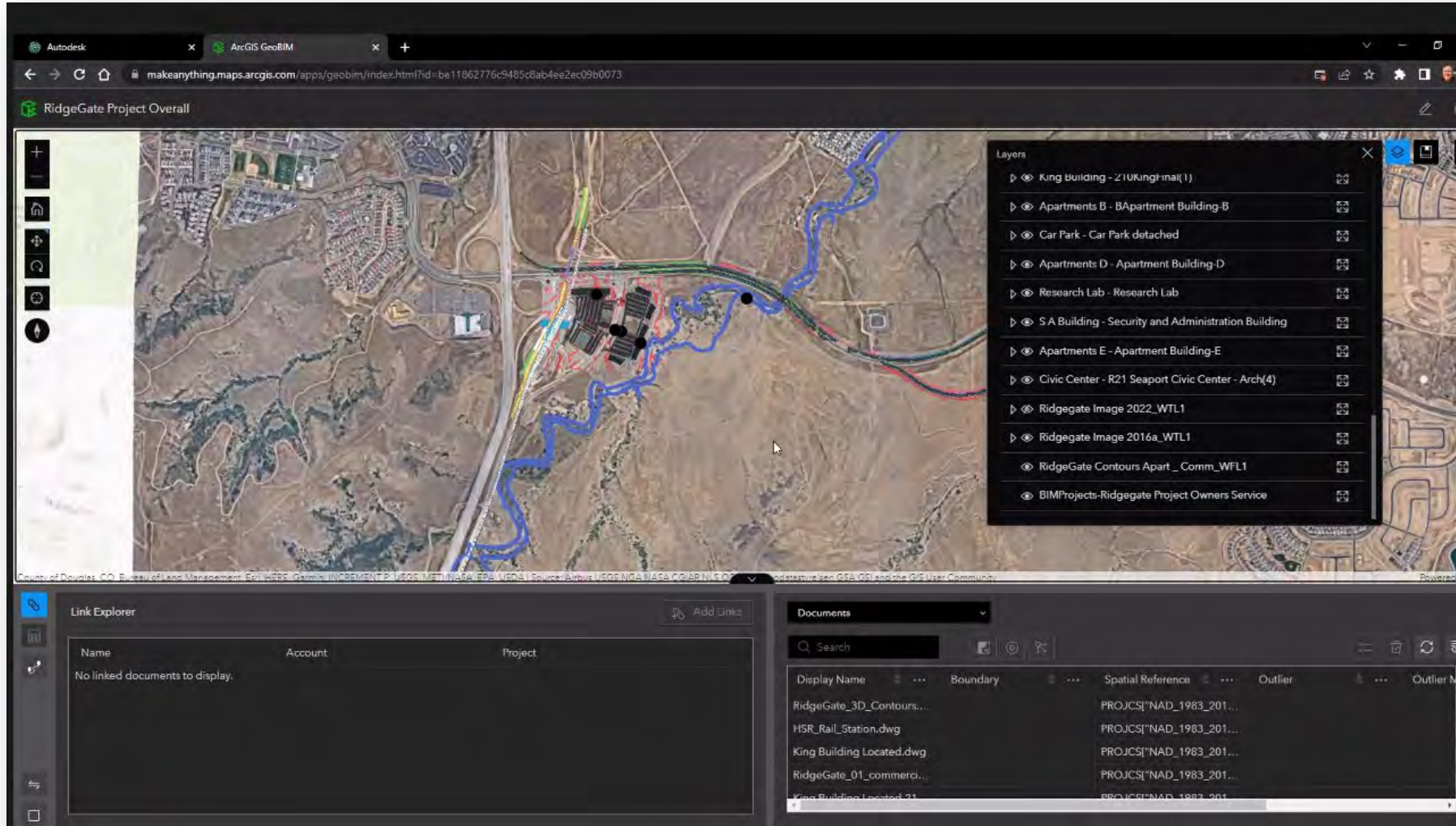
Incorporate 3D Context with BIM Models

REVIT



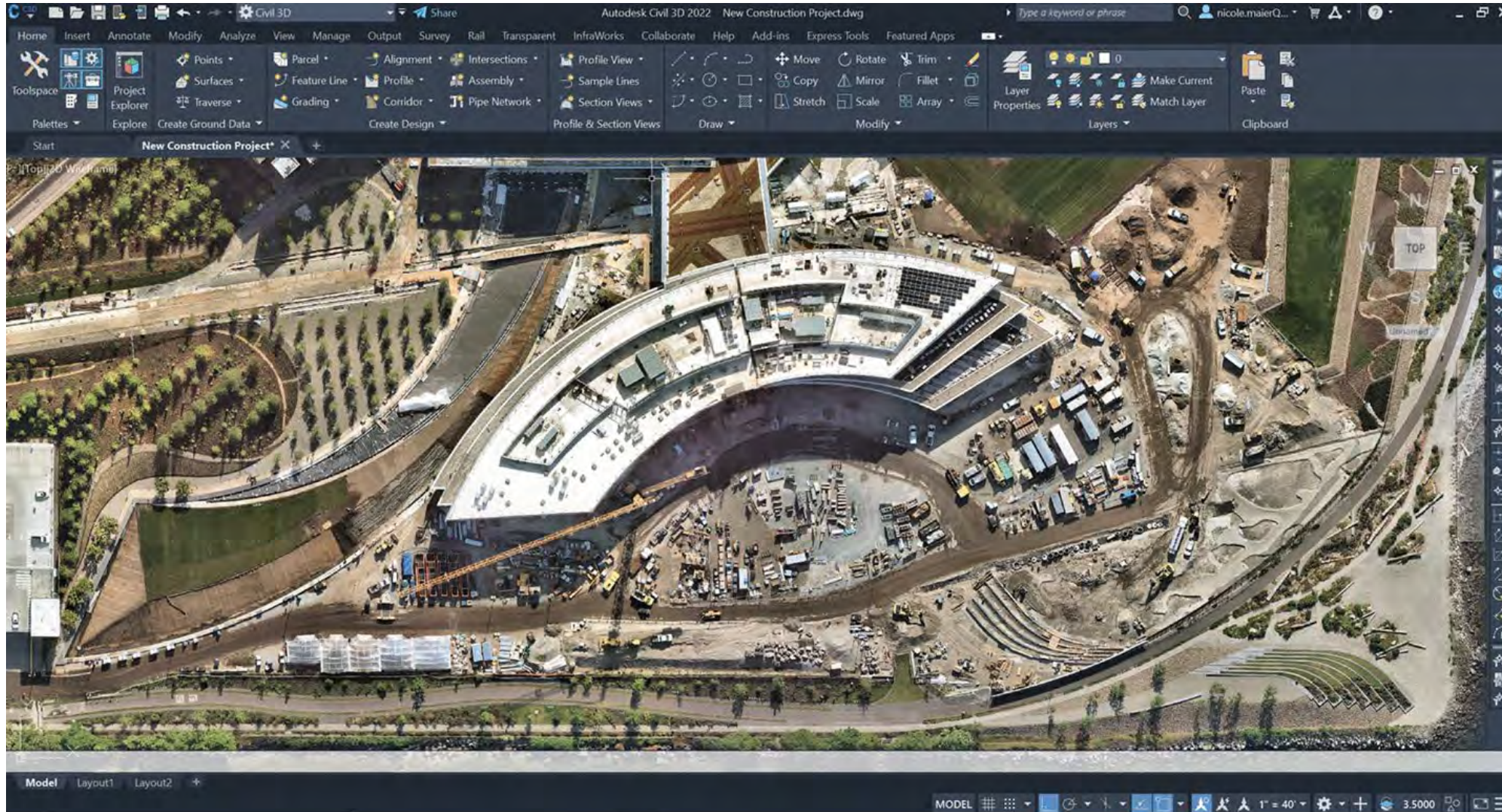
Incorporate Imagery Data in Coordinated Workflows

