

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ROOFR INC.,
Petitioner

v.

PICTOMETRY INTERNATIONAL CORP.,
Patent Owner

Case IPR2023-00436
U.S. Patent No. 9,183,538

**PATENT OWNER RESPONSE
UNDER 37 C.F.R. § 42.120**

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PATENT OWNER'S UPDATED EXHIBIT LIST

Exhibit	Description
2001	<i>Intentionally Left Blank</i>
2002	Certified Prosecution History of U.S. Patent No. 9,183,538
2003	<i>Intentionally Left Blank</i>
2004	<i>Intentionally Left Blank</i>
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2011	<i>Intentionally Left Blank</i>
2012	<i>Intentionally Left Blank</i>
2013	<i>Intentionally Left Blank</i>
2014	Microsoft Word Comparison Petition to Cummings Declaration
2015	U.S. Application Publication 2010/0179787 to Pershing et al.
2016	U.S. Patent No. 8,145,578 to Pershing et al.
2017	Microsoft Word Comparison Pershing-789 to Pershing-787
2018	U.S. Application Publication 2010/0296693 to Thornberry et al.
2019	U.S. Application Publication 2013/0155109 to Schultz et al.
2020	Excerpt from Merriam-Webster's Collegiate Dictionary, Eleventh Edition, 2008 (definition of predominant)
2021	<i>Intentionally Left Blank</i>
2022	<i>Intentionally Left Blank</i>
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Exhibit	Description
2027	<i>Intentionally Left Blank</i>
2028	<i>Intentionally Left Blank</i>
2029	May 23, 2023 Email from Roofr's Counsel to the Board in IPR2023-00435, -00436, and -00437
2030	May 23, 2023 Email from Patent Owner's Counsel to the Board regarding Roofr's request reply to the POPRs in IPR2023-004345, -00436, and -00437
2031	Declaration of Justin T. Kestner, P.E. in Support of Patent Owner's Response
2032	Deposition Transcript of Tony L. Cummings (November 17, 2023)
2033	<i>Curriculum Vitae</i> of Justin T. Kestner, P.E., MS, MBA
2034	"RSMMeans Illustrated Construction Dictionary, The Complete Source of Construction Terms and Concepts," Fourth Edition, Unabridged
2035	"Residential Asphalt Roofing Manual," published by The Asphalt Roofing Manufacturers Association (ARMA), 1997
2036	Excerpts from "Residential Asphalt Roofing Manual: Design and Application Methods," Asphalt Roofing Manufacturers Association (ARMA), 2014
2037	Excerpt from "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation Control and Reroofing," National Roofing Contractors Association (NCRA), 2010
2038	Excerpts from "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing," National Roofing Contractors Association (NCRA), 2014
2039	Excerpt from "The NRCA Roofing and Waterproofing Manual," National Roofing Contractors Association (NCRA), 2006
2040	Merriam-Webster Online Dictionary search for "predominant pitch" definition, accessible online at https://www.merriam-webster.com/dictionary/predominant%20pitch (last accessed November 25, 2023)

Exhibit	Description
2041	Merriam-Webster Online Dictionary search for “predominant slope” definition, accessible online at https://www.merriam-webster.com/dictionary/predominant%20slope (last accessed November 25, 2023)
2042	Merriam-Webster Online Dictionary definition of “predominant,” accessible online at https://www.merriam-webster.com/dictionary/predominant (last accessed November 25, 2023)
2043	“About Haag Certified Inspector Program,” Haag Global, Inc., accessible online at https://haageducation.com/s/about-HCI (last accessed November 25, 2023)
2044	“NRCA Market Survey 2015-2016,” National Roofing Contractors Association (NCRA), 2016

I. INTRODUCTION

Petitioner fails to meet its burden of proving that any challenged claim of U.S. Patent No. 9,183,538 (“the ’538 patent”) is unpatentable. The Board should, thus, confirm patentability of the challenged claims.

Specifically, Petitioner’s asserted Grounds fail to show the obviousness of the challenged claims by a preponderance of the evidence for several reasons. First, Bailey does not disclose or suggest “predominant pitch” limitations of independent claims 1, 13, and 14, or the further defined “predominant pitch” limitations of dependent claims 11 and 18.

In particular, as to the independent claims, Bailey does not disclose or suggest (1) determining an estimated roofing area based on the predominant pitch and footprint of the roof (claim elements 1d, 13g, 14c) or (2) determining a predominant pitch of a roof by analyzing one or more images showing the roof (claim elements 1c, 13f). As to dependent claims 11 and 18, Petitioner has not shown that Bailey teaches or suggests using any average of individual pitch values or pitch factors to determine the “predominant slope.”

Additionally, Petitioner fails to demonstrate that either Pershing-789 or Kennedy teaches or suggests *both* determining a roof’s footprint and using that footprint to determine an estimated roofing area, as required by the independent claims. Indeed, Mr. Cummings’s testimony conflates footprint area and surface

area of a roof plane – a fatal flaw that may be due to the fact that Mr. Cummings was not able to explain how one would calculate a roof footprint during his deposition.

Finally, Mr. Cummings’s opinions are entitled to little to no weight because his opinions lack credibility in the area of estimating roof measurements using aerial images. He acknowledged during his deposition that he had **never** done roof measurements using aerial images, was not familiar with fundamental roofing industry documents, and in fact had only done about 15 roof measurements (based on blueprints) in the last 30 years. Yet another reason his opinions should be given little to no weight is because they repeat verbatim the Petition and, throughout his deposition, Mr. Cummings repeatedly could not explain aspects of his own declaration. Thus, Mr. Cummings’s opinions cannot save the Petition’s conclusory and fatally flawed arguments.

II. THE ’538 PATENT

A. Overview

The ’538 patent is generally directed to computer-implemented systems and methods for estimating roof measurements based on image analysis. *See* EX1001, 1:10-25, 3:21-23. This technology improves upon and overcomes limitations and inefficiencies with conventional approaches, typically performed by contractors, for performing roof and material estimates and generating handwritten reports. *Id.*,

1:10-33. The '538 patent describes the process in which “property owners approaching a major roofing project may... contact one or more contractors for a site visit... in order to make a determination on material needs” and prepare an estimate for the project. *Id.*, 1:10-16. With this approach, the “time and energy for providing such an estimate becomes laborious.” *Id.*, 1:16-18. Several factors—including the availability of personnel of the roofing contractors, size of the roof, weather and traffic conditions, and the distance between the roofing contractor and the site of the estimate—impact contractors’ ability to provide timely estimates. *Id.*

Relevant here, the '538 patent generally describes a practical application of computer-based image analysis that includes determining an estimated roofing area based on the predominant pitch and the footprint of the roof, and generating a roof report for determination of the amount of materials needed for a construction project. *Id.*, Abstract; *see also id.*, 3:21-23, 9:1-7, FIG. 8. The technology described and claimed in the '538 patent increases the “speed at which an estimate can be prepared,” “reduce[s] labor and fuel costs associated with on-site visits,” and enhances safety by avoiding the need for manual measurements atop of roof. *See id.*, 1:30-33. As discussed below, Petitioner fails to demonstrate that the applied references teach or suggest image analysis that determines an estimated roof area based on the roof properties of “predominant pitch” and “footprint.”

B. Person of Ordinary Skill in the Art (POSITA)

A person of ordinary skill in the art (“POSITA” or “skilled artisan”) of the ’538 patent would have had a Bachelor’s degree in an academic area emphasizing construction, architecture, and/or engineering, or similar discipline, and at least two years of experience with roofing measurement and estimation, aerial imagery use in roofing estimation, and roofing measurement software. EX2031, Kestner Declaration, ¶28. The Board’s preliminary definition of a POSITA in the Institution Decision recognized that the claims relate to image analysis, but the Board’s definition was inappropriately devoid of any mention of roofing measurement experience. DI, 6-7. The parties are in agreement that a POSITA must have experience in performing roof estimation. EX2031, ¶28; Pet., 2; EX1003, ¶7.

