

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ROOFR INC.,
Petitioner

v.

PICTOMETRY INTERNATIONAL CORP.,
Patent Owner

IPR2023-00435
Patent 10,648,800

**DECLARATION OF TONY CUMMINGS IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW**

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LIST OF EXHIBITS

Exhibit	Description
Ex. 1001	U.S. Patent No. 10,648,800 (“’800 patent”)
Ex. 1002	File History of the ’800 patent
Ex. 1003	Expert Declaration of Tony Cummings
Ex. 1004	U.S. Pat. Pub. No. 2008/0262789 A1 (“Pershing-789”)
Ex. 1005	U.S. Pat. Pub. No. 2007/0220174 A1 (“Abhyanker”)
Ex. 1006	U.S. Pat. Pub. No. 2008/0231700 A1 (“Schultz”)
Ex. 1007	<i>Airborne Digital Imaging Technology: A New Overview</i> , Petrie et al., <i>The Photogrammetric Record</i> 11(119): 203-225 (September 2007) (“Petrie”)
Ex. 1008	<i>Pictometry: aerial photography on steroids</i> , LET Staff, <i>Law Enforcement Technology</i> (July 2002) (“Pictometry”)
Ex. 1009	U.S. Pat. Pub. No. 2009/0304227 A1 (“Kennedy”)
Ex. 1010	<i>Roofer: Steep Roofing Inventory Procedures And Inspection And Distress Manual For Asphalt Shingle Roofs</i> , David M. Bailey, U.S. Army Corps of Engineers, CERL Tech. Rept. (December 1999) (“Bailey”)
Ex. 1011	04/17/2008 Drawings From File History of Pershing-789
Ex. 1012	Declaration of Sylvia Hall-Ellis

GROUND OF CHALLENGE (37 C.F.R. § 42.204(b)(2))

No.	Ground for Challenge
1	Pershing-789 And Abhyanker Render Obvious Claims 1-17 Of The '800 Patent
2	Pershing-789, Abhyanker And Pictometry Render Obvious Claims 9 And 14 Of The '800 Patent
3	Kennedy And Abhyanker Render Obvious Claims 1-17 Of The '800 Patent

LIST OF CHALLENGED CLAIMS

Claim
Claim 1a: A process, comprising:
Claim 1b: receiving first location data;
Claim 1c: providing visual access to a first image corresponding to the first location data, the first image including a roof structure of a building;
Claim 1d: providing a first computer input capable of signaling a designation from a user of a building roof structure location within the first image, wherein the building roof structure location is a geographic position of the building roof structure and is different than the first location data;
Claim 1e: receive a designation of the building roof structure within the first image;
Claim 1f: responsive to receiving the designation of the building roof structure location, providing a second computer input capable of signaling user-acceptance of the building roof structure location within the first image, wherein user-acceptance is one or more affirmative steps undertaken by the user to confirm the designation of the building roof structure location; and
Claim 1g: subsequent to receiving the user-acceptance confirming the designation of the building roof structure location, providing a report for the building roof structure.
Claim 2: The process of claim 1, further comprising providing visual access to one or more outline drawing corresponding to the roof structure of the building.
Claim 3: The process of claim 2, further comprising providing one or more length dimension on the outline drawing.
Claim 4: The process of claim 3, wherein the length dimension is one or more of a perimeter of the roof structure, a length of a ridge of the roof structure, a total length of ridges of the roof structure, a length of a valley of the roof structure, a total length of valleys of the roof structure, a length of a flashing of the roof structure, and a total length of flashings of the roof structure.
Claim 5: The process of claim 2, further comprising providing one or more area dimension on the outline drawing.
Claim 6: The process of claim 2, further comprising providing one or more pitch dimension on the outline drawing.
Claim 7: The process of claim 2, further comprising providing one or more indicator of pitch direction on the outline drawing.

Claim
Claim 8: The process of claim 2, further comprising providing one or more non-dimensional attribute of the roof structure on the outline drawing.
Claim 9: The process of claim 2, further comprising, providing visual access to a nadir image from an imagery database corresponding to location coordinates of the building roof structure location, and wherein the outline drawing is super imposed on the nadir image.
Claim 10: The process of claim 1, wherein the first image is taken from an overhead view with respect to the roof structure of the building.
Claim 11a: A non-transitory computer memory storing computer logic, that when executed by computer hardware causes the computer hardware to:
Claim 11b: receive first location data generally corresponding to a geographic location of a building;
Claim 11c: provide visual access to a first image corresponding to the first location data, the first image including a roof structure of the building;
Claim 11d: provide a first computer input capable of signaling a designation from a user of a building roof structure location within the first image, wherein the building roof structure location is a geographic position of the building roof structure and is different than the first location data;
Claim 11e: receive the designation of the building roof structure location;
Claim 11f: responsive to receiving the designation of the building roof structure location, provide a second computer input capable of signaling user-acceptance of the building roof structure location within the first image, wherein user-acceptance is one or more affirmative steps undertaken by the user to confirm the designation of the building roof structure location; and
Claim 11g: subsequent to receiving the user-acceptance confirming the designation of the building roof structure location, providing a report for the building roof structure.
Claim 12: The non-transitory computer memory of claim 11, wherein said computer logic when executed by computer hardware causes the computer hardware to: provide visual access to one or more outline drawing corresponding to the roof structure of the building.
Claim 13: The non-transitory computer memory of claim 12, wherein said computer logic when executed by computer hardware causes the computer hardware to: provide at least one length dimension on the outline drawing.
Claim 14: The non-transitory computer memory of claim 12, wherein said computer logic when executed by computer hardware causes the computer

Claim
hardware to: provide visual access to a nadir image of an imagery database corresponding to location coordinates of the building roof structure location, and wherein the outline drawing is super-imposed on the nadir image.
Claim 15: The non-transitory computer memory of claim 12, wherein said computer logic when executed by computer hardware causes the computer hardware to: provide one or more area dimension on the outline drawing.
Claim 16: The non-transitory computer memory of claim 11, wherein the first image is taken from an overhead view with respect to the roof of the building.
Claim 17a: A method, comprising:
Claim 17b: receiving, by a user, visual access to a first image of a region corresponding to first location data, the first image including a roof structure of a building;
Claim 17c: signaling, by the user, a designation from the user of a building roof structure location within the first image, wherein the building roof structure location is a geographic position of the building roof structure and is different than the first location data;
Claim 17d: signaling, by the user, user-acceptance of the building roof structure location within the first image, wherein user-acceptance is one or more affirmative steps undertaken by the user to confirm the designation of the building roof structure location; and
Claim 17e: subsequent to signaling the user-acceptance confirming the designation of the building roof structure location, receiving a report for the building roof structure; and
Claim 17f: repairing or constructing a roof designated by the building roof structure location.

I. BACKGROUND AND QUALIFICATIONS

1. I have been retained by Petitioner as a technical expert to analyze claims 1-17 of U.S. Patent No 10,648,800. I am being compensated for my time at a consulting rate of \$490 per hour. My compensation does not depend on the outcome of this petition. In this section I have summarized my education, career history, publications, and other relevant information. My curriculum vitae, which includes my qualifications as well as my publications, is attached as Appendix A.

2. I have a Bachelor of Architecture from Kansas State University graduating in 1977. I have been a licensed, practicing architect since 1983 hold architectural licenses in 18 states, 14 are currently active. I also have certification with OSHA 10-hour Construction Safety and Health Training and California Office of Emergency Services Safety Assessment Program Evaluator. I have previously held a Level 2 Certification as an Infrared Thermographer performing building wall and roof evaluations for moisture intrusion. I hold professional memberships at the American Institute of Architects (AIA), Construction Specifications Institute (CSI), International Code Council (ICC), National Fire Protection Association (NFPA), National Institute of Building Science (NIBS), Society of Value Engineering (SAFE), American Society of Professional Estimators (ASPE), and the International

Institute of Building Enclosure Consultants (IIBEC), formally known as The Roof Consultant's Institute (RCI).

3. My experience with evaluation and testimony on construction disputes started in 1984 during the period I had an architectural practice in Colorado. In 1989 and a portion of 1990, I worked for a claims consulting firm in their Clearwater Florida office where I evaluated defective construction claims primarily related to condominium projects.

4. Since 1990, I have owned and operated Construction Forensics, Incorporated (CFI) providing analysis of construction failures and disputes. In that time, I have performed forensic investigations in 16 states, for plaintiffs and defendants to include: code review and conformance, failure analysis of building systems and components, material and workmanship evaluations, Standard of Care for design professionals, CPM schedule analysis, suitability of plans and specifications, analysis of cost estimates and providing cost estimate for remediation, including roofing. Deposition and expert testimony, beginning in 1984, have been for cases in Circuit Courts, District Courts, Superior Court, Arbitration, Mediation, the Armed Services Board of Contract Appeals, and the United States Civilian Board of Contract Appeals.

5. My experience with estimating construction projects began during my architectural internship period assembling preliminary cost

estimates for clients on projects that the architectural firms were designing. The vast majority of these projects were new construction which required cost related to new roofing on both commercial and residential. Between 1980 and 1983 I began as an estimator and later became head of estimating for a firm in Colorado specializing in Department of Defense construction projects (primarily housing rehabilitation). In total, we bid and completed approximately 2000 housing units across the United States ranging from minor interior renovation to whole house/building repairs. Between 1987 to 1989, I was hired to become head of estimating and overhaul the existing estimating component of the firm which also specialized in Department of Defense construction projects. While at this firm, I became the quality control officer on a 135-unit housing development overseeing the total renovation of abandoned base housing in Newport, Rhode Island. Since 1990, I have provided forensic analysis of numerous roofs and performed estimates which have included estimating the cost to repair for litigation purposes on a variety of project types.

6. While I am not a computer programmer, I have extensive experience using software related to construction. Indeed, I have spent decades working with software related to construction modeling and estimation. For example, I have relied on Computer-aided Design Packages

(CAD), programs that have automated the building code review process, Critical Path Method scheduling packages (CPM), and construction estimating software. I have been using this software for decades. I also have experience collaborating with software developers to create new software in my field. For example, in approximately 2010 I partnered with a computer programmer to develop a photo-documentation and document control software to assist in my Owner's Representative assignments.

II. LEVEL OF SKILL IN THE ART

7. I understand that a person of ordinary skill in the art at the time of the alleged invention would have bachelor's degree in architecture or an equivalent with at least five years of experience performing roof estimation. This level of skill is approximate, and more experience would compensate for less formal education, and vice versa.

III. LEGAL STANDARDS

8. I understand that "prior art" includes patents and printed publications that existed before the earliest applicable filing date of the '800 Patent.

9. I understand that in order for a claim to be anticipated, each and every requirement of the claim must be found, expressly or inherently, in a single prior art reference as recited in the claim.

10. I understand that a claimed invention is not patentable if the claimed invention would have been obvious to a person of ordinary skill in the field of the invention at the time the invention was made.

11. I understand that in order to show obviousness based on a combination of references, a particular motivation to combine the teachings in the references must be shown.

12. I understand that claim terms are generally given their ordinary and customary meaning, which is the meaning that the term would have to a person of ordinary skill in the art at the time of the invention. I further understand that a person of ordinary skill in the art must read the claim term not only in the context of the particular claim in which the term appears but in the context of the entire patent, including the specification.

13. I understand that the obviousness inquiry should not be done in hindsight, and depends on the scope and content of the prior art, the differences between the prior art and the claims at issue, the knowledge of a person of ordinary skill in the pertinent art at the time of invention, and any other objective factors indicating obviousness or non-obviousness.

14. I understand that in order to rely on a reference for obviousness, the reference must be analogous art. I also understand that to be analogous art, the reference must be either (1) from the same field of endeavor as the

claimed subject matter, regardless of the problem addressed, or (2) if not in the same field of endeavor, reasonably pertinent to the particular problem with which the inventor is involved. I am also familiar with the premise that for a reference to be reasonably pertinent, it must have logically commended itself to an inventor's attention at the time of invention.

IV. CLAIM CONSTRUCTION

15. Based on my review of the '800 patent, it is my opinion that express interpretations of the challenged claims of the '800 patent are not necessary, as the challenged claims are rendered unpatentable by the cited art under any reasonable interpretation of the claims. I reserve my right to respond to, and/or to offer alternative constructions to any proposed claim constructions offered by Patent Owner. I have taken no position in this declaration as to whether the claims are indefinite, and no statements herein should be interpreted to mean that the terms are definite.

V. OVERVIEW OF THE '800 PATENT

16. The '800 patent is generally directed towards a "system and process for roof measurement" using an image of a roof. Ex. 1001 at Abstract. The challenged claims generally recite: (1) receiving a location; (2) providing an image of the location; (3) providing an input for a user to select a roof within the image; (4) receiving the user selection; (5) providing an input for

the user to confirm the selection; and (6) providing a “report” for the selected roof. Ex. 1001 at claim 1.

17. The specification of the ’800 patent includes exemplary flow charts describing the alleged invention. *Id.* at 1:66-2:4. For example, Figure 3 embodies the steps recited in claim 1.

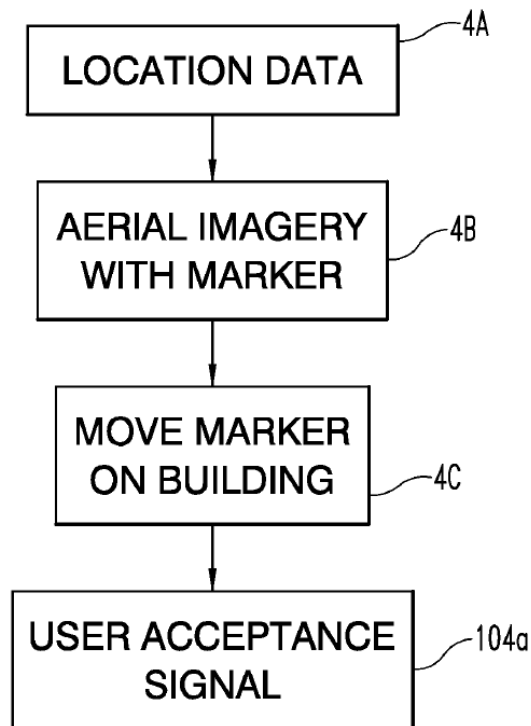


Fig. 3

18. Ex. 1001 at Fig. 3. At the first step “location data . . . is entered.” *Id.* at 11:39. Then, corresponding “[a]erial imagery with a marker is provided.” *Id.* at 11:39-40. These steps are shown in Figs. 4A and 4B:

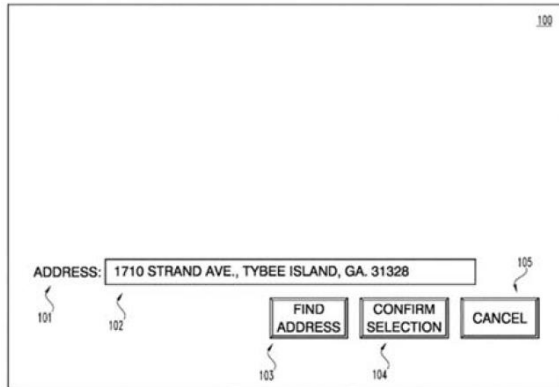


Fig. 4A

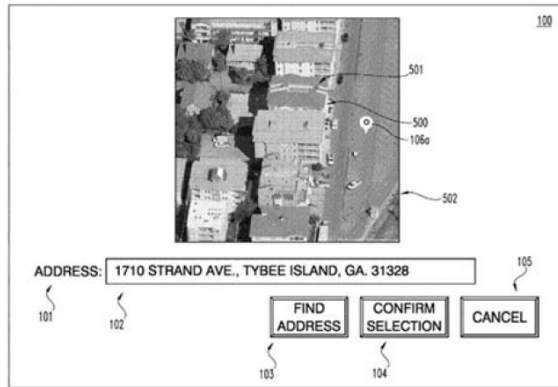


Fig. 4B

19. Ex. 1001 at Figs. 4A-B. As shown in the figure above, the location may be the address of a house or a building with a roof to be measured.

20. Next, a “person moves the marker on the image of the building.” *Id.* at 11:40-41. Then, a user signals “acceptance of that marker position”—in other words, the user confirms their selection. *Id.* at 11:41-42. These steps are shown in Figs. 4C and 4D, highlighted below:

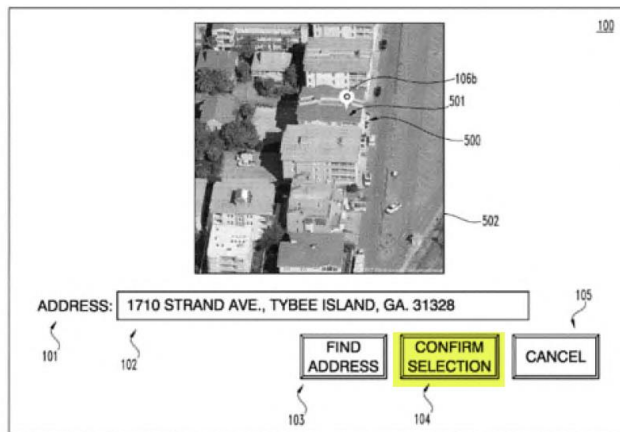


Fig. 4C

Fig. 4D

21. *Id.* at Figs. 4C-D. Finally, a “report” may be delivered (*id.* at 7:35-39) including “one or more pages or screen shots, or both, made available to a user including aerial imagery and/or data from such imagery.” *Id.* at 4:36-

39. According to the specification, these steps may all be performed using routine computer processes (*e.g.*, mouse clicks or check boxes). *Id.* at 3:12-15, 10:19-22.

VI. PROSECUTION OF THE '800 PATENT

22. The application that led to the '800 patent was filed on February 1, 2019. The Examiner issued a Notice of Allowance less than a year later, on January 10, 2020, without issuing a single rejection. Ex. 1002.

VII. PRIORITY DATE OF THE '800 PATENT

23. The earliest application to which the '800 patent claims priority is U.S. Pat. No. 8,401,222 filed on May 22, 2009. It is my understanding that all of the references relied upon in the Grounds in this petition qualifies as prior art if the '800 patent is given a priority date of May 22, 2009. This is consistent with my experience, which confirms that the teachings of the prior art were well-known by May 22, 2009.

VIII. PRIOR ART

A. Pershing-789

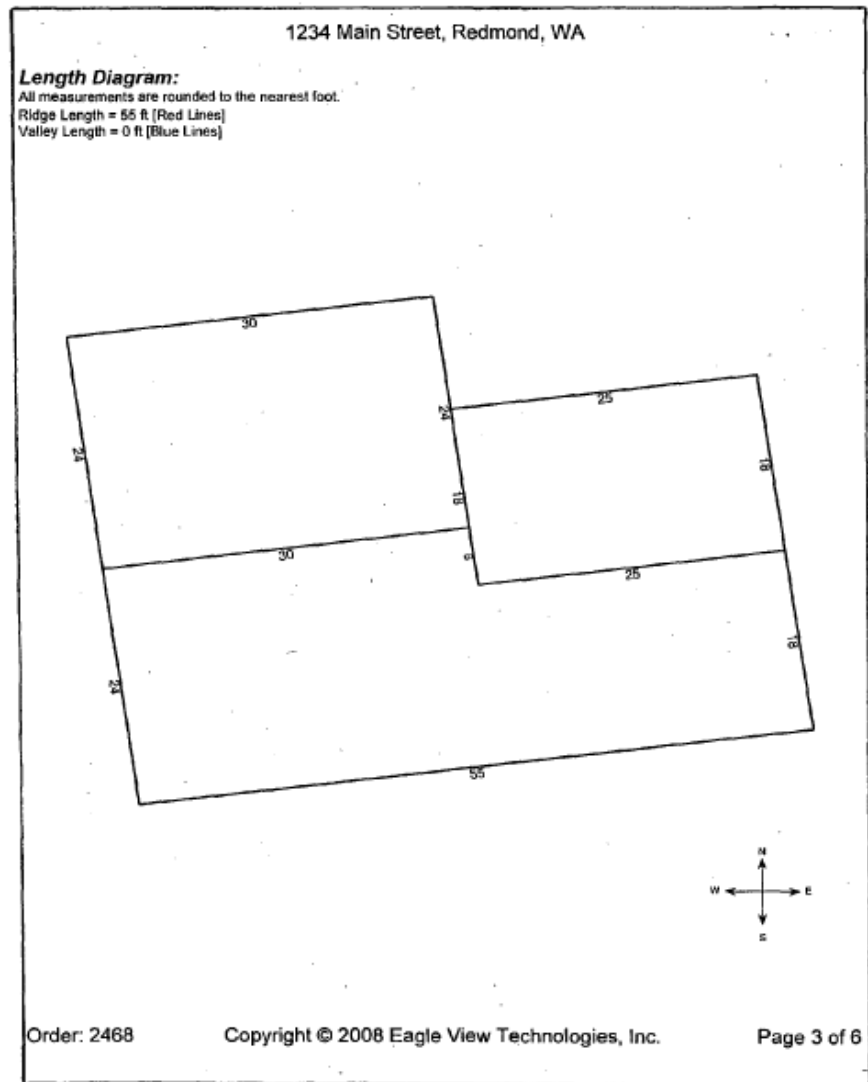
24. U.S. Pat. Pub. No. 2008/0262789 A1 ("Pershing-789") is a U.S. Patent Publication published on October 23, 2008. Accordingly, Pershing-789 qualifies as prior art to the '800 patent under pre-AIA § 102(a). Pershing-789 discloses a "system that allows the remote measurement of the size, geometry, pitch and orientation of the roof...and then uses the information to

provide an estimate to repair or replace the roof, or to install equipment thereon.” Ex. 1004 at Abstract,[0003].