GEOBIM



Track Project Progress

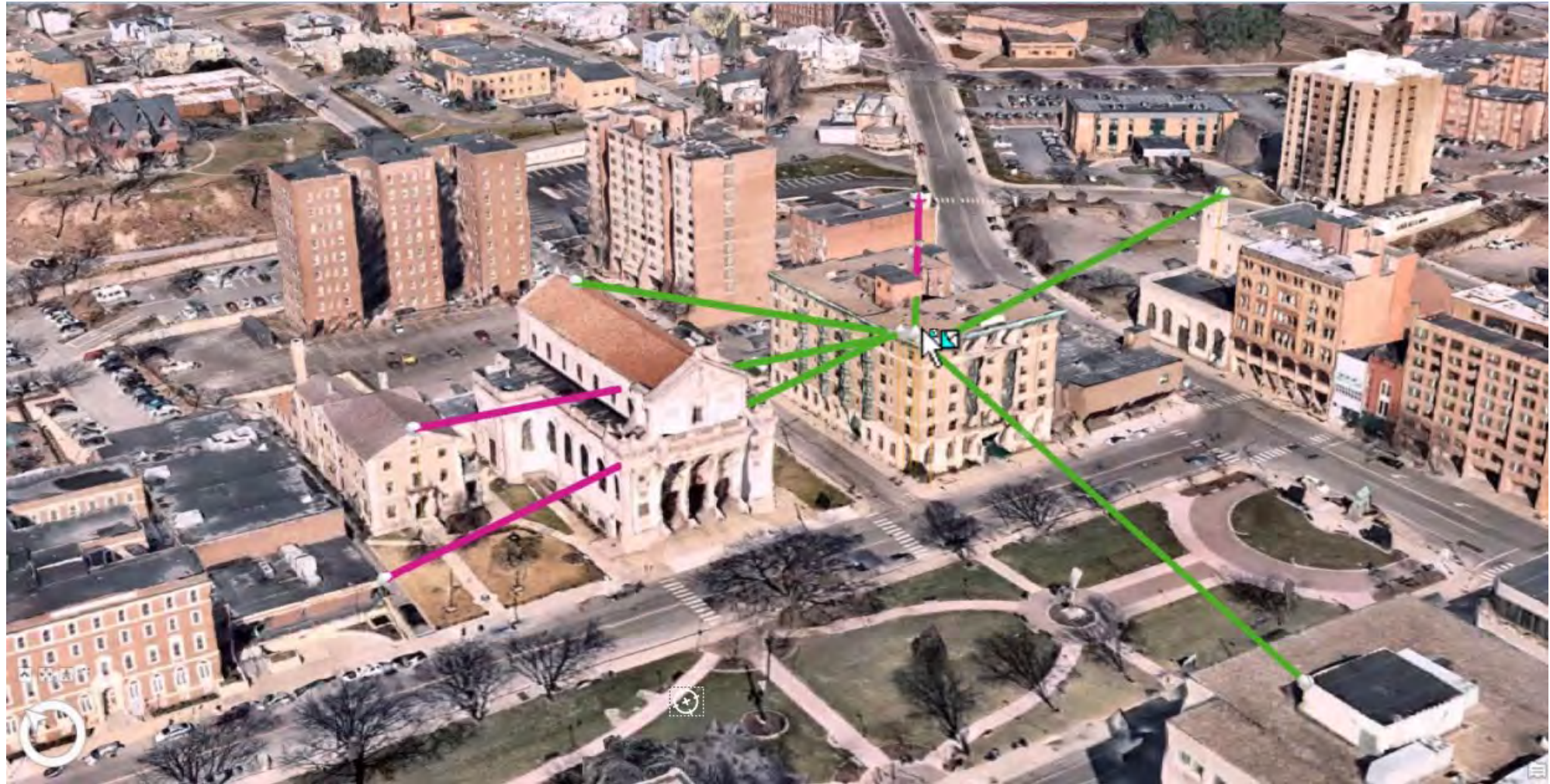
CIVIL3D





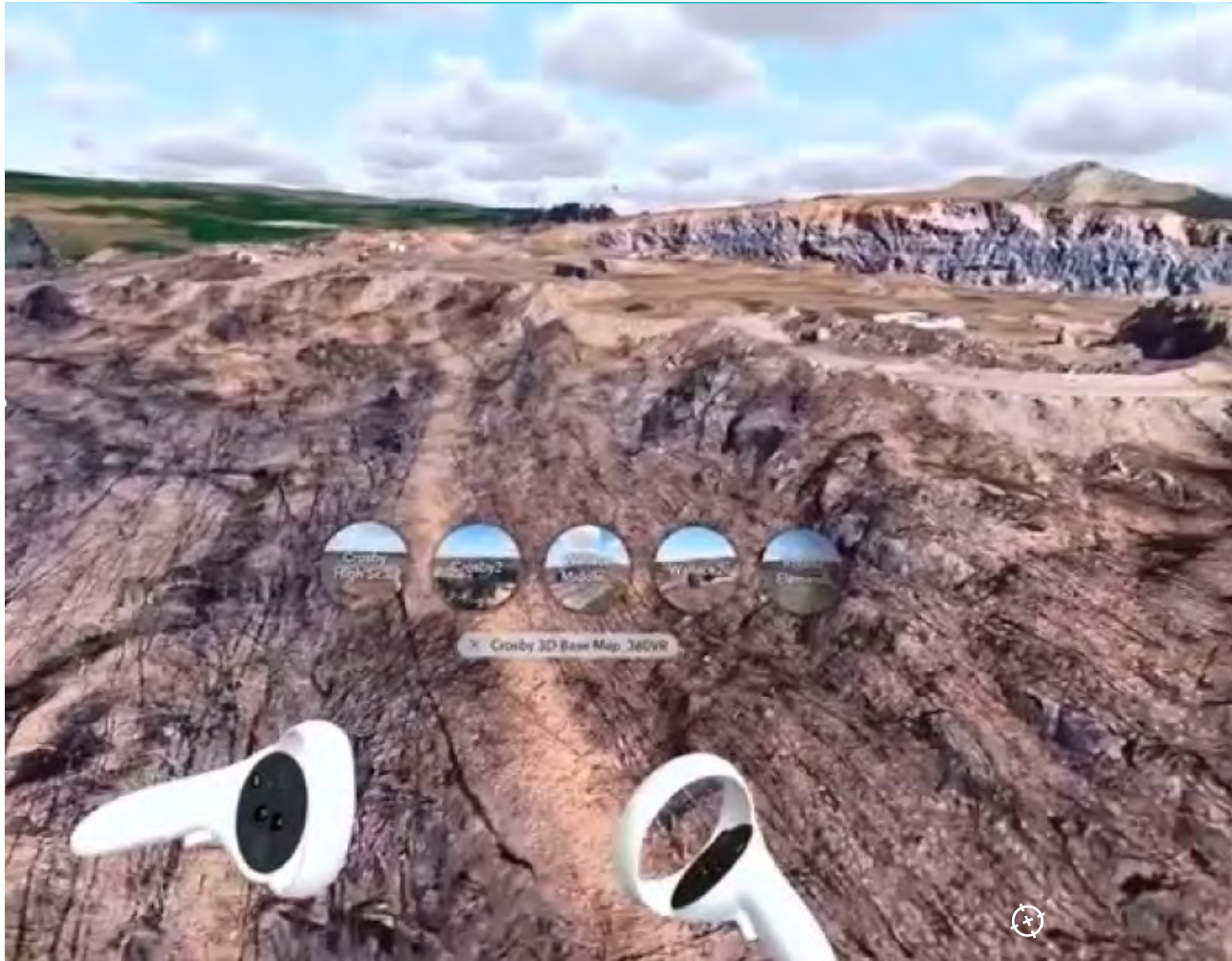
Line of Sight Analysis

3D DATA FOR 3D TELECOM ANALYSIS - ARCGIS PRO



Virtual Reality Demo

Leveraging 3D Data In Immersive Environments



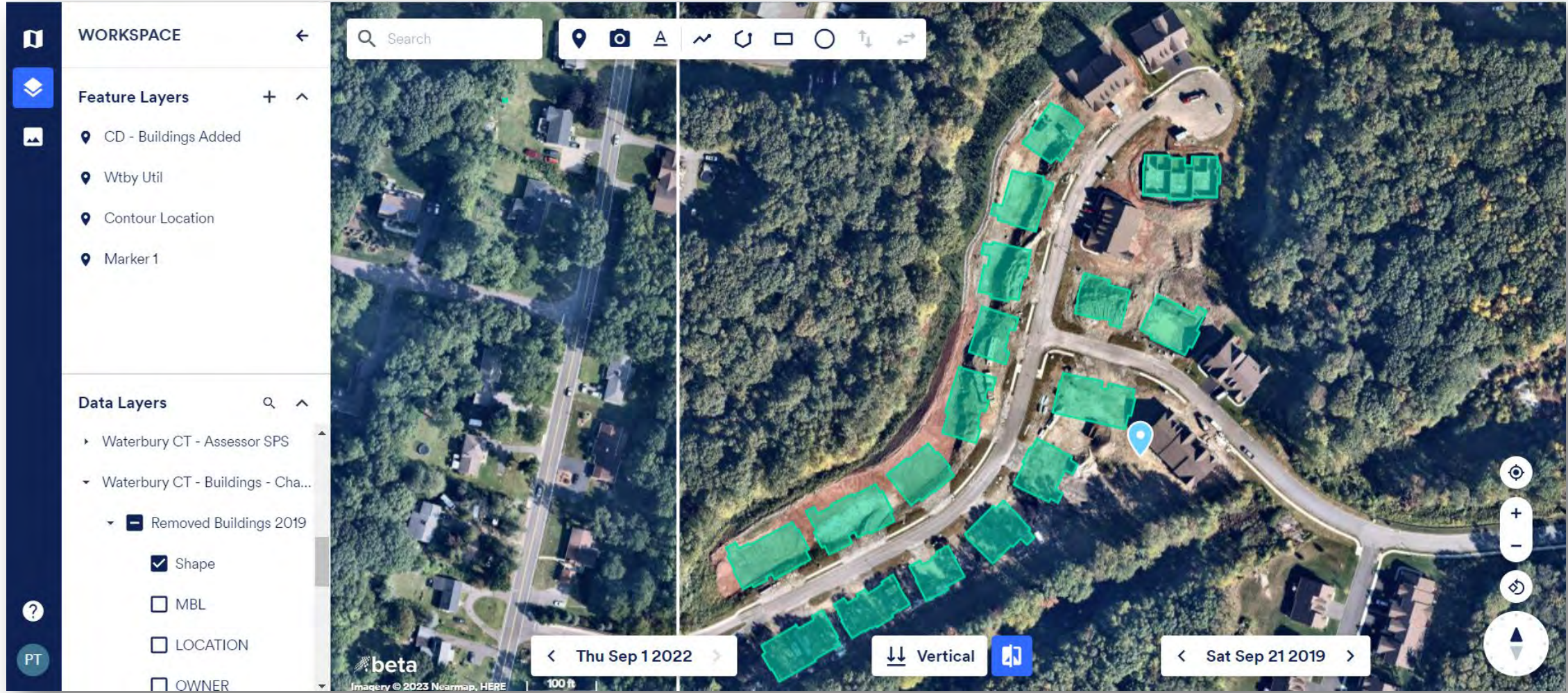
VR USE CASES

An immersive view of your built environment

- Can we Access the site from there?
 - Identify the best options for access
- Is that slope too steep?
 - Constructability Review from the desktop
- What does it look like from my house?
 - Public Hearings that can be productive and lead to buy in
- Let the team see the vision
 - Collaboration at a whole new level

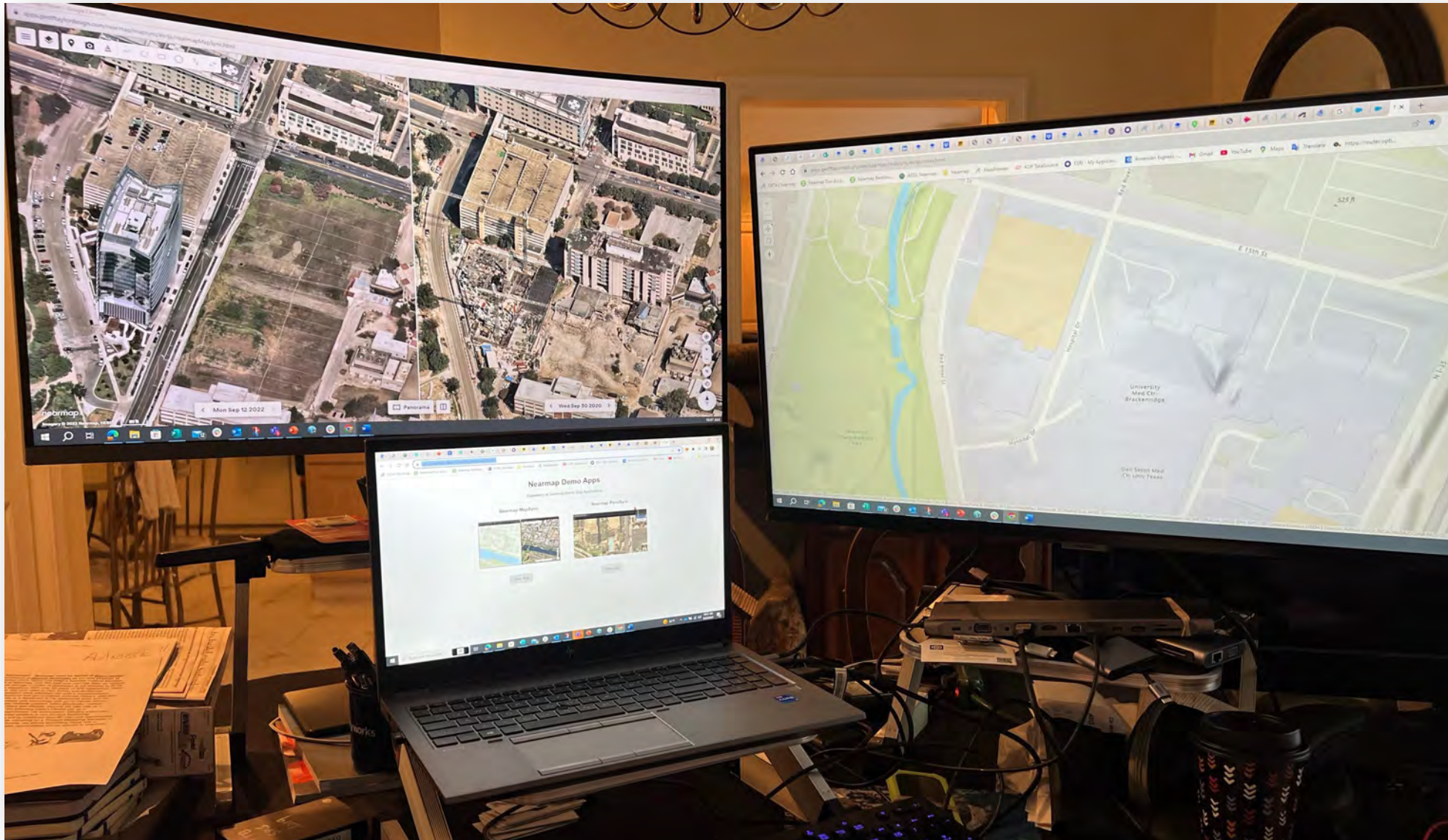
Integrate AI Features Through Map Services

Leverage published AI data in many applications



Embedded Imagery

Opportunities to synchronize Imagery and Applications



Can we look back in time at the previous condition?

- Compare historic imagery sets

Can we look around?

- Check each side of the building

Can we see the 3D at the same time?

- Side by side comparisons



Approved
Continuing
Education

From AI to Solutions

Creating Real World Geospatial Solutions

Two Use Cases:

- Large Scale *Change Detection* Solution
- Citywide *Permeable Surface* Solution





AI Based Change Detection

Leveraging Imagery Based AI to create
a Change Detection Solution



AI Data - The Big Picture

From Data to Information to Solution

- There is a lot of talk about using Artificial Intelligence and Machine Learning technology to extract geospatial features from Aerial Imagery.
- What does that mean for me?
 - This means the you can use geospatial data that is automatically extracted and digitized from imagery to help update your project progress, determine areas of change, and count changed features.
 - These are datasets that traditionally take thousands of hours to digitize and can now be leveraged out-of-the-box from Nearmap IA products.
 - That can be a savings of *hundreds of thousands* of dollars for a project.
 - It can be a source for identifying infrastructure, increasing productivity, and monitoring the built environment.





**Approved
Continuing
Education**

OFFERED BY Board of Building Regulations and Standards Office of Public Safety and Inspections Division of Occupational Licensure

Massachusetts State Building Code - 780 CMR

An unofficial copy of all versions of the Mass. State Building Code

The Massachusetts State Building Code consists of a series of international model codes and any state-specific amendments adopted by the Board of Building Regulations and Standards (BBRS). The BBRS regularly updates the state building codes as new information and technology becomes available and change is listed here, as well as links to the model codes.

The MSBC is separated into two distinct volumes: The Residential volume regulates all one structures and townhouses that are three stories or less, as well as their accessory structure regulates all structures that are not covered by the Residential regulations.