Given that the focus of the ’538 patent is roofing measurement using aerial imagery, a POSITA would necessarily need to have experience in the area of roofing measurement and the use of aerial imagery used in roofing estimation. EX2031, ¶28. Although, a person of ordinary skill could potentially have no educational degree but more industry experience, a higher level of education cannot replace the requirement for actual experience with roofing measurement and aerial imagery use in roofing estimation. *Id.*

III. SUMMARIES OF ASSERTED REFERENCES¹

A. Bailey

Bailey is a US Army Corps of Engineers report including procedures for establishing roofing inventory and help facility managers make the best use of roof maintenance and repair dollars. EX1010, 1. Petitioner relies on certain worksheets and reports discussed in chapter 2 of Bailey. Chapter 2 is an inventory procedure for steep roofing systems. *Id.*, 8. “The inventory provides the information needed by engineering personnel to manage roofing assets.” *Id.*, 10.

Bailey describes dividing the roof network into manageable components, *i.e.*, buildings and roof sections. *Id.*, 10-11. “Building roofs are managed by units called ‘roof sections’ for which all repair and replacement decisions can be made.” *Id.*, 10. Bailey’s “Roof Section Identification Worksheet (Figure 4) simplifies the task of collecting the inventory data for a roof section and ensures uniformity in reporting terminology.” *Id.*, 12. Bailey describes that the needed “[d]ata can be obtained from specifications, drawings, and visual inspection.” *Id.*

One of the items on the Worksheet is “SLOPE (primary).” *Id.*, 15. Bailey provides the following:

¹ Petitioner also relies on Abhyanker in Grounds 2 and 4. *See* Pet., v. Abhyanker is not discussed herein and a summary is not provided.

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).

Id., 17 (emphasis in original). Bailey does not provide details of what a predominant slope is, nor does it disclose or suggest any details of how to determine or calculate “predominant slope.” EX2031, ¶38.

Bailey’s “Roof Inspection Worksheet (Figure 6) ... show[s] all physical roof features” and instructs “[a]ctual measured dimensions ... should be determined for each exposure.” EX1010, 18. Here, Bailey also describes that “[s]lopes (inches of rise per foot of horizontal distance) should be measured for each exposure (see Appendix B).” *Id.*, 21.

Appendix B of Bailey is a Field Measurement Method for estimating the area of a roof. *Id.*, 133-137. Bailey does not disclose or suggest using the “predominant slope” recorded on the Roof Section Identification Worksheet in these area calculations. EX2031, ¶¶31-35; EX2032, Cummings Deposition Transcript, 63:19-64:14. Rather, Bailey describes calculating the area separately for each portion of the roof based on the actual slope thereof. EX1010, 135. “Because the actual area is a function of the slope, calculations must be grouped in terms of roof slope and those of different slopes are not combined until the true

roof areas have been determined.” *Id.*; *see also id.*, 136-137 (showing example calculation). Once the areas of each roof portion are converted to actual area, only then are they added together to obtain the total area of the roof. *Id.*, 137.

B. Pershing-789

Pershing-789 describes a “system that allows the remote measurement of the size, geometry, pitch and orientation of the roof sections.” EX1004, Abstract. Figures 5A-5F of Pershing-789 are an exemplary roofing report. *Id.*, ¶¶21, 28. Figure 5D “show[s] the pitch angle of each roof section along with a compass indicator.” *Id.*, ¶28. Figure 5E “show[s] the square footage of each roof section along with the total square foot area value.” *Id.* As described in Pershing-789, “[i]f the report is meant for delivery to a roofing company, the information in the report may include total square footage, *square footage and pitch of each section of roof*, linear measurements of all roof segments,” among other information. *Id.*, ¶37 (emphasis added). Pershing-789 does not mention “predominant pitch” or suggest using such a predominant pitch for determining an estimated roofing area. EX2031, ¶36.

C. Kennedy

Kennedy describes a system for remotely determining the measurements of a roof. EX1009, claim 1. In Kennedy, an “interactive measuring tool” is used for “sizing surfaces such as [a] roof of [a] house.” *Id.*, ¶105. In Kennedy, roof pitch

can also be determined using measurements of the displacement of a roof ridge from the roof base. *Id.*, ¶116. Kennedy does not mention “predominant pitch” or suggest using such a predominant pitch for determining an estimated roofing area. EX2031, ¶36.

IV. PETITIONER FAILS TO SHOW THAT THE CHALLENGED CLAIMS ARE UNPATENTABLE.

“In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring IPR petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). To prevail in its challenge to Patent Owner’s claims, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). “To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements.” *In re Magnum Oil Tools Int’l Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). And “conclusory expert testimony is inadequate to support an obviousness determination” *TQ Delta, LLC v. Cisco Systems, Inc.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019); *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, 15-16 (P.T.A.B. Aug. 24, 2022) (precedential) (declining to credit to expert

testimony that “merely repeats, *verbatim*, the conclusory assertion for which it is offered to support.”) (emphasis in original); 37 C.F.R. § 42.65(a).

“Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved.” *Graham v. John Deere Co. of Kansas City*, 383 US 1, 17 (1966).

A. Grounds 1-4: Petitioner fails to demonstrate the asserted combinations disclose or suggests the various “predominant pitch” limitations.

Petitioner’s entire showing in the asserted references for “predominant pitch” is based on Bailey’s use of the term “predominant slope” in a discussion of the types of inventory data collected for a roof section on a “Roof Section Identification Worksheet.” *See* EX1010, 12-18; Pet., 31-34, 66. Bailey does not provide any discussion of the details of this “predominant slope.”

The challenged claims include additional limitations related to the recited “predominant pitch,” for example using the “predominant pitch” for estimating roof area, and further details about how the “predominant pitch” is determined. As admitted by Mr. Cummings, Bailey does not disclose using its predominant slope to estimate a roof area, nor does Bailey provide any information or discussion about where its “predominant slope” comes from or what it means. In fact, Bailey’s teachings would dissuade a POSITA from using its predominant slope to

estimate a roof area. Petitioner also has not shown that that the term predominant slope has any well-known meaning in the art.

Petitioner's insufficient showing on the "predominant pitch" limitations is fatal to all asserted grounds.

1. Independent Claims 1, 13, and 14

Independent claims 1, 13, and 14 each recites determining an estimated roofing area based on a roof's predominant pitch and footprint. EX1001, 15:27-28, 16:48-49, 16:62-67. Independent claims 1 and 13 also each recites determining a roof's "predominant pitch" "by analyzing one or more images showing the roof." *Id.*, 15:25-27, 16:46-47.

Petitioner relies on Bailey's "predominant slope" as allegedly disclosing the claimed "predominant pitch" limitations of the '538 claims. Pet., 31-34, 66. This argument is fundamentally flawed. Each of the independent claims require "determining a predominant pitch **of the roof** by analyzing one or more image showing the roof."² A fundamental flaw of Petitioner's argument is that the disclosure of "predominant slope" in Bailey's Worksheet is the "predominant slope" for a **section** of the roof, not the entirety of the roof. Bailey explicitly states

² Patent Owner does not contest that skilled artisans often used the general terms slope and pitch interchangeably. EX2031, ¶54.

that entry 33 – Slope (primary) is “[t]he predominant **slope of the roof section.**”

EX1010, 17. Moreover, Bailey instructs that “[s]lopes (inches of rise per foot of horizontal distance) should be measured for each exposure (see Appendix B.)” *Id.*, 21. Referring to Appendix B, Bailey proceeds to use multiple slopes to calculate the surface area for an entire roof. Specifically, the diagram and calculation show at least two different slopes for different portions of the roof, a 9” slope, and a 6” slope. *Id.*, 136. There is no mention of “a predominant pitch ... of the roof,” as required by the claims. Indeed, Mr. Cummings testified that Bailey does not determine or use a predominant slope in the roof measurement guidance provided in Appendix B. EX2032, 63:19-64:14.

Beyond this fundamental flaw, the independent claims require even more that the Petition failed to demonstrate as obvious. All of the independent claims require determining an estimated roofing area *based on* the predominant pitch and footprint. And independent claims 1 and 13 also require determining the predominant pitch in a particular way, namely by analyzing roof images, which the specification makes clear are aerial images of a roof. *See, e.g.*, EX1001, 8:19-25.

Nothing in Bailey teaches or suggests either that the estimated roofing area is or should be determined based on the roof’s predominant pitch or that the predominant pitch is determined by analyzing roof images. And at his deposition,

Petitioner's declarant Mr. Cummings admitted that Bailey does not disclose these important claim elements.