25. Pershing-789 discloses receiving first location data, such as an address (Ex. 1004 at [0011]), and displaying an aerial image of the address in question to enable roof measurement:

The software program 50 is linked to ***an aerial image file database 52 that contains aerial images files 54*** of various building 92 in a region. The aerial image files 54 may be taken any available means, such as an aircraft, balloon, a satellite, etc. ***As shown in FIG. 3, the image files 54*** typically include at least one a top plan view 65 and a perspective view 66 of the building 92.

26. *Id.* at [0022] (emphasis added). Pershing-789 discloses, after taking measurements of the roof in question, generating a report: “From these determinations, the overall shape, slopes and square footage of the roof sections are determined and a ***report*** is produced.” Ex. 1004 at [0012] (emphasis added). An exemplary report is shown in Figure 5C:



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FIG. 5C

Ex. 1004 at Fig. 5C; *id.* at [0038].

B. Abhyanker

27. U.S. Pat. Pub. No. 2007/0220174 A1 (“Abhyanker”) is a U.S. Patent Publication published on September 20, 2007. Accordingly, Abhyanker qualifies as prior art to the ’800 patent under pre-AIA § 102(b). Abhyanker discloses a system that allows “**marker placement in a mapping environment.**” Ex. 1005 at Abstract (emphasis added). Abhyanker discloses

that its mapping environment may include, *e.g.*, “**aerial photography** over neighborhoods and/or places in a terrestrial environment (*e.g.*, the Earth).” Ex. 1004 at [0005] (emphasis added). Abhyanker teaches a “marker” (*e.g.*, a pushpin, an indicator, a pointer, a pin, etc.) may be placed on a landmark in the aerial image by an algorithm. *Id.* at [0004].

28. Abhyanker notes that, in some cases, an algorithm may not correctly place the marker. Abhyanker explains that the algorithm may mistakenly “place [a] marker nearby, but not precisely on, a correct rooftop” or other landmark. *Id.* at [0005]. This glitch may cause problems because, for example, a misplaced marker may result in incorrect driving directions and would result in customer disappointment. *Id.*

29. Abhyanker teaches remedying marker misplacement by allowing a user to “drag and drop” a marker to a corrected location:

Furthermore, the method may include applying a **drag and drop** algorithm that enables the user to sequentially and/or concurrently relocate markers in the mapping environment, iteratively performing additional verifications when any particular marker has been previously moved[.]

30. Ex. 1005 at [0011] (emphasis added). Abhyanker further teaches that, once the marker has been placed by a user, the user may “lock” the location of a marker, confirming its placement:

The locking module 220 may process a marker **locking request** when the particular user claims the wiki profile associated with

the address data. In addition, the locking module 220 may enable the user(s) to control the future relocation of the marker in the mapping environment.

Id. at [0064] (emphasis added).

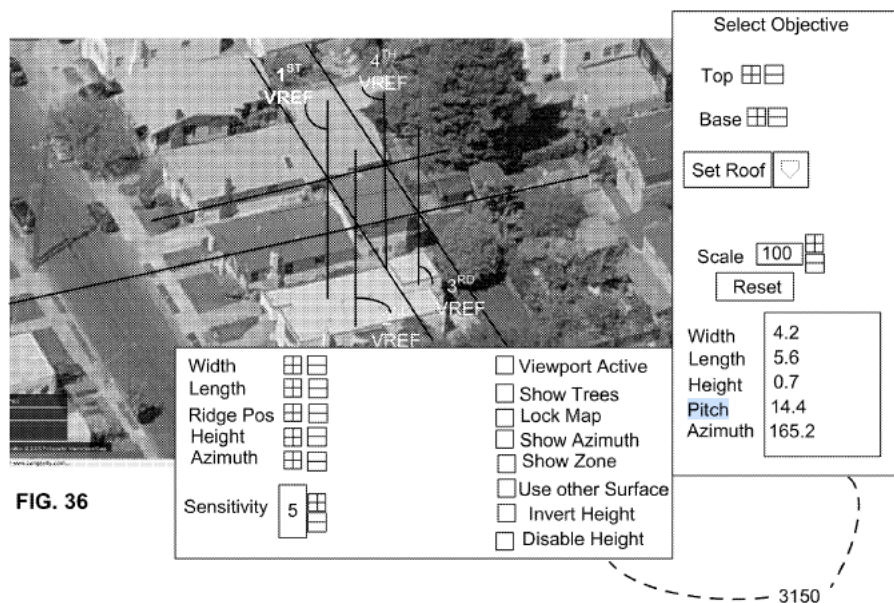
C. Pictometry

31. *Pictometry: aerial photography on steroids*, LET Staff, Law Enforcement Technology (July 2002) (“Pictometry”) is a printed publication published on July 2002. Accordingly, Pictometry qualifies as prior art to the ’800 patent under pre-AIA § 102(b). Pictometry discloses a program that allows users to annotate aerial photographs. *See, generally* Ex. 1008. Pictometry teaches that a variety of aerial photographs can be taken, and that users can “zoom, measur[e]...and annotate[e]” these images. *Id.* at 115. Pictometry teaches a “distance tool” which allows a user to measure things contained within the image. *Id.* at 116. Pictometry specifically teaches drawing lines around a “parcel” to learn the square footage and area of a region. *Id.* Pictometry’s tool can also be used for “measuring angles.” *Id.* at 116.

D. Kennedy

32. U.S. Pat. Pub. No. 2009/0304227 A1 (“Kennedy”) is a U.S. Patent Publication published on December 10, 2009 claiming priority to provisional applications filed February 1, 2008 and April 22, 2008. Accordingly, Kennedy qualifies as prior art to the ’800 patent under pre-AIA

§ 102(e). Kennedy teaches a computer implemented method for generating a roof estimate. Kennedy teaches a “roof estimating software program.” Ex. 1009 at Abstract. Kennedy teaches displaying an aerial image of a building having a roof comprising a plurality of planar roof sections that each have a corresponding pitch. Kennedy teaches that some embodiments of the system “include a sizing tool for determining the size, geometry, and pitch of the roof sections of a building being displayed.” Ex. 1009 at Abstract. This is shown, for example, in Figure 36:



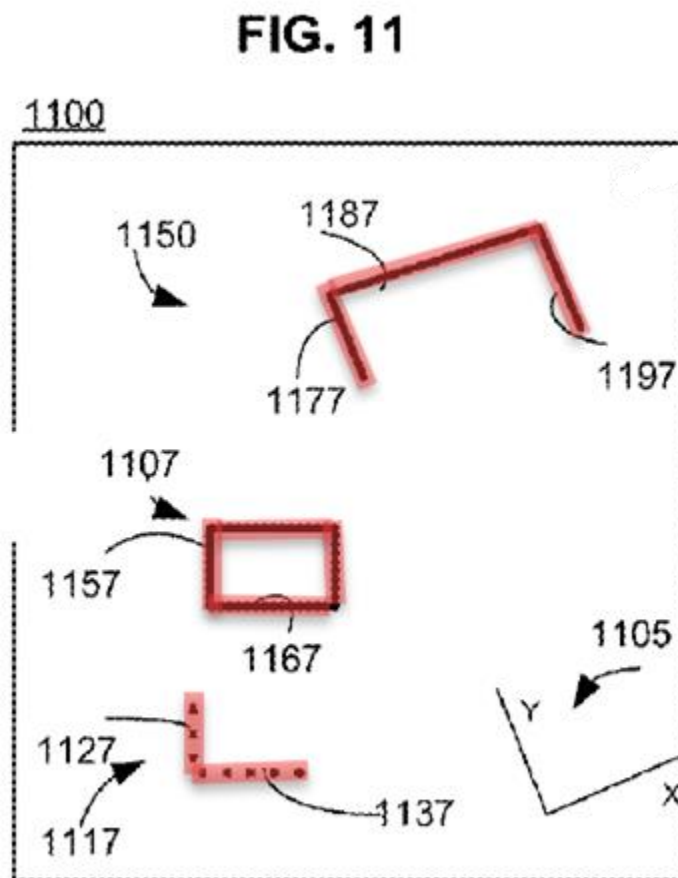
Id. at Fig. 36. Kennedy discloses a sizing subsystem with a “sizing tool” that can be used to determine pitch:

In one embodiment of the invention, a graphical user interface (best illustrated in FIGS. 8-9) cooperates with sizing subsystem 500 of system 100 to implement a sizing tool enabling user 107 to **determine surface dimensions and pitch of a surface, for**

example a roof 191 of a house appearing in the retrieved image 153. Thus there is no need to physically visit the installation site to make measurements and perform sizing calculations.

Id. at [0058] (emphasis added).

33. In one embodiment, Kennedy's "sizing subsystem" includes an **"interactive measuring tool...for use in sizing surfaces such as roof of house 600 in Fig. 6."** *Id.* at [0105] (emphasis added). The sizing tool is shown, for example, in Figure 11:



Id. at Fig. 11 (annotated). Kennedy explains that its measuring tool is "rotatable and scalable by a user 507 to align at least two sides of the tool an

image [sic] of an object to be measured, for example a roof surface to be measured.” *Id.* at [0105]. Kennedy further explains that “an orientation of measuring tool with respect to axes 670 [the x/y/z axis] is determined.” *Id.* at [0108].

34. Kennedy makes clear that the sizing tool is “superimposed” over an aerial image. *Id.* at [0110] (“To size surface 1215 user 507 superimposes sizing tool, in this example tool 1117 (illustrated in Fig. 11) of at least a portion of image 1215...in some embodiments, information defining an orientation of shape 1215 with respect to a reference axis 1211 is generated by comparing orientation of adjusted tool 1107 to reference axis 1211.”).

35. Kennedy discloses that the measuring tool can be used to determine the pitch of a roof. *Id.* at [0116] (“...measuring tool 1107 [can be] used to measure displacement of a ridge of roof 650 from base 635. The displacement information is used by modeling unit 591 (Fig. 5) to determine ***pitch of roof*** 600.”) (emphasis added).

E. Bailey

36. *Roofer: Steep Roofing Inventory Procedures And Inspection And Distress Manual For Asphalt Shingle Roofs*, David M. Bailey, U.S. Army Corps of Engineers, CERL Tech. Rept. (December 1999) (“Bailey”) is a printed publication published December 1999. Accordingly, Bailey qualifies

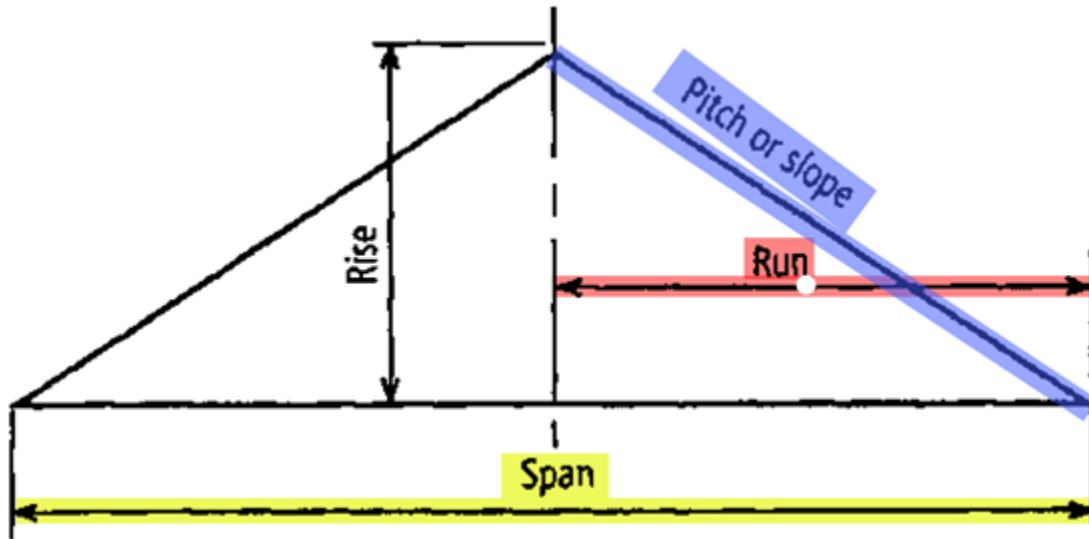
as prior art to the '800 patent under pre-AIA § 102(b). Accordingly, Bailey qualifies as prior art to the '840 patent under pre-AIA § 102(b). Bailey discloses steep roofing inventory procedures and inspection techniques. Bailey generally teaches methods for collecting data about a roof, including the “***predominant slope***” of the roof:

Section 33 - Slope. The ***predominant slope*** of the roof section. The roof plan will ***generally indicate the slope*** (e.g., 4 in. in 12). If the slope is not noted on the roof plan, the section drawings may indicate the slope. If such information is not available, field measurement will be required (use the method in Appendix B).

37. Ex. 1010 at 17 (emphasis added); *see also id.* at 15 (showing a “primary” slope at entry line 33).

38. Bailey explains that “slope” and “pitch” are equivalents, both describing the “degree of incline” of a roof. Ex. 1006 at 134 (“The degree of incline a roof possess is usually expressed as its ‘***pitch***’ or ‘***slope***.’”) (emphasis added).

39. Bailey explains that pitch uses the entire span of the roof (*i.e.*, the entire length of the base of the roof) to express this incline, and slope uses the run of the roof (*i.e.*, half the length of the base of the roof), but, as shown in Figure 14 of Bailey, both pitch and slope represent the ***same thing***—the degree of incline of the roof:



Id. at Fig. 14 (annotated), 134-35.

40. As Bailey further explains, pitch and slope are interchangeable for purposes of area calculations: “Whether a particular roof incline is expressed in pitch or slope, ***the results of area calculations will be the same.***”

Id. at 134 (emphasis added).

41. Bailey explains that finding the “predominant slope [*i.e.*, pitch]” for a “roof section” means any roofing area of 10,000 square feet or less—for example, Bailey teaches that “all exposed roof areas on the building shown in Figure 2 would comprise ***one roof section***” (*id.*):

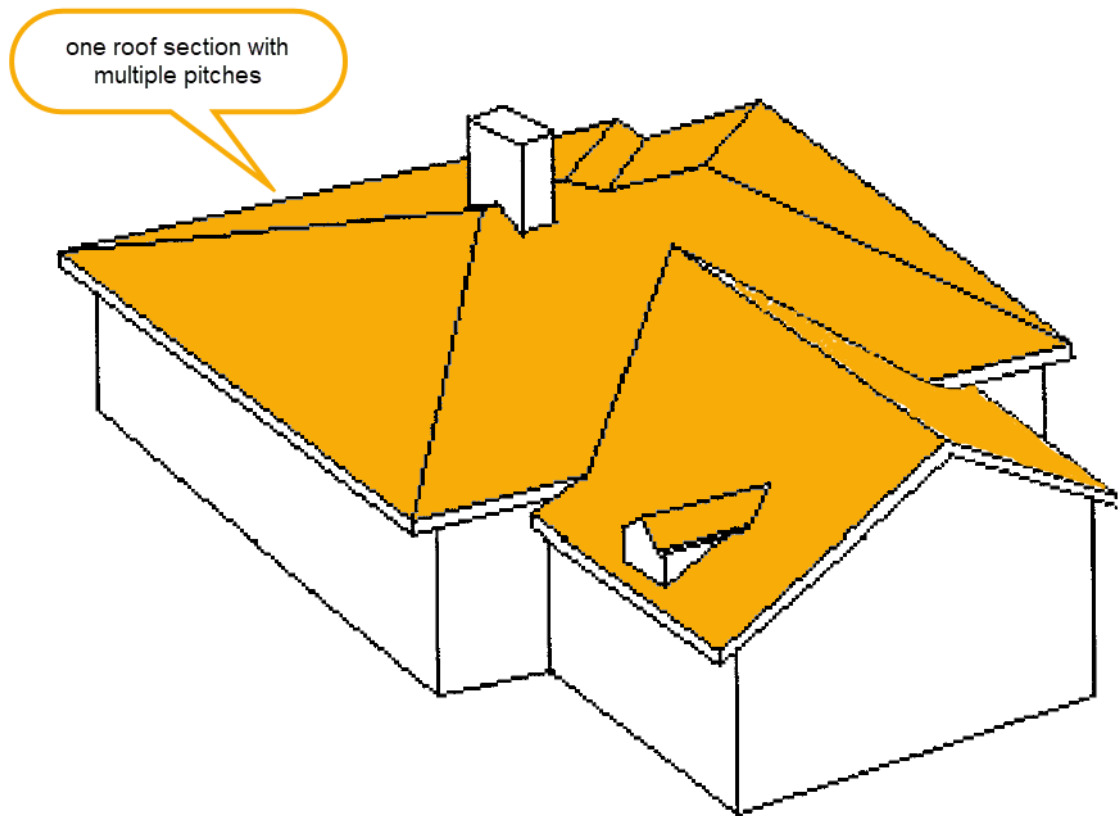


Figure 2. Example of a building roof comprising a roof section.

42. *Id.* at Fig. 2 (annotated). Thus, Bailey teaches finding the “predominant slope [pitch]” for, *e.g.*, an entire residential roof, like that shown in Figure 2.

IX. GROUND 1: PERSHING-789 AND ABHYANKER RENDER OBVIOUS CLAIMS 1-17 OF THE '800 PATENT

43. Pershing-789 expressly teaches the bulk of the claim elements recited in the '800 patent, including a software system for locating a customer's roof at a specific geographic location, analyzing roof dimensions to estimate the materials needed to repair or replace the customer's roof and

generating a report for a customer. A POSITA would have been motivated by the teachings of Abhyanker to allow users of Pershing-789's roofing system the option to specifically designate the geographic position of a roof to be analyzed using a marker, and to include a subsequent user confirmation option to ensure the correct roof is being analyzed.

A. Motivation To Combine Pershing-789 and Abhyanker

44. There are a variety of reasons a POSITA would be motivated to apply these teachings from Abhyanker to Pershing-789. For example, allowing a user to designate a geographic position of a roof and to subsequently confirm that the roof location is correct would promote the *accuracy of the system*. Abhyanker's teachings expressly address this motivation. Abhyanker discloses that automated systems used to pinpoint geographic locations (like Pershing-789's) are not always 100% accurate, and mistakes will result in user disappointment. Ex. 1005 at [0004]-[0005]. That is especially true here: if Pershing-789's system inadvertently marked a neighboring roof (or a roof with the same address in a different state or town), the resulting materials estimate would be incorrect. This would cost both the user and the service provider time and money (and would potentially cost the software provider business). Thus, it would have been obvious to include Abhyanker's teachings of allowing a user to place a "marker" on the roof in

question and to affirmatively “confirm” the right selection was made. This accuracy check would *save money, save time* and *avoid customer losses*.

45. In addition, applying Abhyanker’s teachings to Pershing-789’s system would also *add convenience* to a user. For example, if a user inadvertently input a neighbor’s address it would be convenient to allow the user to apply a drag-and-drop feature, like that taught by Abhyanker, to correct this error by simply sliding the marker to the correct location. This would also add to the convenience for users who may have difficulties typing or reading smaller print in the form fields in a screen—dragging a colored “marker” would assist such users in marking the right roof.

