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COMMENT

THE ADMISSIBILITY OF AERIAL PHOTOGRAPHS—EVIDENTIARY FOUNDATIONS

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I. INTRODUCTION

Companies, such as Google and AOL, significantly impact how consumers use the Internet[1] with their products, particularly Google Maps[2] and MapQuest.[3] For as much as Google Maps and MapQuest contribute to Internet use, interesting issues arise concerning the use of satellite images and aerial photographs in the context of litigation.[4] Historical concerns about satellite and aerial imagery typically involved expectations of privacy and the application of the Fourth Amendment.[5] Courts and citizens alike were primarily concerned with outlining when and where privacy ended with respect to aerial views.[6] Concerns as to the

1. *See* Zoe Fox, *7 Stats Proving Google's Global Internet Domination*, MASHABLE (Sep. 27, 2013), http://mashable.com/2013/09/27/google-statistics (stating, in 2013, 54% of all smartphone users used the Google Maps application); John McKinley, *MapQuest: A Symbol of Everything That's Gone Wrong*, BUS. INSIDER (Feb. 15, 2009, 9:13 AM), http://www.businessinsider.com/mapquest-a-symbol-of-everything-thats-gone-wrong-2009-2 (indicating in late 2008, Google Maps and MapQuest held roughly the same U.S. market share of internet visits); Greg Sterling, *ComScore to Report Google Maps Now Number 1*, SEARCH ENGINE LAND (Feb. 14, 2009, 11:12 AM), http://searchengineland.com/comscore-to-report-google-maps-now-number-1-16570 (finding Google Maps overtook MapQuest in January 2009).

2. *See* Bret Taylor, *Mapping Your Way*, GOOGLE OFFICIAL BLOG (Feb. 8, 2005), http://googleblog.blogspot.com/2005/02/mapping-your-way.html (suggesting Google introduced Google Maps to the general public in 2005).

3. *See generally* John Moragne, *John Moragne: How I Created MapQuest and Changed How We Get Around*, SILICON VALLEY BUS. J., http://www.bizjournals.com/sanjose/print-edition/2013/04/12/john-moragne-how-i-created-mapquest.html (last updated Apr. 17, 2013) (detailing the beginning stages of MapQuest and its ultimate sale to AOL "in 1999 for roughly $1.1 billion").

4. *See* Brian Craig, *Online Satellite and Aerial Images: Issues and Analysis*, 83 N.D. L. REV. 547, 547–78 (2007) (discussing the "online satellite and aerial imagery industry" and the legal issues that accompany it); Peter Stokely, *Using Aerial Photography, Geospatial Data, and GIS to Support the Enforcement of Environmental Statutes*, NAT. RESOURCES & ENV'T, Summer 2013, at 38, 38–42 (discussing the importance of aerial photography interpretation and arguing for its reliability, evidenced by its historical use for both the military and civilians).

5. *See* California v. Ciraolo, 476 U.S. 207, 213 (1986) (opining law enforcement's aerial view of a home where marijuana was growing in the backyard was not a search under the Fourth Amendment and officers were not required to shield their eyes because the illegal activity could be seen "from a public vantage point"); *see also* Dow Chem. Co. v. United States, 476 U.S. 227, 228 (1986) (analyzing the Fourth Amendment to conclude the aerial photographs at issue were not a constitutional violation); Lisa J. Steele, Comment, *The View from on High: Satellite Remote Sensing Technology and the Fourth Amendment*, 6 HIGH TECH. L.J., 317, 322–26 (1991) (explaining the relevance of applying the Fourth Amendment to the "use of satellites by government agencies to search for evidence of criminal activity").

6. *See Ciraolo*, 476 U.S. at 213–14 (finding the defendant had no reasonable expectation of privacy in his backyard when photographs were taken from an airplane at 1,000 feet above his home); *see also* Florida v. Riley, 488 U.S. 445, 445 (1989) (holding even aerial surveillance by helicopter at

admissibility of aerial photographs were also prominent.[7] Specifically, interest in admissibility of these photographs focused on sufficiency, relevance, and accuracy.[8] For example, some courts found an evidentiary foundation may still be laid even without testimony from the photographer as to a photograph's accuracy.[9] Nonetheless, with the general public's increased access to aerial photographs through applications, such as Google Maps and MapQuest, questions remain as to how courts will rule, particularly in Texas, on the evidentiary issues in connection with aerial photographs.

This Comment explores the evidentiary problems attorneys and judges encounter with the issue of introducing aerial photographs as evidence.

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400 feet failed to invoke the Fourth Amendment's protection against searches); *Dow Chem. Co.*, 476 U.S. at 228 (finding the aerial photographs taken by the EPA without a warrant did not constitute a violation of the Fourth Amendment); JAMES J. TOMKOVICZ & WELSH S. WHITE, CRIMINAL PROCEDURE: CONSTITUTIONAL CONSTRAINTS UPON INVESTIGATION AND PROOF 31 (7th ed. 2012) (analyzing the Supreme Court's application of the Fourth Amendment to aerial photographs).

7. *See* Mousel v. Ten Bensel, 238 N.W.2d 632, 633 (Neb. 1976) (rejecting the contention that, for aerial photographs, testimony from the photographer is required; rather, it is sufficient to provide testimony from a witness who is familiar with the object or scene depicted and is able to testify as to the accuracy and verity of the representation); *see also* Morris v. State, 833 S.W.2d 624, 628 (Tex. App.—Houston [14th Dist.] 1992, pet. ref'd) (indicating admissibility was not based on whether a witness was physically present when the disputed photograph was taken).

8. *See* Smith v. Claybrook, 349 So. 2d 1087, 1090 (Ala. 1977) (announcing no reversible error occurred when a trial court refused to admit an aerial photograph into evidence when the witness had no actual knowledge of whether the photographs were an accurate and true depiction of the disputed property); *see also* Gioielli v. Mallard Cove Condo. Ass'n, 658 A.2d 134, 140–41 (Conn. App. Ct. 1995) (suggesting the proponent of an aerial photograph failed to meet the relevancy requirement and preserve error when a he "made no offer of proof as to when the photograph was taken or why it was relevant"); Tewes v. Pine Lane Farms, Inc., 522 N.W.2d 801, 805–06 (Iowa 1994) (recognizing the trial court properly refused the admission of aerial photographs as business records when the court found measurement information notated on the back of the photographs was in preparation for litigation and not in the ordinary course of business); *Mousel*, 238 N.W.2d at 633 (determining the testimony of one who is "familiar with the subject matter" of an aerial photograph as sufficient to show "an accurate and true representation of the scene depicted").

9. *See Mousel*, 238 N.W.2d at 632 ("Expert evidence is not ordinarily required to lay a foundation for the introduction of an aerial photograph."); *see also Morris*, 833 S.W.2d at 628 (clarifying a lack of actual presence at the time the photographs were taken was not dispositive in the determination of the admissibility of photographs); DAVID A. SCHLUETER & JONATHAN D. SCHLUETER, TEXAS RULES OF EVIDENCE MANUAL § 901.02[4][c], at 997 (10th ed. 2015) [hereinafter EVIDENCE MANUAL] (emphasizing the absence of a requirement that the testifying witness must have either taken the photograph themselves or seen it being taken). *But see* Moore v. McConnell, 125 S.E.2d 675, 676 (Ga. Ct. App. 1962) (finding an aerial photograph "was improperly admitted as evidence because (1) no one testified that he had made the photograph, (2) it was not established when the picture was made, (3) it was not interpreted by an expert witness, and (4) no person testified as to why or how the photograph was made").

Part II examines the background of the admissibility of photographs and the current issues that arise when applying the current evidentiary rules to aerial and satellite images. Part III discusses the application of the rules of evidence available and the several methods litigants can use to introduce aerial photographs into evidence. Part IV suggests how Texas courts should apply the evidentiary rules to aerial photographs and provides questions about future application in situations such as private and public drones. Part V suggests a practical solution to resolve the ambiguity attorneys and judges confront in dealing with the admission of aerial photographs.