- a. **Bailey does not disclose or suggest determining an estimated roofing area based on the predominant pitch and footprint of the roof (claim elements 1d, 13g, 14c).**

None of Petitioner's references or proposed combinations discloses *determining an estimated roofing area based on a predominant pitch* and the footprint of the roof. *See* EX2031, ¶¶30-36.

In all asserted Grounds, Petitioner relies on Bailey's "predominant slope" as allegedly disclosing the claimed "predominant pitch" used to determine an estimated roof area. *See* Pet., 31-34, 66. Petitioner alleges a POSITA would use Bailey's "predominant slope" instead of Pershing-789's or Kennedy's pitch in performing roof estimation. *Id.*, 20-25, 61-62. But nothing in Bailey suggests using its "predominant slope" in calculating the roof's area. In fact, Bailey's express teachings suggest otherwise. Pershing-789 and Kennedy are likewise silent on using anything other than measured pitch values in roof estimation.

Petitioner contends that "Bailey teaches the a [sic] 'predominant slope [*i.e.*, pitch]' may be used for [calculating the area of the] entire roof." *Id.*, 34 (second modification in Petition). Contrary to Petitioner's contention, Bailey does not disclose or suggest using its "predominant slope" for determining an estimated area

of an entire roof. EX2031, ¶31. Rather, Bailey teaches the opposite—that area calculations should be performed separately for each slope, and then these results are added to obtain the total area of the roof. EX1010, 134-137; EX2031, ¶¶31-33. Petitioner specifically relies on pages 134-136 of Bailey, Pet., 34, which is part of an “estimation procedure ... reprinted courtesy of the Asphalt Roofing Manufacturers Association,” and which describes calculating the area of a complex roof using actual pitch values of each roof surface and the horizontal projection of the roof. EX1010, 133; EX2031, ¶32. Nowhere does Bailey teach using a *predominant* or *primary* slope in performing this calculation. EX2031, ¶33. In fact, Mr. Cummings admits that Bailey’s roof estimation procedure set forth in Appendix B **does not use** the predominant slope. *See* EX2032, 60:20-64:14 (discussing Bailey’s example at page 136); *id.*, 64:12-14 (“Q So in this example [at Bailey, page 136], he does not use predominant slope as part of his calculation? A No, he does not.”).

Bailey instructs: “Because the actual area is a function of the slope, calculations must be grouped in terms of roof slope and *those of different slopes are not combined until the true roof areas have been determined.*” EX1010, 135 (emphasis added). In the exemplary calculation provided in Bailey—for a roof having surfaces with 9” slope and surfaces with 6” slope—the areas of the surfaces having *different slopes are calculated separately* and then “the results can be

added to obtain the total area of [the] roof.” *See id.*, 136-137 (emphasis added); EX2031, ¶¶32-35. In other words, in Bailey, the overall area of the roof is computed by adding together the areas calculated for separate portions of the roof, each of which has their own pitch (or slope). Thus, Bailey teaches using the *actual slope values* to calculate the area of different portions of the roof; Bailey does not teach using a single predominant pitch (or slope) for the estimation of the total roofing area as claimed. EX2031, ¶¶32-35.

Petitioner points to Bailey’s teaching that “all exposed roof areas on the building shown in Figure 2 would comprise *one roof section*.” Pet., 13 (quoting EX1010, 10) (emphasis in original). Petitioner further alleges that “[a] POSITA would be motivated to use Bailey’s single pitch value (the ‘predominant slope’) for a roof section of 10,000 square feet to simplify the calculations used by Pershing-789 related to roof repair or replacement.” *Id.*, 22-23; EX1003, ¶46; Pet., 61 (referring back to Pershing-789 ground for Kennedy); EX1003, ¶129 (same). But, despite Petitioner’s allegation otherwise, nothing in Bailey teaches that the “predominant slope” included on the Worksheet is used to calculate the area for an entire residential roof. EX2031, ¶31. Rather, this Worksheet is simply for “data collection” and its purpose is to “simplif[y] the task of collecting the inventory data for a roof section and ensure[] uniformity in reporting terminology.” EX1010, 11-12.

A review of the discussion of “Roof Sections” in Bailey (where Figure 2 is discussed) reveals that it is not related to calculating the area of a roof at all. *Id.*, 10-11. Rather, this section of Bailey relates to managing repair and replacement decisions. *Id.*, 10. Bailey teaches that for buildings less than 10,000 square feet, *repair and replacement decisions* (not estimations or measurements as Petitioner contends) may be made for the building as a whole. *Id.* But “[f]or buildings with larger roof areas, the roof may be divided into two or more sections, and each section inspected and rated independently” for the purpose of repair and replacement considerations. *Id.* “Using this approach, a roof section in poor condition does not detract from the assessment of a roof section on the same building that is performing well.” *Id.*, 10-11. This is important because “[i]t may be possible to replace only those sections that have reached the end of their service life while making the necessary repairs to the remaining roof sections.” *Id.*, 11. Once an assessment reveals that a roof section needs repair or replacement, measurements for that roof section would still be necessary. Bailey does not teach that such estimations or measurements are made using a predominant pitch, for the building as a whole or otherwise. EX2031, ¶¶31-35.

Instead, Bailey instructs that “[s]lopes (inches of rise per foot of horizontal distance) should be measured *for each exposure* (see Appendix B).” EX1010, 21 (emphasis added). Bailey points to Appendix B for instructions on determining

actual area of the roof section. *Id.*, 22 (Bailey disclosing using individual roof slopes for calculating “roof section area”: “The roof section area used in the condition rating procedure is the actual exposed area – not the projected horizontal area. The latter area can be determined from a roof section plan having horizontal dimensions and then can be converted to the actual area by adjusting for roof slope (see Appendix B)”). In Appendix B, Bailey clearly states that “those [roof areas] of different slopes *are not combined* until the true roof areas have been determined.” *Id.*, 135 (emphasis added). These teachings are contrary to using a “predominant slope” for determining roof area for an entire building. Thus, the express teachings of Bailey would have dissuaded a POSITA from using a single, predominant slope when estimating roof area. EX2031, ¶¶31-35.

As discussed, Bailey does not disclose or suggest determining an estimated roofing area based on the predominant pitch and footprint of the roof. Petitioner does not allege that Pershing-789 or Kennedy teaches determining an estimated roofing area based on the predominant pitch and footprint. *See generally* Pet. And, Pershing-789 or Kennedy do not include such a teaching. EX2031, ¶36.

Petitioner, thus, has not shown by a preponderance of the evidence that the asserted combinations disclose, teach, or suggest determining an estimated roofing area based on the predominant pitch and footprint of the roof, as recited in each of

independent claims 1, 13, and 14. This reason alone is sufficient to confirm the patentability of all challenged claims in view of Petitioner's asserted grounds.

b. Bailey does not disclose or suggest determining a predominant pitch of a roof *by analyzing one or more images showing the roof* (claim elements 1c, 13f).

Bailey also does not disclose or suggest determining a predominant pitch of a roof *by analyzing one or more images showing the roof*, as recited in independent claims 1 and 13. *See* EX2031, ¶¶37-39.

Bailey's disclosure of "predominant slope" is in a discussion of the types of inventory data collected for a roof section on a "Roof Section Identification Worksheet." *See* EX1010, 12-18. Here, Bailey describes:

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).

Id., 17.

Bailey simply indicates the slope information (as opposed to "predominant slope") may be indicated on the roof plan. *Id.*; *see* EX2032, 59:5-60:4 (Mr. Cummings confirming that the roof plan does *not* indicate predominant slope, but only individual slopes). Bailey alternatively points to Appendix B for instructions on field measurement of the slope. EX1010, 17. But, as discussed above, Bailey's

Appendix B discloses measuring the slope of each roof surface separately, and provides no guidance on determining the “predominant slope.” *Id.*, 133-137; EX2031, ¶38.

As for the predominant slope listed on the Worksheet, Bailey does not specify what a predominant slope is, nor does it disclose or suggest any details of how to determine or calculate the predominant slope, let alone disclose or suggest analyzing roof images to do so. EX2031, ¶38. Mr. Cummings confirmed that Bailey provides no instructions on how to determine the predominant slope:

Q And do you have the understanding of how he determined the primary slope?

A He talks about a predominant pitch and taking – *he doesn’t really give you an exact formula or anything of that nature on how to calculate it.* ... To answer, no, he does not say it [*i.e.*, how to determine primary slope].