46. In addition, a POSITA would have been motivated to combine the teachings of Pershing-789 and Abhyanker because they are in the *same field of endeavor* as the ’800 patent. Both Pershing-789 and the ’800 patent are directed towards systems that locate and measure roof dimensions. Ex. 1001 at Abstract; Ex. 1004 at Abstract. Similarly, Abhyanker is broadly directed towards accurate placement of markers in a “mapping environment,” like the ones used in the Pershing-789 and ’800 patent systems. Ex. 1005 at Abstract, [0012]. Further, Pershing-789, Abhyanker and the ’800 patent all use *similar techniques to solve the same problems*. As discussed below, Pershing-789 uses the same techniques to locate roofs and measure their

dimensions as the '800 patent, and Abhyanker uses the same techniques to ensure accurate roof location. A POSITA would also have a ***reasonable expectation of success*** in including the teachings of Abhyanker in Pershing-789. Abhyanker's teachings confirm that user confirmation options in "mapping environments" such as Pershing-789's were well known, and Pershing-789 specifically teaches that its system can be used in the same context—locating roofs. Ex. 1005 at [0012]. Accordingly, Abhyanker itself would motivate a POSTIA to apply its teachings of user confirmation steps to improve Pershing-789's system.

B. Claim 1

1. Claim 1a: A process, comprising:

47. Pershing-789 discloses a process. In particular, Pershing-789 discloses a "system that allows the remote measurement of the size, geometry, pitch and orientation of the roof...and then uses the information to provide an estimate to repair or replace the roof, or to install equipment thereon." Ex. 1004 at Abstract; *see also id.* at [0003] (describing "systems and methods for estimating construction projects"), [0015], [0034] (describing a "process").

2. Claim 1b: receiving first location data;

48. Pershing-789 discloses receiving first location data, such as an address:

During use, the ***physical address or location information*** of the building ***is inputted into the program*** which then presents aerial images of roof sections on the building at the specific address location.

49. Ex. 1004 at [0011] (emphasis added), *see also id.* at Abstract, [0012]-[0014], [0022]-[0023].

3. Claim 1c: providing visual access to a first image corresponding to the first location data, the first image including a roof structure of a building;

50. Pershing-789 teaches providing visual access to a first image corresponding to the first location data by displaying an image of the input location:

During use, the physical address or location information of the building is inputted into the program which then ***presents aerial images of roof sections on the building at the specific address location.***

Ex. 1004 at [0011] (emphasis added).

51. For example, a first image corresponding to the first location data is shown in Figure 3:

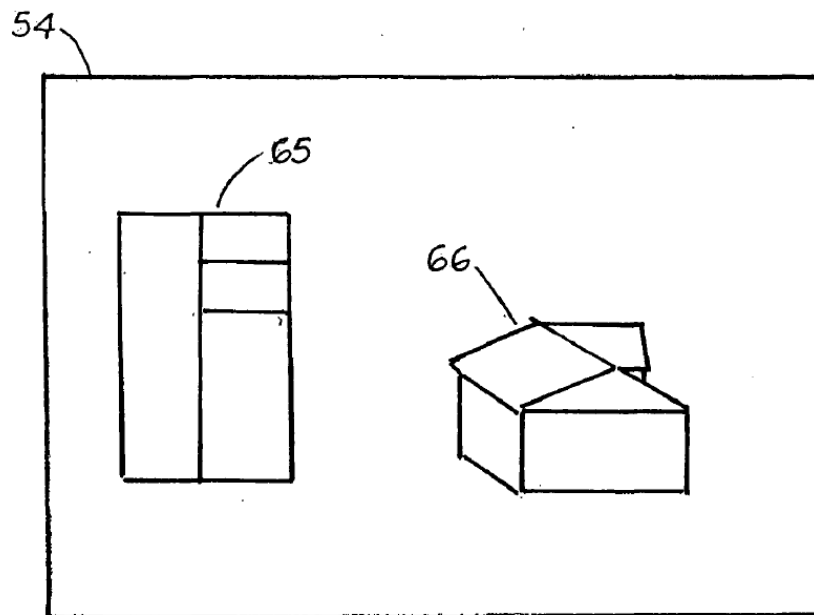


FIG. 3

52. Ex. 1004 at Fig. 3; *see also* Figs. 4, 5A-F. Pershing-789 explains that this hand-sketched drawing in Figure 3 is meant to represent ***actual aerial images of a building*** stored in its system's database:

The software program 50 is linked to ***an aerial image file database 52 that contains aerial images files 54*** of various building 92 in a region. The aerial image files 54 may be taken any available means, such as an aircraft, balloon, a satellite, etc. ***As shown in FIG. 3, the image files 54*** typically include at least one a top plan view 65 and a perspective view 66 of the building 92.

53. *Id.* at [0022] (emphasis added); *see also* [0011]-[0014], [0023]-[0028]. Accordingly, Pershing-789 discloses displaying an actual aerial photo of a building.

54. Pershing-789's disclosure that actual aerial images are used in Figure 3A is consistent with its disclosure that the same aerial images of customer roofs are included in its report, such as the exemplary reports shown in Figures 5A-B:

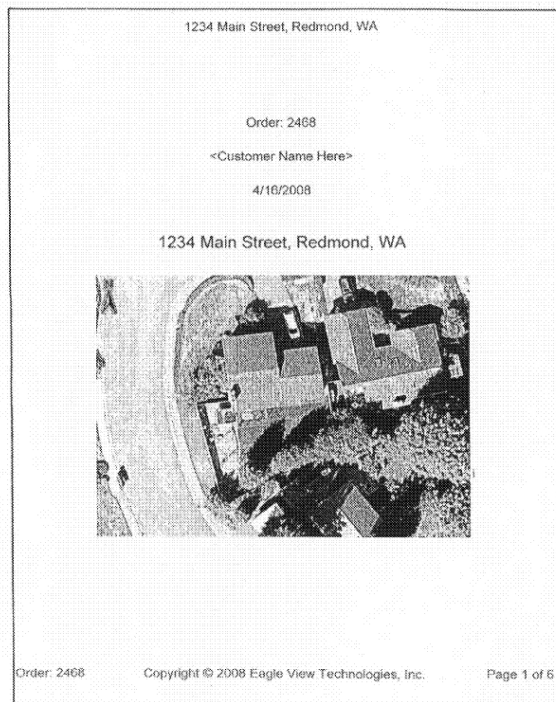


FIG. 5A

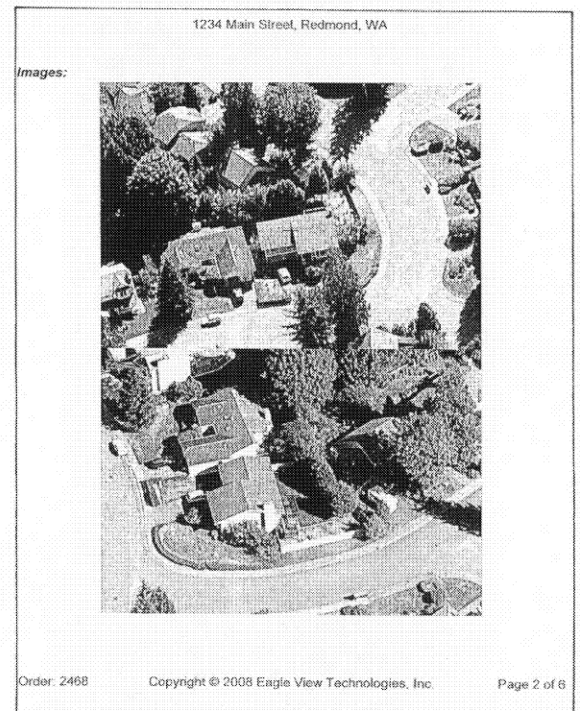


FIG. 5B

Id. at Figs. 5A-B.

55. Further, as shown in Figure 3 (and Figures 5A-B), Pershing-789's image includes a roof structure of a building as part of its “*top plan view*” of the building. *Id.*

4. **Claim 1d: providing a first computer input capable of signaling a designation from a user of a building roof structure location within the first image, wherein the building roof structure location is a geographic**

position of the building roof structure and is different than the first location data;

56. Abhyanker teaches providing a first computer input capable of signaling a designation from a user of a building roof structure location within the first image as required by the first part of claim 1d. In particular, Abhyanker's "first computer input" is its digital "marker" which the user may drag and drop on an aerial image of a roof, thereby "signaling a designation from a user of a building roof structure location within the first image" as required by the claim.

57. For example, Abhyanker discloses a system that allows "marker placement in a mapping environment." Ex. 1005 at Abstract. Abhyanker discloses that its mapping environment may include, *e.g.*, "aerial photography over neighborhoods and/or places in a terrestrial environment (*e.g.*, the Earth)." Ex. 1004 at [0004]. Abhyanker teaches a "marker" (*e.g.*, a pushpin, an indicator, a pointer, a pin, etc.) may be placed on a landmark in the aerial image by an algorithm. *Id.*

58. In addition, Abhyanker also teaches that the building roof structure location is a "geographic position of the building roof structure and is **different** than the first location data" as required by the claims. For example, Abhyanker teaches that a user may drag and drop this marker anywhere in the image. *Id.* at [0004]. Thus, the user may use Abhyanker's drag-and-drop

feature to designate a location that is ***different*** from the first location data (the first location data being the original location of Pershing-789’s “marker” before it was dragged-and-dropped by the user) as required by the claims.

59. Abhyanker notes that it may be necessary to drag and drop a marker to a different location because, in some cases, an algorithm may “place marker nearby, but not precisely on, a correct rooftop” or other landmark. *Id.* at [0005]. A misplaced marker would result in customer dissatisfaction. *Id.* Abhyanker thus teaches remedying marker misplacement by allowing a user to “drag and drop” a marker to a corrected location:

Furthermore, the method may include applying a ***drag and drop*** algorithm that enables the user to sequentially and/or concurrently relocate markers in the mapping environment, iteratively performing additional verifications when any particular marker has been previously moved[.]

60. Ex. 1005 at [0011] (emphasis added). Thus, a user has freedom to relocate a marker anywhere desired within the aerial image, including a location that is ***different*** from the original address entered by a user (which may have been entered in error or misplaced by the algorithm) as required by the claims.

5. Claim 1e: receive a designation of the building roof structure within the first image;

61. As discussed with respect to claim 1d, Abhyanker teaches receiving a designation of the building roof structure within a first image.

Abhyanker teaches that a user may drag-and-drop a marker to the desired location, which may include the roof of a building in an aerial photo in the first image. The selection of a roof location using the “drag and drop” feature is the claimed “designation of the building roof structure within the first image.”

6. **Claim 1f: responsive to receiving the designation of the building roof structure location, providing a second computer input capable of signaling user-acceptance of the building roof structure location within the first image, wherein user-acceptance is one or more affirmative steps undertaken by the user to confirm the designation of the building roof structure location; and**

62. Abhyanker teaches this limitation. First, Abhyander teaches “responsive to receiving the designation of the building roof structure location, providing a second computer input capable of signaling user-acceptance of the building roof structure location within the first image.” As discussed above, Abhyanker teaches that a user may “drag and drop” a marker to choose a location:

Furthermore, the method may include applying a ***drag and drop*** algorithm that enables the user to sequentially and/or concurrently relocate markers in the mapping environment, iteratively performing additional verifications when any particular marker has been previously moved[.]

63. Ex. 1005 at [0011] (emphasis added). Thus, a user has freedom to relocate a marker anywhere desired within the aerial image, including a location that is different from the original address entered by a user.

64. Abhyanker also discloses that “**additional verifications** may be iteratively performed when any particular marker has been previously moved[.]” *Id.* at [0053] (emphasis added). Abhyanker’s additional verifications are the claimed “second computer input capable of signaling user-acceptance of the building roof structure location within the first image.” For example, Abhyanker teaches a user may “lock” the location of a marker, preventing unauthorized future relocation:

The locking module 220 may process a marker **locking request** when the particular user claims the wiki profile associated with the address data. In addition, the locking module 220 may enable the user(s) to control the future relocation of the marker in the mapping environment.

65. *Id.* at [0064] (emphasis added). Abhyanker’s additional verifications, such as locking the marker position, are the claimed “second computer input capable of signaling user-acceptance of the building roof structure location” within the image required by the challenged claims.

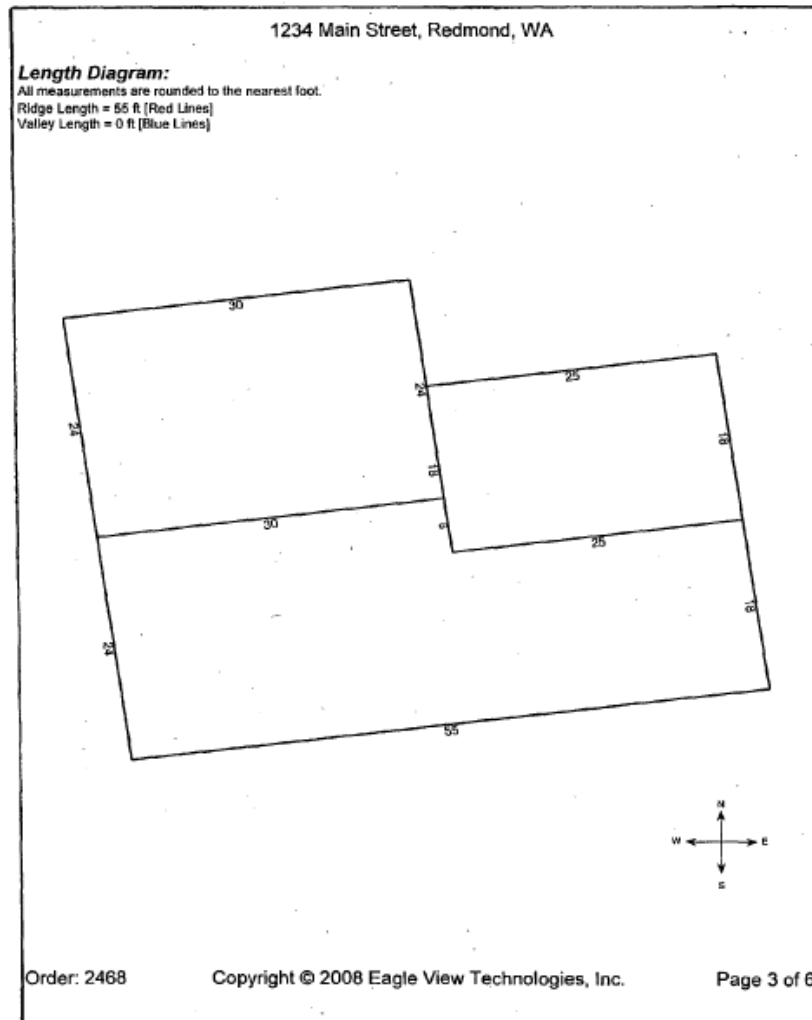
66. Abhyanker also discloses “wherein user-acceptance is one or more affirmative steps undertaken by the user to confirm the designation of the building roof structure location” as recited in the claims. Abhyanker’s

“additional verification,” such as its “locking request,” is the claimed “affirmative step” which “confirms designations of the building roof structure location” as recited in the claims. *Id.* at [0064].

7. Claim 1g: subsequent to receiving the user-acceptance confirming the designation of the building roof structure location, providing a report for the building roof structure.

67. Pershing-789 discloses “providing a report for the building roof structure.” For example, after taking measurements of the roof in question, Pershing-789 generates a report: “From these determinations, the overall shape, slopes and square footage of the roof sections are determined and a **report** is produced.” Ex. 1004 at [0012] (emphasis added). Because the roofing report is generated **after** the measurements are taken, this means that the roofing report is also generated “subsequent to receiving the user-acceptance confirming the designation of the building roof structure location” as required by the claims—indeed, measurements cannot be taken and reported before a roof location is selected in the first instance.

68. An exemplary report is shown in Figure 5C:



105

FIG. 5C

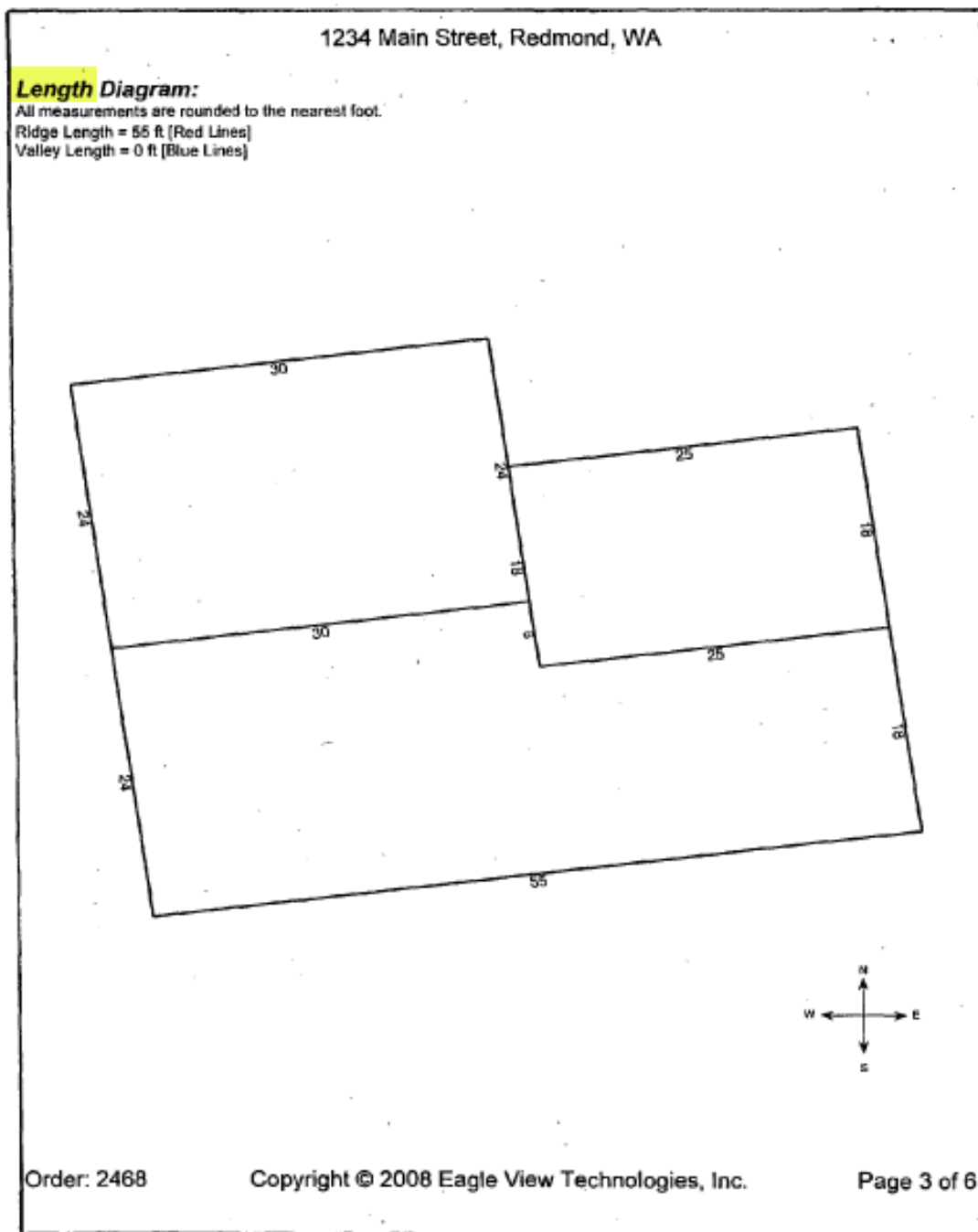
69. Ex. 1004 at Fig. 5C; *id.* at [0038] (“FIG. 5C is the third page 105 of the **report** which shows a line drawing of the building showing ridge and valley lines, dimensions and a compass indicator.”) (emphasis added).

C. Claim 2: The process of claim 1, further comprising providing visual access to one or more outline drawing corresponding to the roof structure of the building.