II. BACKGROUND

A. *Historical Concerns Regarding Aerial Photographs*

The Texas evidentiary rule that applies to the admissibility of photographs "is similar to the Federal Rule and follows the pre-Rules common law and statutory requirements allowing a witness with knowledge to testify as to the genuineness of the proponent's evidence."[10] Texas allows the admission of a photograph into evidence when certain predicates are met prior to its admission.[11] Typically, a testifying witness can authenticate or identify a photograph prior to its admission into evidence either by having "personal knowledge of the matter" or by testifying as to the accuracy of the scene it depicts.[12] However, courts also look to Rule 901(b) of the Texas Rules of Evidence[13] to authenticate

10. EVIDENCE MANUAL, *supra* note 9, § 901.02[4][a], at 996; *see also* TEX. R. EVID. 901(b)(1) (indicating a testifying witness must have knowledge of the matter that is the subject of their testimony); *id.* R. 901(b) (describing examples of authentication that conform to the rule).

11. *See* EVID. 901(a) ("To satisfy the requirement of authenticating or identifying an item of evidence, the proponent must produce evidence sufficient to support a finding that the item is what the proponent claims it is."); *see also* Delacerda v. State, 425 S.W.3d 367, 393 (Tex. App.—Houston [1st Dist.] 2011, pet. ref'd) (noting "[b]efore being admitted into evidence, a photograph must ordinarily be shown to be a correct representation of the subject at a given time" (citing Huffman v. State, 746 S.W.2d 212, 222 (Tex. Crim. App. 1988))).

12. EVID. 602; *see also id.* R. 901(b) (outlining examples that satisfy the requirement of admitting illustrative evidence, such as "[t]estimony that an item is what it is claimed to be"); *id.* R. 901(b)(4) (recognizing some pieces of evidence may be identified by their "distinctive characteristics"); EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 996 (stating "[f]or photographs, X-rays, and slides, the witness with knowledge of the scene or event represented by the proffered evidence may authenticate that evidence by stating that such evidence accurately represents the actual scene or event and that it is substantially the same as the event or scene was at the relevant time").

13. *See* EVID. 901(b)(9) (identifying one method of authentication is to provide an evidentiary description of a process or system and show that it yields an accurate result).

evidence when no witness is available to testify about the accuracy of a recorded scene.[14] Under Rule 901(b)(9), evidence may be identified or authenticated by showing a reliable process or system produced an accurate result.[15]

Traditionally, courts have admitted photographs in two separate ways: (1) testimony from the operator of the camera and (2) testimony from a witness who was at the scene or can testify as to whether the photograph accurately represents the scene as it was at the relevant time.[16] However, when traditional methods are unavailable, courts have looked at whether the systems and processes that generated the photograph were reliable and whether the systems or processes produced an accurate result.[17] Typically, the analysis focuses on systems or processes courts deem reliable, such as those that are self-contained or controlled by an individual who can testify about the maintenance and care of the system, as well as the steps taken to reach production.[18] For instance, courts have

14. *See* Stephen Jeffrey Chapman, *America's Least Funny Home Videos: A Critique of the* Kephart v. State *Authentication Standard for Videotape Evidence*, 3 TEX. WESLEYAN L. REV. 71, 74 (1996) (discussing the application of the silent witness theory, allowing for the verification that a system is reliable and able to accurately depict a scene).

15. *See* EVID. 901(b)(9) (illustrating how Texas courts may admit evidence even without a witness to testify as to the accuracy of the representation, so long as the evidence, produced from a reliable process, is an accurate portrayal).

16. *See* Mousel v. Ten Bensel, 238 N.W.2d 632, 633 (Neb. 1976) (basing the inquiry into whether the evidentiary foundation has been met on whether a witness can testify as to the accuracy of the depiction due to familiarity with the scene); *see also* Brummitte v. Lawson, 182 S.W.3d 320, 325 (Tenn. Ct. App. 2005) (noting the trial court, having examined testimony from all parties and witnesses and determining that the aerial photographs from the surveyor portrayed a visible boundary line at issue in this dispute, the aerial photographs were properly admitted); Morris v. State, 833 S.W.2d 624, 628 (Tex. App.—Houston [14th Dist.] 1992, pet. ref'd) (acknowledging the relevance of evidence is dependent on the tendency of that evidence to make an action more or less probable); EVIDENCE MANUAL, *supra* note 9, § 901.02[4][b], at 996 (noting the common method in identifying evidence is from the testimony of a witness who has personal knowledge about the proposed evidence). *See generally* EVID. 401 (defining relevancy of evidence as dependent on whether the evidence would make an action more or less probable than would be the case without the evidence).

17. *See* EVID. 901(b)(9) (identifying a method in Texas of admitting photographs without a witness who has personal knowledge of the scene or familiarity with the scene depicted); *see also* Reavis v. State, 84 S.W.3d 716, 719 (Tex. App.—Fort Worth 2002, no pet. h.) (noting the silent witness theory "has developed in many jurisdictions and allows videos or photographs to" be admitted "upon introduction of evidence that the process or system that produced the photo or video is reliable" (citation omitted)); EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 997 (discussing how courts can admit photographs through the silent witness theory when the photographs are a produced "from a reliable process or system").

18. *See* State v. Young, 303 A.2d 113, 116 (Me. 1973) (finding testimony from the individuals who were in physical custody of the process or system relevant to the determination of that system's

historically admitted photographs that speak for themselves,[19] such as Automated Teller Machine (ATM) photographs or video footage from bank security systems.[20] However, each of these systems provide either the preference for self-containment or for an available witness to testify about how the process, from start to finish, consistently produces accurate and reliable photographs or videos.[21]

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reliability); *see also Brummitte*, 182 S.W.3d at 324–25 (finding the aerial photograph, in connection with the testimony of a surveyor who conducted field work and consulted recorded deeds in the public records, was properly admitted).

19. *See* People v. Bowley, 382 P.2d 591, 594–95 (Cal. 1963) (accepting a traditional approach that allows photographs to be free from an illustrative only limitation and, under certain conditions, to act as silent witnesses or to speak for themselves); *see also* State v. Gann, 154 Ohio App. 3d 170, 2003-Ohio-4000, 796 N.E.2d 942, ¶¶ 40–41 (suggesting a majority of photographs can speak for themselves).

20. *See* United States v. Taylor, 530 F.2d 639, 641–42 (5th Cir. 1976) (admitting security footage of a robbery irrespective of the fact that the employees were locked inside the bank vault at the time the footage was recorded); *see also* United States v. Fadayini, 28 F.3d 1236, 1240–41 (D.C. Cir. 1994) (rejecting an appellant's argument that ATM photographs failed to meet the evidentiary requirements of sufficiency).

21. *See* United States v. Rivera-Maldonado, 194 F.3d 224, 236–37 (1st Cir. 1999) (finding the trial court did not err by admitting composite videotapes of drug transactions when a witness testified about the process of reviewing the videos with the individual who actually videotaped the crime scenes); *see also* United States v. Sivils, 960 F.2d 587, 597 (6th Cir. 1992) (opining no abuse of discretion occurred when the trial court admitted evidence produced by FBI videotaping equipment when such evidence was accompanied with testimony regarding the routine checking of the equipment to ensure it was in working order, the procedure for handling produced tapes, and the chain of custody of the tapes following their removal from the recording equipment); *Taylor*, 530 F.2d at 642 (recognizing the significance of judicial discretion where photographic or video evidence is coupled with testimony regarding the installation of the camera, the activation of the camera, the handling of the film after the event occurred, the chain of custody of the produced film, and proper process of development). *But see* United States v. Rembert, 863 F.2d 1023, 1027 (D.C. Cir. 1988) (indicating, even in a situation where there is no witness to testify about when a photograph was made, how it was made, where it was made, or whether it was a fair and accurate depiction, a party may still authenticate a photograph if it is so sufficient that a reasonable juror could find the photograph "is what its proponent claims" it to be (quoting United States v. Blackwell, 694 F.2d 1325, 1330 (D.C. Cir. 1982))); United States v. Stephens, 202 F. Supp. 2d 1361, 1368 (N.D. Ga. 2002) (noting recent federal decisions have allowed for automated surveillance equipment to be admitted even when no human actually witnessed the evidence recorded by the camera, so long as it is deemed reliable based upon a witness's testimony as to the type of camera or equipment used, the reliability of such equipment, the quality of the equipment and its product, and the processes involved); *Brummitte*, 182 S.W.3d at 325 (acknowledging a surveyor was able to authenticate the aerial photograph by giving testimony regarding his process of field work and examination of recorded deeds). *See generally* FED. R. EVID. 901(a) (noting, generally, all a proponent seeking to authenticate a piece of evidence is required to produce is "evidence sufficient to support a finding that the item is what the proponent claims it is").

