



# LANMAR SERVICES

3D LASER SCANS TO READY TO USE BIM

## BIM As-Builts from Plans vs 3D Laser Scans

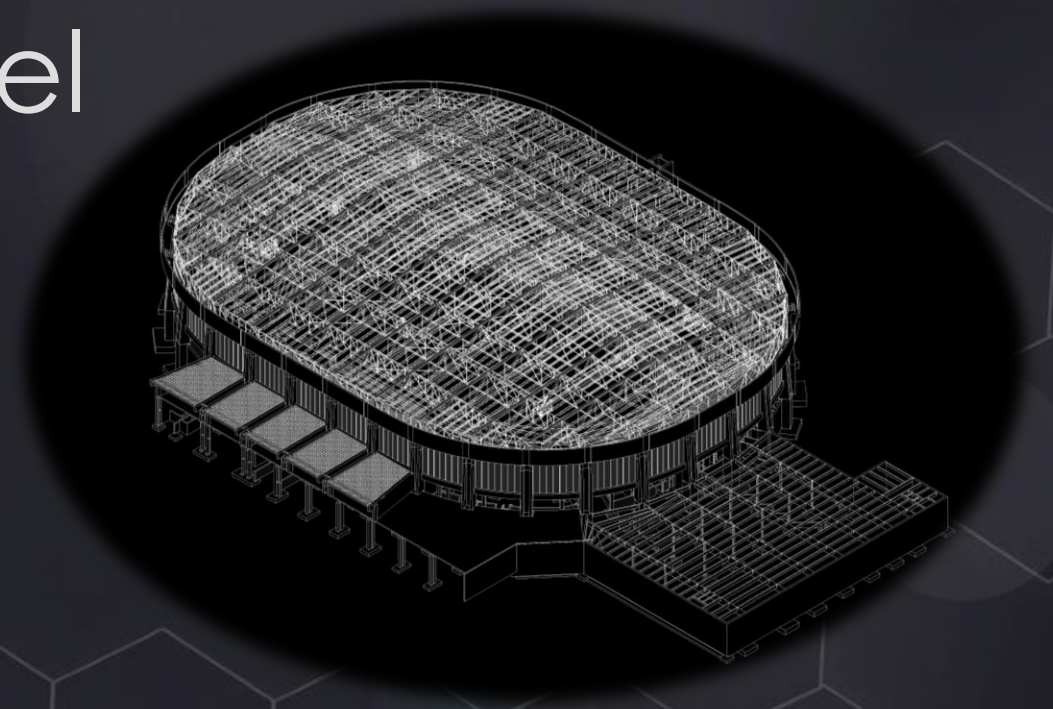
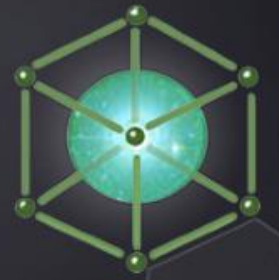
AU 2014

# Goal of discussion is to give you tools for talking to a potential new client

- ▶ Modeling from Plans vs Scans
- ▶ Phases of building design and construction
- ▶ Types of Clients and their needs
- ▶ Bidding tools



“We have the existing plans from 1964. Everything was built exactly according to them. We don’t have the time or the budget to scan the place. It will be faster and cheaper to just build the Revit model from the plans.”





## Will Rogers Coliseum Small



**Scanned** in 1 day  
1.5 weeks 1 modeler  
70 Hours

## vs Nassau Coliseum Medium



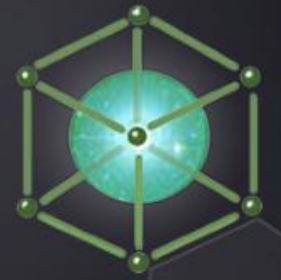
Drawings and field  
Verification

6 Days in Field - 2 People  
2<sup>nd</sup> trip ½ day – 1 person  
8 weeks - 3 Modelers  
460 hours+

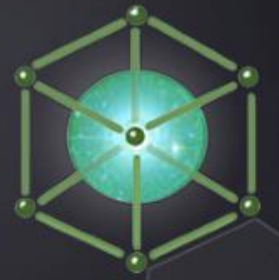
## vs American Airlines Stadium Large



3 days scanning  
3 weeks modeling – 1  
person  
160 hours



# Field Time: Scanner vs Measuring



- ▶ Mechanical rooms are loud hot uncomfortable environments
  - ▶ 20 min scanning = 6 hours measuring
- ▶ Less time in field is greater convenience for clients
  - ▶ Less Disruption to occupied spaces
  - ▶ Less chance for contaminants of Operation rooms, Clean rooms, MFG...
  - ▶ Less need for security escorts

# Modeling from Plans vs Scans

When someone suggest they should use existing plans to build a computer model and scanning isn't necessary – What is required?

- ▶ Architectural
- ▶ Structural
- ▶ Mechanical
- ▶ Electrical
- ▶ Plumbing
- ▶ Civil





# Modeling from Plans vs Scans

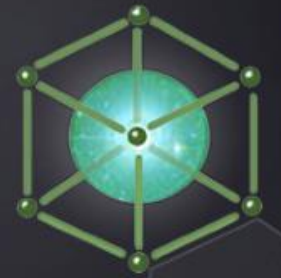
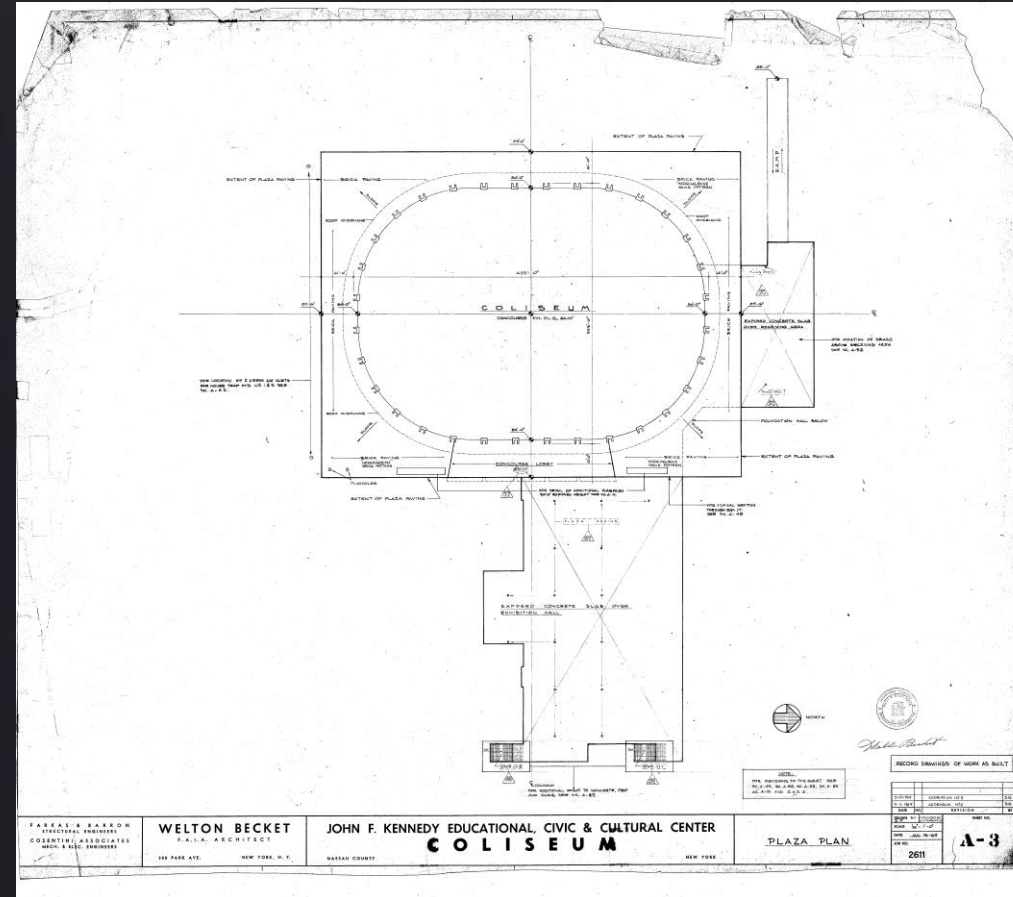
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- ▶ **Architectural**