70. Pershing-789 provides “visual access to an outline drawing corresponding to the roof structure of a building” as required by the

D. Claim 3: The process of claim 2, further comprising providing one or more length dimension on the outline drawing

72. Pershing-789 discloses providing one or more length dimension on the outline drawing. For example, Pershing-789 discloses a drawing as part of its report in Figure 5C, which includes “length” dimensions:

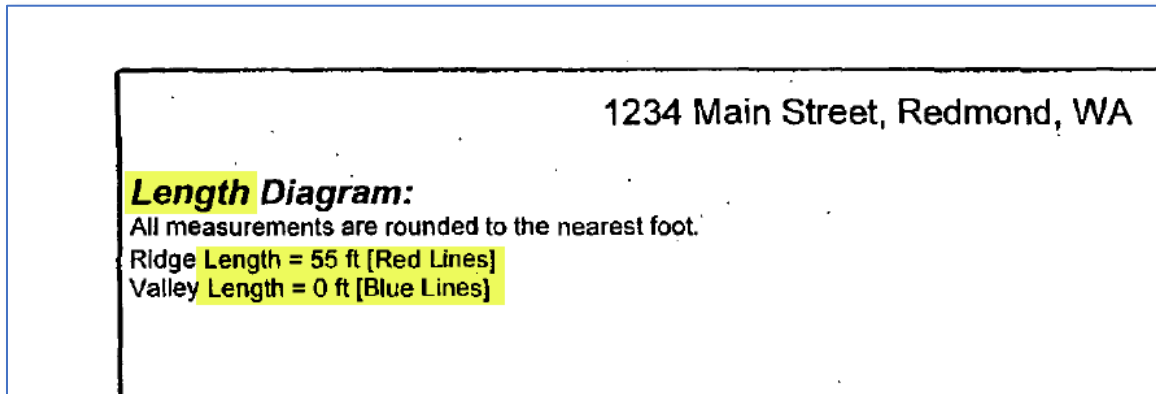


105

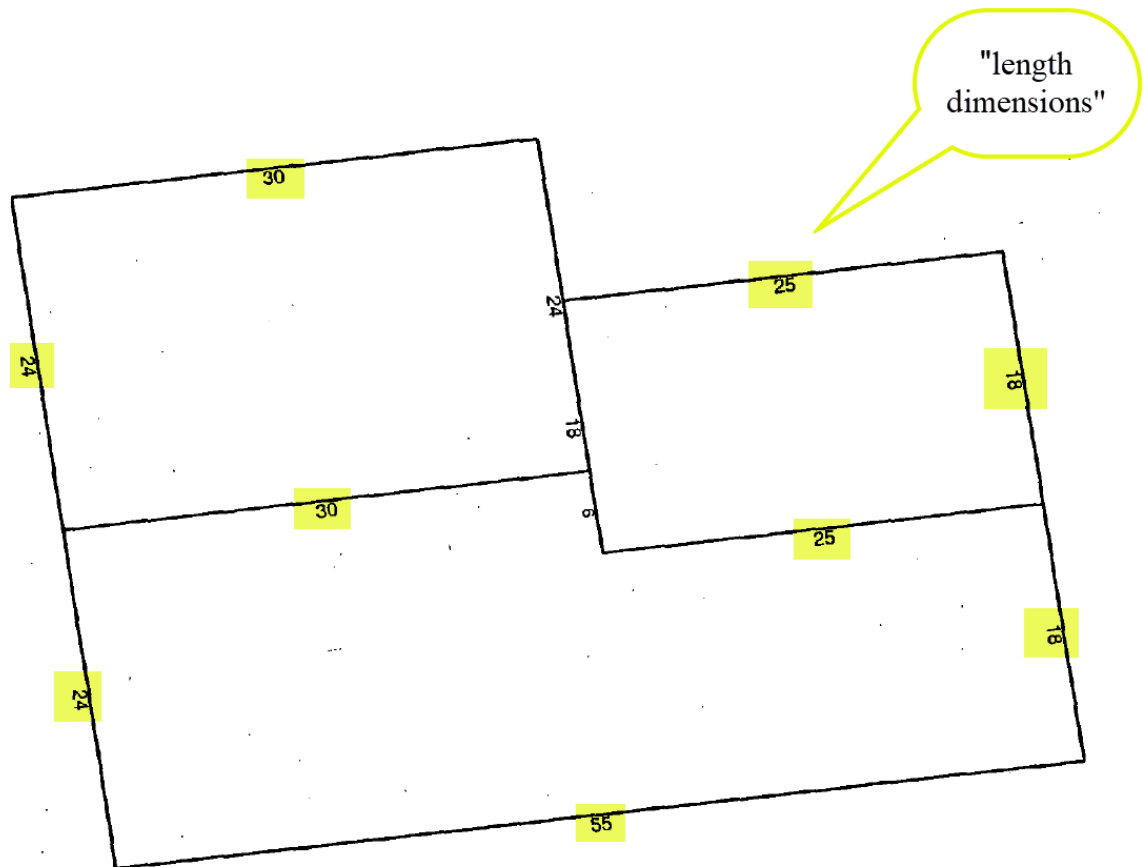
FIG. 5C

73. Ex. 1004 at Fig. 5C. Persing-789 discloses: “FIG. 5C is the third page 105 of the report which *shows a line drawing* of the building showing ridge and valley lines, *dimensions* and a compass indicator.” Ex. 1004 at

[0038] (emphasis added). As shown in this close-up of Fig. 5C, these “dimensions” expressly include length (in feet):



74. *Id.* at Fig. 5C (annotated—close-up). Another closeup of Fig. 5C shows that this report includes various length measurements across the roof:

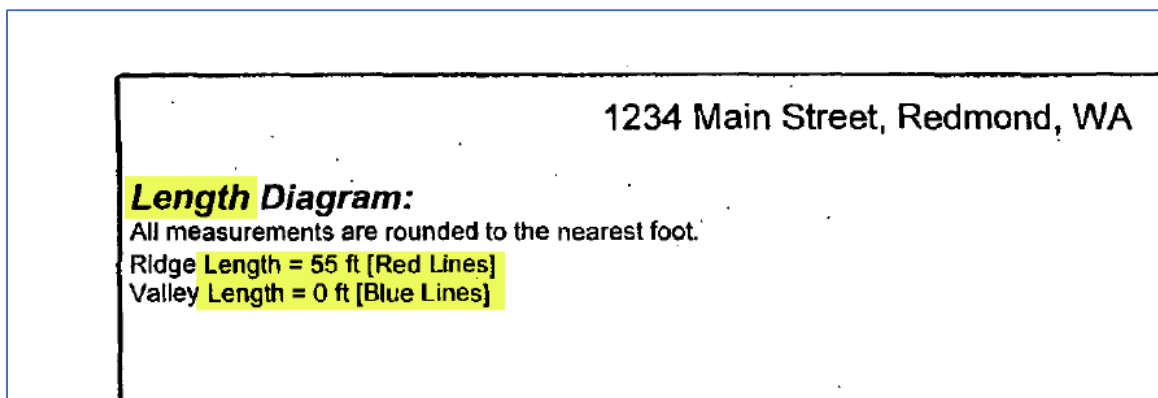


Id. (annotated—close-up).

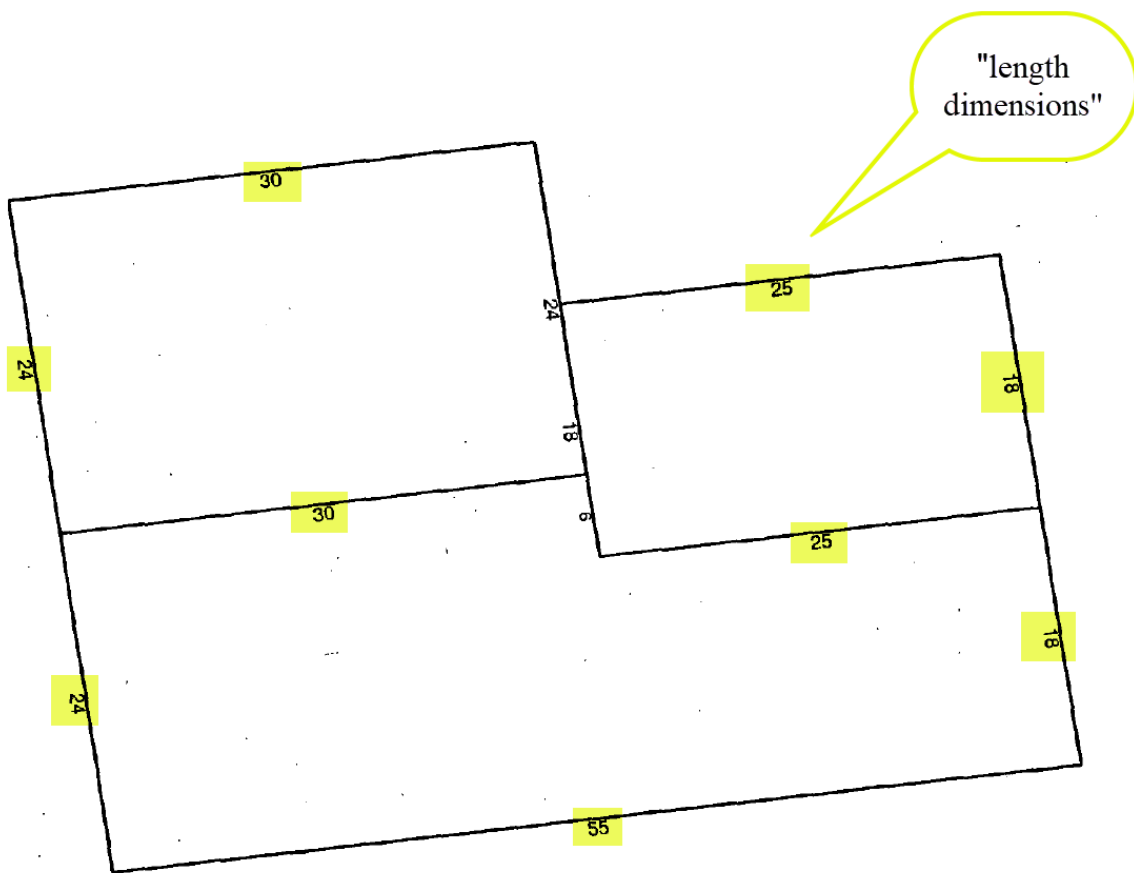
- E. **Claim 4: The process of claim 3, wherein the length dimension is one or more of a perimeter of the roof structure, a length of a ridge of the roof structure, a total length of ridges of the roof structure, a length of a valley of the roof structure, a total length of valleys of the roof structure, a length of a flashing of the roof structure, and a total length of flashings of the roof structure.**

75. As discussed with respect to claim 3, Pershing-789 discloses: “FIG. 5C is the third page 105 of the report which *shows a line drawing* of the building showing ridge and valley lines, *dimensions* and a compass indicator.” Ex. 1004 at [0038] (emphasis added). The length dimensions show, *e.g.*, the roof “*perimeter*” as well as “*ridge and valley lines*” (i.e., dimensions of ridges and valleys) as required by the claims. *Id.*

76. Pershing-789’s Fig. 5C shows the total length of both ridges and valleys in the roof structure.



77. *Id.* at Fig. 5C (annotated). Pershing-789’s Fig. 5C also shows lengths of valleys and ridges of the roof structure:

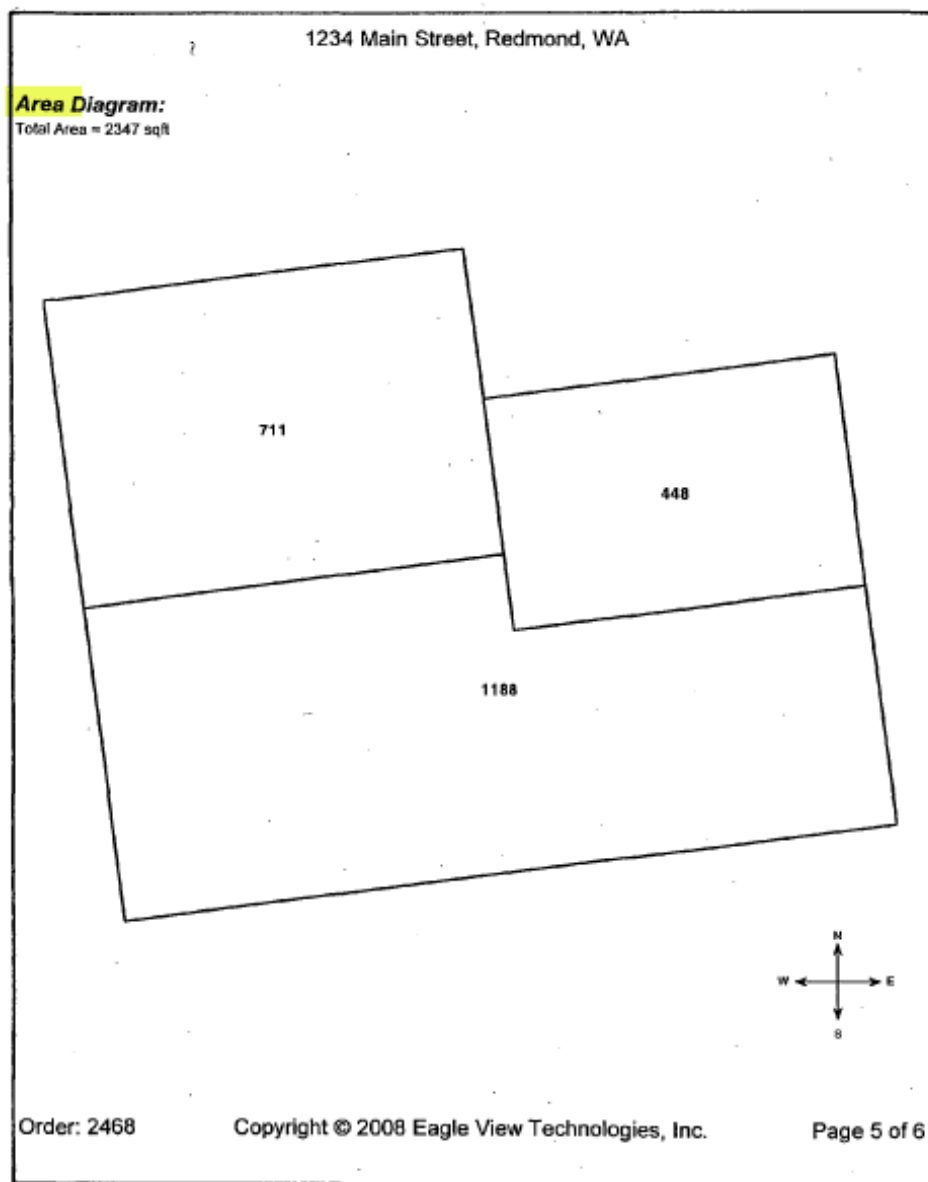


78. *Id.* (annotated). Accordingly, Pershing-789 discloses this limitation.¹

¹ The claims only require **one of** “a perimeter of the roof structure, a length of a ridge of the roof structure, a total length of ridges of the roof structure, a length of a valley of the roof structure, a total length of valleys of the roof structure, a length of a flashing of the roof structure, and a total length of flashings of the roof structure.” Ex. 1001 at claim 4. As shown above, Pershing-789 discloses multiple dimensions recited in the claim.

F. **Claim 5: The process of claim 2, further comprising providing one or more area dimension on the outline drawing.**

79. Pershing-789 further teaches showing “area” dimensions in its outline drawing, for example, in Figure 5E:



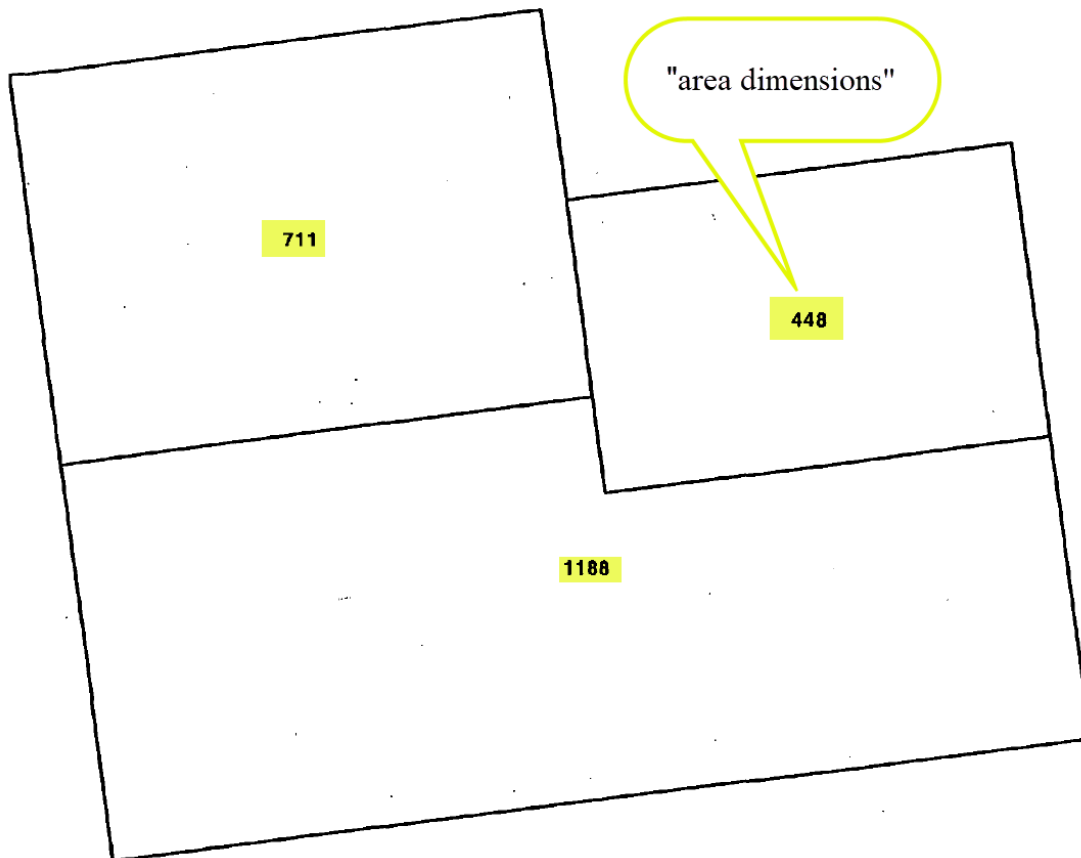
107

FIG. 5E

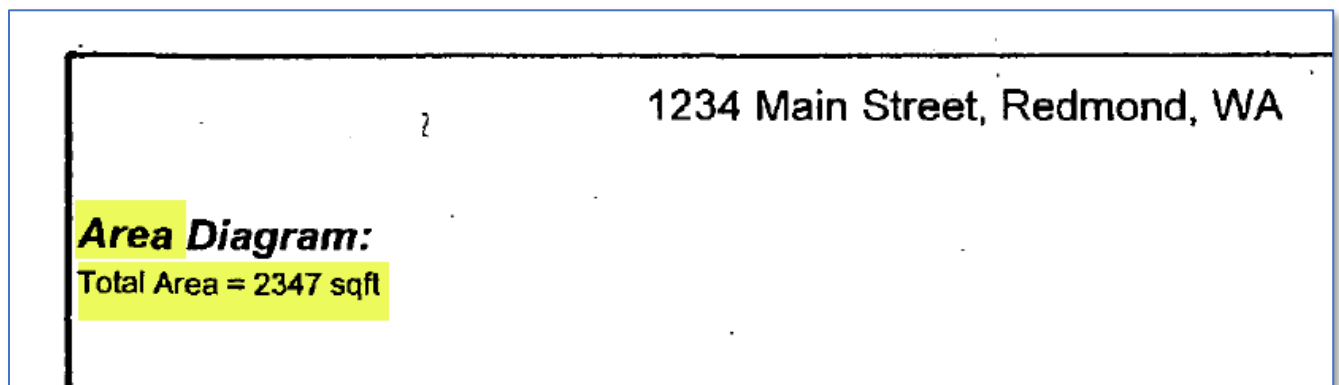
80. Ex. 1004 at Fig. 5E (annotated). Pershing-789 explains that, “FIG. 5E is an illustration of the fifth page 107 of the report showing the

square footage of each roof section along with the total square foot **area** value.”

