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Aurora, IL

Indoor Mapping Solution

Project Overview (1/3)

BUSINESS CHALLENGE	The City of Aurora, Illinois seeks a partner to build a "Digital Twin" of City buildings through accurate mapping and modeling of its infrastructure. This will be a multi-step engagement, beginning with imaging of all in-scope rooms/floors/buildings before using modeling software to build the 2-Dimensional or ideally 3-Dimensional Digital Twin. The City prefers to find a partner to perform both elements but may choose to split the work amongst qualified vendors.
PROJECT BACKGROUND	The evolution of Aurora's building infrastructure is no longer well-represented by original blueprints. City Hall, for example, has had multiple additions made over the last 70+ years, and there is no cohesive, accurate map of the building as it stands today. Additionally, across City buildings, there are numerous unrecorded instances of walls removed or installed, doors added or removed, among other alterations. City stakeholders lack a centralized, accurate schematic of its building stock - and seek a partner to help build one.

Project Overview (2/3)

The City of Aurora, Illinois seeks a partner to build a "Digital Twin" of City buildings through accurate mapping and modeling of its infrastructure. This will be a multi-step engagement, beginning with imaging of all in-scope rooms/floors/buildings before using modeling software to build the 2-Dimensional or ideally 3-Dimensional Digital Twin. The City prefers to find a partner to perform both elements but may choose to split the work amongst qualified vendors.

Process Sequence:

- Created Market Landscape with 10+ potential companies.
- Drafted RFQ document based on the needs of the Information Technology and Public Facilities Departments.
- Based on the Market Landscape and City Stakeholder review, Marketplace.city publicly posted and distributed the Opportunity and Scope Document for vendors to complete in order to be included in the reporting and selection process.
  - It was posted and distributed on 11/18/22 and closed 12/13/22.
- There were 8 responses completed by the deadline – Raw Data File Here.

Note:

- Due to the volume of submitted proposals (8), we built two separate "Summary" slides listing the vendors in alphabetical order.
- Over the course of this project, stakeholders knew that imaging the entire inventory of Aurora municipal buildings may occur over several years, in several waves, as budget allows. With this in mind, a list of 28 "Priority Buildings" was developed that represented key consistently populated properties. Tallying square footage of these properties also allowed finalists to forecast a "Phase 1 Price" based on the common cost-per-square-foot pricing model for these companies. The Priority Inventory list can be found here.

Summary 1

	Solution		Functional Questions	Prior Experience	Pricing & Model		Implementation	
Company	**1-Page Solution Overview**	**Which of the two component parts of this project you are able to accomplish?**	**Which type of Digital Twin can you provide?**	**# of previous government engagements?**	**Pricing Model**	**Simplified Pricing**	**Please estimate how long it would take you to perform the on-site imaging process.**	**From the completion of the imaging process, approximately how long does it take to deliver the Digital Twin?**
Axim Geospatial, LLC	Solution Narrative	On-site City Building Imaging Software Development to build "Digital Twin" of City Buildings	2-Dimensional 3-Dimensional	10-25	Solution as a Service	$0.275 - 0.3 / square foot Total cost anticipated to be in the $950K-$1.1M range. *Assuming 3M sq ft. total	Each of our three teams can image about **25,000 square feet per hour**, including setup and breakdown (75,000 square feet per hour if all three teams are deployed simultaneously).	Axim anticipates it will take approximately **3-4 months** to deliver the complete Digital Twin, including modeled and linked assets, documentation, and knowledge transfer. Intermittent deliveries can be made throughout this timeframe for client feedback and acceptance.
Cloudpoint Geospatial	Solution Narrative	On-site City Building Imaging Software Development to build "Digital Twin" of City Buildings	2-Dimensional 3-Dimensional	1-10	Solution as a Service	$0.11 - $0.16 / square foot ArcGIS Indoors Implementation: $0.05-$0.10/square foot	It is anticipated that each building will require no more than one day of onsite collection time. With this in mind, Cloudpoint proposes to phase the collection of the buildings over a **5 to 6 month period** to allow time for adequate planning and data processing.	Digital twin generation will begin immediately once the first onsite collections are complete. This will require 3-5 days per building which yields an estimated delivery time of 7 to 12 months after completion of collection work. The total project duration will be approximately **12 to 18 months**.
Gewalt Hamilton	Solution Narrative	On-site City Building Imaging Software Development to build "Digital Twin" of City Buildings	3-Dimensional	1-10	Time & Materials	Total Estimated Cost - $52,000.00	Building scans will take approximately 160 hours or **four weeks** to complete.	After completing the imaging process, the Matterport doll house would be available within 2 days; however, the finshed digital twin would be available **1 - 2 months after** completing the imaging.
Michael Baker International Inc.	Solution Narrative	On-site City Building Imaging Software Development to build "Digital Twin" of City Buildings	2-Dimensional 3-Dimensional	100+	Other	$0.15/ square foot The 'Inside' Solution is offered as a SaaS model at $10,000/year for 5 users	With City support, and based on assumptions for size, complexity, location, and facility accessibility, MBI can complete the on-site data collection within **40 business days**. MBI also offers optional accelerated schedule solutions.	Production routines require 2-hrs per floor after generating the 360-imagery & LiDAR point cloud. Loading the ESRI data model into the solution and complete testing requires **1 week**. CCTV camera integration is an optional self-service model that the city can perform after completion of training.