A shed permit is more like a construction permit because it gives you the right to build a shed. Some homeowners have to apply for shed permits depending on the requirements of their zones.

A shed building permit allows you to do construction work on your property. Even with the necessary permissions, you must comply with local codes to ensure you don't go against any safety measures.

Do You Need a Building Permit for a Shed in Connecticut?

You need a shed permit if you intend to build any type of shed or accessory structure in Connecticut.

There will also be zoning requirements to comply with; for example, how many square feet in size your shed will be, depending on the district in which you live.

How do I get a... Shed Building Permit for a Residence? (One or Two Family Dwelling)

The information contained in this document is of a general nature and not meant to take the place of the building or zoning codes, which are comprehensive and often detailed. Nothing herein should be construed as an interpretation of the applicability of codes and procedures to your specific project. If there are any questions about the application of the information herein, please contact the Building Inspection office at 860-253-6370 or email your question to permits@sonfield.org

To do the project safely and legally the following issues must be considered and addressed when placing a shed on your property:

1. Permits shall not be required for one-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 200 square feet.
2. Exemption from the permit requirements of the building code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of the building code or any other laws, statutes, regulations or ordinances of the town or the State of Connecticut. Other departments/agencies such as (but not limited to) Planning and Zoning, Wetlands and the Health Department may require permits. If your project is exempt from a Building Permit, please contact the other departments and agencies to see if permits are required from their respective departments and to determine if your project is in keeping with their codes and regulations.
3. A site or plot plan submitted with a permit application is required to show the proposed location of the shed on the property. You may use a copy of the town GIS map for your property found on the town web page. Please keep in mind that the GIS is not 100% accurate and does not take the place of a survey. Link to GIS mapping <http://host.cdmamingh.com/enfieldct/>
4. The shed must be in the rear yard behind the back line of the house or any additions or decks and must be at least five feet from any property line in the case of an interior lot.
5. Corner lots have additional requirements for setbacks on the street side of the yard. For specific information about your lot contact the zoning enforcement officer at 860-253-6355.