- ▶ **Site Plans**

- ▶ Floor Plans
  - ▶ Reflected Ceiling plans
  - ▶ Elevations
  - ▶ Multiple Schedules
  - ▶ Multiple Sections
  - ▶ Multiple Details
  - ▶ Specifications

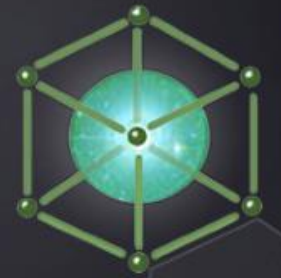
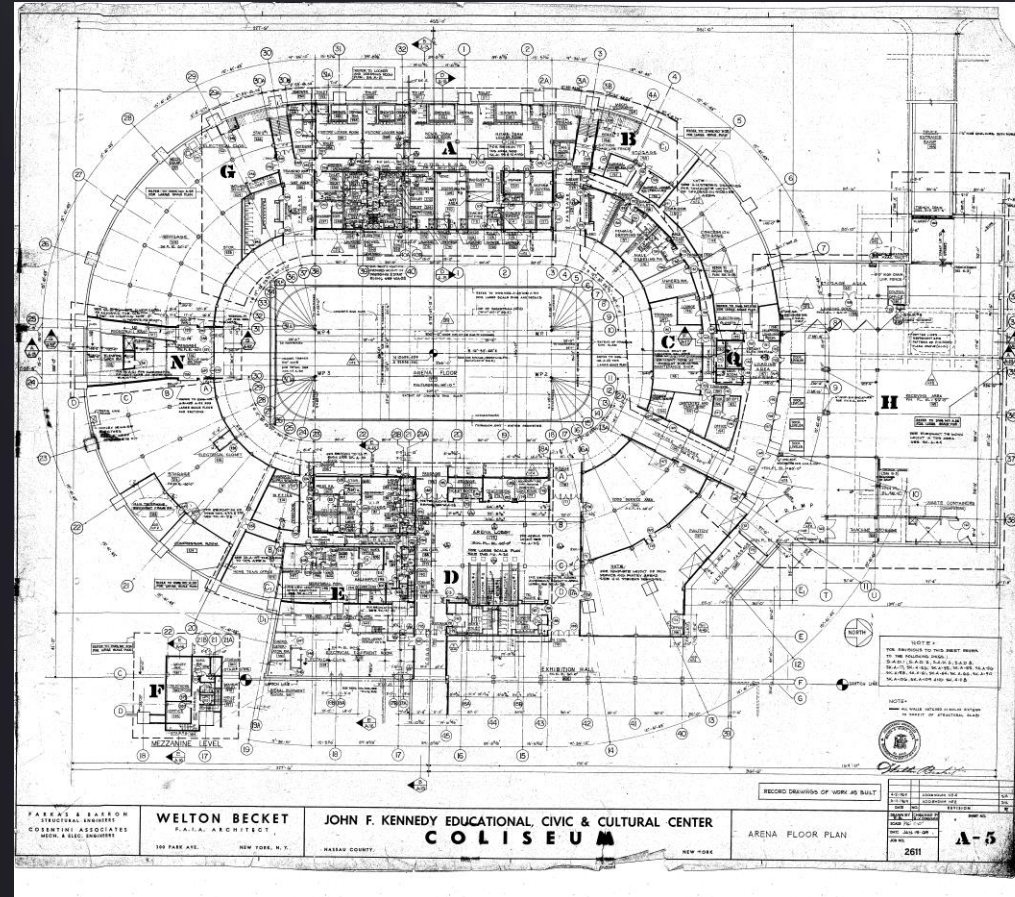
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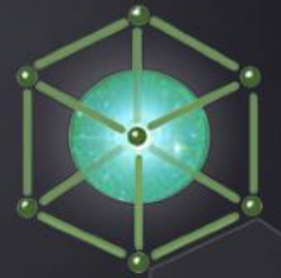
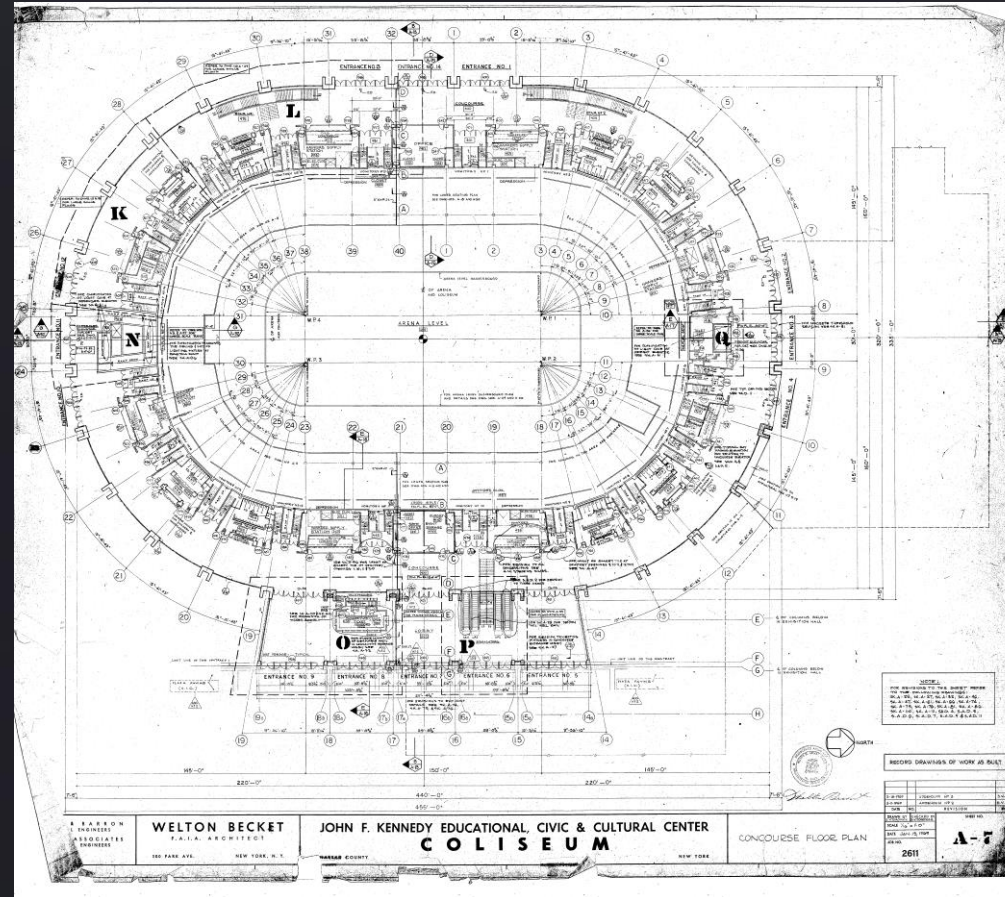