Summary 2

	Solution		Functional Questions	Prior Experience	Pricing & Model		Implementation	
Company	1-Page Solution Overview	Which of the two component parts of this project you are able to accomplish?	Which type of Digital Twin can you provide?	# of previous government engagements?	Pricing Model	Simplified Pricing	Please estimate how long it would take you to perform the on-site imaging process.	From the completion of the imaging process, approximately how long does it take to deliver the Digital Twin?
Motivf Corporation	Solution Narrative	On-site City Building Imaging Software Development to build "Digital Twin" of City Buildings	2-Dimensional 3-Dimensional	100+	Other	We expect the process to take 7-10 days and cost $41,600.00.	Motivf typically schedules the full first week of onsite work several weeks in advance of the visit. Square footages of the buildings are used to estimate the time it will take to image each building. After the first couple days, the field team will know how long the remaining buildings will take and appointments will be scheduled with building managers when/if escorts are required. We expect the on-site capture to take between **7 to 10 days**.	We anticipate that the total timeframe to develop and deliver the digital twin - including the 3D Virtual Representation (Esri-based map view), asset locations (cameras, door locking mechanisms), and integrated camera video feeds and lock status data, to be approximately **four months.**
PrecisionPoint, Inc.	Solution Narrative	On-site City Building Imaging Software Development to build "Digital Twin" of City Buildings	2-Dimensional 3-Dimensional	100+	Solution as a Service	Mobile mapping and stitching: $0.07 - $0.20/square foot 3D Digital Twin Model Creation: $0.25 - $0.50/square foot Linked Asset Custom Software Integration: $12.00 - $15.00/asset	PrecisionPoint's RapidScan mobile mapping system is capable of scanning up to 150,000 square-feet per day. PrecisionPoint has the capability of assigning multiple technicians operating independently to expedite the data collection process. Assuming multiple technicians assigned to the project the City can expect a timeframe of **30-45 business days** of data collection. A refined schedule and timeframe for completion will be developed after receiving an inventory of buildings to be documented.	Typically, it takes **2-4 weeks after** the laser scanning and imaging data collection to compile and deliver the Digital Twin. This timeframe can be shorter or longer depending on the size and complexity of the building. A timeline and delivery schedule can be refined with a listing of the buildings.
Soar3D	Solution Narrative	On-site City Building Imaging Software Development to build "Digital Twin" of City Buildings	2-Dimensional 3-Dimensional	None	Other	$0.10 / square foot	Our rate of on-site data capture is 10,000 sqft per 30 mins per Scanner (Smartphone). Provided we use our 10 of our network scanners or City Personnel, we could capture any building (300,000 Sqft) within 3 hours. For all 80 buildings, this could take anywhere between **2 - 3 weeks**.	After data capture, it will take us roughly **2-5 business days** to deliver your Digital Twin.
ZealRiver	Solution Narrative	On-site City Building Imaging Software Development to build "Digital Twin" of City Buildings	2-Dimensional 3-Dimensional	10-25	Solution as a Service	Rough order of magnitude based on 80 buildings @ $600K per building over the time duration of the project.	Dependent upon access and Aurora personnel availability approximately 10 buildings per month for **8 months**. Upon award we would collaborate with the customer on desired timeline and develop an integrated mast schedule to track all tasks planned and the progress against that plan.	Once the end platform and solution are identified the building information is added as available along with IOT links into the consolidated Digital Twin that **can be viewed as buildings are scanned** and data is available.

Project Overview (3/3)

The City of Aurora, Illinois seeks a partner to build a "Digital Twin" of City buildings through accurate mapping and modeling of its infrastructure. This will be a multi-step engagement, beginning with imaging of all in-scope rooms/floors/buildings before using modeling software to build the 2-Dimensional or ideally 3-Dimensional Digital Twin. The City prefers to find a partner to perform both elements but may choose to split the work amongst qualified vendors.