Id. at [0028] (emphasis added). A closeup of Fig. 5E shows the area of different roof segments:



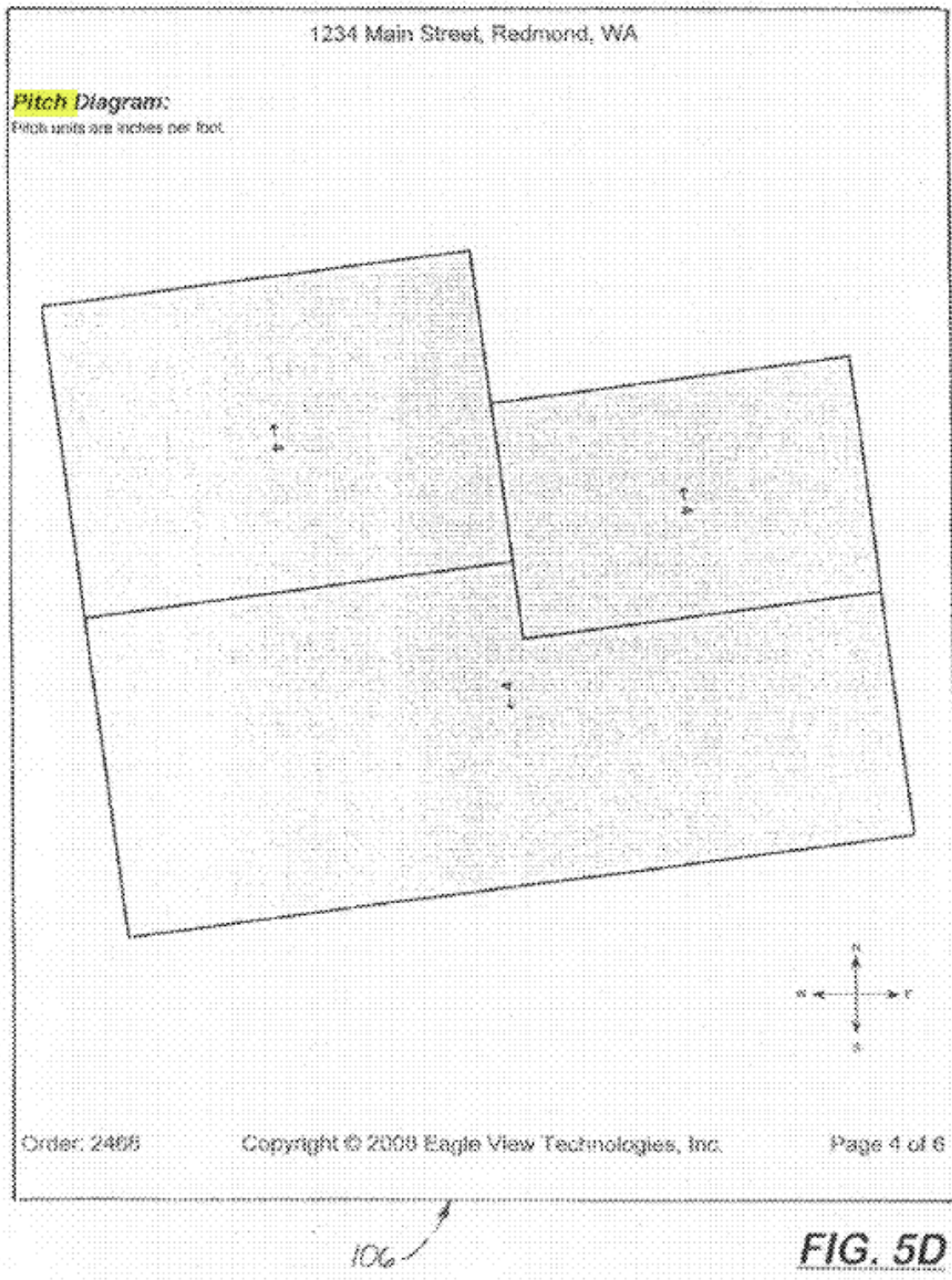
81. *Id.* at Fig. 5E (annotated—close-up). Likewise, another closeup of the figure shows the total area calculation:



Id. (annotated—close-up).

G. Claim 6: The process of claim 2, further comprising providing one or more pitch dimension on the outline drawing.

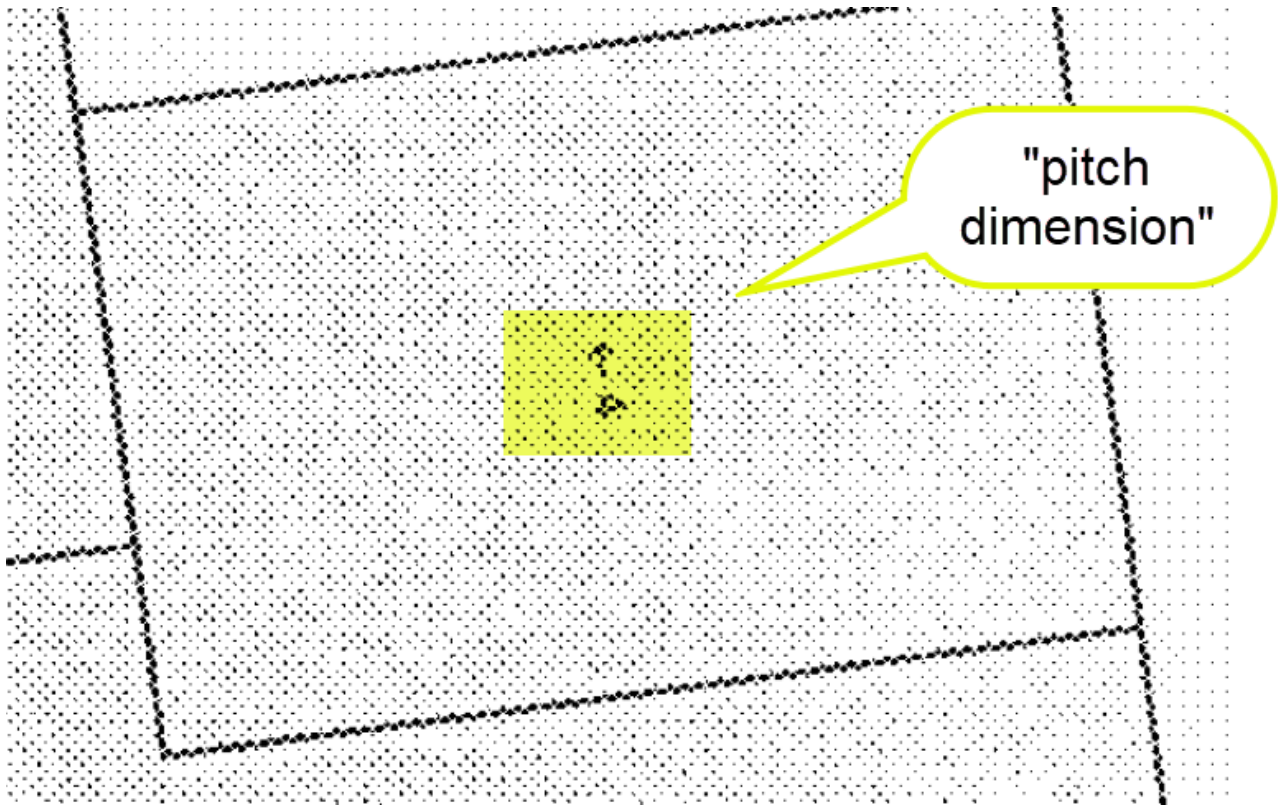
82. Pershing-789 further teaches showing “pitch” dimensions in its outline drawing, for example, in Figure 5D:



83. Ex. 1004 at Fig. 5D (annotated). Pershing-789 explains that, “FIG. 5D is an illustration of the fourth page 106 of the report showing the

pitch angle of each roof section along with a compass indicator.” *Id.* at [0028]

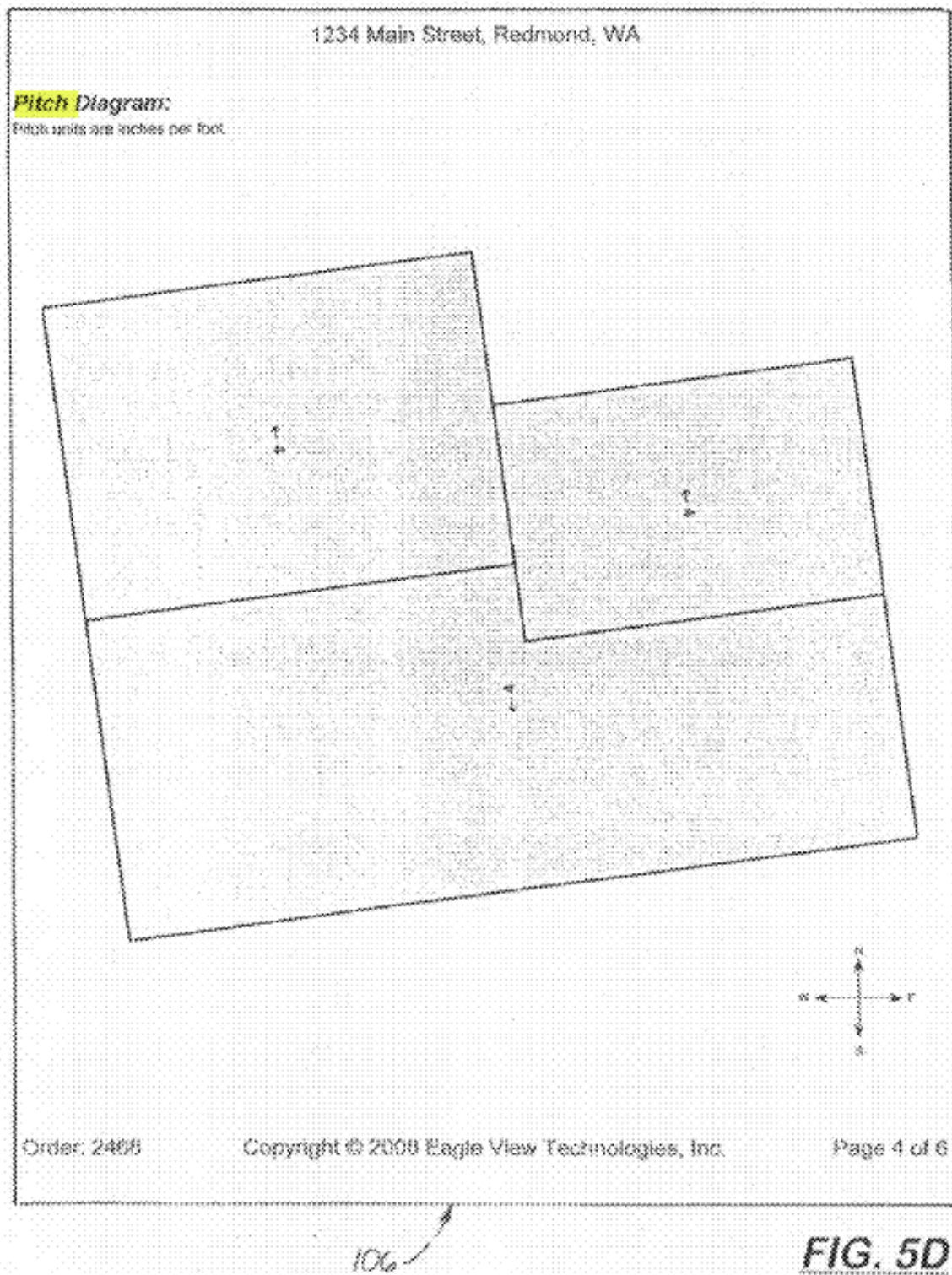
(emphasis added). This is shown in the closeup of Fig. 5D below:



Id. at Fig. 5D (annotated—close up) (showing a pitch value of “4”).

H. Claim 7: The process of claim 2, further comprising providing one or more indicator of pitch direction on the outline drawing.

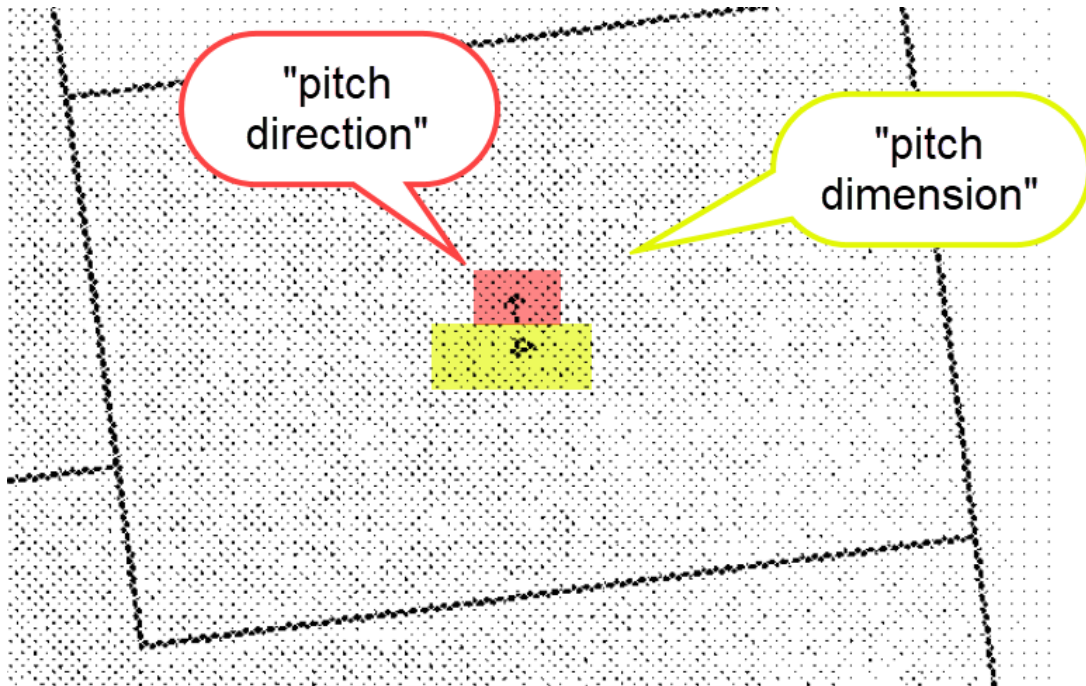
84. Pershing-789 further teaches showing “pitch direction” in its outline drawing, for example, in Figure 5D:



85. *Id.* 1004 at Fig. 5D (annotated). Pershing-789 explains that, “FIG. 5D is an illustration of the fourth page 106 of the report showing the

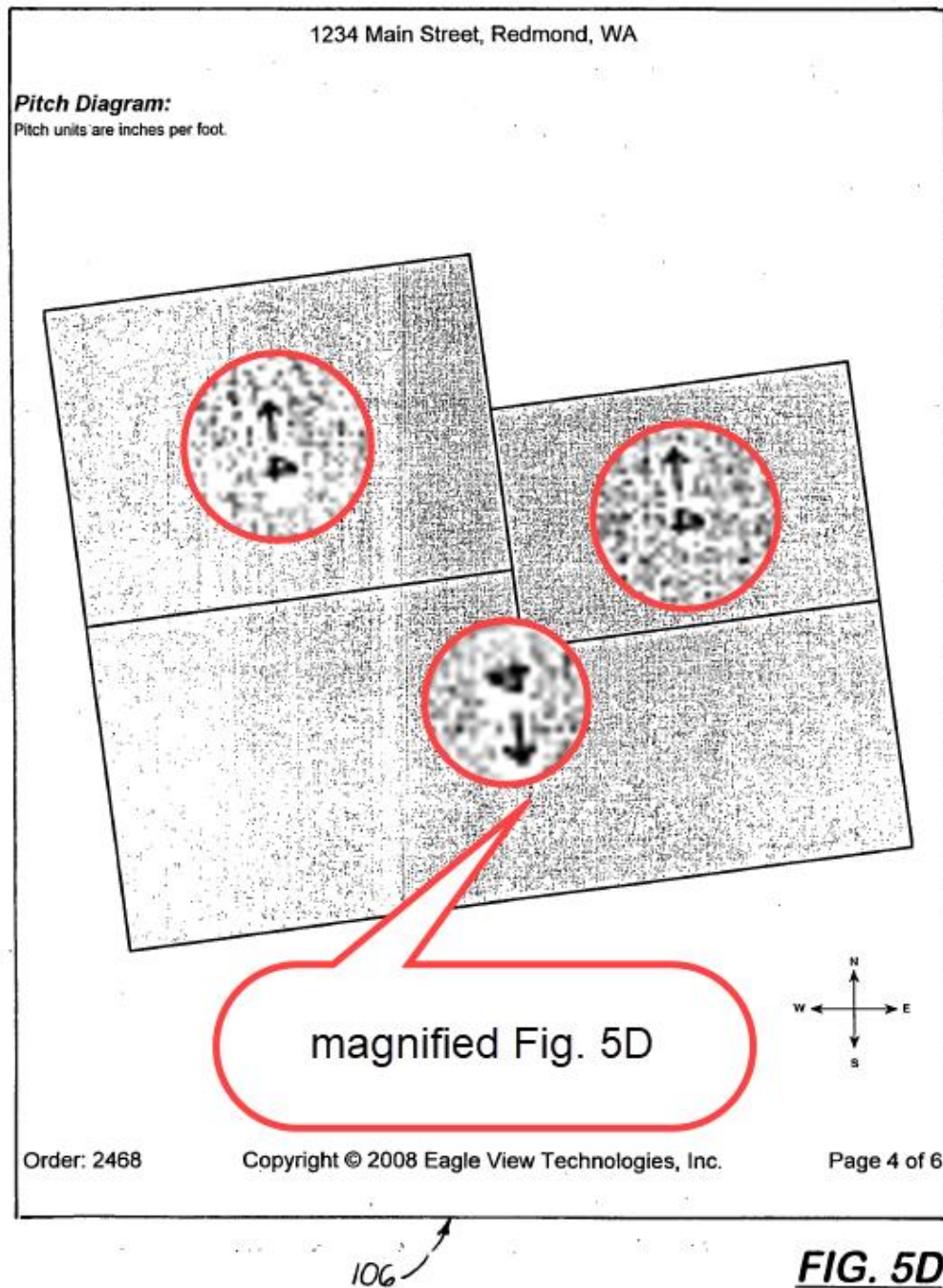
pitch angle of each roof section along with a compass indicator.” *Id.* at [0028] (emphasis added).

86. Pershing-789’s Fig. 5D also includes arrows pointing to the “direction” of the pitch in addition to the value of the pitch:



Id. at Fig. 5D (annotated—close-up).