40 Giles St, #1, Waterbury, Connecticut, 06704

1,495.3 ft

100 2,000

Results:900

- Building Footprints Removed 26
- Building Footprints Added 38
- BuildingFootprints_Building_Sep2022 836

Copyright nearmap 2015 Powered by Earth*

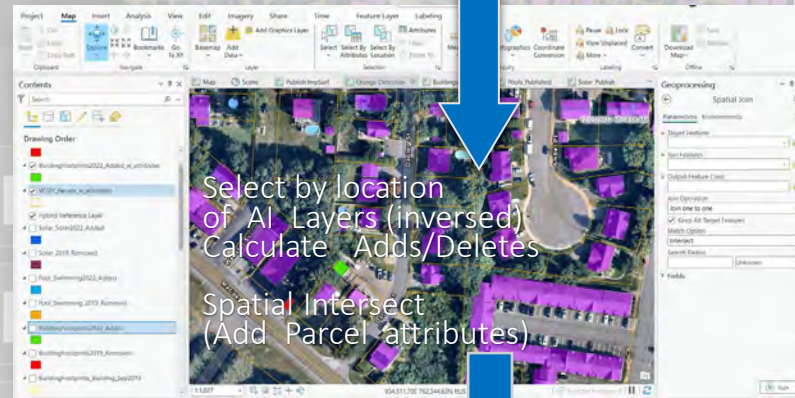
Many organizations find it difficult to manage the construction of building structures across their region

The task of Digitizing Manually Can Be Overwhelming



RESOURCES ARE LIMITED

- Some Communities assign up to 2 FTEs to digitize and manually update Geospatial Data like Building Footprints
- Leveraging automated methods can free up those resources for other important work
- AI based feature identification can help locate and extract Building Footprints, Construction Areas, Driveways, Sidewalks, and other surface features
- The results can reveal areas where current methods do not detect taxable changes to properties



Select by location of AI Layers (inversed)
Calculate Adds/Deletes
Spatial Intersect (Add Parcel attributes)

Nearmap AI - Building Footprint Change Detection
Operations Dashboard Comparing 2022 to 2019 Building Footprints

Total Building Count 39,445 September 2022	Building Added (2019 - 2022) 62 BRANCH ST - COLON ELSA G Building Added	Building Removed (2019 - 2022) 72 BENEFIT ST - QABBAJ MOHAMED Building Removed
Total Building Count 37,899 September 2019	Building Added FeatureStatus: Production SurveyDate: 2022-09-01 Confidence: 0.56 Fidelity: 0.205400 AreaSqft: 50,894382 ClippedAreaSqft: 50,894382 UnclippedAreaSqft: 50,894382	Building Removed SurveyDate: 2019-09-21 Confidence: 0.67 Fidelity: 0.629400 AreaSqft: 71,928915 ClippedAreaSqft: 71,928915 UnclippedAreaSqft: 71,928915
Buildings Added 2,967	Building Additions Filter 42	Building Deletions Filter 30

Level of Confidence Statistics - Filtered

List of Added Buildings

- Added - 62 BRANCH ST Owner - COLON ELSA G
- Added - 104 BIRCH ST Owner - PIERCE LILA WILLIAMS & LORRAINE SURV
- Added - 50 SUMAC ST Owner - MELV RAYMOND & XENIA TORRES (TC)

List of Removed Buildings

- Removed - 72 BENEFIT ST Owner - QABBAJ MOHAMED
- Removed - RUMFORD ST Owner - CITY OF WATERBURY
- Removed - 25 RUMFORD ST Owner - TEAM INC

Publish Results
Create Web Apps and Dashboards

Workflow for Creating Building Footprint Change Detection

GEOPROCESSING STEPS

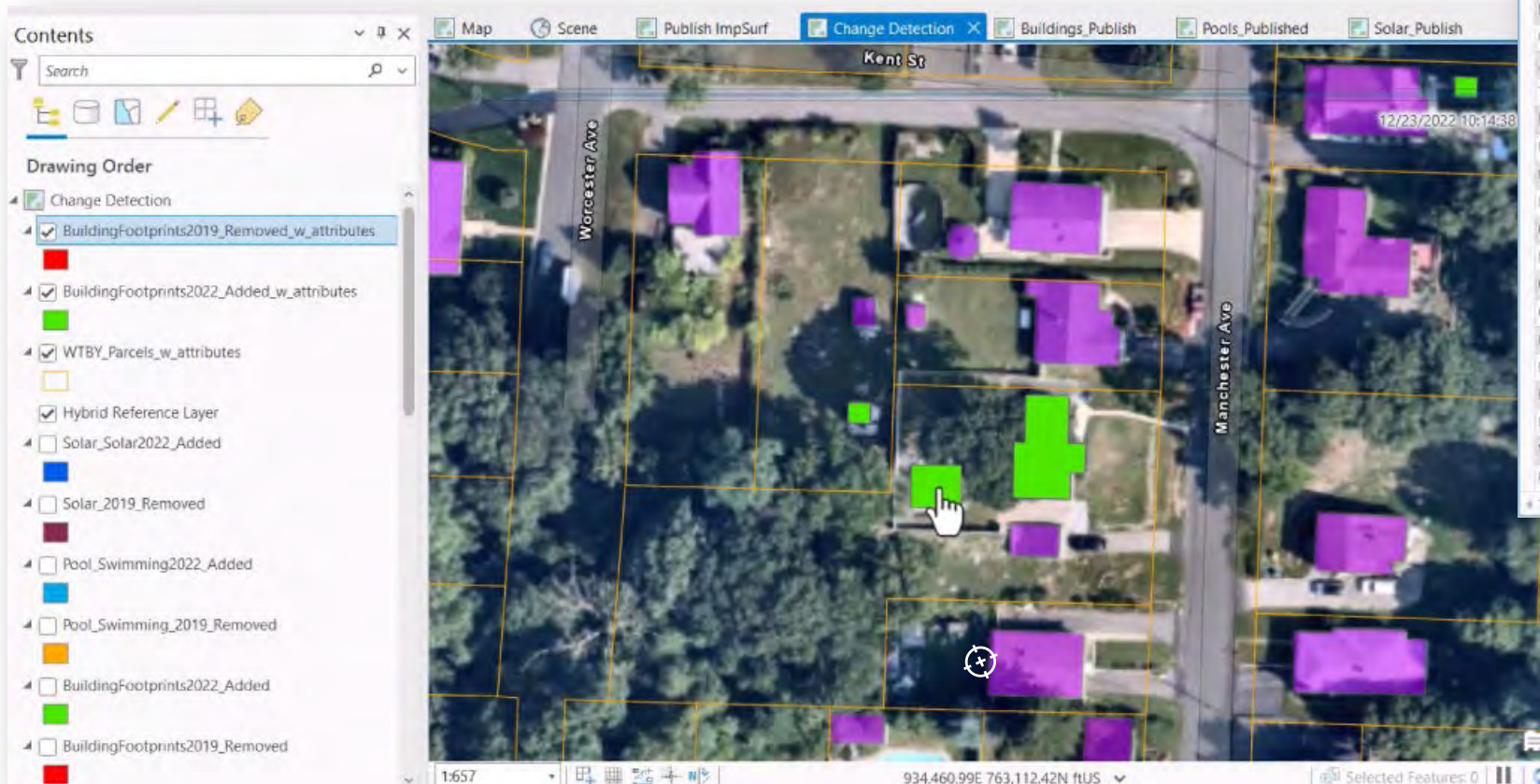
- Add city parcel data to GIS desktop application
 - AI Building Footprint layer (vintage 1)
 - AI Building Footprint layer (vintage 2)
 - Select by Location (Inversed) vintage 1 w/in 2 meters of vintage 2
 - Spatial Join of Parcel Attributes with “Additions”
 - Export (or calculate attribute) the “Additions”
 - Select by Location (Inversed) vintage 2 w/in 2 meters of vintage 1
 - Spatial Join of Parcel Attributes with “Deletions”
 - Export (or calculate attribute) the “Deletions”

EXPORT TO ONLINE WEB MAPPING APPLICATION

- Create Feature Service
- Create Web Map
- Create Web Application
- Create Operations Dashboard
- Share with all stakeholders

Desktop GIS Results

Visualize Results At An Organizational Scale



Pop-up

BuildingFootprints2019_Removed_w_attributes (1)
gen5-tranquil_pool-offline-638706fc354816cb9d22112f3a2267ab

BuildingFootprints2019_Removed_w_attributes - gen5-tranquil_pool-offline...