EX2032, 54:17-55:4 (objections omitted) (emphasis added); *id.*, 57:12-58:5 (again confirming that Bailey does not describe how predominant pitch is determined).

Mr. Cummings testified that the predominant slope in Bailey would be an estimation done by the individual filling out the worksheet, who according to Mr. Cummings would be the technician at the job site making the roof measurements. *Id.*, 56:4-11; 58:6-9. This explanation is consistent with Bailey’s teaching that the

predominant slope listed on Bailey’s Worksheet is not intended for calculating roof area, but simply for “collecting inventory data” for “manag[ing] a roof network,” while “ensur[ing] uniformity in reporting terminology.” EX1010, 11-12; *see also id.*, 134-137 (Bailey’s Appendix B teaching to use *actual* slopes to calculate roof area).

Nothing in Bailey teaches or suggests how the predominant pitch is determined, let alone that it is done by analyzing one or more images. EX2031, ¶39. Thus, Petitioner has not shown by a preponderance of the evidence that Bailey discloses or suggests “determin[ing] ... a predominant pitch of the roof **by analyzing one or more image showing the roof**,” as recited in independent claims 1 and 13. This reason alone also is sufficient to confirm the patentability of challenged claims 1-13 in view of Petitioner’s asserted grounds.

* * *

Petitioner has not shown by a preponderance of the evidence that the asserted references and proposed combinations disclose or suggest the “predominant pitch” limitations of the independent claims. Accordingly, the Petition must fail as to all grounds.

2. Dependent Claims 11 and 18

Dependent claims 11 and 18 further define the “predominant pitch” recited in independent claims 1 and 14. Claim 10 depends from claim 1 and further recites

“wherein determining the predominant pitch includes determining a plurality of pitch values with each pitch value associated with a portion of the roof, the predominant pitch based on the plurality of pitch values.” EX1001, 16:15-19.

Claim 11 depends from claim 10 and further recites “wherein each pitch value is associated with an estimated percentage of roof area to provide an average pitch value.” *Id.*, 16:20-23. Claim 18 depends from claim 14 and further recites “wherein the predominant pitch is based on a weighted average of individual pitch factors for two or more portions of the roof.” *Id.*, 17:16-18.

In the Institution Decision, the Board dismissed Patent Owner’s arguments related to “predominant pitch” as not being commensurate in scope with the claims. *See* DI, 11-12. But, as noted, dependent claims 11 and 18 further limit “predominant pitch,” and Petitioner has not shown by a preponderance of the evidence that claims 11 or 18 would have been obvious in view of the asserted combinations. The patentability of claims 11 and 18 should be confirmed for this additional reason.

- a. Petitioner has not shown that Bailey teaches or suggests using an average of individual pitch values or pitch factors to determine the “predominant slope,” as required by claims 11 and 18, respectively.**

Petitioner relies on Bailey as disclosing the determination of “predominant slope” recited in each of claims 11 and 18. *See* Pet., 47-50 (claim 10), 50-53 (claim

11), 60-61 (claim 18), 81 (referring back to ground 1 for claims 10, 11), 87 (referring back to ground 1 for claim 18). As discussed above, and confirmed by Mr. Cummings, Bailey provides *no details* as to how its predominant slope is determined. Thus, Bailey does not expressly disclose or suggest that the predominant pitch is determined based on an average of a plurality of pitch values as recited in claim 11 or based on a weighted average of pitch factors as recited in claim 18. And, contrary to Petitioner's and Mr. Cummings's allegations otherwise, a POSITA would not have understood Bailey's use of the term "predominant slope" to have this meaning.

- i. Bailey does not expressly disclose or suggest that its use of the term "predominant slope" means an average of individual pitch values or pitch factors.**

Petitioner alleges that "Bailey expressly teaches calculating the 'predominant slope' of the roof." Pet., 31 (emphasis omitted). But, as discussed above, and as confirmed by Mr. Cummings, Bailey includes no such calculation. *See* EX1010, 12-17; EX2032, 54:17-55:4, 56:4-58:11.

Further, as described above, in the instructions for determining roof area in Bailey, there likewise is no teaching or suggestion to average individual pitch values or pitch factors. Rather, Bailey teaches the opposite—that "calculations must be grouped in terms of roof slope and those [roof areas] of different slopes

are not combined until the true roof areas have been determined.” EX1010, 135.

Therefore, in contrast to the ’538 patent, Bailey’s method does not teach or suggest determining any average of different pitch values or pitch factors. EX2031, ¶¶53-58.

ii. A POSITA would not have understood Bailey’s use of the term “predominant slope” to mean an average of individual pitch values or pitch factors.

Petitioner argues that Bailey’s mere use of the words “predominant slope” in its Roof Section Identification Worksheet means a weighted average of roof pitches. Pet., 21; EX1003 ¶44 (Mr. Cummings testifying to the same). Because Bailey does not describe or provide any details about what is meant by “predominant slope,” Petitioner’s and Mr. Cummings’s argument relies on the assumption that “predominant slope” had a well-understood meaning in the art as referring to a weighted average of pitch values of a roof. *See* EX1003, ¶46 (Mr. Cummings testifying that “calculating a predominant pitch ... is merely the computation of a weighted average of pitch values of a roof.”).

In the Institution Decision, the Board preliminarily found that Bailey’s disclosure is sufficient to show a pitch weighted average, noting that “Petitioner presents evidence, un rebutted at this stage, that ‘[a] POSITA would understand that [Bailey’s] broad reference to a pitch calculation would include pitch weighted

averages typically used in estimation.” DI, 12 (quoting EX1003 ¶43, alterations in DI). Petitioner supplies no evidence beyond Mr. Cummings’s conclusory testimony to support its theory that using pitch weight averages was “typical.” Moreover, as discussed *infra*, given Mr. Cummings near total lack of experience regarding roof measurements, his opinion should be given no weight.

As Mr. Kestner testifies, the term “predominant pitch” was not a term of art in the roofing industry. EX2031, ¶¶59-66. Petitioner and Mr. Cummings provide no evidence that either “predominant slope” or “predominant pitch” had any well-understood meaning at the time of the invention, let alone that a predominant pitch would include any pitch weighted averages. *See* Pet., 21; EX1003 ¶44.

This lack of corroborating evidence from Petitioner is not surprising, because “predominant pitch”/“predominant slope” did not have a special well-understood meaning in the art. EX2031, ¶¶59-66. Rather, at the time of the ’538 patent, a POSITA would not have given any special meaning to the term “predominant pitch”/“predominant slope” beyond the ordinary meaning of the words. *Id.*, ¶67. “Predominant” meaning “being most frequent or common”; “pitch” meaning “[t]he angle or inclination of a plane such as a roof, which varies according to climate, design, and materials used, and is expressed as a ration of rise per run”; and “slope” meaning “[t]he slope of a roof, ramp, or paving expressed as one unit of rise to one unit of run. *See also* pitch.” EX2042, Merriam-Webster

Online Dictionary; EX2034, RSMMeans Dictionary, 404, 504 (emphasis in original); EX2031, ¶67.

As Mr. Kestner confirms, prior to the '538 patent, a POSITA would have understood “predominant pitch” (or “predominant slope” as in Bailey) to simply mean the single pitch that covers the majority of the area of the roof (or roof section in relation to Bailey). EX2031, ¶67. Using a primary slope that covers the majority of a roof section increases the speed of estimation and requires fewer field measurements. *Id.*, ¶68. Roofing estimators (whether roofing contractors or insurance adjusters) often prioritize the speed of estimating for steep-slope roof projects, the majority of which are highly competitive reroofing projects. *Id.*, ¶68.