B. *Current Issues in Applying the Evidentiary Rules*

Today, courts face a new dilemma revolving around the admission of aerial photographs when a system like Google Maps lacks the physical, corporeal, and self-containment characteristics courts often rely on when admitting ATM photographs and security system footage.[22] In addition, while parties could make a request for the testimony from a Google employee about the reliability of Google Maps, many individuals would be unable to finance the travel expenses for such a witness, much less recover such expenses in the event of successful litigation.[23] Furthermore, even if parties could readily afford the travel and housing expenses for a Google employee, issues still remain as to the testimony of such an individual and whether a tool, such as judicial notice, might be appropriate.[24] Unlike the situation when a bank employee who, on a regular basis, comes into physical contact with the bank's security system, a Google employee may only come into contact with a single step in the process of production, such as the final product—the aerial photograph contained in the Google Maps application.[25] Thus, the Google employee, having no physical

22. *See* Wagner v. State, 707 So. 2d 827, 831 (Fla. Dist. Ct. App. 1998) (noting evidence of tampering with a camera recording system would cast significant doubt on whether a system possessed an indicia of reliability); *see also* Kindred v. State, 524 N.E.2d 279, 298 (Ind. 1988) (identifying a security system's attribute of self-containment important when determining whether the system was reliable and accurate).

23. *See In re* Slanker, 365 S.W.3d 718, 720 (Tex. App.—Texarkana 2012, orig. proceeding) (illustrating "[e]xpert witness fees are generally not recoverable," meaning, even when a party can afford to have a Google employee testify, it is likely a cost-benefit analysis would discourage such a risky decision); *see also* May v. Ticor Title Ins., 422 S.W.3d 93, 106 (Tex. App.—Houston [14th Dist.] 2014, no pet.) (holding the parties' stipulation that the expert fees of the prevailing party would not be taxed against them was "insufficient to make [the] expert fees collectable"); 16 TEX. JUR. 3D *Costs* § 52, at 75 (3d ed. 2013) [hereinafter TEX. JUR. *Costs*] (asserting, "[r]egardless of any good cause shown, costs of experts are merely incidental expenses in preparation for trial and are not recoverable").

24. *See* United States v. Perea-Rey, 680 F.3d 1179, 1182 n.1 (9th Cir. 2012) (taking judicial notice of a Google satellite image as a source not reasonably questioned in order to determine the location of a home); *see also* State *ex rel.* J.B., Nos. FJ-19-337-08, FJ-19-439-08, FJ-19-496-08, FJ-19-622-08, FJ-19-502-08, 2010 WL 3836755, at *5 (N.J. Super. Ct. App. Div. Sept. 27, 2010) (per curiam) (sustaining, initially, the defendant's objection regarding the admissibility of a Google Earth image because no foundation for accuracy had been established, but after subsequent testimony from a detective who had personally visited the locations in question, the court admitted the Google Earth images); Garrett v. State, No. 07-08-0159-CR, 2008 WL 5412047, at *1 (Tex. App.—Amarillo Dec. 30, 2008, no pet.) (emphasizing the prosecution had only used an aerial photograph for demonstrative purposes and the fact the appellant failed to object to this use was determinative in the court's finding no error occurred).

25. *See Kindred*, 524 N.E.2d at 298–99 (providing a bank employee's testimony about the process of the bank's security system and his physical interaction with managing the recording

custody of the system or process, in this case the satellite or airplane that took the photograph, would presumably lack the ability to testify about the reliability of the system.[26] Ultimately, the precedential value of the case law dealing with ATM photographs and security system footage may be called into question by the distinguishing factors that accompany aerial photographs and the systems that produce them.[27]

Considering the standard method for admitting photographic evidence, issues may arise in the context of aerial photographs when personal knowledge and the ability to testify as to accuracy from an aerial perspective are clearly lacking.[28] While numerous courts have dealt with the admission of photographs from systems such as an ATM or a bank security system through the "silent witness theory," few have applied this theory to aerial photographs.[29] For example, in *Ponderosa Pines Ranch, Inc. v. Hevner*,[30] the Supreme Court of Montana affirmed a lower court's decision to take judicial notice of aerial photographs when each

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equipment sufficient in establishing the process or system was reliable).

26. *See* State v. Young, 303 A.2d 113, 116 (Me. 1973) (finding the admittance of surveillance photographs was proper when the state introduced testimony from: (1) the bank's manager regarding installation of the camera, (2) the surveillance company's employee regarding installation, operation, and periodic testing of it, (3) the individual who removed the film, (4) the individual who developed the film, and (5) each police officer who had custody of the photograph up until trial).

27. *See* United States v. Taylor, 530 F.2d 639, 642 (5th Cir. 1976) (allowing security footage from a bank to be admitted when witness testimony established the processes involved in the security camera system, including installation, activation, development, and production). However, because witness testimony of this type will rarely, if ever, be available to litigants, precedential value of security footage and ATM photographs will likely be limited. *See id.* (detailing the requirements that must be satisfied before photographic evidence taken by a bank's automatically activated camera will be admitted).

28. *See* Ponderosa Pines Ranch, Inc. v. Hevner, 2002 MT 184, ¶¶ 21–23, 311 Mont. 82, 53 P.3d 381 (addressing the admissibility of aerial photographs from the United States Department of Agriculture and finding that the lower court properly took judicial notice when admitting the aerial photographs); *see also* Brummitte v. Lawson, 182 S.W.3d 320, 325 (Tenn. Ct. App. 2005) (favoring the admission of an aerial photograph when accompanied by the testimony of a land surveyor who had done additional investigation into the boundary line that was in dispute, including field work and the checking of public records); DAVID A. SCHLUETER ET AL., TEXAS EVIDENTIARY FOUNDATIONS § 4.15[1], at 179 (5th ed. 2015) [hereinafter FOUNDATIONS] (detailing that the two most frequently used methods of authentication that have developed over the years in Texas are the pictorial testimony and the silent witness methods).

29. *See Taylor*, 530 F.2d at 641–42 (admitting security footage from a bank security camera); *see also* United States v. Fadayini, 28 F.3d 1236, 1240–41 (D.C. Cir. 1994) (stating the lower court did not err in admitting ATM photographs into evidence because they were sufficiently authenticated when an individual associated with the bank testified about the mechanics of recording and the time stamps on the photographs); Hollis v. Sec'y, Dep't of Corr., No. 6:11-cv-1977-Orl-37, 2014 WL 407980, at *5–7 (M.D. Fla. Feb. 3, 2014) (allowing the admission of ATM photographs).

30. Ponderosa Pines Ranch, Inc. v. Hevner, 2002 MT 184, 311 Mont. 82, 53 P.3d 381.

photograph was accompanied by "a certificate from the United States Department of Agriculture."[31] However, the majority of parties are likely to find certified aerial photographs from the U.S. Department of Agriculture to be of limited use.[32] While they do provide a high rate of acceptance through judicial notice, they lack many of the tools available in Google Maps. Aerial photographs from sources, such as Google Maps, may have a broader application and be better suited to a number of different types of cases, including premises liability, wrongful death, property boundary disputes, automobile collisions, and criminal cases.[33]

III. APPLICATION OF THE RULES OF EVIDENCE

A. *Pictorial Testimony Method*

There are two common techniques for verifying photographs to admit them into evidence: the pictorial testimony method and the silent witness method.[34] The most readily used method is the pictorial testimony method, which requires, through a line of questioning, a witness's testimony have the following foundational elements: (1) familiarity with the scene or object; (2) an explanation for the basis of that familiarity; (3) recognition of the scene or object depicted in the photographs; and (4) testimony indicating the photograph is a fair and accurate depiction of

31. *Id.* ¶ 22; *see also* FED. R. EVID. 201(b) (requiring, in order for a court to take judicial notice of a given fact, the fact must "not [be] subject to reasonable dispute because it [is] . . . determined from sources whose accuracy cannot reasonably be questioned"). *But see Brummitte*, 182 S.W.3d at 325 (proclaiming a court properly admitted an aerial photograph even without certification from a government agency when it was accompanied by verifying testimony from a land surveyor who had conducted additional work to determine the proper location of the boundary line).