Confidence	0.716797
Fidelity	0.2784
AreaSqrm	104.22697
AreaSqft	1121.888683
ClippedAreaSqrm	104.22697
ClippedAreaSqft	1121.888683
UnclippedAreaSqrm	104.22697
UnclippedAreaSqft	1121.888683
Building_Removed	Removed
OBJECTID	78
Join_Count	1
TARGET_FID	78
UNIQUE_ID	030203770070
MBL	0302-0377-0070
MBLU	0302-0377-0070
Description	Cemeteries
COMMENT	
LOCATION	940 MERIDEN RD
OWNER	PINE GROVE CEMETERY ASSOCIATION
OWNER2	
MAILADDR	850 MERIDEN RD
MAILCITY	WATERBURY
MAILSTATE	CT
MAILZIP	067050000
VOLUME	368
PAGE	217

1 of 1 934,243.15E 762,406.94N ftUS

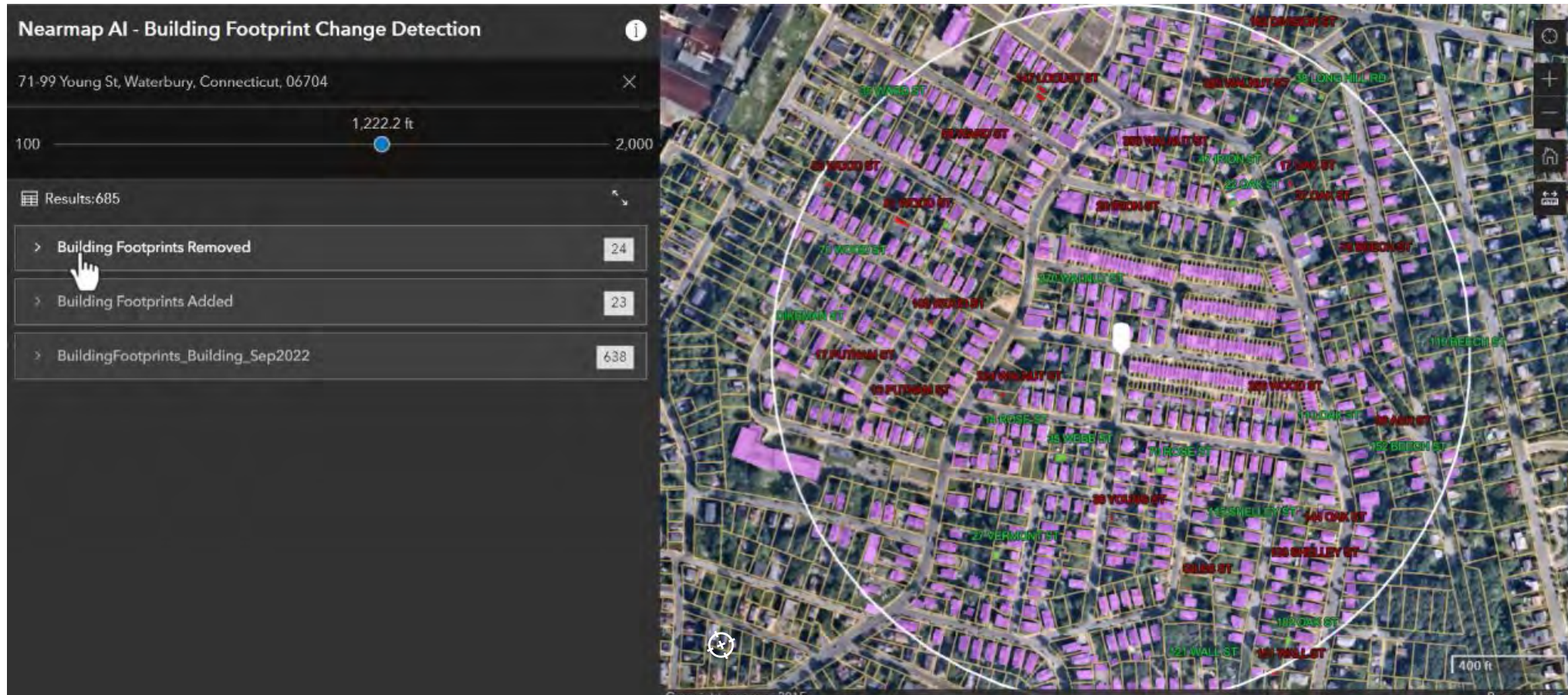
AI Based Change Detection



Approved Continuing Education

Field Application Results

What Are The Nearby Results I Need To Check



AI Based Change Detection

Nearmap AI - Building Footprint Change Detection

Operations Dashboard Comparing 2022 to 2019 Building Footprints

Total Building Count
39,445
September 2022

Total Building Count
37,899
September 2019

Buildings Added
2,967

Buildings Removed
1,507

1 of 42

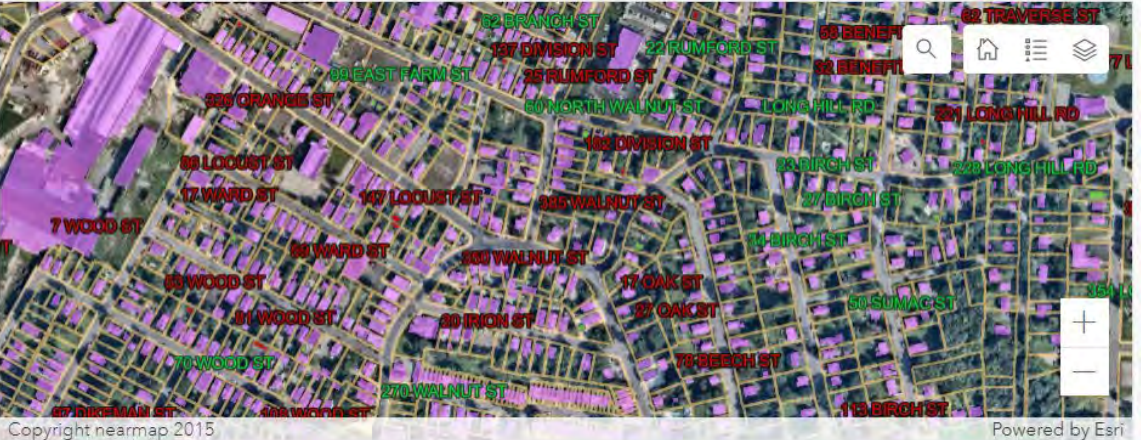
Building Added (2019 - 2022)
62 BRANCH ST - COLON ELSA G
Building Added

FeatureStatus	Production
SurveyDate	2022-09-01
Confidence	0.56
Fidelity	0.205400
AreaSqft	50.894382
ClippedAreaSqft	50.894382
UnclippedAreaSqft	50.894382

1 of 30

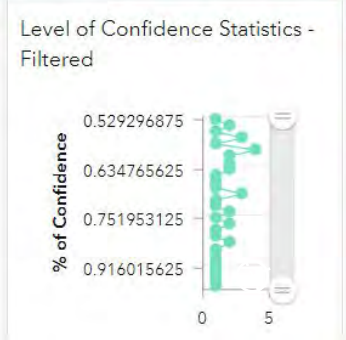
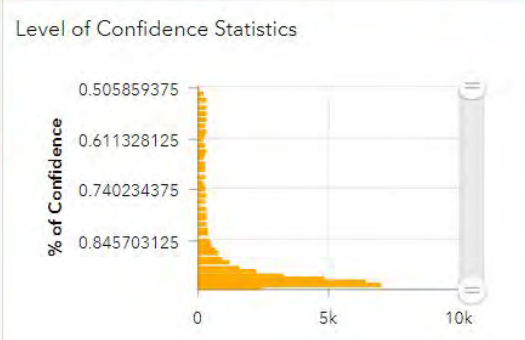
Building Removed (2019 - 2022)
72 BENEFIT ST - QABBAJ MOHAMED
Building Removed

SurveyDate	2019-09-21
Confidence	0.67
Fidelity	0.629400
AreaSqft	71.928915
ClippedAreaSqft	71.928915
UnclippedAreaSqft	71.928915
Building Removed	Removed



Building Additions Filter
42

Building Deletions Filter
30



- List of Added Buildings
- Added - 62 BRANCH ST
Owner - COLON ELSA G
 - Added - 104 BIRCH ST
Owner - PIERCE LILA WILLIAMS & LORRAINE SURV
 - Added - 50 SUMAC ST
Owner - MELY RAYMOND & XENIA TORRES (TC)

- List of Removed Buildings
- Removed - 72 BENEFIT ST
Owner - QABBAJ MOHAMED
 - Removed - RUMFORD ST
Owner - CITY OF WATERBURY
 - Removed - 25 RUMFORD ST
Owner - TEAM INC

AI Based Surface Permeability Solution

Leveraging AI to create an Impervious Surface Solution



CITY OF ST. AUGUSTINE BEACH BUILDING AND ZONING DEPARTMENT (904) 475-4754

IMPERVIOUS SURFACE RATIO (ISR) WORKSHEET

IMPERVIOUS SURFACE: Any building, surface, concrete, pool, wet retention/detention area, pavement or surface that has been compacted or covered with a layer of material so that it is highly resistant to infiltration by water. It includes, but is not limited to, semi-impervious surfaces such as compacted clay, as well as most conventional surfaced streets, roads, sidewalks, parking lots, and other similar structures.

IMPERVIOUS SURFACE RATIO (ISR): The ISR shall be calculated by dividing the total impervious surface area by the total area of the proposed development site or project. Alternative paving with a 10% or greater permeability shall not count as ISR coverage.