This understanding of “predominant pitch” as “primary pitch” is consistent with the disclosure of Bailey, which uses “predominant” and “primary” interchangeably. *Id.*, ¶69; *see also* EX2032, 53:2-11 (Mr. Cummings equating “primary” to “predominant,” as used in Bailey). For example, in reference to Bailey’s “Roof Section Identification Worksheet,” *see* EX1010, 12-18, FIG. 4, Bailey describes Section 33 as: “*Section 33 - Slope. The predominant slope of the roof section.*” EX1010, 17 (emphasis added). On the Worksheet itself, Section 33 is listed as “SLOPE (*primary*)”:

32 ATTACHMENT SURFACE (if applicable):		
☐ WOOD FIBER	☐ WOOD BOARDS	☐ METAL PURLINS
☐ PLYWOOD	☐ WOOD BATTENS	☐ OTHER
		☐ UNKNOWN
33 SLOPE (primary): <u>4</u> IN 12		
34 DRAINAGE (check all):		
☐ INTERIOR DRAINS	☐ SCUPPERS	☐ OVERFLOW SCUPPERS
☐ INTERIOR GUTTERS	☐ ADJACENT ROOF SECTIONS	☐ ROOF EDGE
☒ GUTTERS & DOWNSPOUTS	☐ SCUPPERS W/LEADER & DOWNSPOUTS	☐ OTHER

Id., 15 (emphasis added), FIG. 4 (excerpted and annotated); *see also id.*, 142 (portion of Appendix C – “Samples of Roof Inspection Sheets” showing the same). Likewise, for a similar “Roof Section Identification Sheet,” *see id.*, 18-19, FIG. 5, Bailey also lists Section 33 as simply “SLOPE” with a single entry space available.

ROOF SECTION IDENTIFICATION		AGENCY/INST.: <i>Example</i>	
DATE: <i>JUN/ 1999</i>	BLDG NO: <i>1253</i>	SECTION ID: <i>A</i>	AREA: <i>2813</i> SF
OCCUPANCY: <i>Housing</i>	YEAR ORIG. CONST.: <i>1991</i>	YEAR LAST REPLACED: <i>—</i>	
10 GENERAL			
11 TYPE: <i>Gable, Hip</i>			
12 PERIMETER:			
PARAPET	LF	FIREWALL	LF
ROOF EDGE	<i>234</i> LF	HIP	<i>116</i> LF
ADJACENT WALL	LF	VALLEY	<i>70</i> LF
		RIDGE	<i>69</i> LF
		OTHER	LF
13 ACCESS: <i>External Ladder: Temporary</i>			
20 STRUCTURAL FRAME			
21 TYPE: <i>Wood Trusses</i>			
30 ROOF DECK			
31 STRUCTURAL DECK: <i>Plywood</i>			
32 ATTACHMENT SURFACE:	33 SLOPE:		34 DRAINAGE:
<i>—</i>	<i>4</i> IN 12		<i>Gutters & Downspouts</i>
40 UNDERLAYMENT			
<i>Asphalt Saturated Sheet</i>			

Id., 19, FIG. 5 (excerpted and annotated); *see also id.*, 140 (portion of Appendix C – “Samples of Roof Inspection Sheets” showing the same).

Bailey’s Appendix B is a reproduction of the Estimating Procedure contained in Chapter V of the 1997 edition of the “Residential Asphalt Roofing Manual” published by the Asphalt Roofing Manufacturers Association (ARMA)³.

³ The Asphalt Roofing Manufacturers Association (ARMA) is a well-established trade association that represents the majority of the asphalt roofing industry’s manufacturers and their raw material suppliers. A POSITA would have been familiar with ARMA and its publications. EX2031, ¶61.

Id., 133. A review of the copy of the complete manual (EX2035), confirms that nowhere does this manual mention or define “predominant pitch” or “predominant slope,” including in the provided glossary. EX2035, ARMA’s Residential Asphalt Roofing Manual 1997, 95-101; EX2031, ¶60.

Overhang: That portion of the roof structure that extends beyond the exterior walls of a building.

Pallets: Wooden platforms used for storing and shipping bundles of shingles.

Pitch: The degree of roof incline expressed as the ratio of the rise, in feet, to the span, in feet.

Ply: A layer of roofing (i.e., one-ply, two-ply).

Quick-Setting Cement: An asphalt-based cement used to adhere tabs of strip shingles to the course below. Also used to adhere roll roofing laps applied by the concealed nail method.

Racking: Roofing application method in which shingle courses are applied vertically up the roof rather than across and up. Not a recommended procedure.

EX2035, 99. The 2014 version of ARMA’s Residential Asphalt Roofing Manual similarly does not define “predominant pitch” or “predominant slope.” *See* EX2036, ARMA’s Residential Asphalt Roofing Manual 2014, 107-113; EX2031, ¶60.

Other contemporaneous evidence also confirms that neither “predominant pitch” nor “predominant slope” had any special well-understood meaning in the art. For example, the RSMeans Illustrated Construction Dictionary, cited by Mr. Cummings as being a “complete source of construction terms and concepts,” EX1003, ¶97 (citing EX1013), does not define “predominant pitch” or

“predominant slope.” *See* EX2034, 404-405, 418, 504; EX2031, ¶64. Likewise, the National Roofing Contractors Association (NRCA)⁴, another authoritative source in the roofing industry, did not define “predominant pitch” or “predominant slope” in the glossaries of its 2006 edition of the NRCA Manual: *Roofing and Waterproofing* (EX2039), or the 2010 or 2014 editions of the NRCA Roofing Manual: *Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing* (EX2037, NRCA Roofing Manual 2010; EX2038, NRCA Roofing Manual 2014). EX2031, ¶63.

Petitioner simply has not shown that a POSITA would have considered the term “predominant pitch”/“predominant slope,” without more, to refer to a weighted average of pitch values of a roof. EX2031, ¶¶59-70.

⁴ The National Roofing Contractors Association (NRCA) was founded in 1886 and is a leading organization in the roofing industry. Its members include contractors, manufacturers, distributors, engineers, architects, roof consultants, building owners, and government officials. A POSITA would have been familiar with NRCA and its publications. EX2031, ¶62.

b. Bailey’s slope factor chart is not used to determine a predominant pitch based on a weighted average of individual pitch factors, as required by claim 18.

Claim 18 recites that “the predominant pitch is based on a weighted average of individual pitch factors for two or more portions of the roof.” EX1001, 17:16-18. Petitioner has not shown that Bailey discloses or suggests this limitation.

EX2031, ¶¶71-72. As to claim 18, Petitioner’s entire argument is:

Bailey also expressly teaches using the same “pitch factors” shown in Figure 7 of the ’538 patent to calculate area (as shown below). Ex. 1010 at 137. Thus, Bailey also renders obvious “wherein the predominant pitch is based on a weighted average of individual pitch factors for two or more portions of the roof.” *See also* claims 10, 11; Ex. 1003 at ¶ 128.

Pet., 60-61 (also citing EX1001, FIG. 7; EX1010, Table 3). Petitioner’s argument misses the point. As Mr. Cummings testified, Table 3 of Bailey is simply a table of conversion “factor[s that] you multiply the square footage [of the horizontal area] by in order to get the correct square footage of the angled portion of the roof.” EX2032, 65:18-20. Teaching the limitations of claim 18 requires more than a disclosure of the pitch factor table.

The ’538 patent describes details of using Figure 7 in its calculation of predominant pitch:

The predominant pitch may be a weighted average of individual pitch factors for two or more portions of the roof. FIG. 7 illustrates an exemplary slope factor chart for determining pitch factors. For example, a first portion of the roof (e.g., 60% of the roof) may be at a 6:12 pitch. The 6:12 pitch corresponds to 1.1180 as the pitch factor). A second portion of the roof (e.g. 40% of the roof) may be at a 4:12 pitch. The 4:12 pitch corresponds to 1.0541 as the pitch factor. Thus, the weighted value of the first portion of the roof having 6:12 pitch is:

$$(\text{Pitch Factor}) * (\text{Percentage of roof}) = \text{First Weighted Value}$$

$$1.1180 * 0.6 = 0.6708 \quad \text{EQ. 1}$$

The weighted value of the second portion of the roof having 4:12 pitch is:

$$(\text{Pitch Factor}) * (\text{Percentage of roof}) = \text{Second Weighted Value}$$

$$1.0541 * 0.4 = 0.42164 \quad \text{EQ. 2}$$

The sum of 0.6708 and 0.42164 is 1.09244 as the total weighted pitch value. A total weighted pitch value of 1.09244 is closest to a pitch factor of 1.0833 in the table in FIG. 7. This pitch factor corresponds to a 5:12 pitch. As such, the predominant pitch in this scenario would be 5:12.

EX1001, 12:12-37.

Bailey does not teach or suggest using the information in its Table 3 to determine a weighted average of individual pitch factors in this way. EX2031, ¶72.