87. The published version of Figure 5D is a scanned image, which makes the directional arrows somewhat difficult to see. The file history of Pershing-789 includes a cleaner version of the same Figure 5D, reproduced below, which more clearly shows the directional pitch arrows:

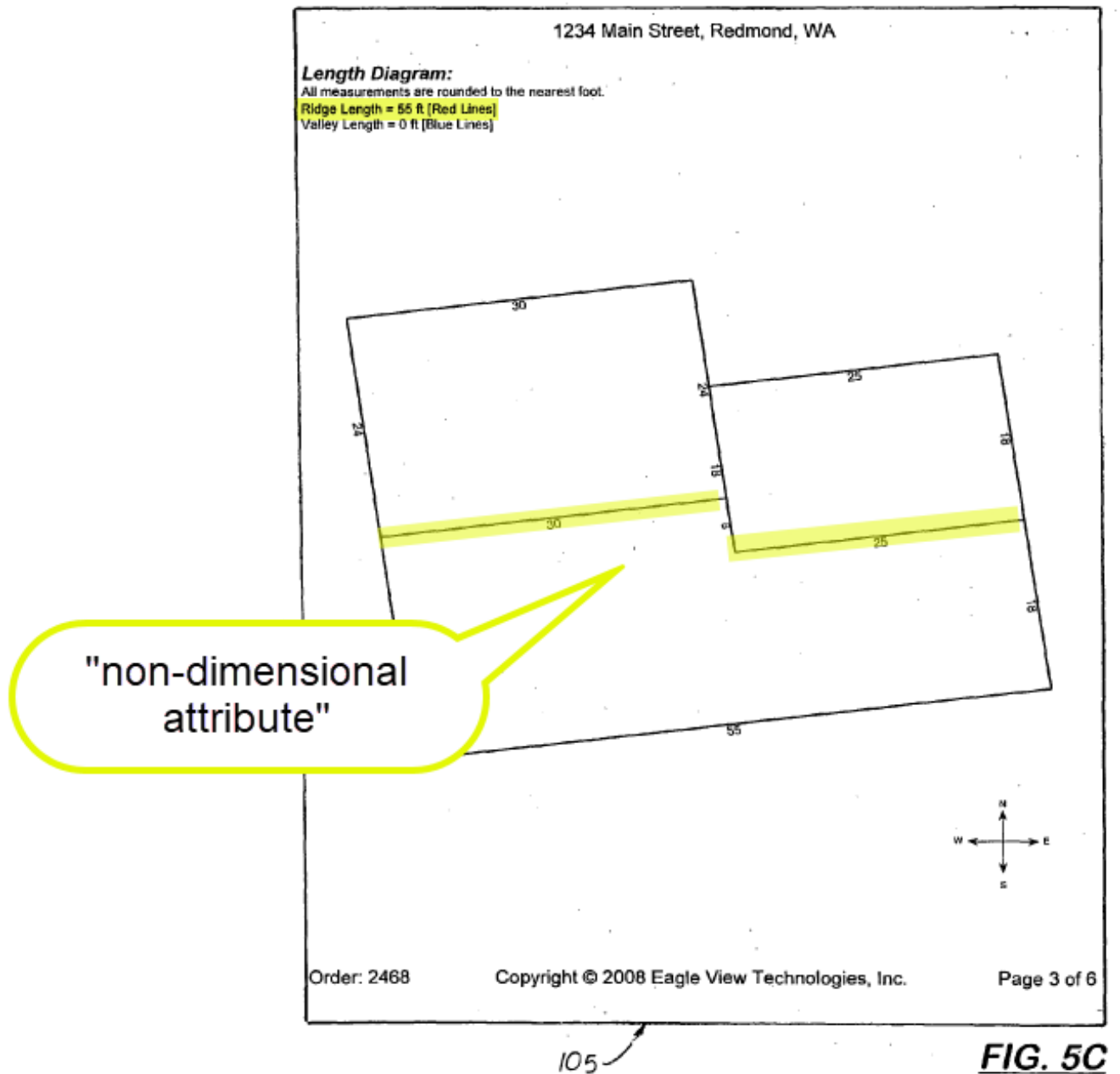


88. Ex. 1011 at 7, Fig. 5D as submitted 04/17/2008 (annotated using the “magnifying glass” feature in Snagit). These arrows show the “pitch direction.”

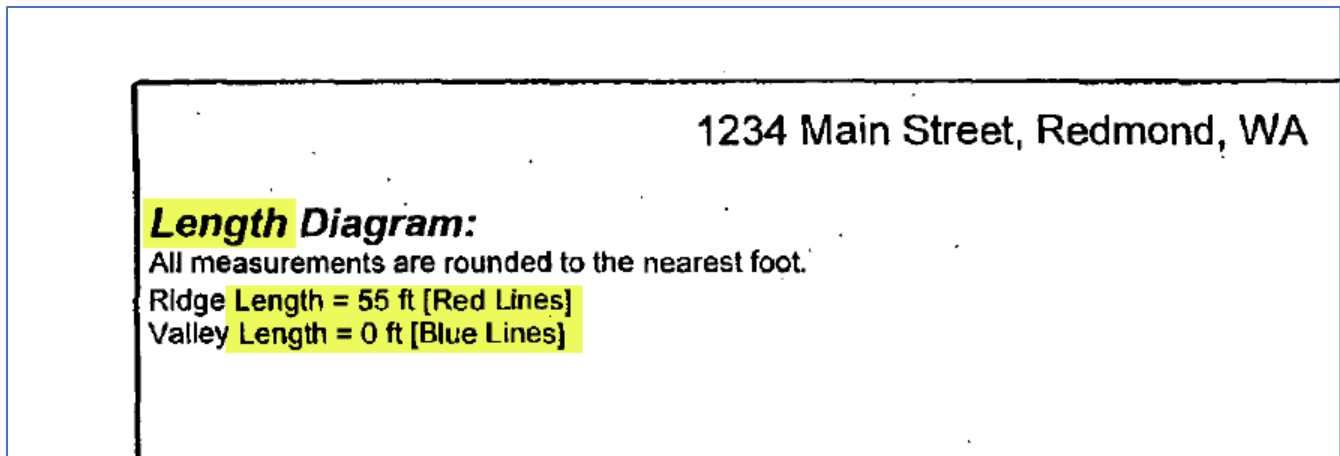
I. Claim 8: The process of claim 2, further comprising providing one or more non-dimensional attribute of the roof structure on the outline drawing.

89. The '800 patent teaches that a “non-dimensional attribute” may include at least a “linear ridge.” Ex. 1001 at 6:26-31 (“FIG. 6. also depicts an optional table and/or fields showing the *non-dimensional attributes* at **507** and the total values for them at **508**. *This can include* the area of roofing **509**, the *linear ridge feet* **510**, linear valley feet **511**, starter/perimeter linear feet **512**, step flashing **513**, and/or others.”) (emphasis added).

90. Pershing-789 discloses a “linear ridge” length in feet (as well as the “linear valley feet” and “area of roofing”), for example, in Figure 5C:



91. Ex. 1004 at Fig. 5C. A closeup of Fig. 5C confirms this measurement is in “feet”:



Id. at Fig. 5C (annotated).

- J. **Claim 9: The process of claim 2, further comprising, providing visual access to a nadir image from an imagery database corresponding to location coordinates of the building roof structure location, and wherein the outline drawing is super- imposed on the nadir image.**

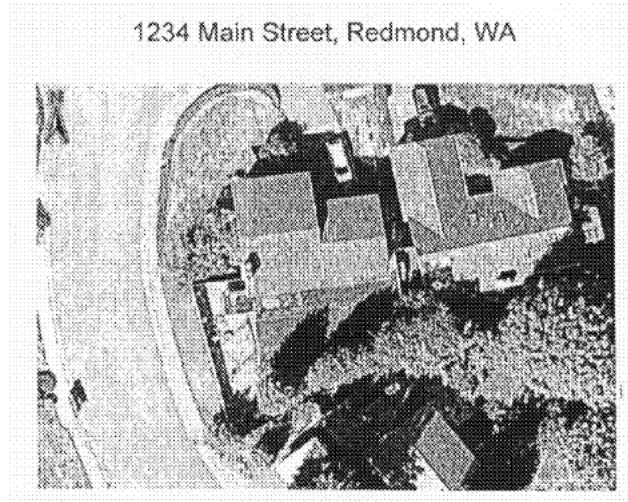
92. Pershing-789 teaches “providing visual access to a nadir image from an imagery database corresponding to location coordinates of the building roof structure location, and wherein the outline drawing is super-imposed on the nadir image.” As discussed above, Pershing-789 teaches obtaining an aerial image from an image database corresponding to location coordinates of a building roof structure location. See claim 1.

93. The ’800 patent specification does not define a “nadir image.” However, POSITA would have understood the *plain and ordinary meaning* of “nadir image” to be an aerial image taken from above. This is consistent with the disclosures of the ’800 patent, which consistently show aerial images taken from above. Ex. 1001 at Figs. 4B-D, 5A-C, 6. This is also consistent

the usage of “nadir image” in the prior art. *See, e.g.*, Ex. 1006 at [0006] (“The input image used to create an ortho-rectified image is a **nadir image**—that is, an image captured with the **camera pointing straight down.**”) (emphasis added); Ex. 1007 at 216 (describing aerial photography from a plane: “This allows [the camera] to be pointed obliquely to the side of the aircraft to acquire imagery in a stand-off mode as well as in **the vertical (nadir) orientation.**”) (emphasis added).² Thus, Pershing-789’s aerial image database discloses the claimed “nadir image.”

94. Indeed, Pershing-789 includes several figures showing an overhead view of the roof structure of a building, the claimed “nadir image”—for example, Fig. 5A, below:

² I do not rely on Exhibits 1006 and 1007 as part of the proposed combination. Instead, these exhibits are relied upon to confirm a POSITA’s understanding of the ordinary meaning of “nadir image” as an overhead image.



95. Ex. 1004 at Fig. 5A (annotated) (showing overhead view of a roof); *see also* Fig. 5B (showing an overhead image of a roof).

96. As discussed above, Pershing-789 also teaches generating outline drawings. Pershing-789 further teaches that such dimensional outline drawings may be generated *on the nadir image itself* using Pershing-789's calibration module:

Like the software program 50 loaded into the roof contractor's computer 72 in the previous embodiment the software program 50' is also able to *retrieve aerial images of houses* from a database 52' containing aerial images files 54' of houses located in the region served by the roof company 70. An optional *calibration module 56' may be provided which enables the entity 105 to determine the angles and linear dimensions of various roof sections on the house 92.*

Ex. 1004 at [0025].

97. Pershing-789 teaches that, for example, the calibration module may calculate the physical length of features *in an aerial photo* using

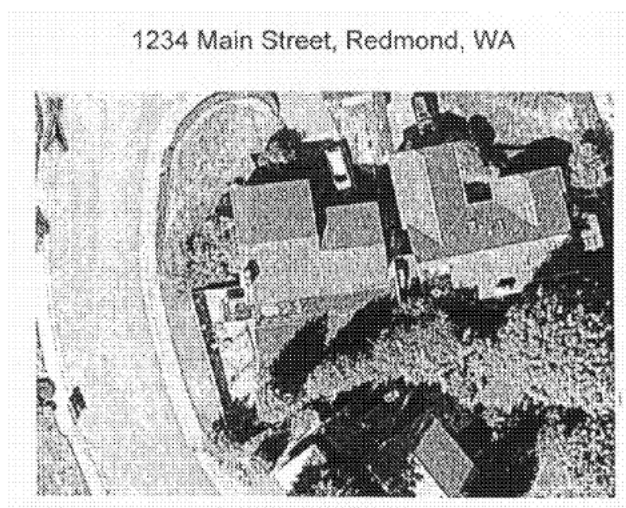
“distance in pixels between two points” that is “converted into physical length”:

Once the images of the roof section of the building are obtained, at least one of the images needs to be calibrated. During calibration, ***the distance in pixels between two points on the image is converted into a physical length.*** This calibration information is ***typically presented as a scale marker on the image*** itself, or as additional information supplied by the image database provider along with the requested image.

98. *Id.* at [0032]. This “scale marker” depicting “physical length” between pixels constitutes an outline drawing that is super-imposed on the nadir image.

K. Claim 10 The process of claim 1, wherein the first image is taken from an overhead view with respect to the roof structure of the building.

99. As discussed with respect to claim 9, Pershing-789 teaches a first image is taken from an overhead view with respect to the roof structure of the building, for example, as shown in Figure 5A:



100. Ex. 1004 at Fig. 5A (annotated) (showing overhead view of a roof); *see also* Fig. 5B (showing an overhead image of a roof).

L. Claim 11

1. Claim 11a: A non-transitory computer memory storing computer logic, that when executed by computer hardware causes the computer hardware to:

101. Pershing-789 teaches non-transitory computer memory storing computer logic. For example, Pershing-789 teaches that its system runs its roof estimating software “loaded into its working memory”:

The roof company uses a local computer with an estimating ***software program loaded into its working memory*** to access an image file database located on the computer or on a remote server connected via a wide area network to the local computer.

102. Ex. 1004 at [0012]; *see also id.* at [0024], [0025], [0027], [0039]. Pershing-789’s disclosure in no way limits the type of memory where the software program is stored, merely referring to any “working memory” in a system. Accordingly, Pershing-789’s disclosures encompass non-transitory memory.

2. Claim 11b receive first location data generally corresponding to a geographic location of a building;

103. As discussed with respect to claim 1, Pershing-789 teaches receiving first location data generally corresponding to the geographic location of a building. *See, supra*, claim 1. For example, Pershing-789 teaches:

During use, the ***physical address or location information*** of the building is inputted into the program which then presents aerial images of roof sections on the ***building*** at the specific address location.

Ex. 1004 at [0011] (emphasis added).

3. **Claim 11c provide visual access to a first image corresponding to the first location data, the first image including a roof structure of the building;**

104. See claim 1c.

4. **Claim 11d provide a first computer input capable of signaling a designation from a user of a building roof structure location within the first image, wherein the building roof structure location is a geographic position of the building roof structure and is different than the first location data;**

105. See claim 1d.

5. **Claim 11e receive the designation of the building roof structure location;**

106. See claim 1e.

6. **Claim 11f responsive to receiving the designation of the building roof structure location, provide a second computer input capable of signaling user-acceptance of the building roof structure location within the first image, wherein user-acceptance is one or more affirmative steps undertaken by the user to confirm the designation of the building roof structure location; and**

107. See claim 1f.

7. **Claim 11g subsequent to receiving the user-acceptance confirming the designation of the building roof**

structure location, providing a report for the building roof structure.

108. *See claim 1g.*

M. Claim 12: The non-transitory computer memory of claim 11, wherein said computer logic when executed by computer hardware causes the computer hardware to: provide visual access to one or more outline drawing corresponding to the roof structure of the building.

109. *See claim 2.*

N. Claim 13: The non-transitory computer memory of claim 12, wherein said computer logic when executed by computer hardware causes the computer hardware to: provide at least one length dimension on the outline drawing.

110. *See claims 1, 3.*

O. Claim 14: The non-transitory computer memory of claim 12, wherein said computer logic when executed by computer hardware causes the computer hardware to: provide visual access to a nadir image of an imagery database corresponding to location coordinates of the building roof structure location, and wherein the outline drawing is super-imposed on the nadir image.

111. *See claim 9.*

P. Claim 15: The non-transitory computer memory of claim 12, wherein said computer logic when executed by computer hardware causes the computer hardware to: provide one or more area dimension on the outline drawing.

112. *See claim 5.*

Q. Claim 16 The non-transitory computer memory of claim 11, wherein the first image is taken from an overhead view with respect to the roof of the building.

113. See claim 10.

R. Claim 17

1. Claim 17a A method, comprising:

114. As discussed with respect to claim 1, Pershing-789 discloses a method. See claim 1.

2. Claim 17b receiving, by a user, visual access to a first image of a region corresponding to first location data, the first image including a roof structure of a building;

115. As discussed with respect to claim 1, Pershing-789 discloses receiving, by a user, visual access to a first image of a region corresponding to first location data, the first image including a roof structure of a building. See claim 1. For example, a user is able to see a first image of a region corresponding to a building address, which includes a roof structure of a building. *Id.*

3. Claim 17c signaling, by the user, a designation from the user of a building roof structure location within the first image, wherein the building roof structure location is a geo-graphic position of the building roof structure and is different than the first location data;

116. See claim 1d-e.

4. Claim 17d signaling, by the user, user-acceptance of the building roof structure location within the first image, wherein user-acceptance is one or more

affirmative steps undertaken by the user to confirm the designation of the building roof structure location; and

117. See claim 1f.

5. **Claim 17e subsequent to signaling the user-acceptance confirming the designation of the building roof structure location, receiving a report for the building roof structure; and**

118. See claim 1g.

6. **Claim 17f repairing or constructing a roof designated by the building roof structure location.**

119. Pershing-789 teaches that its system is designed to create cost estimates for repair or replacement of roofing structures: “The information can then be used to prepare a cost estimate for the repair or replacement of the roof or installation of roof equipment.” Ex. 1004 at Abstract. Pershing-789’s system also expressly relies on roofing “contractors.” See, e.g., *id.* at [0017], [0018]. Thus, a POSITA reading Pershing-789 would understand that its disclosures teach ***repairing or replacing a roof*** once a report is generated.

120. At a minimum, it would have been obvious to actually repair or construct a roof at the desired location. The ***entire purpose*** of Pershing-789’s system is to provide a customer with an estimate for repair/replacement in conjunction with contractors—it would make no sense to generate such a report and then not actually allow the contractor to perform the repair/replacement. Such a read would render the teachings of Pershing-789

completely useless, as a customer has no use for a roof estimate report other than to engage with a contractor for the repair/replacement of a roof.

X. GROUND 2: PERSHING-789, ABHYANKER AND PICTOMETRY RENDER OBVIOUS CLAIMS 9 AND 14

A. Claims 9 and 14

121. To the extent Patent Owner argues that Pershing-789 does not disclose an “outline drawing is superimposed on the nadir image,” as required by claims 9 and 14, Pictometry teaches this limitation. Pictometry discloses a program that allows users to annotate aerial photographs. *See, generally* Ex. 1008. Pictometry teaches that a variety of aerial photographs can be taken, and that users can “zoom, measur[e]...and annotate[e]” these images. *Id.* at 115. Pictometry teaches a “distance tool” which allows a user to measure various attributes contained within an image. *Id.* at 116. Pictometry specifically teaches drawing lines around a “parcel” to learn the square footage and area of a region. *Id.* Pictometry’s tool can also be used for “measuring angles.” *Id.* at 116. Thus, Pictometry expressly teaches superimposing drawings on a nadir image, and specifically teaches drawing the same types of measurements taught by Pershing-789 (length, pitch, area). Accordingly, a POSITA would have been motivated to use an “outline drawing is superimposed on the nadir image” in Pershing-789’s system based on the teachings of Bailey.

B. Motivation To Combine

122. A POSITA would have been motivated to incorporate Pictometry's drawing annotation option into Pershing-789 for a variety of reasons. Pictometry teaches that the annotation feature is an “*indispensable* tool.” *Id.* at 115 (emphasis added). A POSITA would, thus, have been motivated to utilize Pictometry's indispensable annotation feature in similar systems, like Pershing-789's system.

123. Likewise, Pictometry expressly discloses that its annotation tool can be used to “analyze any house [or] building.” *Id.* at 114. A POSITA reading Pictometry would have, thus, been motivated to use Pictometry's annotation tool in Pershing-789's system to analyze the roof of a house or building.

124. A POSITA would have also been motivated to use Pictometry's annotation tool in Pershing-789's system because doing so would allow roofers and customers to see the house being analyzed. This would *promote accuracy*, since users could confirm that the correct house was being measured.

125. Likewise, a POSITA would be motivated to use Pictometry's annotation tool because it would provide roofers and customers *greater flexibility* related to which aspects of the home to measure. Showing

annotations on a nadir image would also improve **precision** because users could ensure that the measurements were properly aligned with the building.

126. Petitioner has already explained why a POSITA would have been motivated to combine the teachings of Pershing-789 and Abhyanker. A POSITA would be further motivated to incorporate Pictometry's annotation feature for similar reasons. Like Pershing-789 and Abhyanker, Pictometry is in the **same field of endeavor** as the '800 patent. Pictometry is broadly directed towards accurate measurements of structure, including buildings, in aerial images. Ex. 1008 at 114. Further, Pershing-789, Abhyanker, Pictometry and the '800 patent all use **similar techniques to solve the same problems**. As discussed above, Pictometry use the same techniques to locate roofs (*e.g.*, input an address) and measure their dimensions (*e.g.*, annotations) as the '800 patent. A POSITA would also have a **reasonable expectation of success** in including the teachings of Pictometry in Pershing-789's system. Pictometry's itself discloses that its annotation feature can be used in a system for measuring attributes of buildings. Ex. 1008 at 114. For the foregoing reasons, a POSITA would be motivated to use Pictometry's teachings of annotations to improve Pershing-789's system.

XI. GROUND 3: KENNEDY, ABHYANKER AND BAILEY RENDER OBVIOUS CLAIMS 1-17 OF THE '800 PATENT

127. As discussed below, the combination of Kennedy and Abhyanker renders obvious the challenged claims. Kennedy expressly teaches the bulk of the claim elements recited in the '800 patent, including a software system for locating a customer's roof at a specific geographic location and analyzing roof dimensions. A POSITA would have been motivated by the teachings of Abhyanker to allow users of Kennedy's roofing system the option to specifically designate the geographic position of a roof to be analyzed using a marker, and to include a subsequent user confirmation option to ensure the correct roof is being analyzed.

A. Motivation To Combine Kennedy and Abhyanker

128. There are a variety of reasons a POSITA would be motivated to apply these teachings from Abhyanker to Kennedy. For example, allowing a user to designate a geographic position of a roof and to subsequently confirm that the roof location is correct would promote the *accuracy of the system*. Abhyanker's teachings expressly address this motivation. Abhyanker discloses that automated systems used to pinpoint geographic locations (like Kennedy's) are not always 100% accurate, and mistakes will result in user disappointment. Ex. 1005 at [0004]-[0005]. That is especially true here: if Kennedy's system inadvertently marked a neighboring roof (or a roof with the

same address in a different state or town), the resulting calculations would be irrelevant. This would cost both the user and the service provider time and money (and would potentially cost the software provider business). Thus, it would have been obvious to include Abhyanker's teachings of allowing a user to place a "marker" on the roof in question and to affirmatively "confirm" the right selection was made. This accuracy check would ***save money, save time*** and ***avoid customer losses***.