32. *See* U.S. DEP'T OF AGRIC., FSA-441A, PRICES FOR AERIAL IMAGERY & RELATED PRODUCTS 1 (2013), http://www.fsa.usda.gov/Internet/FSA_File/fsa0441a_130327vol.pdf [hereinafter PRICES FOR AERIAL IMAGERY] (providing the prices of obtaining aerial images and providing examples of the images available to be purchased).

33. *See* Mousel v. Ten Bensel, 238 N.W.2d 632, 633 (Neb. 1976) (using an aerial photograph as evidence in a property dispute involving an adverse possession claim); *see also* Brian Craig, *Online Satellite and Aerial Images: Issues and Analysis*, 83 N.D. L. REV. 547, 548, 557–58 (2007) (commenting on the vast impact the aerial imagery industry has on society and consequently its increasing significance in many areas of litigation).

34. *See Mousel*, 238 N.W.2d at 633 (proclaiming an aerial photograph may be admitted into evidence when coupled with witness testimony that establishes the witness's familiarity with the scene and ability to testify about the accuracy of the scene depicted in the photograph); *see also* FOUNDATIONS, *supra* note 28, § 4.15[1], at 179 (commenting that the two most common methods of verification for photographs are the methods of pictorial testimony and the silent witness).

the scene or object at the relevant time.[35]

When applying the pictorial testimony method, certain issues may arise in the context of aerial photographs, which are not typically present with, for example, photographs taken at the scene of an automobile accident.[36] A person involved in an auto collision may testify, even without having taken the photograph himself, that the scene is an accurate depiction of the auto collision he personally observed.[37] However, the issue of verification becomes more complicated when that same individual uses an aerial photograph from Google Maps in an attempt to recreate or depict the scene of the accident for the court.[38] The opposing party may object to the admission of the aerial photograph because the witness lacks the ability to testify about the fairness or accuracy of the depiction.[39] How

35. *See Mousel*, 238 N.W.2d at 633 (identifying an aerial photograph as sufficiently having an evidentiary foundation when a witness testifies as to familiarity, recognition, and accuracy); *see also Brummitte*, 182 S.W.3d at 325 (providing an example of a trial court that had readily available facts to determine whether the photograph was authentic, even without testimony from the photographer); Morris v. State, 833 S.W.2d 624, 628 (Tex. App.—Houston [14th Dist.] 1992, pet ref'd) (permitting the admittance of a photograph into evidence even without requiring the witness to have been physically present during the time the relevant photograph was taken); FOUNDATIONS, *supra* note 28, § 4.15[1], at 179–80 (providing the proponent of the photograph must meet certain evidentiary foundational elements through the testimony of a witness who has the ability to testify about the fairness and accuracy of the evidence).

36. *See* S.D.G. v. State, 936 S.W.2d 371, 381 (Tex. App.—Houston [14th Dist.] 1996, writ denied) (proclaiming the predicate required to admit a photograph "need not be laid by the photographer," the individual photographed, or even an individual who was present during the taking of the photograph; however, there must be a witness who observed the depicted object or scene); *see also Morris*, 833 S.W.2d at 628 (proposing the witness need not have been present during the time the photograph was actually taken).

37. *See S.D.G.*, 936 S.W.2d at 381 (requiring, in order to lay the proper predicate for admitting a photograph into evidence, the witness must only have observed the depicted object or scene, but need not have been present at the time the photograph was taken); *see also Morris*, 833 S.W.2d at 628 (reiterating there is no requirement a witness or party must have been present when particular photographs were taken).

38. *See* Moore v. McConnell, 125 S.E.2d 675, 676 (Ga. Ct. App. 1962) (refusing to admit aerial photographs when it could not be established when, how, or why the photograph was made); *see also* Tewes v. Pine Lane Farms, Inc., 522 N.W.2d 801, 805–06 (Iowa 1994) (reiterating the trial court properly rejected a proponent's classification of aerial photographs as business records when information allegedly certifying contested boundary lines was handwritten on the back of the photographs and not done so in the ordinary course of business, but for the purpose of litigation); Corsi v. Town of Bedford, 58 A.D.3d 225, 232 (N.Y. App. Div. 2008) (concluding an aerial photograph could not be admitted, even with an expert witness, when there was no testimony regarding the method used to take the photograph or the purpose for taking the photograph). The court in *Corsi* did find a different aerial photograph was properly admitted under the business records exception to hearsay because testimony established how and why the aerial photograph was taken. *Id.*

39. *See* FOUNDATIONS, *supra* note 28, § 4.15[2][c], at 180–81 (suggesting a sample line of

can a witness testify about the fairness and accuracy of a photograph from an aerial perspective when his familiarity with the scene depicted is only recognizable from ground level?[40] Surely, the witness's ability to testify about distances, landmarks, and other features of the landscape is less reliable when he has never viewed the scene from that perspective. It would seem a court should be skeptical about whether the proper foundational elements have been laid.[41]

The glaring issues in using the pictorial testimony method revolves around a witness's familiarity with the scene, the witness's ability to explain the basis of that familiarity, and the witness's ability to establish the fairness and accuracy of the photograph.[42] Ultimately, with photographic evidence, the goal is for the trier of fact not to simply view the scene or object but to do so as the witness did at the relevant time.[43] This is a

questioning to use in order to establish the foundational elements when using the pictorial witness method to admit a photograph); *see also* EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 996–97 (indicating a basic requirement in the process of authenticating photographic evidence by the pictorial testimony method is establishing, through witness testimony, that the photograph accurately depicts the relevant scene).

40. *See Brummitte*, 182 S.W.3d at 325 (permitting the admission of an aerial photograph even when the witness testifying about the boundary line had not actually seen the land from the aerial perspective); *see also* Georg v. Animal Def. League, 231 S.W.2d 807, 811 (Tex. Civ. App.—San Antonio 1950, writ ref'd n.r.e) (admitting an aerial photograph map without objection when the individual who prepared the photograph testified about the scale of the map and its level of correctness).

41. *See* Buchanan v. Hurdle, 48 So. 2d 354, 355 (Miss. 1950) (finding no error in a chancellor's refusal to admit aerial photographs into evidence when the accuracy of the images was not sufficiently shown).

42. *See* Mousel v. Ten Bensel, 238 N.W.2d 632, 633 (Neb. 1976) (noting the importance of establishing familiarity with the scene depicted and proving by witness testimony that the photograph demonstrates a fair and accurate representation); *see also Brummitte*, 182 S.W.3d at 325 (determining an aerial photograph was properly admitted when the land surveyor testified about his familiarity with the property because of his field work and consultation of recorded deeds); *Georg*, 231 S.W.2d at 811 (recognizing the admission of an aerial photograph was proper when testimony from the creator of the photograph established the accuracy of the aerial photograph and when such testimony was not disputed by the opposing party); FOUNDATIONS, *supra* note 28, § 4.15[2][a]–[b], at 179–80 (discussing the foundational elements required, which include those related to fairness and accuracy when using the pictorial testimony method to introduce photographic evidence through the testimony of a witness who possesses personal familiarity with the scene depicted); EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 996–97 (emphasizing the pictorial testimony method as a manner to authenticate photographic evidence when a witness can testify about the accuracy of the depiction).