Rather, Table 3 of Bailey is simply used to convert projected horizontal areas to actual roofing areas: “Now that the total projected horizontal areas for each roof slope have been calculated, the results can be converted to actual areas with the aid of Table 3. (To calculate the Actual Area, multiply the Horizontal Area by the Area/Rake Factor.)” EX1010, 137. At his deposition, Mr. Cummings confirmed this understanding of Bailey’s use of Table 3. *See* EX2032, 64:20-67:3. In particular, discussing Bailey’s Table 3, he testified:

The pitch has to be -- *this table doesn't determine pitch*. Once you determine the pitch in the field, or off the drawings or whatever, then you can apply this factor to wherever the pitch had been determined.

Id., 66:21-67:3 (emphasis added).

Claim 18 of the ’538 patent, on the other hand, requires the use of individual pitch factors to determine “the predominant pitch.” Nowhere does Bailey disclose that its “Area/Rake Factor[s]” are used to determine a pitch or slope of any kind, let alone to calculate a predominant pitch, as recited in claim 18. EX2031, ¶72.

* * *

For these additional reasons, Petitioner has not shown by a preponderance of the evidence that the asserted references and proposed combinations disclose or suggest the “predominant pitch” limitations of dependent claims 11 and 18. Accordingly, the Board should confirm the patentability of these claims.

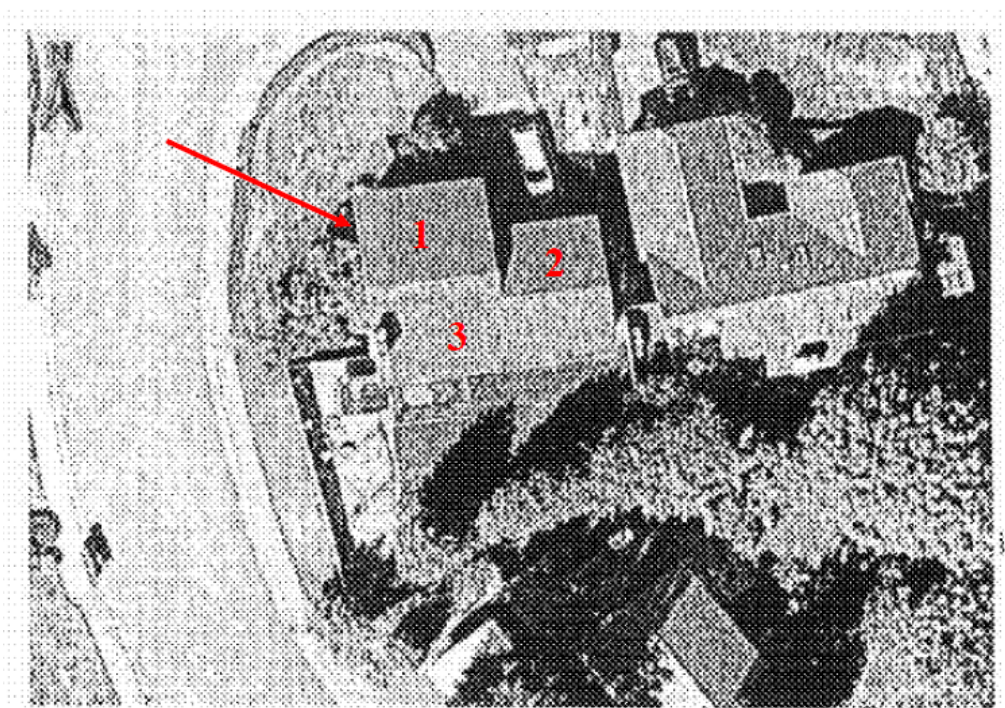
B. Grounds 1-2: Petitioner fails to demonstrate that Pershing-789 determines a roof's footprint.

Each of independent claims 1, 13, and 14 recites determining a footprint of the roof and determining an estimated roofing area of the roof based on, in part, the footprint. EX1001, 15:25-28, 16:46-49, 16:62-67. Petition has not known that Pershing-789 teaches or suggests these claim elements. *See* EX2031, ¶¶40-46.

As described in the '538 specification, a roof's "footprint may provide a two-dimensional boundary and/or outline of the roof." *Id.*, 12:8-9. The RSMean Dictionary defines "footprint" as: "The area that falls directly beneath and shares the same perimeter as a structure." EX2034, 219. Mr. Cummings also confirmed that, in his view, the footprint requires an indication of the area thereof. EX2032, 69:13-79:7; EX1003, ¶54.

Petitioner alleges that Pershing-789's Figure 5E teaches determining the footprint of a roof. *See* Pet., 27-30 (addressing Element 1c), 54 (addressing Element 13f by referring to claim 1), 59 (addressing Element 14c by referring to claim 1). Pershing-789's Figure 5E is a "page ... of the report showing the square footage of each roof section along with the total square foot area value." EX1004, ¶28. Petitioner relies on this *same disclosure* in alleging Pershing-789 teaches determining the estimated roof area. *See* Pet., 34 (addressing Element 1d), 54, 59.

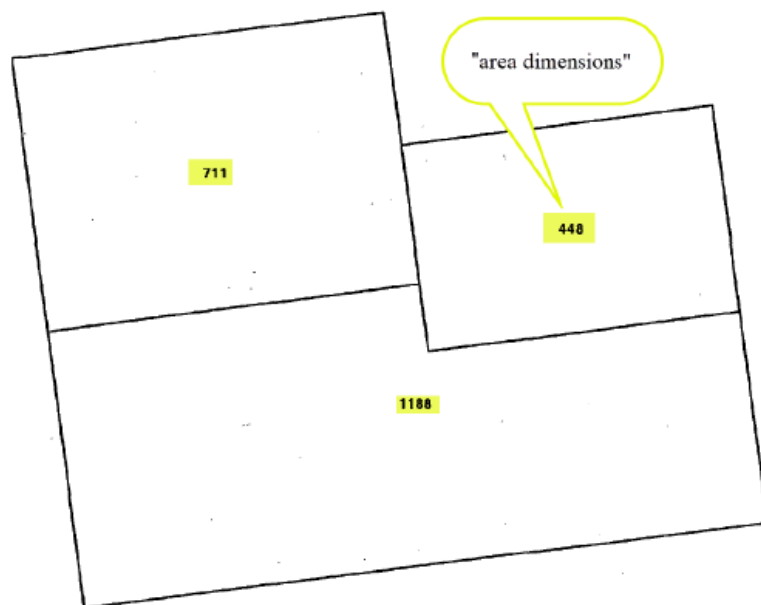
Petitioner and Mr. Cummings confuse and conflate (1) the footprint of a pitched roof, the horizontal area defined by its outline or boundary, and (2) the total square footage (or surface area) of the surface of pitched roof, which is shown in Figure 5E of Pershing-789. EX2031, ¶¶40-46. Pershing-789 discloses that “FIG. 5E is an illustration of the fifth page” of the example roofing report shown in Figures 5A-5F. EX1004, ¶28. As shown in Figure 5A of Pershing-789 (reproduced in-part and annotated below), the subject roof is a pitched roof having three sections.



EX1004, FIG. 5A (reproduced in-part and annotated).

As shown in Petitioner’s annotated version (reproduced below), Figure 5E of Pershing-789 depicts the roof’s three sections, labeled 711 (1st section), 448 (2nd

section), and 1186 (3rd section). Pet., 28. And Pershing-789 discloses that “FIG. 5E . . . show[s] the square footage of each roof section along with the total square foot area value.” EX1004, ¶28; *see* Pet., 29-30. A POSITA would have understood this to be the surface area of the roof. EX2031, ¶44.



Pet., 30 (annotating EX1004, FIG. 5E).

The square footage of each section and corresponding total area shown in Figure 5E of Pershing-789 is not the same as and does not indicate the footprint of Pershing-789’s example roof. EX2031, ¶44. That is, Pershing-789’s Figure 5E shows the total surface area of the example roof. EX1004, ¶28, FIG. 5E; EX2031, ¶44. But because the roof is pitched, the roof’s total surface area is not the same as and does not indicate the roof’s footprint, which is the roof’s outline or boundary

projected on the ground. EX1001, 12:8-9; *see also* EX2019, ¶¶7-9; EX1013, 462 (defining “roof pitch” and explaining that “[m]ore roofing material is required to cover the increased roof area when the slope or pitch is great.”); EX2031, ¶44.