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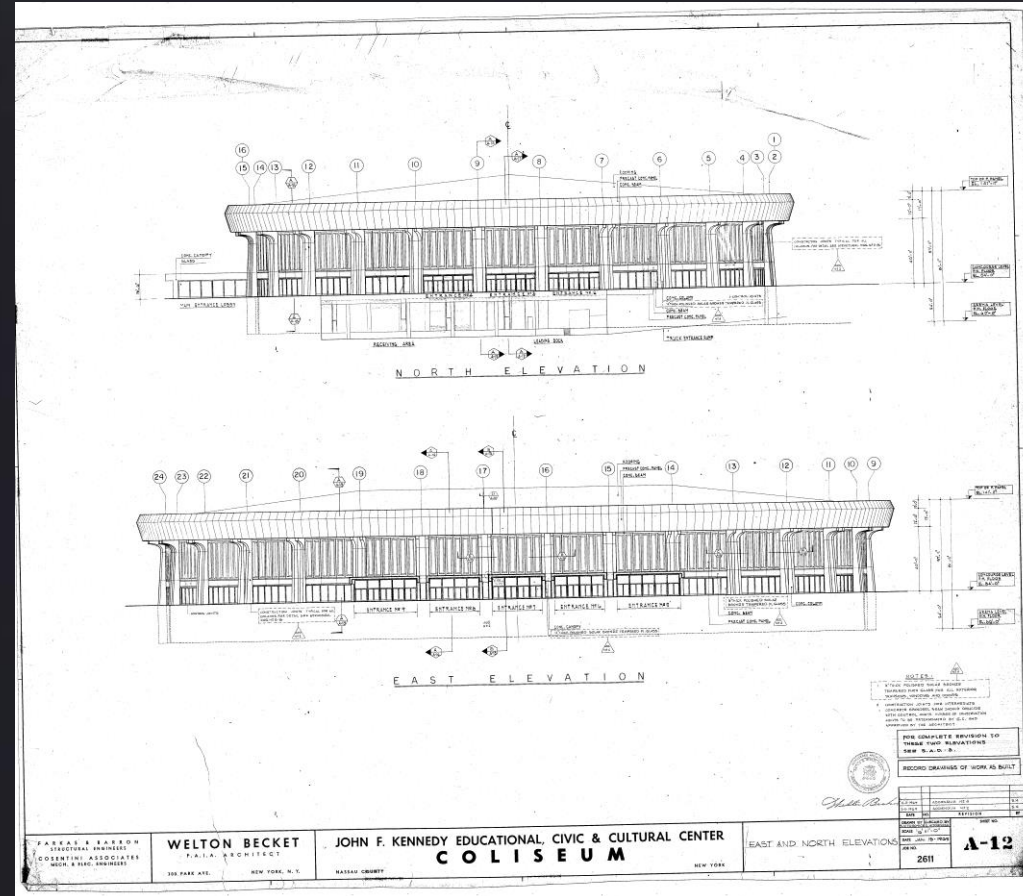
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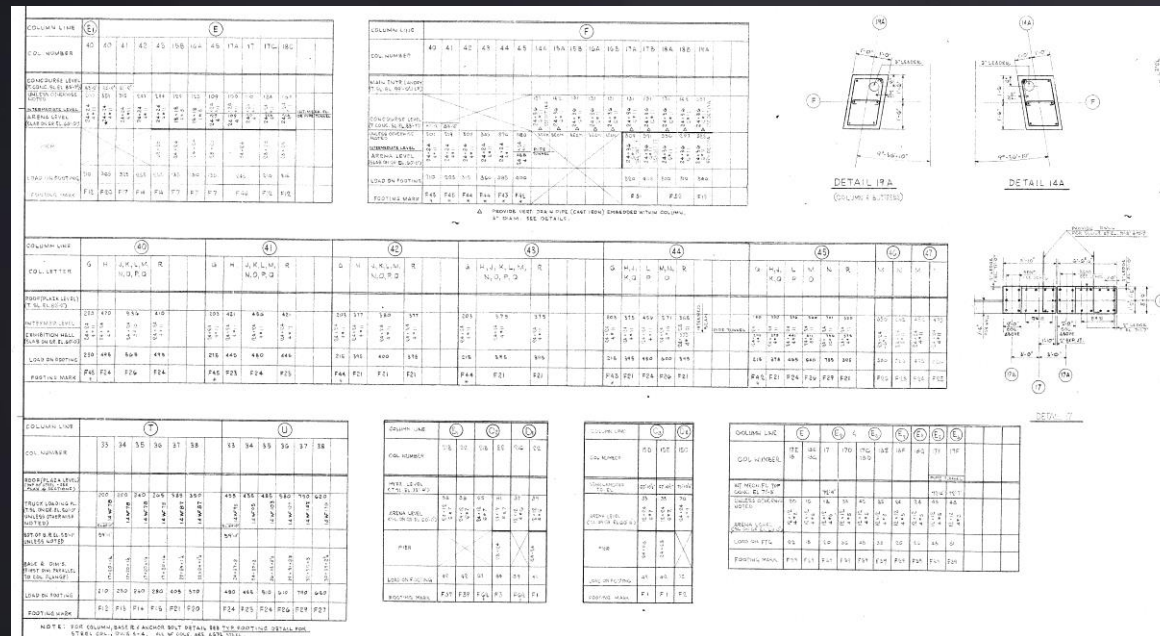
## ► Structural

## ► Mechanical

## ► Electrical

## ► Plumbing

## ► Civil



The image displays a complex architectural drawing with multiple schedules and details. The schedules are organized into columns and rows, each with a specific header and data fields. The details are labeled DETAIL 142 and DETAIL 143, showing cross-sections of structural elements. The drawing is a technical representation of a building's structural components, likely for a bridge or a large industrial structure, given the scale and complexity of the details.