43. *See* FOUNDATIONS, *supra* note 28, § 4.15[1], at 179 (noting the verification of photographic evidence can depend on a witness's ability to testify about the photograph's accuracy in its depiction of the relevant scene); *see also* EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 996–97 (describing the necessity of the photograph to be illustrative of witness testimony and to be an accurate depiction of, or substantially similar to, the scene at the time in question).

basic concept is often overlooked and best explained by a simple hypothetical. Imagine a person is flying into San Antonio, Texas on a recent business trip and looks out the window of the plane during its final descent. He has lived in this city for the majority of his life, yet he struggles to find certain landmarks and locations. He is surprised to see certain locations, which should be familiar, are not exactly where he thought they were. These landmarks and specific locations are in "different places" because, if someone is not a pilot or one who sees San Antonio from an aerial view on a regular basis, he is unfamiliar with *this* San Antonio. Now, imagine this same person is a witness in a personal injury suit involving a vehicle collision and is used by the plaintiff's counsel to lay the foundation for an aerial photograph. What value does his testimony have? Unless the witness's familiarity with the evidence includes information regarding an aerial perspective, which is unlikely in a vehicle collision case, the value of that witness's testimony through the pictorial testimony method appears suspect due to his inability to establish accuracy or familiarity.[44] In this instance, an objection should be made for failure to lay the predicate. Thus, the pictorial testimony method provides limited utility regarding relevancy, if any, in the admission of aerial photographs due to the requirements of accuracy, personal familiarity, and an explanation of that familiarity.[45]

44. *See* S.D.G. v. State, 936 S.W.2d 371, 381 (Tex. App.—Houston [14th Dist.] 1996, writ denied) (stating the analysis properly focuses on whether the testifying witnesses have personal familiarity with and the ability to testify as to the depiction's accuracy, such as when they observed the scene or event, not whether they took the photograph or were present at the precise moment the photograph was taken); *see also* Morris v. State, 833 S.W.2d 624, 628 (Tex. App.—Houston [14th Dist.] 1992, pet ref'd) (indicating the focus of the inquiry is on relevance and determining if the photograph is reflective of the scene at the time the photograph was taken, meaning any timing issue does not attach to the point the photograph was taken, but to the makeup of the scene when the witness observed it); FOUNDATIONS, *supra* note 28, § 4.15[2][a], at 179 (outlining that testimony from the photographer or detailed testimony about the camera used is not required, but personal familiarity and evidence of accuracy is necessary); EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 996 (acknowledging the paramount requirement the photographic evidence provided accurately represent the scene relevant to the testimony).

45. *See* FOUNDATIONS, *supra* note 28, § 4.15[2][a], at 179 (identifying the usefulness of the pictorial testimony method for admitting photographs into evidence); *see also* EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 997 (pointing to the pictorial testimony as a useful tool in authenticating evidence, but also requiring the evidence to be an illustration of the witness's testimony). If this photographic evidence is neither a true nor accurate illustration of the scene in conjunction with the witness's testimony, generally it will be found inadmissible. EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 996.

B. *Silent Witness Method*

The second common method of authenticating photographs deals with the admission of photographs and videos from processes or systems that lack the human presence typically accompanied by photographic evidence.[46] A landowner may be able to hire a photographer to take pictures of the boundaries of his land and then testify in a property dispute as to the photograph's accuracy, his ability to recognize the scene, and his familiarity with the scene.[47] However, it is doubtful the manager of a bank can do the same if his bank is robbed outside of business hours and no one is able to verify what was recorded by the video surveillance system actually occurred.[48] Thus, courts remove their focus from the witness on

46. *See* United States v. Oslund, 453 F.3d 1048, 1054 (8th Cir. 2006) (applying a more rigid, multi-factor test to determine whether an audio recording system was reliable and accurate without an accompanying witness to testify about the events recorded); *see also* United States v. Rembert, 863 F.2d 1023, 1027 (D.C. Cir. 1988) (determining, even without witness testimony regarding the processes involved in creating the photograph or whether it is fair and accurate, a photograph may still be authenticated so long as it is sufficient for a reasonable jury to conclude the photograph is what its advocate claims); United States v. Harris, 55 M.J. 433, 438 (C.A.A.F. 2001) (discussing the historical development of the acceptance of the silent witness theory as a method of authentication in nearly all jurisdictions, allowing photographs to speak for themselves); State v. Haight-Gyuro, 186 P.3d 33, 36 (Ariz. Ct. App. 2008) (approving a less rigid approach of authenticating photographic or video evidence by focusing on whether a jury could conclude the evidence was accurate; rather, the court chose to decline to adopt a rigid, formulaic process of evaluating evidence under the silent witness theory); People v. Vaden, 784 N.E.2d 410, 415 (Ill. App. Ct. 2003) (adopting the silent witness method as a procedure for authenticating photographs); State v. Stangle, 97 A.3d 634, 637 (N.H. 2014) (emphasizing the vast majority of jurisdictions now allow for the authentication of photographs and other recordings through the silent witness method); FOUNDATIONS, *supra* note 28, § 4.15[3][a], at 183 (noting the difference between the pictorial testimony method and the silent witness method is the shift in focus from the witness to the reliability of a particular camera system); EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 997 (pointing to the silent witness theory as a means to permit a proponent of a piece of evidence to still have the evidence admitted when they do not have a witness that can testify as to authenticity or accuracy).

47. *See Brummitte*, 182 S.W.3d at 325 (indicating the trial court was able to determine, after testimony from witnesses and parties, as well as exhibit evidence, that a disputed property boundary was in accordance with the boundary established by the surveyor); *see also S.D.G.*, 936 S.W.2d at 382–83 (describing an example of a court ultimately being concerned with accuracy, recognition, and familiarity of the proposed depiction); FOUNDATIONS, *supra* note 28, § 4.15[2][a], at 179 (clarifying that the proponent of the photographic evidence is not required to produce the actual photographer); EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 997 (expressing that a witness may authenticate a photograph even without actually seeing the photograph being taken).

48. *See* United States v. Fadayini, 28 F.3d 1236, 1239–41 (D.C. Cir. 1994) (allowing for the admission of ATM photographs into evidence even without testimony from an individual who witnessed the events that occurred); *see also Harris*, 55 M.J. at 438–39 (discussing the importance of the silent witness theory's application to situations involving automatic cameras and the types of witnesses required to authenticate such equipment); Robinson v. State, 621 So. 2d 389, 392 (Ala. Crim. App. 1993) (recognizing the importance of a party's ability to use the silent witness theory,

the stand and turn the inquiry towards the reliability of the system or process that recorded the scene.[49]

When courts look at the reliability of the process or system under the silent witness theory, the analysis turns on a number of factors, which includes the following: (1) how the memory card or film was loaded into the camera; (2) the working order of the camera and its activation; (3) the manner of the removal of film or memory card; (4) the manner in which the film or memory card was handled afterwards; and (5) the process of development and whether that process produces trustworthy results.[50] However, with aerial images, a court's application of these factors is significantly complicated due to the inherent differences between Google Maps and other reliable processes, such as ATM photographs or automated bank video surveillance systems.[51]

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specifically with ATM surveillance, as a means to identify a defendant in a situation where no eyewitness was available to testify about the accuracy of the recording).

49. *See Harris*, 55 M.J. at 438 (indicating the formal adoption of the silent witness theory for use in military courts); *see also Vaden*, 784 N.E.2d at 415 (using the silent witness theory to authenticate photographs and videotapes produced from automated camera equipment); FOUNDATIONS, *supra* note 28, § 4.15[3][a], at 183 (noting courts can look to the reliability of a camera system to determine if the photographs can be deemed reliable and accurate); EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 997 (proposing the silent witness theory as an appropriate method for courts in authenticating photographic evidence, particularly from automated camera surveillance systems).