PERMEABLE PAVING WITH 10% OR GREATER PERMEABILITY SHALL BE LIMITED TO 15% OF LOT COVERAGE IN LOW AND MEDIUM DENSITY LAND USE DISTRICTS (SEE #8 BELOW).

Site Address: _____ Lot Area _____ square feet

Impervious Surfaces:

1. Building footprint _____ square feet
2. Parking & driveway areas _____ square feet
3. Access easements _____ square feet
4. Walkways _____ square feet
5. Pools and decks _____ square feet
6. Other (screen rooms, patios, porches, etc.) _____ square feet
7. Equipment and air-conditioning pads _____ square feet
8. Permeable pavers > 10% permeability _____ square feet

Total Impervious Surfaces: _____ square feet

Total Impervious Surfaces: Lot Area _____ Impervious Surface Ratio % _____

I, _____ (signature) certify that the calculations submitted above for the impervious surface ratio calculations are accurate and complete.

Name _____ Date _____

Address _____ Phone _____

Email address: _____

Shoreland Impervious Surface Calculations

Riparian lots or properties entirely within 300' of the Ordinary High Water Mark

How do I calculate total impervious surfaces?
 Impervious surfaces are all those surfaces that do not allow rain to absorb into the soil. This includes: roofs, paved areas such as driveways, sidewalks and patios, and compacted areas such as gravelled driveways, walkways, and play areas. To calculate the percent of existing and proposed impervious surfaces on your lot, divide the total square footage of existing impervious surfaces by the total square footage area of your lot then multiply by 100. Then divide the total square footage of proposed impervious surfaces by the total square footage area of your lot then multiply by 100. Please view the example below as a reference.

Impervious Surface Item	Dimensions	Surface Area (Sq Ft)
House/Dwelling	length 50' x width 20'	1,000 sq. ft.
Proposed Garage	length 25' x width 10'	250 sq. ft.
Driveway	length 10' x width 10'	100 sq. ft.
Total Impervious Area		1,250 sq. ft.

Impervious and treated surfaces are determined by Marathon County Conservation, Planning & Zoning Staff:

Total Existing Impervious Area (Square Feet) = 2,800 sq. ft.
 Total Lot Area (Square Feet) = 20,000 sq. ft.

$\frac{2,800 \text{ sq. ft.}}{20,000 \text{ sq. ft.}} \times 100 = 14\% \text{ Impervious}$

Total Impervious Area (Total Lot Area - 10% Impervious Surface)
 Total Proposed Impervious Area (Square Feet) = 3,300 sq. ft.

Total Lot Area (Square Feet) = 20,000 sq. ft.
 $\frac{3,300 \text{ sq. ft.}}{20,000 \text{ sq. ft.}} \times 100 = 16.5\% \text{ Impervious}$

Total Impervious Area + Total Lot Area - 10% Impervious Surface Calculation

Conservation, Planning & Zoning Department
 310 River Drive | Wausau, WI 54403-6449 | Tel 715.261.6000 | Fax 715.261.6016 | Call 800.298.0153 if within Marathon County
 cpsz@co.marathon.wi.us | www.co.marathon.wi.us



Shoreland Impervious Surface Calculations

Riparian lots or properties entirely within 300' of the Ordinary High Water Mark

PARCEL PIN# _____ Permit# _____
 (From Tax Bill - Include All Acres and Decimal Points) (FOR OFFICE USE ONLY)

Name of Owner _____

Address of Project Site _____

Parcel Impervious Surface Percentage $\leq 15\%$ = No Mitigation Required
 Parcel Impervious Surface Percentage from 15.1% to 30% = Requires Mitigation *See mitigation help sheet

Calculating the percent of existing impervious surfaces on your lot within 300 feet of OHWM:

Impervious surfaces are those surfaces/areas that releases the runoff of all or a majority of the precipitation that falls onto it. "Impervious surface" excludes frozen soil but includes rooftops, sidewalks, driveways, parking lots, and streets unless specifically designed, constructed, and maintained to be pervious. Please fill in the information that is applicable to your project below and calculate the percent of existing impervious areas within your lot.

House/Dwelling (square footage of roof) _____ sq. ft.

Driveway(s), Paved or Unpaved _____ sq. ft.

Parking pads(s) Paved or Unpaved _____ sq. ft.

Walkway(s), concrete, pavers, or gravel _____ sq. ft.

Patio(s), (including wood slatted decks) _____ sq. ft.

Outbuilding 1 (square footage of roof and slabs) _____ sq. ft.

Outbuilding 2 (square footage of roof and slabs) _____ sq. ft.

Other Impervious Areas (_____) _____ sq. ft.

Other Impervious Areas (_____) _____ sq. ft.

Other Impervious Areas (_____) _____ sq. ft.

Total ft² of Existing Impervious Surfaces _____ Total _____ Sq. Ft.

Total sq. ft. of Impervious Surfaces (Within 300' of the OHWM) _____ Total sq. ft. of Shoreland Lot (Total Parcel Area) _____

$\frac{\text{Total sq. ft. of Impervious Surfaces (Within 300' of the OHWM)}}{\text{Total sq. ft. of Shoreland Lot (Total Parcel Area)}} \times 100 = \text{Total \% of Impervious Surface}$

FOR OFFICE USE ONLY

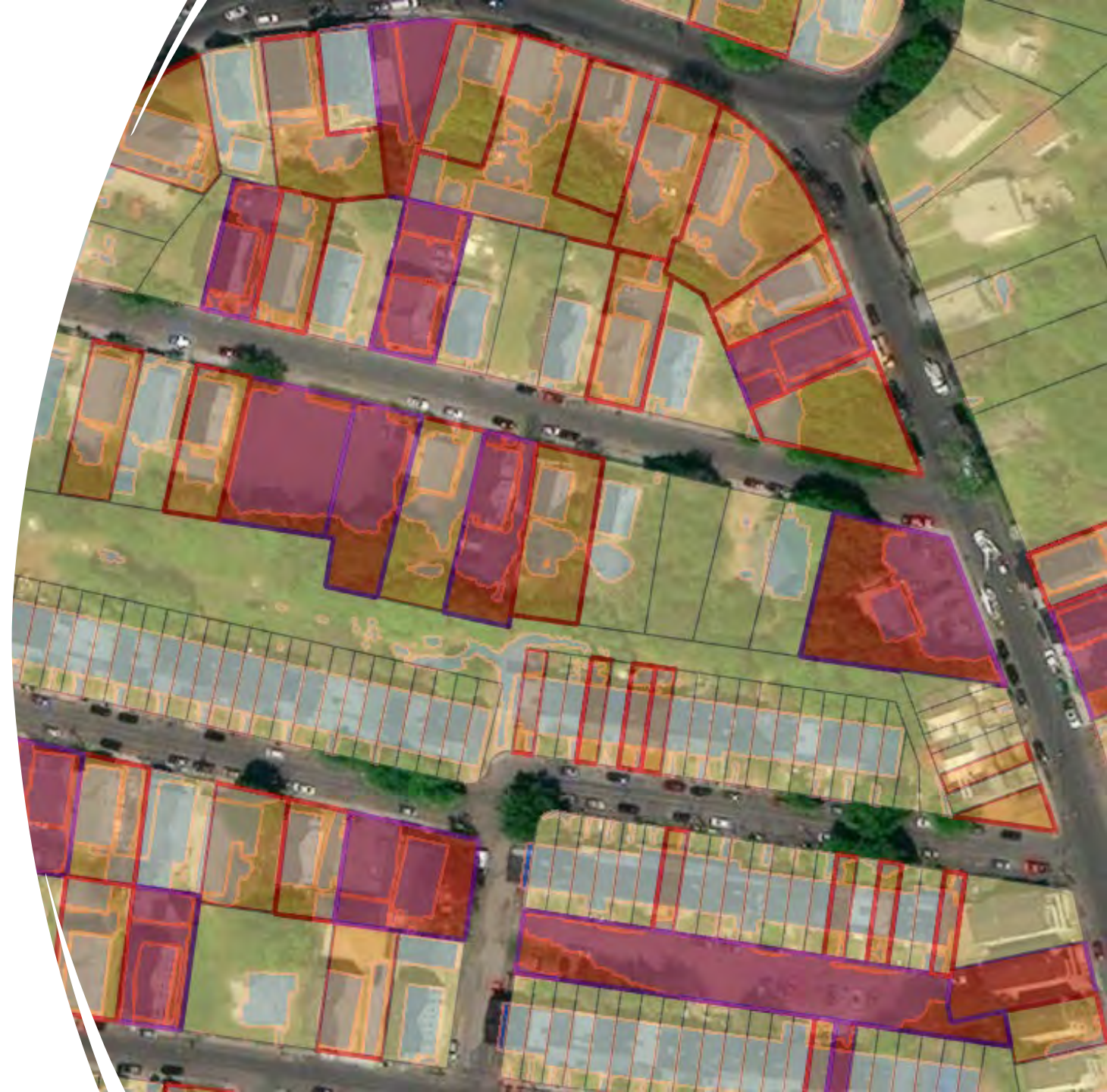
Reviewer Signature _____ Date _____

Conservation, Planning & Zoning Department
 310 River Drive | Wausau, WI 54403-6449 | Tel 715.261.6000 | Fax 715.261.6016 | Call 800.298.0153 if within Marathon County
 cpsz@co.marathon.wi.us | www.co.marathon.wi.us