Mr. Cummings based his analysis for claim element 1c on the mistaken belief that the areas shown on Figure 5E of Pershing-789 are the areas of the horizontal projection of the roof. *See* EX2032, 69:9-12 (“Q Okay. So is it your view that the areas indicated in that figure are areas of the horizontal projection of the roof? A That's how I'm reading it.”), 70:14-71:3. EX2031, ¶46. But in the context of Pershing-789’s disclosure, this does not make sense. Pershing-789’s report is used “to prepare a cost estimate for the repair or replacement of the roof or installation of roof equipment.” EX1004, Abstract. A POSITA would have understood the information included in Figure 5E of the report to be the actual area of the surface of the roof (rather than of the horizontal projection thereof), because this would provide the information necessary to provide these cost estimates. EX2031, ¶46.

Regardless, under Petitioner’s theory, Pershing-789’s Figure 5E cannot disclose *both* the footprint of a pitched roof *and* the total square footage (or surface area) of the surface of pitched roof because Figure 5E only discloses one set of area information. *Id.*, Mr. Cummings testified that the footprint of the roof must include at least the area information:

Q And so, when you say "the footprint of the roof includes, at least, its area," why would it be bigger than the area?

A Well, it's not bigger than the area. *That's the least information.* It could have dimensions, it could have other -- it could have other annotations. *But it has at least its -- it has, at least, its square footage or the area marked on it.*

Q Okay. So, if I, like, restate what I think I understand this sentence to mean, the footprint of the roof includes, at least, the area of the footprint?

A Yes.

Q And it might include other identifiers, like, length and width and dimensions?

A Correct.

EX2032, 69:13-70:7 (emphasis added).

Petitioner has failed to meet its burden of showing the unpatentability of independent claims 1, 13, and 14 under its asserted Grounds 1 and 2 for this additional reason. The claims that depend therefrom, likewise, have not been shown to be unpatentable.

C. Grounds 3-4: Petitioner fails to demonstrate that Kennedy determines a roof's footprint.

Each of independent claims 1, 13, and 14 recites determining a footprint of the roof and determining an estimated roofing area of the roof based on, in part, the footprint. EX1001, 15:25-28, 16:46-49, 16:62-67. Petitioner has not shown that Kennedy teaches or suggests these claim elements. *See* EX2031, ¶¶47-50. As discussed above, Mr. Cummings testified that the footprint of the roof must include at least the area information for the horizontal projection of the roof. *See* EX2032, 69:13-70:7; EX1003, ¶54.

In the Institution Decision, the Board pointed to Figure 12 of Kennedy, preliminarily finding that “for a rectangular roof section like that shown in Figure 12, the two sides do define the outline or boundary (i.e., footprint) of the roof.” DI, 14. But, the teachings related to Kennedy’s Figure 12—that the “shape 1215 is defined by a length L (at 1230), a base B (indicated at 1235) and a ridge line 1241,” EX1009, ¶109, FIG. 12—do not meet the definition of “footprint” provided by Petitioner’s own declarant, which requires at least the *area* of the footprint to be identified. *See* EX2032, 69:13-70:7; EX1003, ¶54. Petitioner also does not allege this would have been obvious in view of Kennedy, and it is Petitioner’s burden to do so.

Further, in alleging that Kennedy teaches determining a footprint, Petitioner explains that Kennedy's "sizing tool" determines "surface dimensions" of a "planar installation surface," as well as pitch. Pet., 15-17 (discussing Kennedy), 64-66 (discussing element 1c). Kennedy describes: "The term 'sizing' as used herein refers to obtaining or generating length and width measurements for a generally rectangular planar installation surface such as a side of a roof. An installation surface is a surface area of a roof, for example a roof side contemplated for installation of energy system components." EX1009, ¶82. Thus, the "installation surface" Petitioner expressly relies on as the alleged footprint in Kennedy is actually the surface of the pitched roof, not the footprint. EX2031, ¶49. The claims further recite determining an estimated roofing area of the roof based on, in part, the footprint. Here, Petitioner also points to measuring an "installation surface area." See Pet., 66-67 (discussing element 1d). Petitioner cannot rely on Kennedy's "installation surface area" as teaching both the claimed footprint *and* the claimed roofing area. EX2031, ¶50. These are distinct claim elements.

Petitioner has failed to meet its burden of showing the unpatentability of independent claims 1, 13, and 14 under its asserted Grounds 3 and 4 for these additional reasons. The claims that depend therefrom, likewise, have not been shown to be unpatentable.

V. THE BOARD SHOULD GIVE MR. KESTNER’S OPINIONS SIGNIFICANTLY MORE WEIGHT THAN THOSE OF MR. CUMMINGS.

The Board should give significantly more weight to Mr. Kestner’s testimony because he has much more relevant experience than Mr. Cummings in the area of roof measurement, and in particular in the area of roof measurement using an image of roof. In fact, Mr. Cummings has no experience using aerial images for roof measurements and has extremely limited experience in any form of roof measurement, having testified that in the last 30 years he has only done about 15 roof measurements. The Board also should not credit Mr. Cummings’s testimony because his opinions are conclusory and merely repeat *verbatim* the arguments presented in the Petition.

A. Mr. Kestner has significantly more relevant experience than Mr. Cummings in the area of roof measurement.

Mr. Cummings testified that “[t]he ’538 patent is generally directed towards a ‘system and process for roof measurement’ using an image of a roof.” EX1003, ¶16. But Mr. Cummings admitted during his deposition that he has *never* estimated roof measurements using aerial images. See EX2032, 20:11-14, 21:8-11, 23:2-12, 79:2-4, 79:12-14. He considers himself a POSITA based solely on his experience of doing roof estimates in the context of working with blueprints. *Id.*, 42:8-43:4. As Mr. Kestner explains, however, roof estimation using blueprints is not the same as roof estimation using aerial images. EX2031, ¶¶73-75. For example, blueprints

are two-dimensional representations of an *as-designed* structure, whereas the actual *as-built* condition of the structure typically has variations from the as-designed blueprints, including, *i.e.*, roof appurtenances such as flues, plumbing stacks, attic vents, and others typically are not shown on the plans. EX2031, ¶75. Further, roof estimation based on aerial images was itself an evolution in the technology available. EX2031, ¶7.

Mr. Cummings simply has no experience with this technological advance. Mr. Cummings could not even identify when aerial images of rooftops were first used to estimate roofing measurements:

... Q So, just to make sure my question was clear, was it looking, specifically, at aerial images used for rooftop measurements?

A I don't remember the exact date. I would imagine it was probably in the early 200s -- 2000s, excuse me.

Q And when you say you'd imagine it was in that time frame, what is the basis for –

A There is no basis. I'm saying I don't know for sure, but that seems to be when things started popping in the industry, that I can remember.

EX2032, 29:16-30:5.

Mr. Kestner, on the other hand, has extensive experience with roof estimates based on aerial images. *See* EX2031, ¶¶4-13; EX2033, Kestner CV. For example,

in his roofing work he has used various third-party providers of roof diagrams that include dimensions and areas to evaluate thousands of roofs. EX2031, ¶¶7-8.

These roof diagrams were prepared using photogrammetry taken, for example, by planes, UAVs (drones), and even smartphones. *Id.* He also has co-authored studies evaluating the measurement and area accuracy of such third-party providers of roof diagrams and areas. *Id.*, ¶¶9-10.

Even if the Board determines that the relevant experience is roof measurement and estimating more generally, Mr. Kestner again has significantly more experience than Mr. Cummings.

Mr. Cummings has not been regularly involved with estimating roofs since the late 1980s. EX2032, 18:16-22:15 (confirming his work in the roof estimation area was from 1981 to 1988/89), 77:5-7 (same). Despite testifying on redirect that “since 1990, I’ve done a significant number of estimates for roof repairs and roof placements and dealing with litigation cases,” *id.*, 77:9-11, on re-cross he clarified that the “significant” number of estimates was “in the neighborhood of ... 15 to 20.” *Id.*, 78:21-79:1. In other words, Mr. Cummings has estimated the roof area of *only 15 to 20 roofs* in the past *thirty years*. And Mr. Cummings’s early experience in roof estimation was primarily using blueprints and drawings, not images, with minimal reliance on on-site measurement:

Q And how did you apply roof estimation techniques to those situations?