Column Line	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
COL. NUMBER	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
CONCRETE GRADE	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
STEEL GRADE	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
REINFORCING	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
LOAD ON FOOTING	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
FOOTING MARK	F1	F1	F1	F1	F1	F1	F1	F1	F1	F1	F1	F1	F1	F1	F1	F1

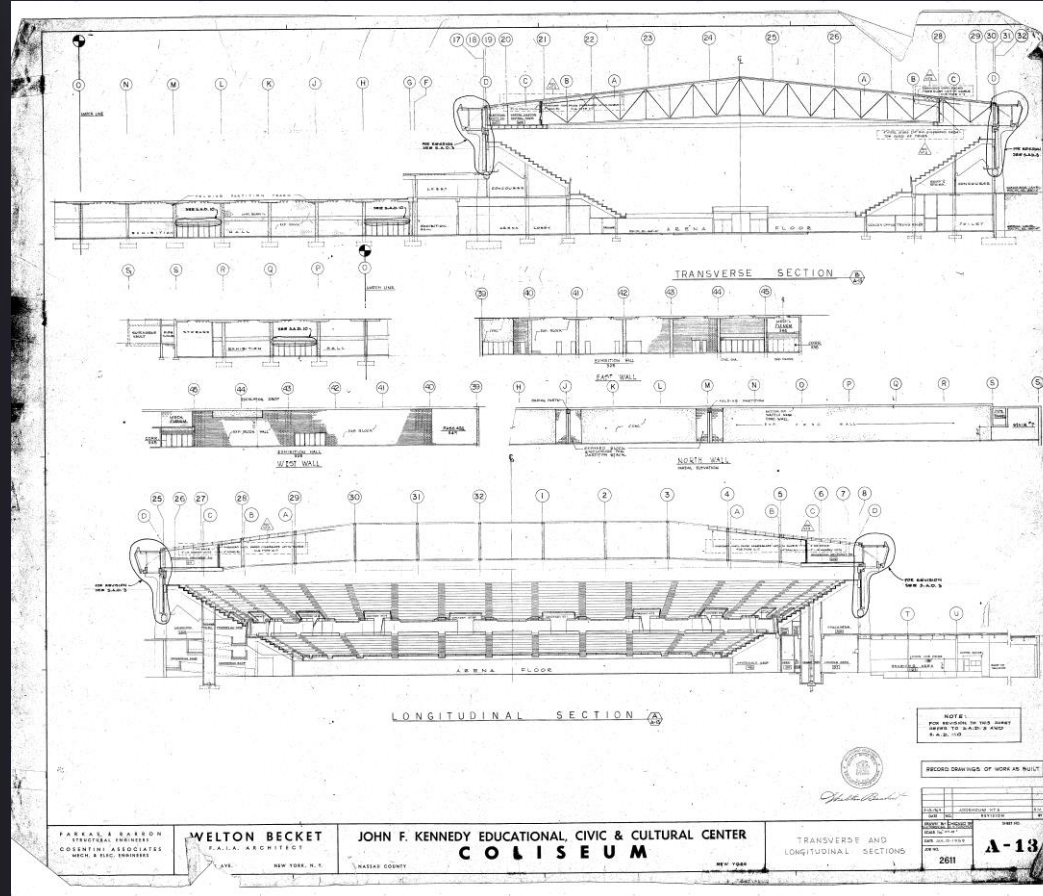
DETAIL 142  
DETAIL 143



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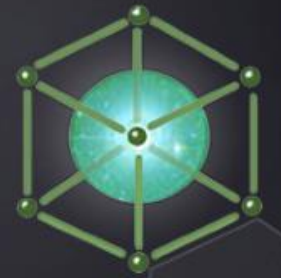
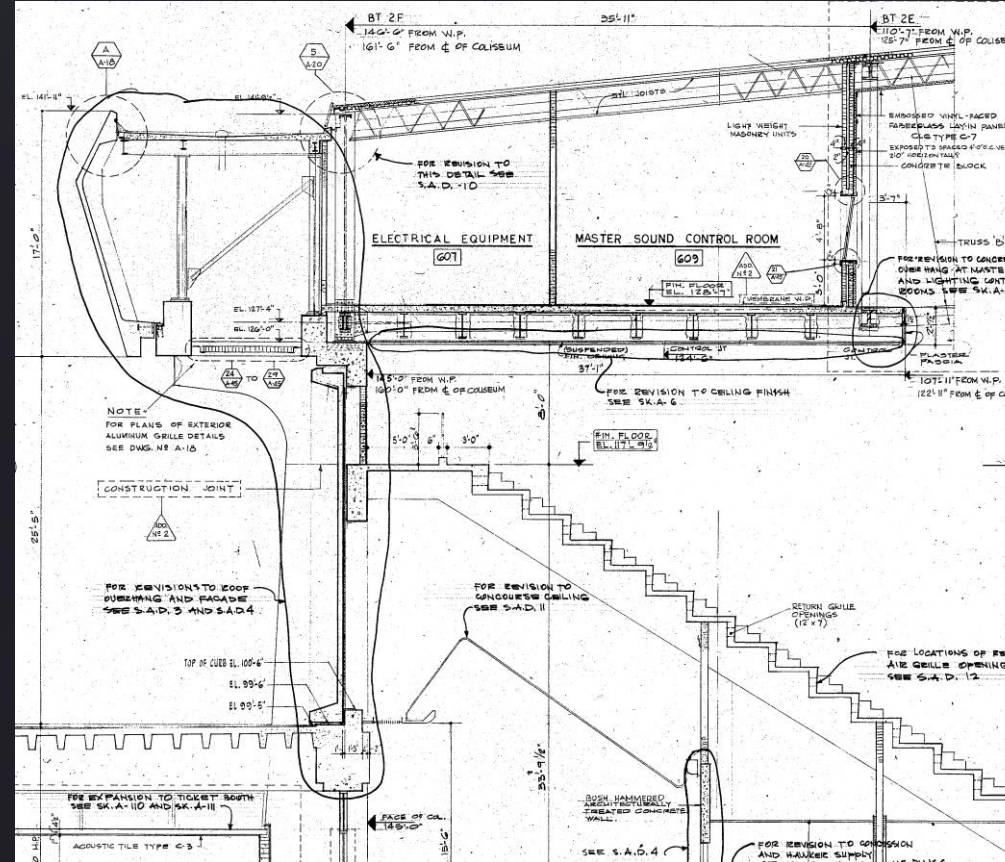
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Blah blah blah blah blah blah blah blah blah blah  
blah blah blah blah blah blah blah blah blah blah  
blah blah blah blah blah blah blah blah blah blah  
blah blah blah blah blah blah blah blah blah blah  
blah blah blah blah **THINGS YOU** blah blah blah  
blah blah blah blah **CARE ABOUT** blah blah blah  
blah blah blah blah blah blah blah blah blah blah  
blah blah blah blah blah blah blah blah blah blah  
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# Modeling from Plans vs Scans

When someone suggest they should use existing plans to build a computer model and scanning isn't necessary – What is required?