Many Communities are beginning to Manage and Regulate Surface Stormwater Runoff and Mandate Mitigation

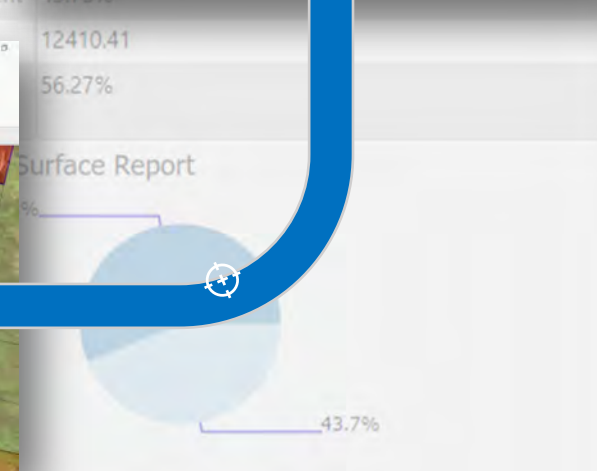
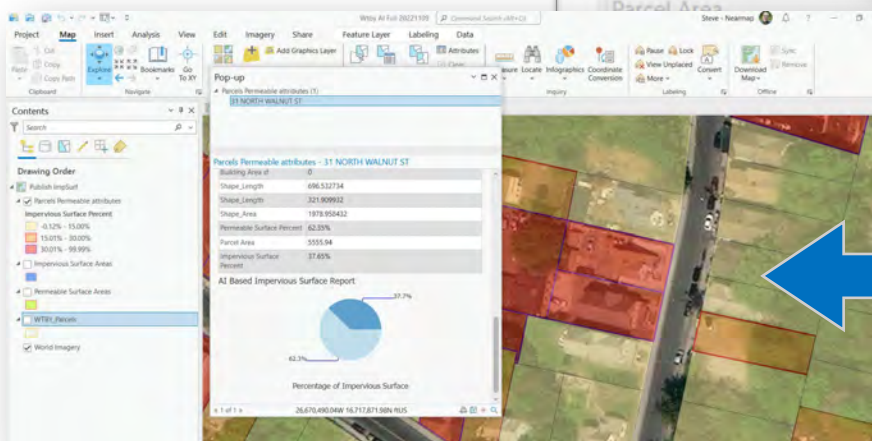
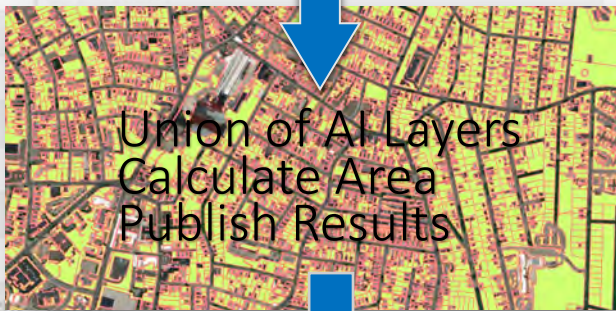
AI Workflows Can Streamline Nearly All Of That Effort

Leverage AI to create the solution in hours,
rather than months





ACRES	0.29
Confidence	0
Area Pieces	5427.558063
Area Combined	
Confidence	
Building Area sf	
Shape_Length	
Shape_Length	
Shape_Area	
Permeable Surface Perc	
Parcel Area	



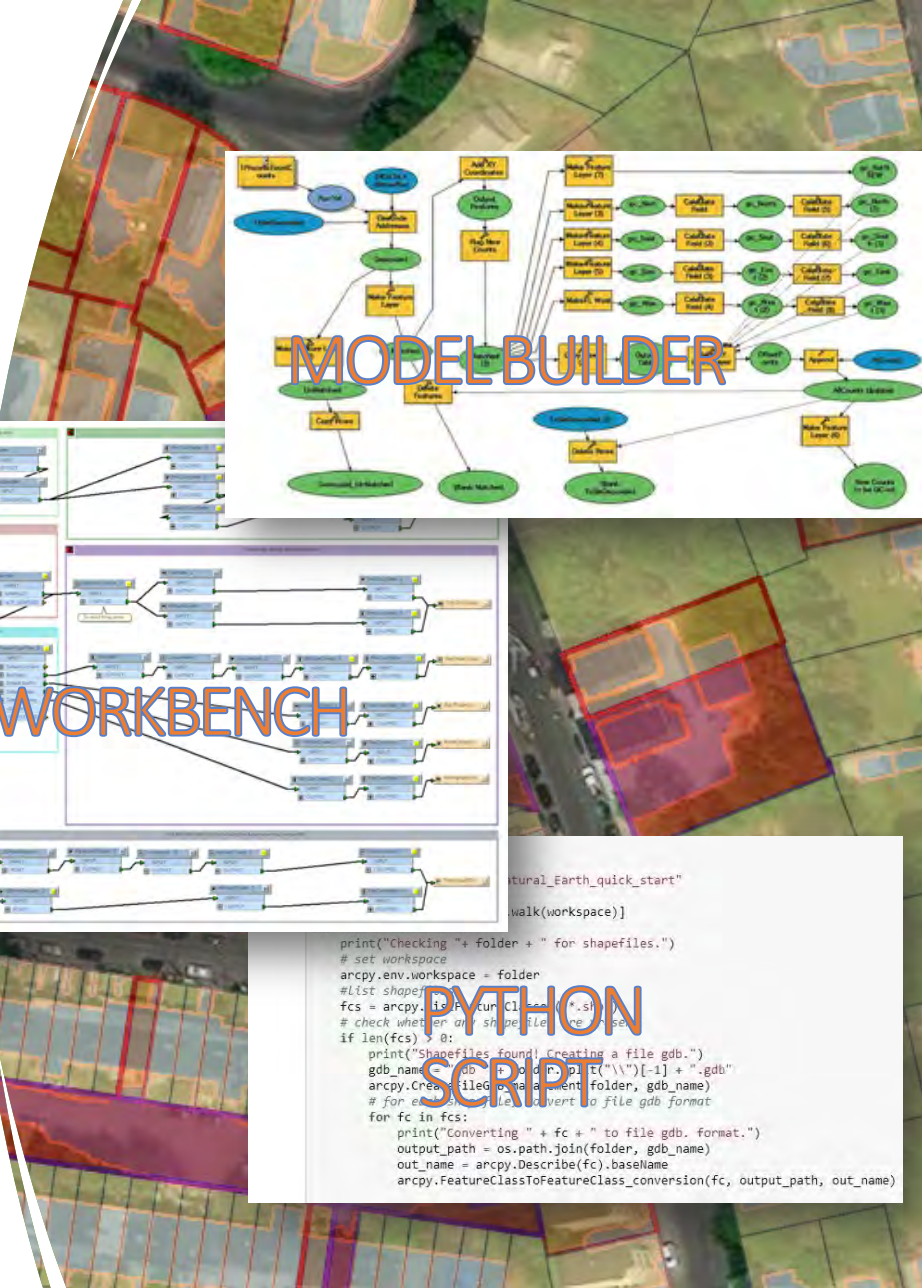
Workflow for Creating Surface Permeability Report

Geoprocessing Steps

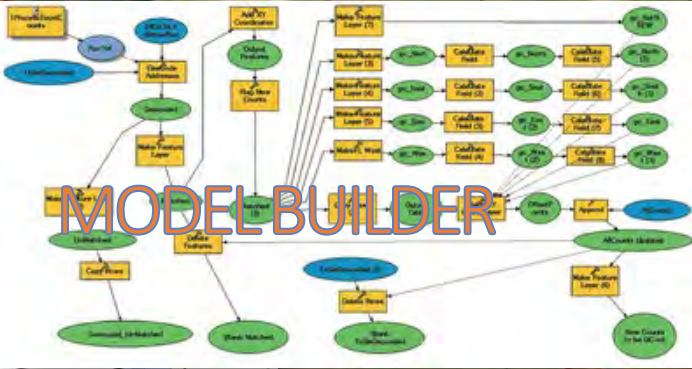
- Start with city parcel data
- Calculate parcel area
 - AI building footprint layer
 - AI surface permeability data
 - Hard surface
 - Natural pervious surface
- Union of layers (clips surf perm data to parcel boundary)
- Calculate areas
- Select confidence = 0
- Export permeable surface layer
- Invert selection
- Export impervious surface layer
- Spatial join permeable surface with parcels
- Calc % (pervious / parcel area) add attributes for perm and imp surface
- Display parcel w permeable attributes by graduated color
 - 0% - 15.00
 - 15.01% - 30.00
 - 30.01%+
 - Configure popup with chart
- Export To Online Web Mapping Application
 - Create Feature Service
 - Create Web Map
 - Create Web Application
 - Create Operations Dashboard
 - Share with all stakeholders

Full Automation - The Ideal Solution

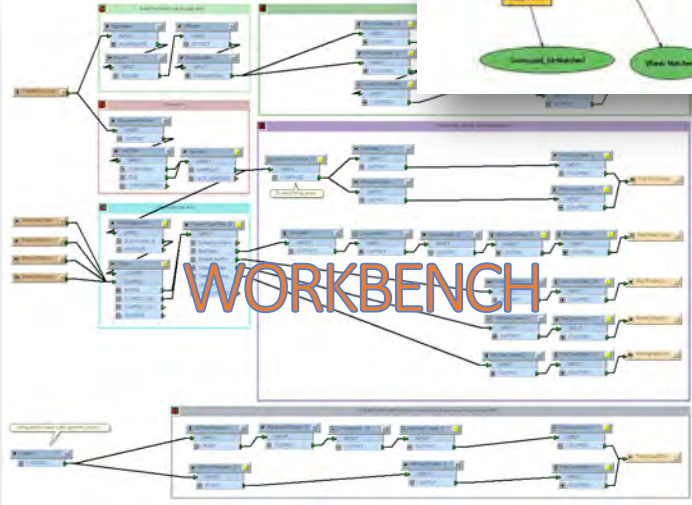
An ideal solution would be fully automated, leveraging AI-enabled feature extraction from aerial imagery to quickly and accurately identify and digitize impervious surfaces. This would reduce the time and cost associated with field surveys and manual digitization, while also providing more accurate and up-to-date data.