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- There were 8 responses completed by the deadline – Raw Data File Here.
- After reviewing the proposals, stakeholders scored the full set resulting in five preferred partners, which were invited to further conversation and demonstration. Four responded to be included in these meetings. Full Initial Scoring can be Found Here.
  - These four vendors were Axim Geospatial, Cloudpoint Geospatial, Michael Baker International, and Motivf Corporation. Gewalt Hamilton did not respond to multiple invitations to participate after submitting its proposal.
- Post-demonstrations, these four vendors were sent follow-up questions on their scanning methodology, the level of detail provided with their mapping systems, and how they can integrate Genetec Security Camera assets into their Digital Twins – Full Responses Here.
- Lastly, the four vendors received customized pricing templates to complete and return to Marketplace.city. These documents provided a direct apples-to-apples comparison of the many options provided by these firms – Full Pricing Templates Found Here.
  - Project leaders developed a list of 28 Priority properties to be completed in the initial wave of imaging. The pricing templates include this "Priority Inventory" tab, which includes Name, Addresses, Square Footage, Number of Floors, etc. Priority Inventory.
- Project stakeholders submitted final scoring based on the cumulation of this data on 6/27/23.

Final Pricing Analysis

Company	Pricing Model	Unit Price (i.e. $0.xx / sqft)	Phase 1 Total (28 Priority Buildings with 1,824,723 Sq. Ft.)	Phase 1 Genetec Linkage	Base Layer Description [Vendor Language Pulled from Template]	Ongoing Rates for Future Phases & Additional Services	Full Response Link
Axim Geospatial	Cost-per-Square-Foot	**$0.38**	**$693,394.74**	"Points representing CCTV cameras (location only) included in the base layer"	Base layers: • LOD 250-300 • 360 Video for all buidlings • Auditable Point Cloud (LiDAR) • Georeferenced 3D REVIT Files (floors, windows, ceiling, walls, facades, & point locations of all Genetec CCTV security cameras) • ArcGIS Floor Aware File Geodatabase of Convereted REVIT Files	Base Layer +/- $0.38 / sqft Extended Layer +/- $0.25 / sqft Max Layer +/- $0.60 / sqft	Final Pricing Document
Cloudpoint Geospatial	Cost-per-Square-Foot	**$0.31**	**$565,664.13**	$19,500 - Lump Sum	Onsite 3D laser scanning of priority buildings and surrounding facades using hand-held SLAM lidar unit capturing 300k points per second with RGB coloriziation. -Generate floor plan GIS layers, building entrance labels, room labels and hallways -Development of 3D BIM model at LOD 350 to be imported into GIS format -Creation of POI layers for linked assets including building access points (doors), ramps, stairs, fire connections, fire extinguishers, lock boxes, AED's, and security cameras. [UPDATED NOTE: "We had a recent breakthrough with integrating 360 imagery within our LiDAR scanning process so we would be able to offer this as part of our standard deliverables for the indoor mapping project. The 360 images would be integrated with the GIS maps for easy access and navigation as needed. This is not using the Matterport system but comes natively with our LiDAR scanning system. I wish we could have worked this into our previous response but we just discovered the capabilities in our latest project in which we are currently processing the data for."]	Matterport Capture: $0.06 / sqft [$109,483.38] Maintenance: $8,880 / year Matterport 3D Image Hosting: $3,500 / year	Final Pricing Documents
Michael Baker Internaitonal	Cost-per-Square-Foot	**$0.094**	**$171,523.96** **+ $80,000 INSIDE Digital Twin SaaS Annual Subscription**	"Feature is native to the INSIDE digital twin platform. Included at No Additional Charge"	Features/Assets included in the Digital Twin: Doors, Cased Openings, Walls, Rooms, Stairwells, Elevators, Water Fountains, CCTV Camera locations, Fire Pulls, Fire Extinguishers, and AEDs • Additional fixed asset types may be optioned for a base fee of $5.25 each asset. Year 1 INSIDE Digital Twin SaaS Subscription includes: • Setup & Configuration • Training & Support • 15 Admin/Editor Users • $565 per additional user • Up to 2,000 CCTV cameras • $1 per month for each additional CCTV	$0.104 / sqft capture rate $5.25 / additional asset inventory linkage $80,000 / year SaaS Subscription	Full Pricing Document
Motivf	Cost-per-Square-Foot	**$0.085**	**$155,101**	$6,000 - one-time fee	The base layer (base deliverable) will include the following, for the 28 Phase 1 priority buildings: (1) ArcGIS Indoors Architecture, including: -- Walls, halls, doors, stairways, escalators, and elevator shafts, half walls and cubicles -- delivered at BIM Level of Detail (LOD) 300: (illustrated below) (2) Matterport "Dollhouse" - hosted by Matterport Showcase application (which can be connected to any of the City's web-based applications and viewers) (3) Floor Plan Schematics (PDF, SVG, and PNG) (illustrated below) NOTE: Genetec camera linkages are not included in the base deliverable. See below for Genetec camera feed integration	$0.085 / sqft capture rate $126 / hr labor cost for ArcGIS Indoors file maintenance $126 / hr labor cost of future Genetec camera linkage	Full Pricing Document