129. In addition, applying Abhyanker's teachings to Kennedy's system would also ***add convenience*** to a user. For example, if a user inadvertently input a neighbor's address it would be convenient to allow the user to apply a drag-and-drop feature, like that taught by Abhyanker, to correct this error by simply sliding the marker to the correct location. This would also add to the convenience for users who may have difficulties typing or reading smaller print in the form fields in a screen—dragging a colored "marker" would assist such users in marking the right roof.

130. In addition, a POSITA would have been motivated to combine the teachings of Kennedy and Abhyanker because they are in the ***same field of endeavor*** as the '800 patent. Both Kennedy and the '800 patent are directed towards systems that locate and measure roof dimensions. Ex. 1001 at Abstract; Ex. 1009 at Abstract, [00784], [0075]. Similarly, Abhyanker is

broadly directed towards accurate placement of markers in a “mapping environment,” like the ones used in the Kennedy and ’800 patent systems. Ex. 1005 at Abstract, [0012]. Further, Kennedy, Abhyanker and the ’800 patent all use *similar techniques to solve the same problems*. As discussed below, Kennedy uses the same techniques to locate roofs and measure their dimensions as the ’800 patent, and Abhyanker uses the same techniques to ensure accurate roof placement. A POSITA would also have a *reasonable expectation of success* in including the teachings of Abhyanker in Kennedy. Abhyanker’s teachings confirm that user confirmation options in “mapping environments” such as Kennedy’s were well known, and Abhyanker specifically teaches that its system can be used in the same context—locating roofs. Ex. 1005 at [0012]. Accordingly, Abhyanker itself would motivate a POSITA to apply its teachings of user confirmation steps to improve Kennedy’s system.

B. Motivation To Combine Kennedy, Abhyanker and Bailey

131. A POSITA would have been further motivated by the teachings of Bailey to use the roof estimates calculated by Kennedy and Abhyanker to generate a report and to actually repair or construct the roof in question. A POSITA would have been so motivated for a variety of reasons.

132. Bailey generates a report based on roof attributes, including pitch. Ex. 1010 at 15. Bailey's roof report collects the same types of roof attributes as Kennedy's system (area, pitch, length). Ex. 1010 at 11-22, Ex. 1009 at [0072], [0081]-[0087]. Thus, a POSITA considering Kennedy's system for collecting roof data would be motivated by Bailey to generate a report reflecting that data.

133. Bailey also discloses instructions for collecting data that can be used to inform roof inspectors about, *e.g.*, the "needed level of **repair**." Ex. 1010 at 1 (emphasis added). Bailey's report teaches the manual method for collecting the **same** roof data as Kennedy's automated system, including length, slope (*i.e.*, "pitch") and area. *Id.* at 11-22. Thus, a POSITA viewing Bailey would have been motivated to apply the data collected by Kennedy's system to repair a roof, as taught by Bailey. Indeed, Kennedy already discloses using contractors to "**maintain**" structures mounted on a roof, *e.g.*, solar panels. Ex. 1009 at [00784], [0075]. Thus, Kennedy's teachings already contemplate using its system to facilitate repairs. Thus, it would have been a natural fit to apply Kennedy's roof estimation to the repairs contemplated by Bailey.

134. In addition, a POSITA would have been motivated to combine the teachings of Kennedy and Bailey, because they are in the **same field of**

endeavor as the '800 patent. Like Kennedy and the '800 patent, Bailey is also aimed at taking roof dimensions. Ex. 1001 at Abstract; Ex. 1009 at Abstract, [00784], [0075]; Ex. 1010 at Abstract. Further, Kennedy and Bailey and the '800 patent all use *similar techniques to solve the same problems*. As discussed above, Kennedy uses the same techniques to locate roofs and measure their dimensions as the '800 patent, and Bailey teaches using the type of roof data collected by Kennedy for repairs or replacement. A POSITA would also have a *reasonable expectation of success* in including the teachings of Bailey in Kennedy. Indeed, Bailey's teachings of using roof estimates for repair/replacement would have been easily implemented in Kennedy, at least because Kennedy already calculates the same type of roof dimensions (Ex. 1010 at Abstract), includes options to hire contractors to build structures on a roof (*id.* at [0074], [0075]) and even contemplates using contractors for maintenance (*id.*). Accordingly, a POSITA would have had a reasonable expectation of success in using.

C. Claim 1

1. Claim 1a: A process, comprising:

135. Kennedy teaches a process. Kennedy teaches a “roof estimating software program.” Ex. 1009 at Abstract. Kennedy teaches using its system's

roof estimation to prepare a “quote” for customers. Ex. 1009 at ¶¶ 164, 169.

For example, Kennedy teaches:

A system according to one embodiment of the invention remotely determines the measurements of a roof. An exemplary system comprises a computer including an input means, a display means and a working memory. An aerial image file database contains a plurality of aerial images of roofs of buildings in a selected region. A roof estimating software program receives location information of a building in the selected region and then presents the aerial image files showing roof sections of building located at the location information. Some embodiments of the system include a sizing tool for determining the size, geometry, and pitch of the roof sections of a building being displayed.

136. *Id.* at Abstract; *see also id.* at [0169] (“In one embodiment of the invention a quote for the displayed system is provided in association with the image of the system.”).

2. Claim 1b: receiving first location data;

137. Kennedy teaches that its user interface is configured to receive “user information, for example, *site location information from a user*[.]” Ex. 1009 at [0053]-[0054] (emphasis added).

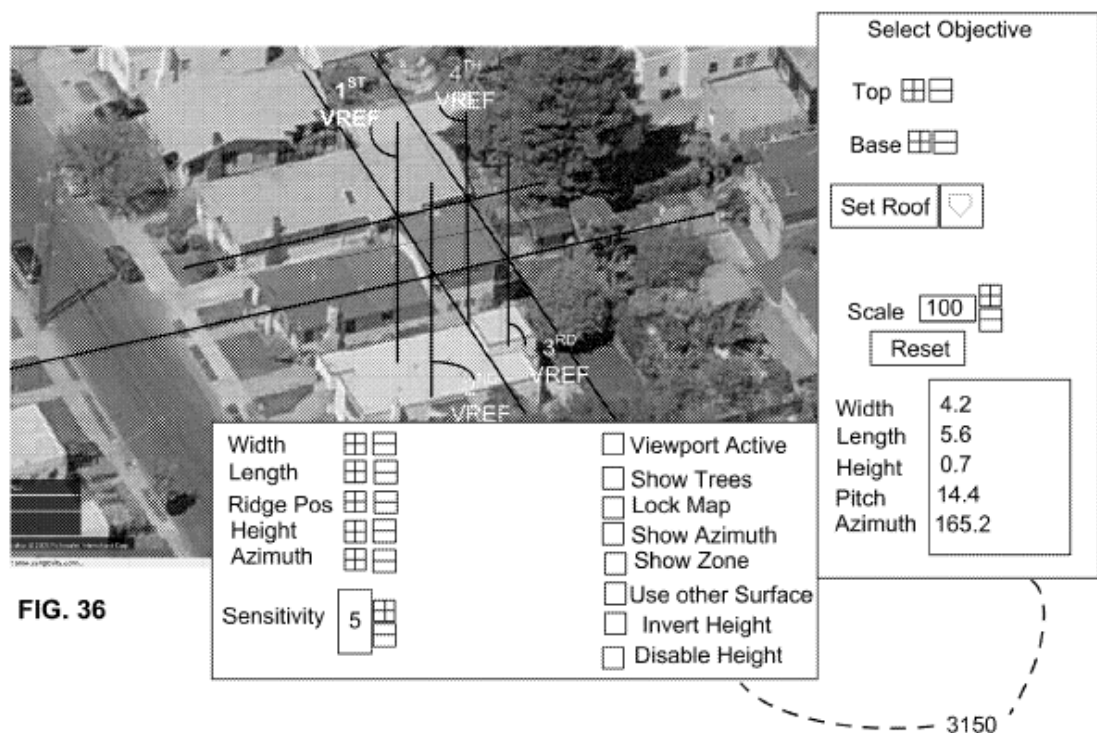
3. Claim 1c: providing visual access to a first image corresponding to the first location data, the first image including a roof structure of a building;

138. Kennedy teaches providing visual access to a first image corresponding to the first location data, the first image including a roof structure of a building:

[S]ystem 100 uses the location information received from user system 106 to **retrieve an image** 153 of the location (or site) from a geophysical database 109. In response to receiving the location information, system 100 provides an image corresponding to the location, for example **an image of a roof of a house 391 for display on screen 380** of display device 108 of a user system 106.

Ex. 1009 at [0056] (emphasis added).

This is shown, for example, in Figure 36:



Id. at Fig. 36.

4. **Claim 1d: providing a first computer input capable of signaling a designation from a user of a building roof structure location within the first image, wherein the building roof structure location is a geographic**

position of the building roof structure and is different than the first location data;

139. As discussed with respect to Ground 1, Abhyanker teaches this limitation. *See* Ground 1, claim 1d.

5. Claim 1e: receive a designation of the building roof structure within the first image;

140. As discussed with respect to Ground 1, Abhyanker teaches this limitation. *See* Ground 1, claim 1e.

6. Claim 1f: responsive to receiving the designation of the building roof structure location, providing a second computer input capable of signaling user-acceptance of the building roof structure location within the first image, wherein user-acceptance is one or more affirmative steps undertaken by the user to confirm the designation of the building roof structure location; and

141. As discussed with respect to Ground 1, Abhyanker teaches this limitation. *See* Ground 1, claim 1f.

7. Claim 1g: subsequent to receiving the user-acceptance confirming the designation of the building roof structure location, providing a report for the building roof structure.

142. As discussed with respect to Ground 1, Abhyanker teaches “receiving the user-acceptance confirming the designation of the building roof structure location.” *See* Ground 1, claim 1g. Further, Bailey teaches “providing a report for the building roof structure.” Ex. 1010 at 11-22 (disclosing a “report”).

D. Claim 2: The process of claim 1, further comprising providing visual access to one or more outline drawing corresponding to the roof structure of the building.

143. Kennedy expressly discloses a “sizing tool” that is superimposed on an aerial image to determine “surface dimensions” of a roof:

In one embodiment of the invention, a graphical user interface (best illustrated in FIGS. 8-9) cooperates with sizing subsystem 500 of system 100 to implement a sizing tool enabling user 107 to determine surface dimensions and pitch of a surface, for example a roof 191 of a house appearing in the retrieved image 153. Thus there is no need to physically visit the installation site to make measurements and perform sizing calculations.

144. *Id.* at [0058]; see also *id.* at [0110] (“**To size surface 1215 user 507 superimposes sizing tool**, in this example tool 1117 (illustrated in Fig. 11) of at least a portion of image 1215...in some embodiments, information defining an orientation of shape 1215 with respect to a reference axis 1211 is generated by comparing orientation of adjusted tool 1107 to reference axis 1211.”) (emphasis added). Kennedy discloses “**generating length and width measurements** for a generally rectangular planar installation surface such as a side of a roof.” *Id.* at [0082] (emphasis added); see also [0109], Fig. 12.

145. Thus, Kennedy teaches the claimed outline drawing, including drawing length dimensions around the perimeter of roofing sections in an aerial image.

E. Claim 3: The process of claim 2, further comprising providing one or more length dimension on the outline drawing

146. As discussed with respect to claim 2, Kennedy discloses providing one or more length dimensions in the outline drawing as shown, for example, in Figure 12:

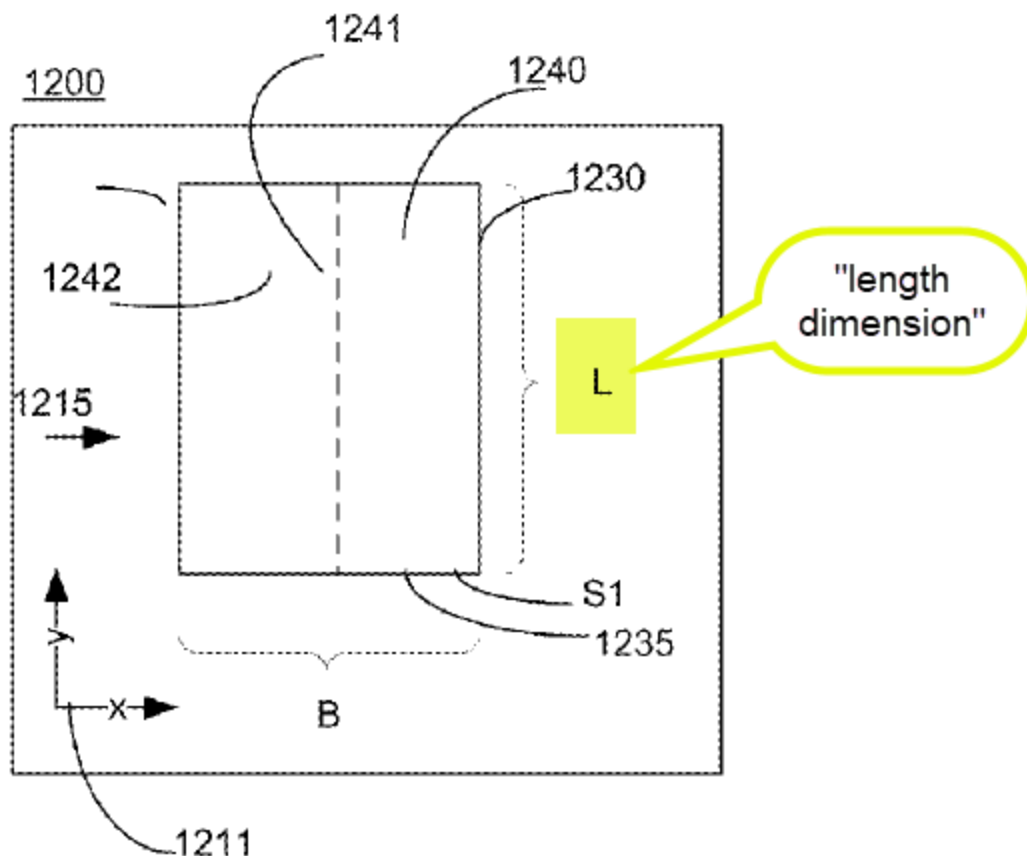


FIG. 12

Id. at Fig. 12 (annotated); see also [0109]-[0113].

- F. **Claim 4: The process of claim 3, wherein the length dimension is one or more of a perimeter of the roof structure, a length of a ridge of the roof structure, a total length of ridges of the roof structure, a length of a valley of the roof structure, a total length of valleys of the roof structure, a length of a flashing of the roof structure, and a total length of flashings of the roof structure.**

147. As discussed with respect to claim 3, Kennedy's length dimension includes, at least, the length of a ridge or valley of a roof structure. *Id.* at [0109] ("The imaged surface shape 1215 is defined by a length L (at 1230), a base B (indicated at 1235) and a ridge line 1241."), [0110] ("In that manner user 507 generates measurements which describe shape 1215 by length and base measurements.").

- G. **Claim 5: The process of claim 2, further comprising providing one or more area dimension on the outline drawing.**

148. Kennedy renders obvious this limitation. Kennedy teaches measuring the area dimension of a roof: "Referring now to FIG. 6, in order to *measure an installation surface area*, such as a *roof 640 area* of house 600 in FIG. 6, user 507 *positions measuring tool 1150 over an image of roof 600* in alignment with a side of the image of roof 600." Ex. 1009 at [0106] (emphasis added). Thus, Kennedy teaches an "outline drawing" of "area dimensions" via its disclosure of its sizing tool superimposed on an aerial image of a roof for measuring area dimensions.

149. It would have been obvious to include area dimensions on the outline drawing. Indeed, Kennedy already teaches including a variety of dimensions on its outline drawings, such as width, length, height, pitch, azimuth and ridge position as shown, *e.g.*, in Fig. 36:

FIG. 36

Select Objective

Top 

Base 

Set Roof 

Scale 

Width	4.2
Length	5.6
Height	0.7
Pitch	14.4
Azimuth	165.2

3150

150. *Id.* at Fig. 36 (annotated). A POSITA would have been motivated to also include Kennedy's calculation of area in the image to provide a complete data set for the user. Indeed, Kennedy's disclosures are primarily geared towards calculating surface area, *e.g.*, to determine the size of possible solar cell installations. *Id.* at Abstract. Thus, Kennedy's calculation of surface area would be a critical measurement, and a POSITA

would have been motivated to include it in Kennedy's outline drawing to make it readily available to a user. Adding an area value would be a simple modification at least because Kennedy's images already include both length and width—thus, no additional data collection would be required.

H. Claim 6: The process of claim 2, further comprising providing one or more pitch dimension on the outline drawing.

151. Kennedy discloses that the measuring tool can be used to determine the pitch of a roof. *Id.* at [0116] (“...measuring tool 1107 [can be] used to measure displacement of a ridge of roof 650 from base 635. The displacement information is used by modeling unit 591 (Fig. 5) to determine ***pitch*** of roof 600.”) (emphasis added). Kennedy expressly teaches including the “pitch” dimension on its outline drawing, *e.g.*, in Fig. 36:

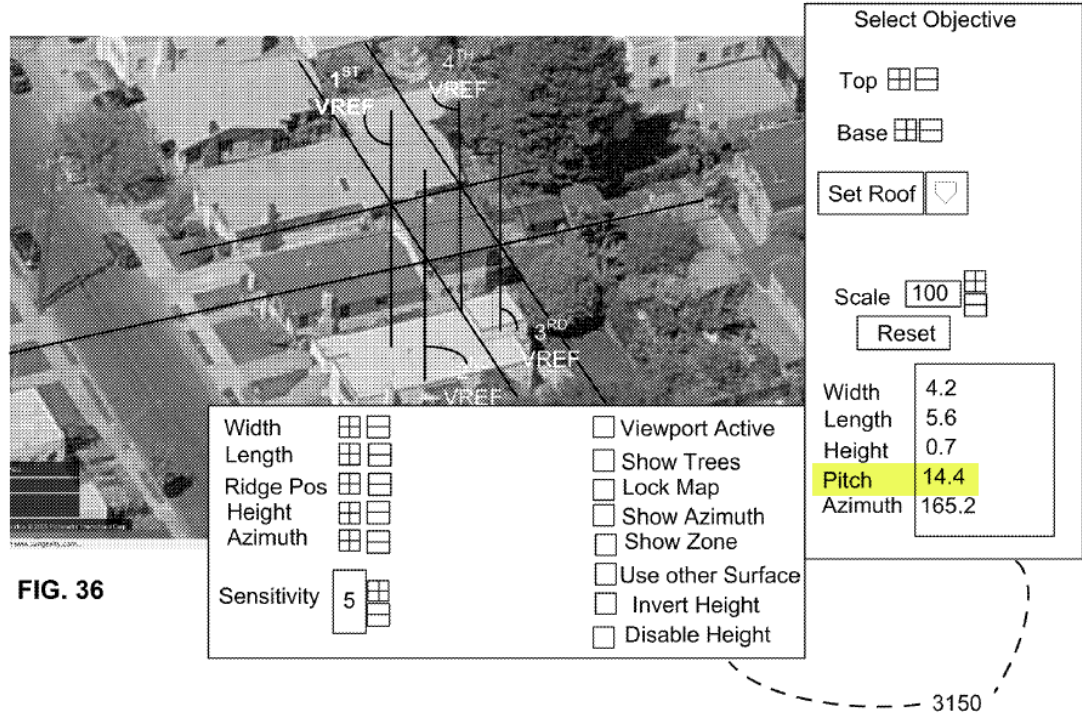


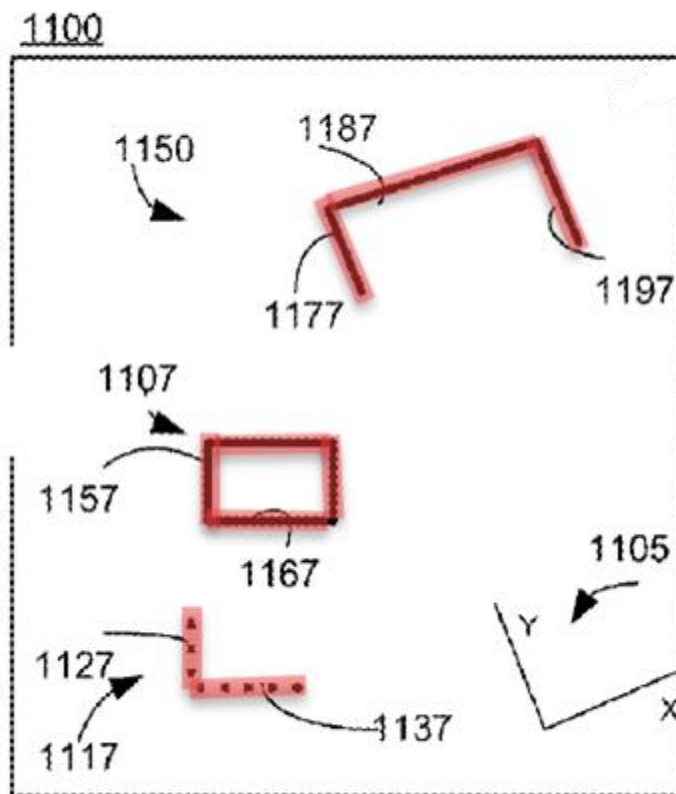
FIG. 36

Id. at Fig. 36 (annotated).