MODEL BUILDER



WORKBENCH



PYTHON SCRIPT

```
print("Checking " + folder + " for shapefiles.")
# set workspace
arcpy.env.workspace = folder
# list shapefiles
fcs = arcpy.ListShapefiles(folder, "*.shp")
# check whether any shapefiles are present
if len(fcs) > 0:
    print("Shapefiles found! Creating a file gdb.")
    gdb_name = folder.replace("\\", "/")[:-1] + ".gdb"
    arcpy.CreateFileGDB_management(folder, gdb_name)
    # for each file, convert to file gdb format
    for fc in fcs:
        print("Converting " + fc + " to file gdb format.")
        output_path = os.path.join(folder, gdb_name)
        out_name = arcpy.Describe(fc).basename
        arcpy.FeatureClassToFeatureClass_conversion(fc, output_path, out_name)
```

Desktop Results

Visualize Results At An Organizational Scale



Surface Permeability Results

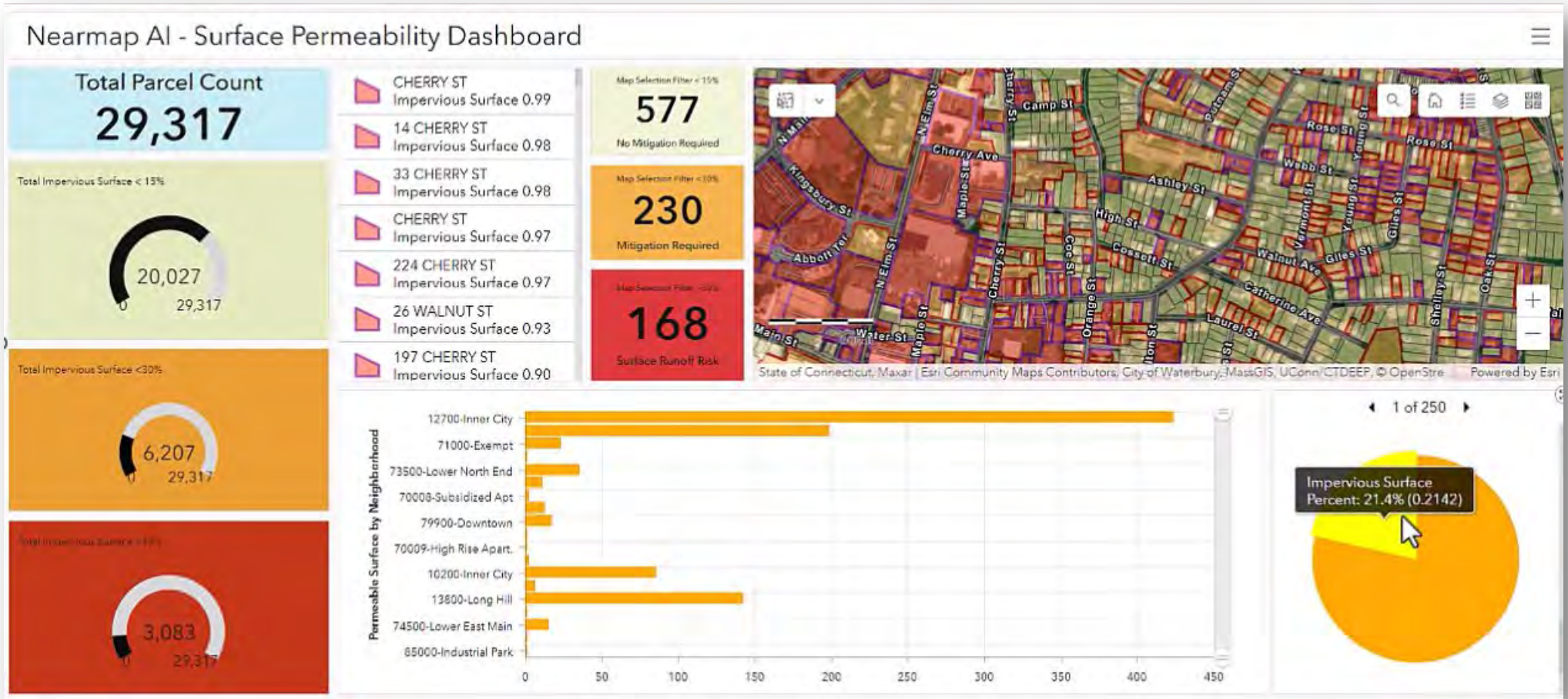
Online Web Application

Visualize Results At An Organizational Scale



Online Dashboard

Visualize Results At An Organizational Scale



Adding Results to the Larger Digital Twin

LEVERAGING AI BASED SOLUTION DATA FOR YOUR PROJECT, SMART CITY, AND DIGITAL TWIN

Nearmap AI - Building Footprint Change Detection
Operations Dashboard Comparing 2022 to 2019 Building Footprints

Total Building Count September 2022 39,445	Building Added (2019 - 2022) 1135 HAMILTON AVE - VELLOTTI EDGAR V & LORI A ADAMS SURV	Building Removed (2019 - 2022) 160 KUKAS LANE - WATERBURY FAMILY LIMITED PARTNERSHIP
Total Building Count September 2019 37,899	Building Added FeatureStatus: Production SurveyDate: 2022-09-01 Confidence: 0.51	Building Removed SurveyDate: 2019-09-21 Confidence: 0.53 Fidelity: 0.042200
Buildings Added 2,967	Level of Confidence Statistics	Level of Confidence Statistics - Filtered
Buildings Removed 1,507	Building Additions Filter 13	Building Deletions Filter 6

List of Removed Buildings:

- Removed - 160 KUKAS LANE
Owner - WATERBURY FAMILY LIMITED PARTNERSHIP
- Removed - 158 FARRELL RD
Owner - FRANZESE OLIVIA TERESA

Roofing Material:

Roof Type - FLAT: 25	Roof Type - GABLE: 279	Roof Type - HIP: 62	Roof Type - TURRET: 0
----------------------	------------------------	---------------------	-----------------------

Roofing Material Chart:

Metal Roof: 0	Other: 35	Shingle Roof: 35
---------------	-----------	------------------

Summary Metrics:

- Building Footprint Count: **351**
- Roofs with Tree Overhang: 16
- Swimming Pools: 22
- Solar Panels: 39
- Trampoline Count: 1



AI – The Big Picture

- **Bottom Line:**
- AI feature Identification automatically captures the data you need to reduce the effort by as much as 99% and potentially save hundreds of thousands of dollars
- Imagery Providers give continuous updates on imagery, AI, and 3D products
- Access to valuable historical data
- Get the data you need, in the format you need, to help streamline many workflows
- Leverage AI to create organization level Solutions that offer location-based insights and bring context to the data

AI Based Solution Value

- Reduces the time and cost associated with field surveys and manual digitization
- Provides more accurate and up-to-date data
- Allows organizations to leverage resources for other tasks
- Helps improve access to federal infrastructure funding
- Identifies where stormwater systems may be inadequate
- Allows AEC firms to better serve their clients
- Regulatory Agencies to identify, monitor, and enforce compliance

MAR 2022 | Waterbury, ct US



Approved
Continuing
Education

Questions and Answers with:



Steven P. Santovasi, GISP
Director of Product Marketing
Nearmap



Todd Danielson
Editorial Director
Informed Infrastructure



Approved
Continuing
Education

If you are viewing the
webcast LIVE, you may
now download the
Certificate of
Completion by clicking
the AIA button at the
bottom of the console

If you are viewing the
ARCHIVE, you must take
and pass the quiz below
this video to obtain a
Certificate of
Completion



**Approved
Continuing
Education**



INFORMED INFRASTRUCTURE

The magazine for civil & structural engineers

Check out
www.informedinfrastructure.com/v1education
to view other accredited
webcasts.

Thank You for Attending