50. FOUNDATIONS, *supra* note 28, § 4.15[3][b], at 183–84; *see Harris*, 55 M.J. at 438 (urging "[a]ny doubt as to the general reliability of the video cassette recording technology has gone the way of the BETA tape"); *see also Vaden*, 784 N.E.2d at 415 (finding the silent witness theory useful to authenticate photographic and video evidence from automated camera systems "when there is evidence as to how and when the camera was loaded, how frequently the camera was activated, when the photographs were taken, and the processing and chain of custody of the film" following its removal). *But see Rembert*, 863 F.2d at 1027–29 (stating, even though the detailed evidence regarding the processes of activation, loading the film, the process of development, and the chain of custody are informative to the court, the sufficiency requirement is met by the submission of evidence that would permit a reasonable jury to find the evidence is what its advocate claims it to be). Notwithstanding its discussion of the requirements for proving up photographic evidence, in *Rembert*, the court stated the trial court's ruling on admissibility and authentication of evidence would not be overturned without proof of "a clear abuse of discretion." *Id.* at 1027 (quoting United States v. Blackwell, 649 F.2d 1325, 1330 (D.C. Cir. 1982)).

51. *See* United States v. Taylor, 530 F.2d 639, 642 (5th Cir. 1976) (determining it was important to have witness testimony regarding the processes involved in the bank surveillance system, including installation of the system and the chain of possession of the developed product, in determining the authenticity of photographs); *see also Fadayini*, 28 F.3d at 1239–41 (deciding no abuse of discretion occurred by allowing the admission of ATM photographs into evidence when accompanied by testimony from an individual familiar with the operations of the ATM, but noting it was uneasy with deeming this witness an expert when it was likely an unassisted jury could make their own conclusion as to whether an identification could be made based on the ATM photographs). The likelihood a party will be able to call a witness who is an employee of Google and had physical contact, possession, or control over the processes of obtaining the evidentiary information or developing the

Courts often look to installation, custody of the system, self-containment, periodic testing, manner of development, and custody of the developed product.[52] Each of these factors, while often available with photographs and videos from ATMs, police surveillance, or security systems, will frequently be absent when a party seeks to admit aerial photographs from Google Maps.[53]

Consider the simple benefit of witness location and availability concerning a bank robbery: witness testimony regarding the relevant factors listed above has been readily available for a court's consideration.[54]

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evidentiary information is significantly less than in the case of an ATM photograph or the footage from an automated bank surveillance system. *See Taylor*, 530 F.2d at 642 (illustrating the challenges of laying the foundation for pictures taken through an automated bank surveillance system because the employees who testified did not actually take the pictures).

52. *See* United States v. Stephens, 202 F. Supp. 2d 1361, 1368 (N.D. Ga. 2002) (indicating the importance of producing witnesses who, while absent from a particular location at the relevant time, can testify about the reliability of security or camera equipment, its quality, and how a final product is generated); *see also* Gioielli v. Mallard Cove Condo. Ass'n, 658 A.2d 134, 140 (Conn. App. Ct. 1995) (noting, because the defendant failed to offer proof of when and why the aerial photograph was taken or how the admittance of the photograph would defeat the plaintiff's claim, the lower court did not err in finding the photograph was inadmissible); *Vaden*, 784 N.E.2d at 415 (identifying numerous factors that provide evidentiary support of the reliability of a process or system, including the activation of the camera, the custody of the evidence before and after development, "and when the camera was loaded"); State v. Young, 303 A.2d 113, 116 (Me. 1973) (identifying the following as useful in determining authenticity: (1) testimony from a bank manager regarding the camera's field of view; (2) testimony from the surveillance company that installed the camera and did periodic testing; (3) testimony from the individual who removed the film; (4) testimony from the individual who developed the film; and (5) testimony from the law enforcement officers that were in custodial possession of the evidence from the time of development through the time of trial); Buchanan v. Hurdle, 48 So. 2d 354, 355 (Miss. 1950) (affirming a lower court's decision to refuse the admittance of aerial photographs because factors indicating whether the aerial photographs were accurate and correct were not sufficiently or properly shown); Georg v. Animal Def. League, 231 S.W.2d 807, 811 (Tex. Civ. App.—San Antonio 1950, writ ref'd n.r.e.) (indicating an aerial photograph was properly admitted because the testifying witness was the individual who prepared the photograph at issue and its accuracy was not disputed). *But see* State v. Haight-Gyuro, 186 P.3d 33, 36 (Ariz. Ct. App. 2008) (adopting a less rigid approach for authenticating photographic and video evidence, which allows for the admittance of recordings of particular scenes or events so long as the evidence is such that a jury could conclude it accurately depicts the scene or event at issue).

53. *See* Wagner v. State, 707 So.2d 827, 831 (Fla. Dist. Ct. App. 1998) (allowing the admission of photographs when a witness who had come into contact with the system could testify about its reliability). It is likely few, if any, of the types of witnesses available to the courts in the cases involving ATM photographs or security system production will be available in connection with Google Maps. *See Taylor*, 530 F.2d at 641–42 (indicating the lack of eyewitnesses testimony available to authenticate security footage did not preclude the possibility of laying the proper foundation for admission). Furthermore, even fewer witnesses will have ever been in physical contact with the system producing the evidence, leaving doubt as to their knowledge of its reliable working condition. Kindred v. State, 524 N.E.2d 279, 298 (Ind. 1988); *Young*, 303 A.2d at 116.

54. *See Taylor*, 530 F.2d at 642 (introducing evidence produced from surveillance equipment

In each instance, courts have heard testimony from people who have been in physical custody of the system and the final product, such as a surveillance company employee who installed the security system, a bank employee who witnessed the installation, an individual who developed the film and yielded the final product, and police officers who possessed the developed photographs until the trial.[55] However, in *United States v. Stephens*,[56] a U.S. District Court in Georgia may have provided a solution for aerial photographs from Google Maps that is also in line with precedent set by other federal courts, including the U.S. Court of Appeals for the Fifth Circuit.[57] In *Stephens*, the court indicated recent federal decisions do not require testimony from the individual in physical custody

when such evidence was accompanied by testimony from witnesses who witnessed installation, activation, or were involved in custody, possession, and development); *see also Kindred*, 524 N.E.2d at 298 (pointing to the testimony from bank managers, who managed the security equipment on a regular basis by loading tapes into the video cameras, removing the tapes at the appropriate time, recording time numbers, and sending tapes away to be stored); Hall v. State, 829 S.W.2d 407, 409 (Tex. App.—Waco 1992, no pet.) (finding video surveillance was properly admitted into evidence because the police officer who videotaped a meeting with the defendant also testified that the videotape was an accurate and fair depiction of the events by asserting the following: (1) identifiable voices in the recording, and (2) a complete lack of alteration or editing of the videotape).

55. *See Taylor*, 530 F.2d at 642 (introducing the testimony of witnesses who were available to testify about the factors courts find determinative for authentication, such as witnesses with hands-on interaction with the equipment, those who installed the equipment, or those who were in possession of the film during its development process); *see also Vaden*, 784 N.E.2d at 415 (describing various necessary types of facts and evidence that should be included when seeking to submit photographic or video evidence under the silent witness theory, most of which require testimony from individuals who have been in physical contact with the evidence throughout the chain of custody, from installation through final production); *Kindred*, 524 N.E.2d at 298 (examining the testimony of bank managers who were consistently in control of the surveillance equipment, from the time of loading the tapes into the cameras until the sending of the tapes to a secured storage facility); Litton v. Commonwealth, 597 S.W.2d 616, 618–19 (Ky. 1980) (approving of the admittance of security footage from a pharmacy when the owner testified the footage was an accurate representation of his store and testified about his personal knowledge of his surveillance system, including how and when it was activated during closing hours); *Young*, 303 A.2d at 116 (detailing the importance of a court being able to hear testimony from witnesses who were in physical custody or control of the evidence, including the following witnesses: (1) a surveillance company employee who installed the system, (2) the person who developed the film, and (3) the officers who kept the film in their custody). *But see Stephens*, 202 F. Supp. 2d at 1368 (finding, even without an individual involved in the physical custody of the recording device or surveillance system, a system may be verified when a witness testifies about the type of equipment used, the reliability of that equipment, the level of quality of the final product, or even the entire system's general reliability).