A Well, we did both site investigations to determine what was on site. We worked off of the building blueprints that were prepared by a third party. ...

Q And when you say "site investigation," what did the site investigations entail?

A Most of the time, they were just a visual from the ground.

Q And did that include roof measurements?

A We didn't do any measurements from that because we were working off -- we may have done a couple, just to quantify, just to double-check the drawings, a quality control check sort of thing...."

Id., 17:13-18:15 (discussing his work from 1981 to 1987); *see also id.*, 20:1-7 ("Q How did you go about making those roof estimations? A As we discussed before, we would take the drawings, and if we felt it was warranted, we would go to the site and do preliminary evaluations to confirm the drawings against the site condition.").

In contrast, over the course of Mr. Kestner's 28-year career (*see* EX2033), he has inspected thousands of roofs. EX2031, ¶6. Mr. Kestner's current and ongoing work regularly involves preparing or reviewing cost estimates for roofing repairs or replacement work. *Id.* He has personally measured hundreds of roofs.

Id., ¶7. Further, Mr. Kestner has developed and taught certification courses and seminars related to residential and commercial roofing, including training on roof area calculations. *Id.*, ¶11; EX2043, About HCI.

Thus, Mr. Kestner’s testimony is based on extensive experience in the area of roof measurement, and in particular in the area of roof measurement using images of a roof. Mr. Kestner’s opinions should be given significantly more weight than those of Mr. Cummings, which are based on decades-old experience that never included estimation based on aerial images of a roof.

B. Mr. Cummings’s opinions are conclusory and repeat *verbatim* the Petition, and thus are entitled to no weight.

Mr. Cummings opinion is a verbatim carbon-copy of the Petition and should be given no weight. “[C]onclusory expert testimony is inadequate to support an obviousness determination” *TQ Delta, LLC v. Cisco Systems, Inc.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019); *see also In re Magnum Oil Tools Int’l*, 829 F.3d 1364, 1380 (Fed. Cir. 2016) (“To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements.”). The Board does not credit declaration testimony that “merely repeats, verbatim, the conclusory assertion for which it is offered to support.” *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, 15-16 (P.T.A.B. August 24, 2022) (precedential) (emphasis omitted); *see also id.*, 15 (“[T]he cited declaration testimony is conclusory and unsupported,

adds little to the conclusory assertion for which it is offered to support, and is entitled to little weight.”); 37 C.F.R. § 42.65(a).

The key substantive sections of Mr. Cummings’s declaration repeat verbatim Petitioner’s conclusory arguments presented in the Petition,⁵ and thus are not entitled to any weight. EX2014. The issue is not simply that his testimony is repeated in the Petition. The issue is that “[t]he declaration sets forth Petitioner’s conclusory assertions as though they are facts, rather than setting forth facts and evidence in support of Petitioner’s assertions.” *Xerox Corp.*, IPR2022-00624, Paper 12, 5 (PTAB Feb. 10, 2023) (Director Vidal’s decision affirming and

⁵ For example, Mr. Cummings’s opinions alleging that Bailey discloses the claimed “predominant pitch” repeat verbatim the Petition. *Compare* Pet., 11-12, 31-34, *with* EX1003, ¶¶30-36, 57-63. Likewise, Mr. Cummings’s opinions alleging that Pershing-789 and Kennedy disclose the claimed “footprint” also repeat verbatim the Petition. *Compare* Pet., 27-30, *with* EX1003, ¶¶50-55; *compare* Pet., 64-65, *with* EX1003, ¶¶136-137. The same is true of Mr. Cummings’s opinions on motivation to combine. *Compare* Pet., 20-25 (Pershing-789 and Bailey), *with* EX1003, ¶¶43-47 (same); *compare* Pet., 61-62 (Kennedy and Bailey), *with* EX1003, ¶¶129-131 (same); *compare* Pet., 54-57, 83-86 (adding Abhyanker), *with* EX1003, ¶¶110-114, 180-184 (same).

designating *Xerox* as precedential). “This is particularly problematic in cases where, like here, expert testimony is offered not simply to provide a motivation to combine prior-art teachings, but rather to supply a limitation missing from the prior art.” *Xerox Corp.*, IPR2022-00624, Paper 9, 16.

As discussed above, none of the asserted references teach a “predominant pitch,” as claimed. Petitioner and Mr. Cummings assert without citing to any supporting evidence that “[a] POSITA would understand that this broad reference to a pitch calculation [in Pershing-789] would include pitch weighted averages typically used in estimation,” Pet., 20; EX1003, ¶43, and that “predominant slope” “is a weighted average of roof pitches,” Pet., 21; EX1003, ¶44. If it were true, as Petitioner contends, that “calculating a predominant pitch, which is merely the computation of a weighted average of pitch values of a roof, has been used in the art for decades,” Pet., 22 (emphasis omitted); EX1003, ¶46, surely Petitioner could have provided a single shred of evidence corroborating this assertion. But they did not and could not. *See* EX2031, ¶¶59-70 (testifying that “predominant pitch” does not have a meaning known in the art). Petitioner cannot rely solely on conclusory unsupported testimony to supply a claim limitation missing from the prior art.

Petitioner’s reliance solely on Mr. Cummings’s testimony is particularly concerning where, as here, it is unclear whether he even wrote his declaration. When asked during cross-examination whether he wrote his declaration, Mr.

Cummings testified that is was a “collaboration between the attorneys and myself,” EX2032, 9:10-14, but in several instances he seemed wholly unfamiliar with his declaration testimony and/or the evidence of record. *See id.*, 12:4-13:5 (unsure about which exhibit was supporting a particular statement in the declaration), 32:22-37:14 (unable to explain his declaration testimony about reasons the examiner allowed the claims), 45:16-46:7 (admitting he did not understand what Section 102(b) is despite having testified in his declaration that “Bailey qualifies as prior art ... under pre-AIA Section 102(b)” at EX1003, ¶30), 48:4-9 (unsure as to the significance of Bailey’s use of 10,000 square feet per section, despite having relied on that portion of Bailey to opine that a POSITA would have used predominant pitch for an entire house), 55:5-12 (unsure as to how Bailey’s Roof Section Identification Worksheet would be used, despite relying on it extensively in arguing Bailey teaches predominant pitch), 74:13-75:18 (unable to explain how to calculate the footprint of a simple gable roof).

Mr. Cummings also admitted that he did not identify the asserted references, but that they were provided by Petitioner’s counsel. EX2032, 10:12-19. And, he was not familiar with them prior to his involvement in this proceeding. *See, e.g., id.*, 44:6-8 (unfamiliar with Bailey prior to this proceeding). Further, Mr. Cummings did even not recognize that the ARMA Residential Asphalt Roof Manual was the *same document* that is reprinted as Appendix B in Bailey and

which he relied upon extensively in the asserted grounds in this proceeding. *Id.*, 44:18-45:9. He admitted that he had never used the manual before. *Id.*, 45:10-12.

Mr. Cummings's Declaration is the quintessential cut-and-paste copy of attorney argument that *Xerox* instructs should be given no weight. *See, e.g., Xerox Corp. v. Bytemark, Inc.*, IPR2022-00621, Paper 36, 53-57 (P.T.A.B. Sept. 7, 2023) (following the precedential *Xerox* decision (IPR2022-00624, Paper 9), and giving little probative weight to expert testimony that is a verbatim repetition of Petitioner's argument; relying instead only on the disclosures in the asserted art and finding them insufficient); *Guardant Health, Inc. v. University of Washington*, IPR2022-00817, Paper 47, 35-36 (P.T.A.B. Oct. 10, 2023) (following *Xerox*, according little weight to expert testimony where the expert provides no support for the testimony); *CommScope, Inc. v. TQ Delta, LLC*, IPR2022-01012, Paper 31, 24-30 (P.T.A.B. Nov. 13, 2023) (following *Xerox*, finding Petitioner's expert's testimony on motivation to combine conclusory and inadequate to support Petitioner's contentions).

VI. CONCLUSION

Petitioner fails to meet its burden of persuasion in this proceeding. The Board should reject the Petition and find all of the challenged claims not unpatentable.

Respectfully submitted,

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CERTIFICATE OF WORD COUNT (37 C.F.R. § 42.24(d))

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CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e))

I certify that the above-captioned **PATENT OWNER RESPONSE**
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