- I. **Claim 7: The process of claim 2, further comprising providing one or more indicator of pitch direction on the outline drawing.**

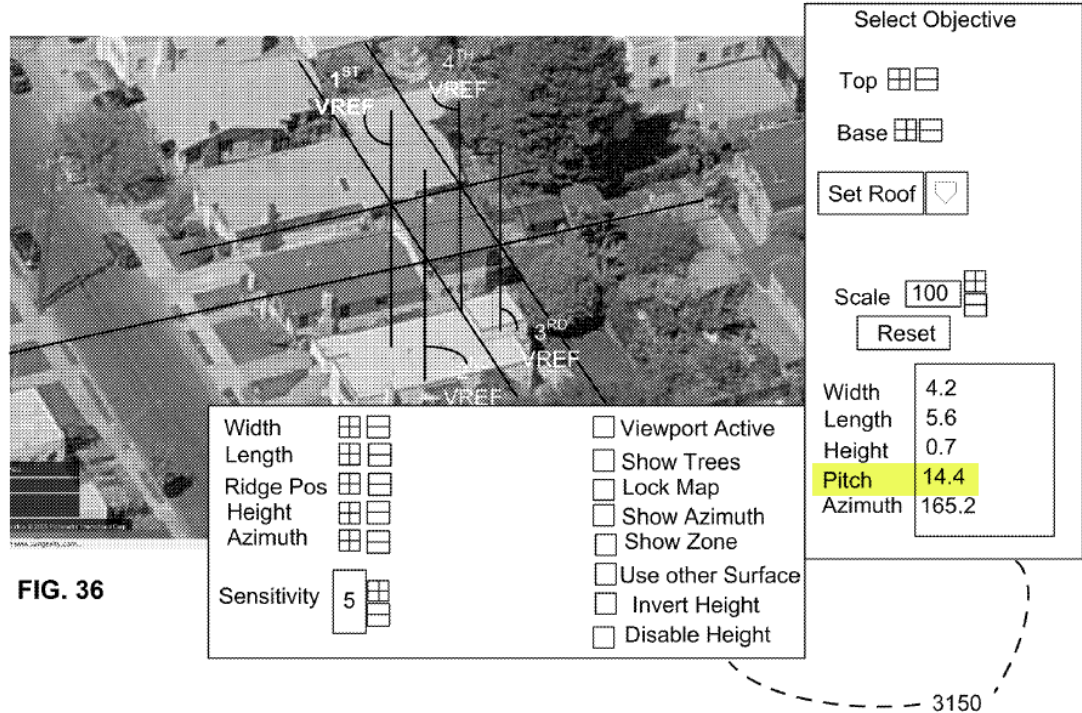
152. Kennedy’s “sizing subsystem” includes an “interactive measuring tool for use in sizing surfaces such as roof of house 600 in Fig. 6. *Id.* at [0105]. The sizing tool is shown, for example, in Figure 11—this sizing tool (also called a “measuring tool”):

FIG. 11



153. *Id.* at Fig. 11 (annotated). Kennedy explains that its measuring tool is “rotatable and scalable by a user 507 to align at least two sides of the tool an image [sic] of an object to be measured, for example a roof surface to be measured.” *Id.* at [0105]. Kennedy further explains that “an orientation of measuring tool with respect to axes 670 [the x/y/z axis] is determined.” *Id.* at [0108]. Thus, Kennedy teaches computing pitch direction.

154. Kennedy expressly teaches including the “pitch” dimension on its outline drawing, *e.g.*, in Fig. 36:

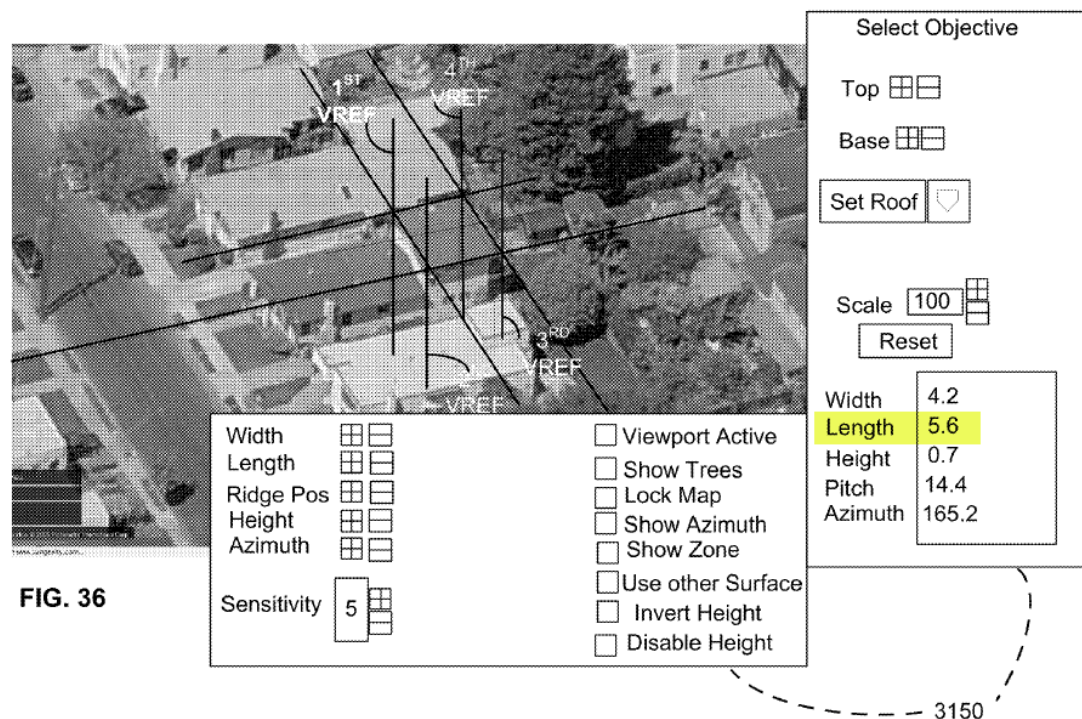


155. *Id.* at Fig. 36 (annotated). A POSITA would have been motivated to also include Kennedy’s calculation of pitch direction in the image to provide a complete data set for the user. Indeed, Kennedy’s disclosures already teach computing pitch direction, and, thus no additional calculations would be required.

J. Claim 8: The process of claim 2, further comprising providing one or more non-dimensional attribute of the roof structure on the outline drawing.

156. The ’800 patent teaches that a “non-dimensional attribute” may include at least a “linear ridge.” Ex. 1001 at 6:26-31 (“FIG. 6. also depicts an optional table and/or fields showing the *non-dimensional attributes*

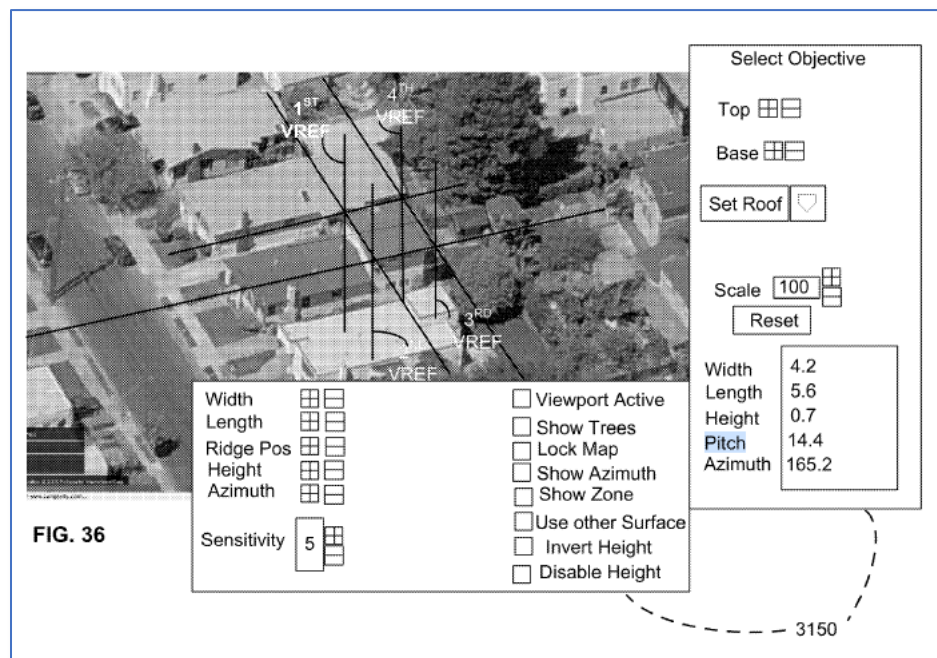
at **507** and the total values for them at **508**. *This can include* the area of roofing **509**, the *linear ridge feet* **510**, linear valley feet **511**, starter/perimeter linear feet **512**, step flashing **513**, and/or others.”) (emphasis added).



158. *Id.* at Fig. 36. Kennedy does not restrict the length value and, thus, its disclosure of displaying a length value encompasses displaying ridge length.

K. Claim 9: The process of claim 2, further comprising, providing visual access to a nadir image from an imagery database corresponding to location coordinates of the building roof structure location, and wherein the outline drawing is super- imposed on the nadir image.

159. Kennedy teaches that some embodiments of the system “include a sizing tool for determining the size, geometry, and *pitch of the roof sections of a building being displayed.*” Ex. 1009 at Abstract. This is shown, for example, in Figure 36, which shows a nadir image a roof:



Id. at Fig. 36.

160. Kennedy makes clear that the sizing tool is “superimposed” over an aerial image. *Id.* at [0110] (“To size surface 1215 user 507 superimposes sizing tool, in this example tool 1117 (illustrated in Fig. 11) of at least a portion of image 1215...in some embodiments, information defining an

orientation of shape 1215 with respect to a reference axis 1211 is generated by comparing orientation of adjusted tool 1107 to reference axis 1211.” *Id.*

L. Claim 10 The process of claim 1, wherein the first image is taken from an overhead view with respect to the roof structure of the building.

161. As discussed with respect to claim 9, Kennedy discloses a first image that is taken from an overhead view.

M. Claim 11

1. Claim 11a: A non-transitory computer memory storing computer logic, that when executed by computer hardware causes the computer hardware to:

162. Kennedy teaches:

For example a commercially available processor or computer system adapted in accordance with the teachings herein implements system 100 including at least one of subsystems 110, 2000, 3000, 3100, 500 and/or 200. For example, one of ordinary skill in the art will recognize upon reading this specification, that commercially available **processors, memory modules**, input/output ports and other commercially available hardware components are suitable for use in constructing embodiments of system 100. These may be assembled as taught in this specification to arrive at the various embodiments.

Id. at [0051] (emphasis added).

2. Claim 11b receive first location data generally corresponding to a geographic location of a building;

163. See claim 1.

3. **Claim 11c provide visual access to a first image corresponding to the first location data, the first image including a roof structure of the building;**
164. *See claim 1c.*
4. **Claim 11d provide a first computer input capable of signaling a designation from a user of a building roof structure location within the first image, wherein the building roof structure location is a geographic position of the building roof structure and is different than the first location data;**
165. *See claim 1d.*
5. **Claim 11e receive the designation of the building roof structure location;**
166. *See claim 1e.*
6. **Claim 11f responsive to receiving the designation of the building roof structure location, provide a second computer input capable of signaling user-acceptance of the building roof structure location within the first image, wherein user-acceptance is one or more affirmative steps undertaken by the user to confirm the designation of the building roof structure location; and**
167. *See claim 1f.*
7. **Claim 11g subsequent to receiving the user-acceptance confirming the designation of the building roof structure location, providing a report for the building roof structure.**
168. *See claim 1g.*

N. Claim 12: The non-transitory computer memory of claim 11, wherein said computer logic when executed by computer hardware causes the computer hardware to: provide visual access to one or more outline drawing corresponding to the roof structure of the building.

169. *See claim 2.*

O. Claim 13: The non-transitory computer memory of claim 12, wherein said computer logic when executed by computer hardware causes the computer hardware to: provide at least one length dimension on the outline drawing.

170. *See claims 1, 3.*

P. Claim 14: The non-transitory computer memory of claim 12, wherein said computer logic when executed by computer hardware causes the computer hardware to: provide visual access to a nadir image of an imagery database corresponding to location coordinates of the building roof structure location, and wherein the outline drawing is super-imposed on the nadir image.

171. *See claim 9.*

Q. Claim 15: The non-transitory computer memory of claim 12, wherein said computer logic when executed by computer hardware causes the computer hardware to: provide one or more area dimension on the outline drawing.

172. *See claim 5.*

R. Claim 16 The non-transitory computer memory of claim 11, wherein the first image is taken from an overhead view with respect to the roof of the building.

173. *See claim 10.*

S. **Claim 17**

1. **Claim 17a A method, comprising:**

174. Kennedy teaches a method. See claim 1; see also Ex. 1009 at [002] (“The present invention relates generally to **methods**.”) (emphasis added).

2. **Claim 17b receiving, by a user, visual access to a first image of a region corresponding to first location data, the first image including a roof structure of a building;**

175. See claim 1.

3. **Claim 17c signaling, by the user, a designation from the user of a building roof structure location within the first image, wherein the building roof structure location is a geo-graphic position of the building roof structure and is different than the first location data;**

176. See claim 1d-e.

4. **Claim 17d signaling, by the user, user-acceptance of the building roof structure location within the first image, wherein user-acceptance is one or more affirmative steps undertaken by the user to confirm the designation of the building roof structure location; and**

177. See claim 1f.

5. **Claim 17e subsequent to signaling the user-acceptance confirming the designation of the building roof structure location, receiving a report for the building roof structure; and**

178. See claim 1g.

6. Claim 17f repairing or constructing a roof designated by the building roof structure location.

179. Bailey teaches instructions for collecting data that can be used to inform roof inspectors about, *e.g.*, the “needed level of **repair**.” Ex. 1010 at 1 (emphasis added). Baily teaches collecting the same types of data as Kennedy’s system, including length, slope (*i.e.*, “pitch”) and area. *Id.* at 12-22. It would have been obvious to apply the data collected by Kennedy’s system to repair a roof, as required by the claims. Indeed, Kennedy already discloses using contractors to “**maintain**” structures mounted on a roof, *e.g.*, solar panels. Ex. 1009 at [00784], [0075].

180. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed on January 3, 2023, in Springfield, VA.

/s/ Tony Cummings
Tony Cummings



Tony L Cummings, AIA, CSI
Construction Forensics, Inc. - President

Registrations & Certifications

Vermont, New Hampshire, Massachusetts, Maine, Rhode Island, Connecticut, New York, Delaware, Pennsylvania, Maryland, Virginia, N Carolina, S Carolina, Tennessee, Missouri, Oklahoma, Florida, Texas, Colorado, Montana, Oregon.

*Contact CFI for license status

National Council of Architectural Registration Boards

OSHA 10-hour Construction Safety and Health Training

California Office of Emergency Services Safety Assessment Program Evaluator

Infraspection Institute – Level II Certified Infrared Thermographer

Education

Bachelor of Architecture – Kansas State University

Professional Service Organizations

Member – American Institute of Architects (AIA)

Member – Construction Specifications Institute (CSI)

Member – International Code Council (ICC)

Member – National Fire Protection Association (NFPA)

Member – International Institute of Building Enclosure Consultants (IIBEC)

Member – National Institute of Building Science (NIBS)

Member – Society of American Value Engineering (SAFE)

Member – American Society of Professional Estimators (ASPE)

Lectures, Seminars & Publications

“Mitigating Moisture Intrusion”: Oregon Washington Community Association Managers

“Construction Defects & Forensic Applications”: Build Virginia Mid-Atlantic Conference

“Construction Defects & How to Avoid Them”: Commercial Builder/Architect Magazine

“The Use of Experts”: Community Association Institute, National Law Review

“Preserving & Protecting Your Investment”: Various Condominium Associations

“Making the Complex Simple - How To Keep The Jury Awake”: Insurance Adjusters

“Failure to Plan – What Could Possibly Go Wrong”: KSU College of Architecture

“Failure to Plan – What Could Possibly Go Wrong”: Kansas Chapter AIA

Professional History

Construction Forensics, Inc.

Founded in 1990 in Virginia, Mr. Cummings is president of CFI, a consulting firm specializing in analyzing and investigating construction disputes. CFI has performed forensic investigations in 16 states, for plaintiffs and defendants to include: code review and conformance, failure analysis of building systems and components, claims analysis, material and workmanship evaluations, Standard of Care for design professionals and contractors, CPM schedule analysis, cost estimating, and the suitability of plans and specifications. Mr. Cummings has qualified as an expert and provided testimony numerous times in 9 states and the Federal Contractor Board of Appeals. Experience as an architect and contractor offers a unique perspective when assessing construction disputes and forensic evaluations. Previously named one of two forensic experts for the State of Tennessee Board of Architecture and Engineering to evaluate Standard of Care claims against architects brought before the Board.

High Point Schaer, Senior Consultant

Mr. Cummings served as Senior Consultant in the Forensic Analysis Department of High Point Schaer (HPS) Florida office. HPS was an international construction-consulting arm of the High Point/Rendel Group. Responsibilities included the analysis and forensic evaluation of numerous defective construction claims related to Florida's condominium market. In addition to forensic investigations, Mr. Cummings provided expert testimony on claims of faulty construction, improper maintenance, moisture intrusion, material failures, and A/E professional standard of care.

Bill Strong Enterprises

Mr. Cummings was hired to head the estimating department of six estimators for the general contracting firm specializing in DOD military base housing throughout the United States. Mr. Cummings was the lead estimator for a ten-million-dollar multi-family housing rehab project at the Naval War College in Newport, RI. Contract requirement resulted in Mr. Cummings becoming the on-site quality control representative responsible for reviewing shipments received, daily documentation of work performed, evaluation of workers, and workmanship.

TL Cummings & Associates

Mr. Cummings owned a full-service architectural firm in Colorado Springs, Colorado. Services included conceptual design development, land planning, the architectural design for residential, multi-family, commercial, industrial, hospitality, shopping plazas, offices, and financial institutions. Responsible for initial design and specifications, reviewing all documents issued by this office, and supervising drafting staff. Mr. Cummings provided a forensic evaluation and expert testimony for claims of faulty construction to an underground parking garage.

DANAC, Inc.

Mr. Cummings began as an estimator and one of the four individuals in the establishment of western division of this general contracting firm specializing in DOD military base housing. Located in Colorado Springs, Colorado, DANAC was an arm of Danish Arctic Contractors (DAC), a firm specializing in construction and services to military installations worldwide. Mr. Cummings was one of two estimators responsible for reviewing contract documents suitability for construction, evaluation errors and ambiguities in the drawings, and preparing cost estimates for competitive bidding. Mr. Cummings became head of estimating, overseeing six additional estimators, coordinating and reviewing all estimates before they were released. DANAC was responsible for renovating over 2,000 multi-family living units in numerous locations around the United States, Bachelor Enlisted Quarters, and a prototype day-care center at the Air Force Academy. During my employment at DANAC, we also performed a design/build joint venture of 100 multi-family housing units at Guantanamo Bay, Cuba.