Scoring Overview

Scoring Criteria	Weight	Vendor Evaluation			
		Axim Geospatial	Cloudpoint Geospatial	Michael Baker International	Motivf
Capabilities / Solution	*25%*	9	9	8.2	8.2
Experience and Qualifications	*20%*	6	5	8.2	7.4
Approach, Services, Implementation Methodology	*10%*	7.4	2.2	7.4	7.4
Pricing and Contract Model	*20%*	2	1.8	5.8	8.2
Additional Services / Innovation	*25%*	4.2	5	4	4.4
Weighted Scoring		5.64	5.08	6.59	7.01

Full Scoring Document Found Here

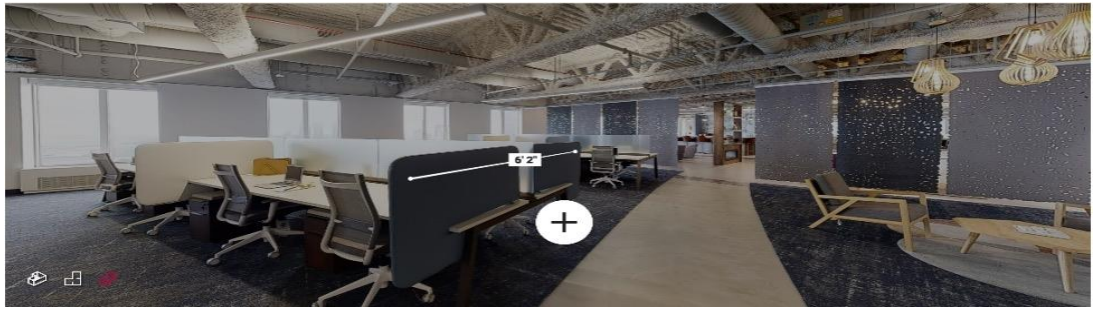
Key Visuals

The base deliverable from Motivf Corporation includes:

- ArcGIS Indoors Architecture delivered at BIM Level-of-Detail 300:

- Floor Plan Schematics (PDF/SVG/PNG):

- The interactive “Dollhouse” visual feature utilized by the Matterport application:



Summary & Recommendation – Motivf Corporation

The project team recommends Motivf Corporation as their partner to image Aurora's municipal buildings and convert this data into "Digital Twin" schematics. Motivf is a proven leader in public sector indoor mapping and will provide high-quality deliverables at a reasonable, locked-in price over several phases of building scans.

DECISION FACTORS

Full Indoor Mapping Capabilities: This partnership will provide a streamlined path to modernizing Aurora's municipal building inventory and management. Motivf provides prompt imaging services and will return flexible, high-quality Digital Twin products back to City stakeholders.

Public Sector Experience: Motivf has conducted imaging work for a broad list of federal, military, and municipal clients, such as the City of Dublin, Ohio, and Roanoke, Virginia.

Asset Linkage: Genetec security camera integration is a critical component of this project, and Motivf offers an effective, low-cost means of folding these pre-existing assets into their deliverables, boosting their value and usefulness to the City.

Project Phasing: Motivf has shown flexibility to engage in a phased rollout of City imaging – starting with the 28 High Priority properties in Phase 1, while locking in an ongoing cost-per-square-foot as it applies to future inventory.

Pricing: Beyond providing the most competitive cost-per-square-foot and Phase 1 total as compared to the three other finalists, Motivf deliverables can be viewed, stored, and manipulated within existing Aurora software, such as Esri. Other solutions required separate proprietary software licenses, inflating cost.

Contract Details

PRICING MODEL	**Cost-per-Square-Foot** **Unit Price: $0.085 / square foot**
PHASE 1 PRICING SUMMARY	**28 High Priority Buildings: $155,101** Genetec Linkage: $6,000 one-time fee Priority Inventory List for Phase 1
ONGOING PRICING	$0.085 / square foot $126 / hr labor costs
CONTRACT DOCUMENTS	Motivf Draft Contract Documentation Motivf Final Pricing Template