Where are the Change Orders  
and Shop Drawings???

Sheets will often go missing, fade,  
torn off, or be badly stained.

# How accurate are existing drawings?



- ▶ Design Drawings – Typically have many inaccuracies. Many changes are made in the field during construction of any project.
  - ▶ Clients increase and decrease budgets and scope during construction.
  - ▶ Contractors have to respond to existing conditions and any uncoordinated issues in drawings.
  - ▶ Some contractors try to out smart the design team...They have SAS...Stupid Architect Syndrome.
  - ▶ CAD vs Tape Measure – The perfect virtual design in CAD is precise, however when laying out things in construction with a tape measure and real materials things grow, shrink, and move
  - ▶ Design Drawings DO NOT EQUAL shop drawings.



# How accurate are existing drawings?

- **Rounding errors in field verifying a space are usually far greater than errors in registration.**



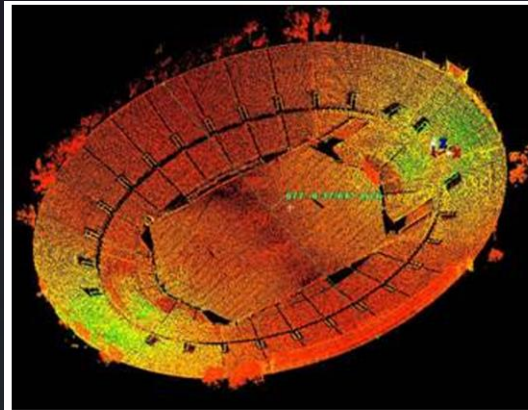
# How accurate are existing drawings?

- ▶ **Liability** and **Reputation** are based on your final deliverable
  - ▶ Which would you want your company's models based on?
    - ▶ Drawings vs. Scanning

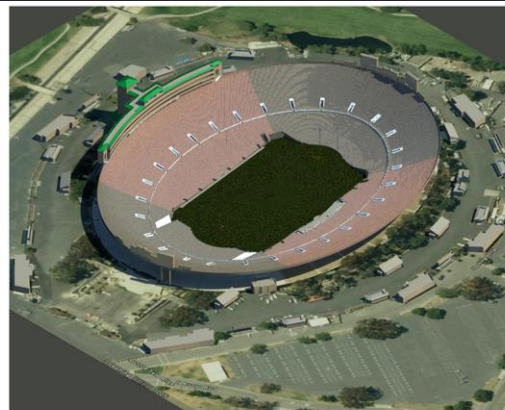


# Time

- ▶ In the field – Scanning vs Referring to Drawings with field verification using tape measure and camera.



3D Laser Scan of the Rose Bowl



Computer Model from Scan

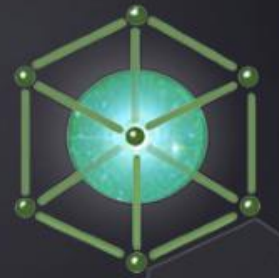
- ▶ **Travel time extended for field verifying + multiple trips**





# Time

- ▶ In the field – Scanning vs Referring to Drawings with field verification using tape measure and camera.
- ▶ In the office review– Reading Hundreds of pages of documents vs registering a point cloud.



# Time

- ▶ In the field – Scanning vs Referring to Drawings with field verification using tape measure and camera.
- ▶ In the office review– Reading Hundreds of pages of documents vs registering a point cloud.
- ▶ Modeling – Referencing hundreds of pages on paper / pdf / cad vs tracing a single registered point cloud of the existing structure.
  - ▶ Having drawings is great additional info to a point cloud.
  - ▶ Should be used after Point cloud is exhausted.



# Time

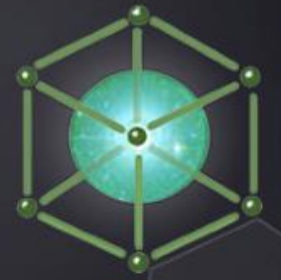
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**The end result is approximately  
3-5 times faster with a point  
cloud and far greater accuracy.**

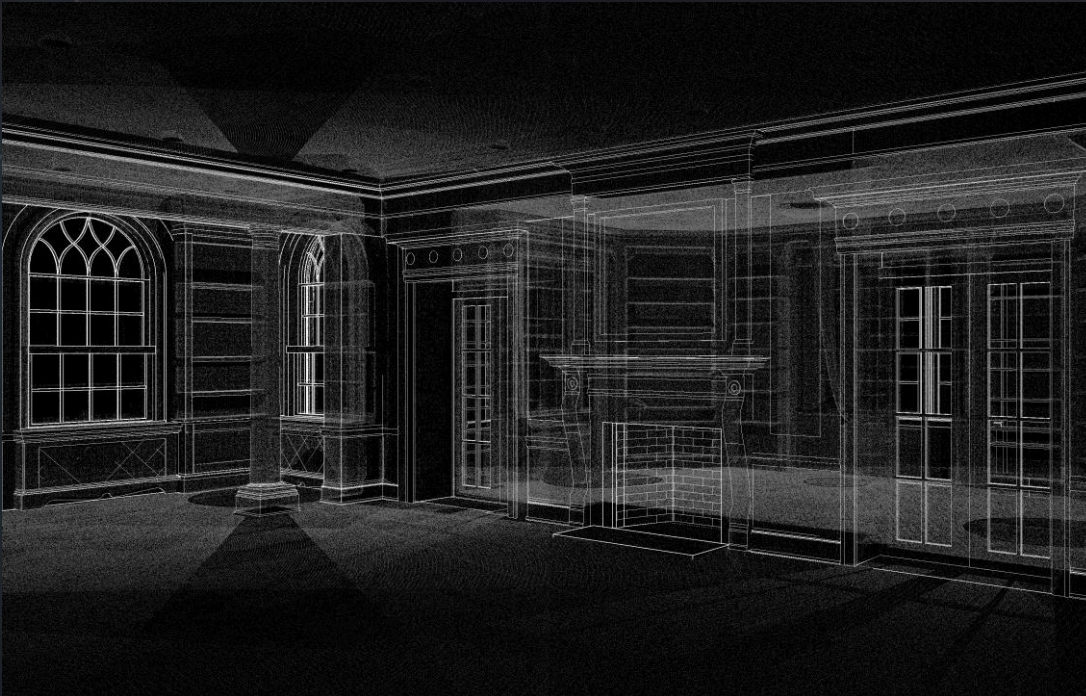




# Time = Money



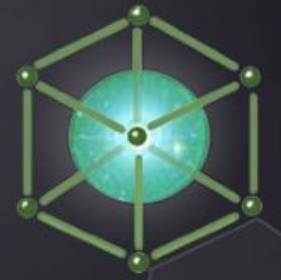
- ▶ 3D Scanning is Faster, more Accurate, and more Economical than any traditional methods of documenting buildings.