56. United States v. Stephens, 202 F. Supp. 2d 1361 (N.D. Ga. 2002).

57. *See id.* at 1368 (determining testimony from an individual who had physical custody or control of the system, including testimony from the individual who operated the camera, may not be required when there is testimony about the general reliability of the system and the type of system or equipment that was used).

of the equipment while it was recording or testimony from an individual who actually witnessed the events.[58] Additionally, the court stated recent federal precedent is mostly concerned with the general reliability of the equipment, the type of camera or equipment, and the quality of the final recording produced.[59] Thus, it would seem aerial images from Google Maps might be admitted under the Federal Rules of Evidence and federal precedent, as so long as there is a witness available to testify about the general reliability of the equipment itself.[60]

Nonetheless, the issue of being able to produce the type of witness typically accepted by other courts will be problematic with an image from Google Maps because it is unlikely a party will be able to locate an individual, outside of pursuing an expert witness,[61] with the requisite knowledge about the equipment, the equipment's reliability, or the quality of the final product.[62] One reason these witnesses are so readily available to testify as to the reliability of a system in other situations is simply due to their physical proximity to the scene at issue, which includes bank managers, surveillance company employees, store owners, police officers, and film developers.[63] While the silent witness theory allows the

58. *See id.* (opining the important facts regarding recording equipment were about the equipment itself, its reliability, and the quality of the product it produces).

59. *See id.* (providing courts are more frequently focusing on the reliability of the equipment, even absent an individual who installed the equipment or who was in physical custody of the evidence prior to its final production).

60. *See id.* (indicating the importance of the availability of a witness to testify about the process of development, the type of equipment, the equipment's general reliability, and the quality of the final product).

61. *See In re* Slanker, 365 S.W.3d 718, 720 (Tex. App.—Texarkana 2012, no pet.) (stressing expert witness fees are unlikely to be recovered in most situations, meaning that such a decision to finance the travel and contingent expenses in obtaining an expert witness from Google would be too risky for most litigants); *see also* May v. Ticor Title Ins., 422 S.W.3d 93, 106 (Tex. App.—Houston [14th Dist.] 2014, no pet.) (pointing out even a stipulation between the parties that expert witness fees would be awarded to the prevailing party was not enough to make the expert witness fees collectable); TEX. JUR. *Costs*, *supra* note 23, § 52, at 75 (acknowledging, "[r]egardless of any good cause shown, costs of experts are merely incidental expenses in preparation for trial and are not recoverable").

62. *See Stephens*, 202 F. Supp. 2d at 1368 (stating, for witness testimony to satisfy the federal Rules of Evidence, there must at least be a testifying witness who possesses the requisite knowledge about the equipment and production procedures). Even though the Federal Rules of Evidence and federal precedent could allow a witness outside of the chain of custody of the recording equipment to testify, there are many litigating parties who would not be able or willing to finance the introduction of an expert witness. *See id* (examining the federal approach to authenticating surveillance recordings).

63. *See* United States v. Taylor, 530 F.2d 639, 641–42 (5th Cir. 1976) (finding witnesses readily available who could testify about the factors courts find determinative for authentication, due to their

admittance of photographs without a testifying witness who took the photograph or witnessed the events, it nonetheless precludes the admission of a photograph without testimony or a showing of the reliability of the system that produced the photograph.[64] Thus, without a witness to testify Google Maps is a reliable process, specifically a witness in line with the courts' preference for individuals who have either been in physical custody of a component of production or individuals with the requisite knowledge about the equipment and process of development, any such aerial photographs would be improperly admitted.[65]

C. *Judicial Notice*

Federal rules allow a court to take judicial notice of a fact derived from a source "whose accuracy cannot reasonably be questioned."[66] The Montana Supreme Court concluded an aerial photograph was properly admitted in this manner because it was produced from the U.S.

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location and because of their involvement with the bank that was robbed); *see also* Kindred v. State, 524 N.E.2d 279, 298 (Ind. 1988) (analyzing the testimony of bank employees who could testify, due to their location and availability, about the process of their security surveillance and about the general reliability). While in *Taylor* and *Kindred*, judges were able to hear testimony from readily available witnesses, Google employees with the same level of knowledge, custody, or control of a particular process or system will likely be unavailable to courts or litigants. *Taylor*, 530 F.2d at 642; *Kindred*, 524 N.E.2d at 298.

64. *See Stephens*, 202 F. Supp. 2d at 1368 (noting federal courts will allow the admittance of photographs or video under certain circumstances, even without the operator of the camera or testimony from an individual who actually witnessed the events recorded); *see also* Litton v. Commonwealth, 597 S.W.2d 616, 618–19 (Ky. 1980) (determining that photographic evidence was properly admitted when there was testimony from the pharmacy owner about the automated system controlling his security camera and testimony that the photographs taken were a fair and accurate representation of his store).

65. *See Taylor*, 530 F.2d at 641–42 (finding witnesses available who could testify about the type of equipment, the installation of the film, and the chain of possession); *see also* Moore v. McConnell, 125 S.E.2d 675, 676 (Ga. Ct. App. 1962) (finding, without testimony from an expert, from someone who made the photograph, or from someone who could establish how the photograph was taken, the aerial photograph could not be admitted; the court found the absence of witness testimony establishing authenticity or accuracy was crucial in determining the aerial photographs were inadmissible (citing Collins v. State, 71 S.E.2d 99 (Ga. Ct. App. 1952))); *Kindred*, 524 N.E.2d at 297–98 (representing that the silent witness theory was appropriate for admitting photographic or video evidence, particularly when witnesses are available who can testify as to the accuracy of the depictions recorded or the processes of the recording equipment that was used (citing Bergner v. State, 397 N.E.2d 1012 (Ind. Ct. App. 1979))); Brummitte v. Lawson, 182 S.W.3d 320, 325 (Tenn. Ct. App. 2005) (approving of the trial court's admission of the aerial photograph into evidence when there was a witness available to establish the authenticity and accuracy of the photograph).

66. *See* FED. R. EVID. 201 (addressing the kinds of facts subject to judicial notice, as well as when a court must take notice).

Department of Agriculture.[67] However, using an aerial photograph from the Department of Agriculture may be impractical.[68] Consider a personal injury lawsuit from a vehicle collision: if a party can only admit aerial photographs from a government agency, the photograph may be lacking pertinent information relevant to the personal injury lawsuit.[69] Google Maps not only provides aerial photographs but also the option to include the designation of street names, subdivisions, and pertinent landmarks.[70] These additional elements could prove crucial in the litigation of a vehicle collision lawsuit.[71] Additionally, Google Maps may be crucial for certain criminal cases, including intoxication manslaughter. For instance, if images certified only by the Department of Agriculture are permitted,[72] it will be difficult for a prosecutor to show, in valuable detail, a victim had properly parked their stalled vehicle on an available shoulder right before a sharp curve in the road when he were struck by a drunk driver. However, Google Maps can show the scene of the incident in great detail from numerous distances and viewpoints, as well as provide a timeline of aerial

67. Ponderosa Pines Ranch, Inc. v. Hevner, 2002 MT 184, ¶ 22, 311 Mont. 82, 53 P.3d 381; *cf.* FED. R. EVID. 902(1) (allowing, presumably, the admittance of an aerial photograph if it is also a sealed document on file with a government agency or custodian of a public office); TEX. R. EVID. 902(1) (authorizing admittance of a document under self-authentication when bearing the seal of a government department or agency).

68. *Compare* PRICES FOR AERIAL IMAGERY, *supra* note 32 (identifying the prices and types of products available through the U.S. Department of Agriculture, but failing to provide the types of useful tools and annotations that accompany a Google Maps aerial photograph), *with* GOOGLE MAPS, http://maps.google.com (then follow "Menu" hyperlink; then follow "Take a Tour" hyperlink) (last visited May 17, 2016) [hereinafter GOOGLE MAPS Take a Tour Hyperlink] (showing the plethora of additional features and tools available in Google Maps that are not available in U.S. Department of Agriculture provided aerial imagery).

69. *Compare* PRICES FOR AERIAL IMAGERY, *supra* note 32 (noting the information available when purchasing aerial photographs from the Department of Agriculture but failing to provide the plethora of information available with Google Maps and satellite images), *with* GOOGLE MAPS, http://maps.google.com (then follow "Menu" hyperlink) (last visited May 17, 2016) [hereinafter GOOGLE MAPS Menu Hyperlink] (providing the Google Maps user access to traffic, bicycling, and mass transit data among other tools that are not available in U.S. Department of Agriculture provided aerial imagery).