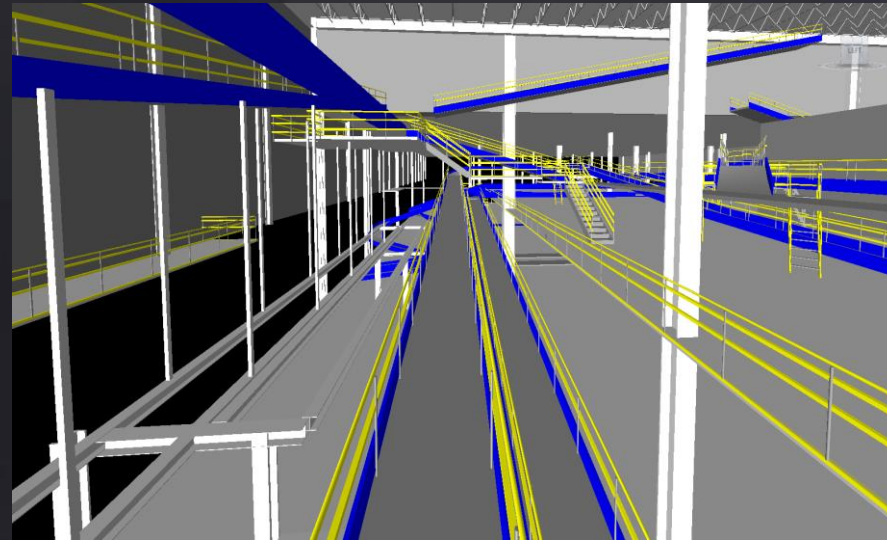
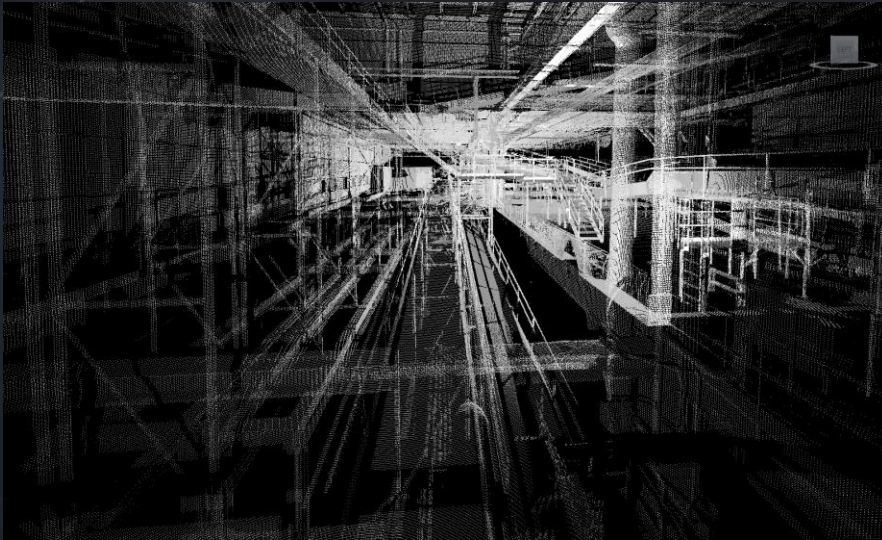
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# Scanning for the phases of building design and construction

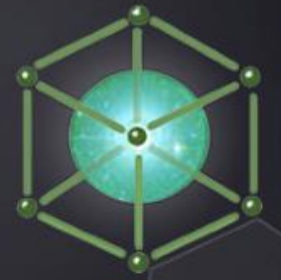


- ▶ Predesign – creating a base model of existing
  - ▶ Architectural, Structural, Mechanical, Electrical, Plumbing, Civil

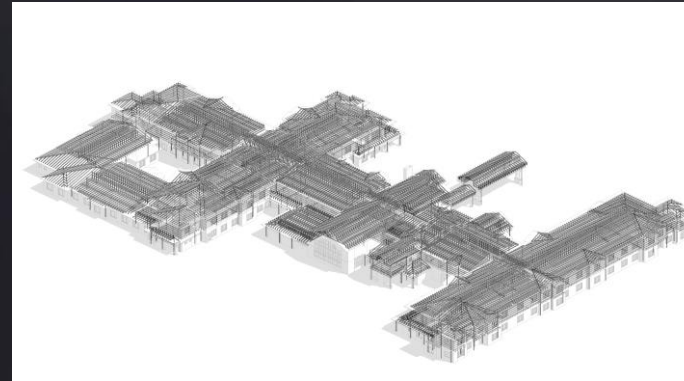
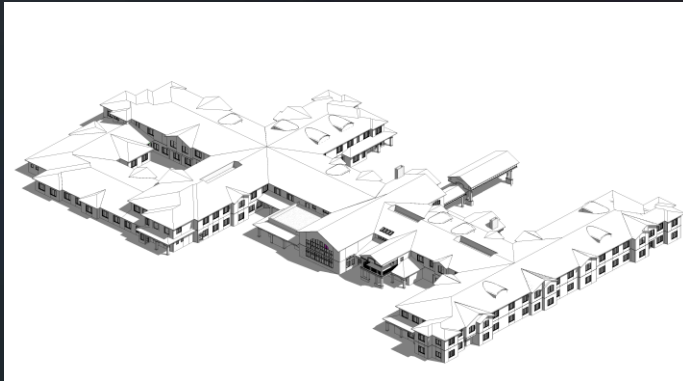




# Scanning for the phases of building design and construction



- ▶ Contractors
  - ▶ Coordination and Collision Detection
  - ▶ Field Verification for all trades – Each trade normally sends someone for measuring. Scanning saves countless hours.

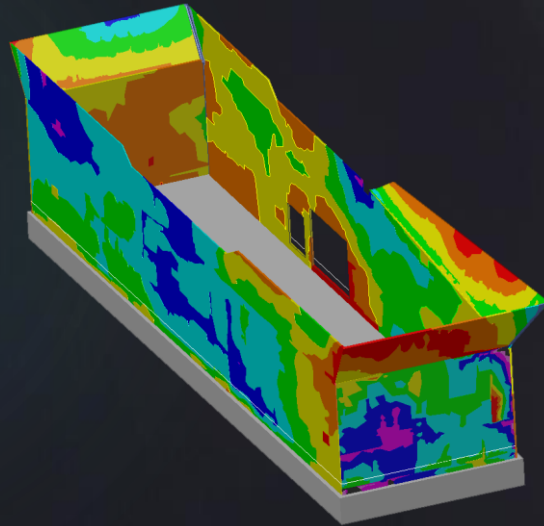




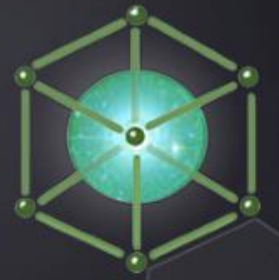
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  - ▶ Flatness of Concrete pours

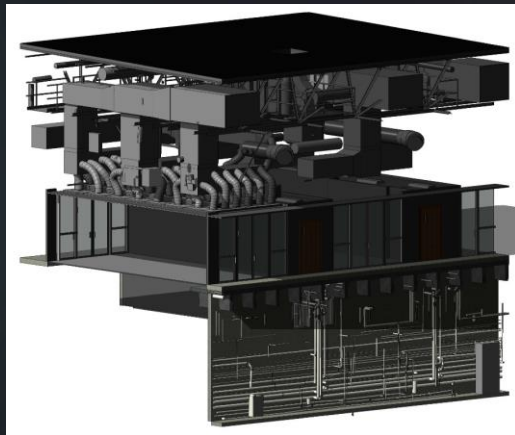


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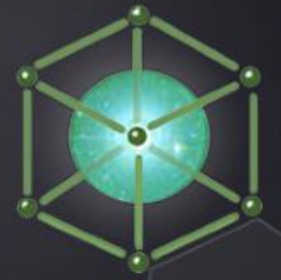


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- ▶ Flatness of Concrete pours
- ▶ Rough ins



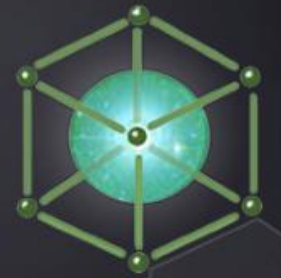
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  - ▶ Final As Builts



# Types of Clients and their needs

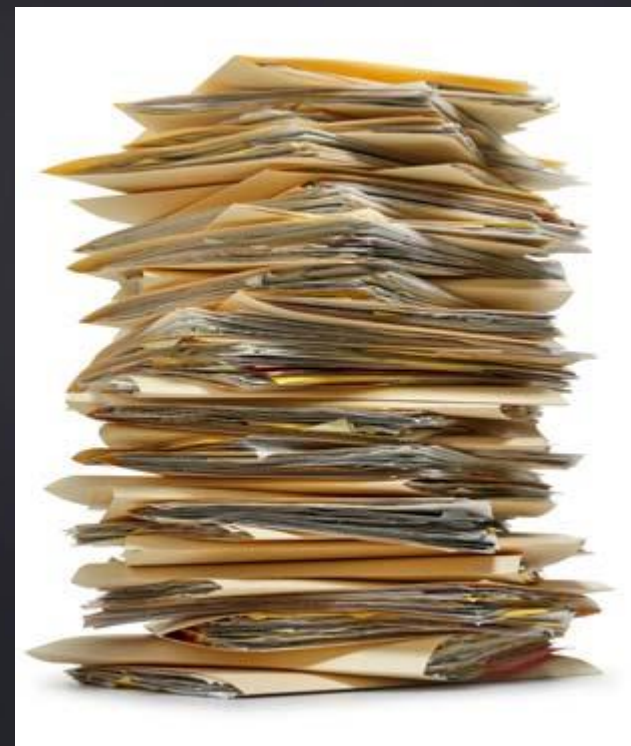
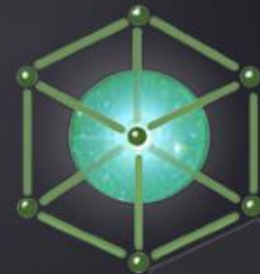


- ▶ Architectural
- ▶ Engineers
- ▶ Contractors
- ▶ Historic Preservation
- ▶ Facility Managers – Maintenance and multiple renovations
- ▶ Property Managers – tracking assets – verify SF on Leases
- ▶ Fundraising
- ▶ Security – Event Preparation – Approach rehearsal



# Bidding tools

- ▶ Photos
- ▶ Old Plans

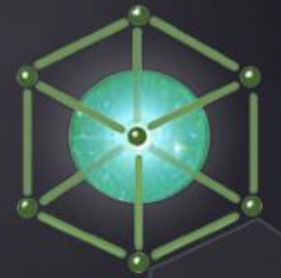


# Bidding tools

## ► Price charts

Price per Square Feet			
1"	3x	6x	12x
2"	2x	4x	6x
4"	1x	2x	3x
	Warehouse	Office	Historic Preservation

1. Clients usually round **DOWN** SF
2. No 2 buildings are the same
3. Tracking your teams progress is crucial to getting an accurate chart





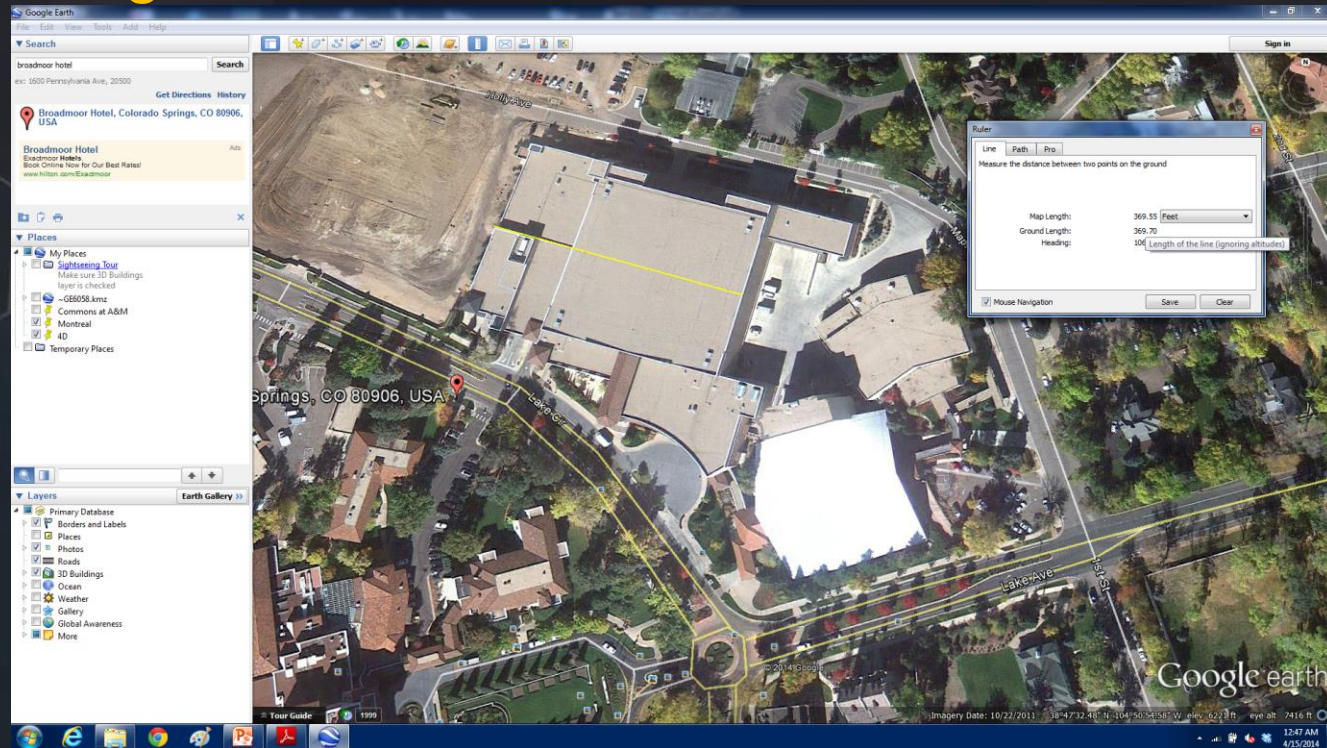
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- ▶ Price charts
- ▶ **Google Earth**

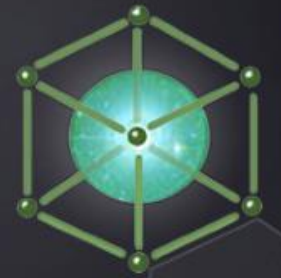


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- ▶ Scan Maps





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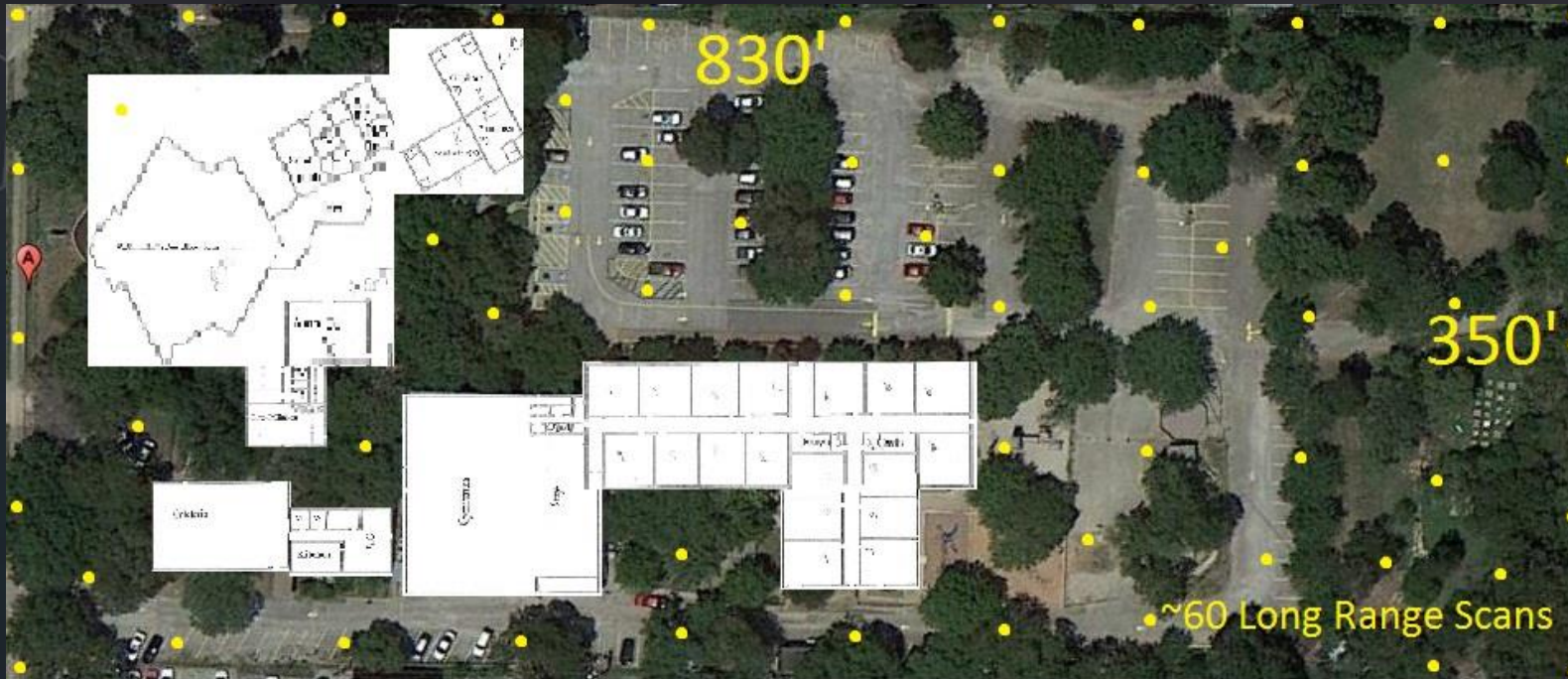
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- ▶ Price charts
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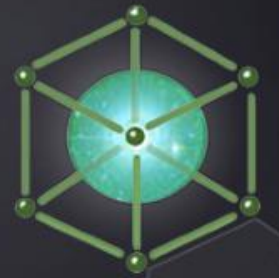
# Bidding tools



- ▶ Standard List of Questions
  - ▶ Security Needs or special requirements
  - ▶ Building type...Warehouse, Office, Factory
  - ▶ Size in SF if known
  - ▶ What will clients use your deliverable for?
  - ▶ Interior / Exterior / Roof?

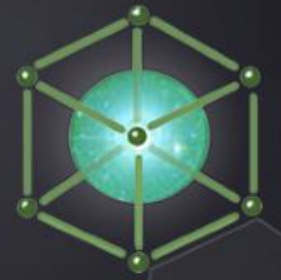


# Scanning isn't Perfect



- ▶ Never claim perfection. Scanning is just a better tape measure than we ever had in previous history.
- ▶ In buildings, there is no such thing as 100% Coverage.
- ▶ Modeling packages decimate
- ▶ Never Over promise – You are cool enough AS IS.
- ▶ Few clients know what to ask for. It is YOUR JOB to understand their needs.





# Thank you

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