70. *See* GOOGLE MAPS Menu Hyperlink, *supra* note 69 (last visited May 17, 2016) (showing numerous features, including the designation of street names, landmarks, and historical progressions of certain landscapes included in satellite images).

71. *See* United States v. Mendell, 447 F.2d 639, 641–42 (7th Cir. 1971) (finding street names and landmarks important in the determination of the appropriateness for judicial notice as the geographic facts were not reasonably disputable).

72. *See, e.g.*, *Ponderosa Pines Ranch*, 2002 MT 184, ¶ 22 (providing aerial photographs were admissible because they were certified by the U.S. Department of Agriculture).

images in certain locations.[73] Yet, perhaps even more vital to these types of cases is the availability of Google's "Street View" function, allowing a first-person perspective of a user-specified location on nearly any street.[74] Clearly, this function would be vital in allowing a court or a jury to visualize the scene of an accident from the perspective of a vehicle on the road.[75] In sum, Google Maps provides a range of valuable features that can allow a court to solidify its understanding of the factual scenario of a case, far more than a certified aerial image purchased from the Department of Agriculture.

Nonetheless, the availability of these features, while crucial, is fruitless if courts will not consider aerial photographs or other images from a system not managed or certified by a government agency.[76] However, much like ATM photographs and security system videos, privately owned systems can produce vital evidence.[77] Moreover, Google is not simply a privately

73. *See* GOOGLE MAPS Menu Hyperlink, *supra* note 69 (allowing the user to take advantage of various features under the "Menu" link such as seeing a panoramic ground level perspective and observing certain conditions at varying times of day). This could demonstrate for a court, in detail, the different views of where an incident in a case may have occurred.

74. *See* GOOGLE MAPS, https://maps.google.com (last visited May 17, 2016) (search for a given address in the search bar; then follow "Left Arrow" hyperlink; then double-click on picture for a panoramic street view) (providing the user the ability to select the option to browse a desired location with "Street View" images).

75. *See id.* (making available the opportunity for a court to view the area where an auto collision occurred from a first person perspective via the "Street View" function).

76. *See Ponderosa Pines Ranch*, 2002 MT 184, ¶ 22, (concluding the trial court properly admitted aerial photographs when they were accompanied by certification from the Department of Agriculture).

77. *See* United States v. Taylor, 530 F.2d 639, 641–42 (5th Cir. 1976) (finding a privately owned security surveillance system of a bank may be deemed reliable so long as it is accompanied by testimony establishing such reliability); *see also* United States v. Stephens, 202 F. Supp. 2d 1361, 1368 (N.D. Ga. 2002) (concluding surveillance video and audio recordings can be properly admitted even when they are recorded on a system that operates automatically, such as in the case of a bank robbery, so long as there is evidence about the general reliability of the recording and a documented chain of custody); Kindred v. State, 524 N.E.2d 279, 298 (Ind. 1988) (illustrating that privately owned security and surveillance systems can still be authenticated without the government's stamp of approval of such a system, so long as there is testimony describing the reliability of the system and processes involved in developing the final product and maintaining a proper chain of custody); Litton v. Commonwealth, 597 S.W.2d 616, 618–19 (Ky. 1980) (finding a less stringent approach by noting the key factor in the analysis for authenticating photographs is not testimony from the photographer or testimony from a witness with personal knowledge regarding the mechanics or procedures in taking the photographs, but that a witness need only provide testimony that the photograph is a fair and accurate depiction of the scene or event at issue); State v. Young, 303 A.2d 113, 116 (Me. 1973) (permitting the recordings of a privately owned bank surveillance system to be admitted into evidence after being properly authenticated by testimony from the employees with the knowledge of the system). Although courts have used several types of witness testimony in an effort to

owned gas station with an ATM that captured the image of an individual suspect in a robbery.[78] Google is a multi-billion dollar company, and Google Maps is one of the most relied on navigation systems in America.[79] As society becomes more mobile and significantly reliant on smartphones, Google's dominance becomes increasingly apparent.[80] Of the top twenty-five mobile apps used in the United States, Google produces six of them, and Google Maps is ranked sixth on the list overall.[81] Google is the clear "top mobile app publisher" by a large margin.[82] In light of precedent allowing the admission of ATM photographs and footage from bank security systems,[83] surely, Google, a juggernaut of the technology industry, is worthy of court recognition as a source not reasonably questioned.[84]

Texas also has rules governing judicial notice, which allow a court to take judicial notice of a fact when it is one "not subject to reasonable dispute."[85] Judicial notice must take place when a party offers proof that a source's accuracy is not reasonably questionable,[86] thus making judicial

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authenticate photographs or video recordings prior to their admission into evidence, the proper focus ultimately falls on whether the photograph or recording is a fair and accurate depiction of the event that is relevant to the case. *Litton*, 597 S.W.2d at 618–19.

78. *See* Press release, Alphabet, Investor Relations: Google Inc. Announces Fourth Quarter and Fiscal Year 2013 Results (Jan. 30, 2014), https://abc.xyz/investor/news/earnings/2013/Q4_google_earnings (proclaiming Google's stand-alone revenue for the year 2013 was $15.7 billion).

79. *See id.* (announcing a multi-billion dollar return for the year 2013); *see also* Fox, *supra* note 1 (finding in 2013, 54% of all smartphone users used the Google Maps application).

80. *See* Dan Frommer, *What's in Your Smartphone? These Are the 25 Most Popular Mobile Apps in America*, QUARTZ (Aug. 21, 2014), http://qz.com/253527/these-are-the-25-most-popular-mobile-apps-in-america (reflecting Google's prominence with five of the twenty-five most popular apps).

81. *Id.*

82. *Id.*

83. *See, e.g.*, *Stephens*, 202 F. Supp. 2d at 1368–69 (recognizing federal courts have held recordings of a bank robbery taken by the bank's camera and surveillance photographs from a camera on an ATM were sufficiently proved reliable, and thus were admissible under the silent witness theory (first citing *Taylor*, 530 F.2d at 641–42; and then citing United States v. Rembert, 863 F.2d 1023, 1028–29 (D.C. Cir. 1988))).

84. Both the Texas and federal evidentiary rules permit judicial notice of "a fact that is not subject to reasonable dispute because it . . . can be accurately and readily determined from sources whose accuracy cannot reasonably be questioned." FED. R. EVID. 201(b); TEX. R. EVID. 201(b).

85. EVID. 201(b); *see also* Office of Pub. Util. Counsel v. Pub. Util. Comm'n of Tex., 878 S.W.2d 598, 600 (Tex. 1994) (per curiam) (identifying the guiding principles of judicial notice, and noting certain evidence is not reasonably questioned because of its capability of being accurately and readily verified); DAVID A. SCHLUETER & STEPHEN A. SALTZBURG, TEXAS RULES OF EVIDENCE TRIAL BOOK § 2-1(B)–(D), at 26–28 (3d ed. 2015) [hereinafter TRIAL BOOK] (laying out the procedures involved in obtaining a court's judicial notice of a particular fact and the benefits of such notice in the context of both civil and criminal cases).

86. *See* EVID. 201(c)(2) (indicating a court "must take judicial notice" upon a party's request

notice the ideal avenue for a party seeking to admit aerial photographs from Google Maps.[87] A party seeking to admit these aerial photographs should request the court take judicial notice of the system from which the photograph is generated.[88] In support of that request, the party should provide satisfactory proof the accuracy of Google Maps cannot be reasonably questioned. Thus, such an offer of proof would mandate judicial notice.[89] The availability of mandated judicial notice is crucial for both the party offering the evidence and the party objecting to the evidence.[90]

Ultimately, because other avenues for admitting aerial photographs into evidence provide little, if any, sense of certainty as to the outcome for a party seeking to admit aerial photographs from Google Maps, judicial notice is clearly the ideal strategic option.[91] Crucially, an appellate court in

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when the party provides the court with "necessary information"); *see also Office of Pub. Util. Counsel*, 878 S.W.2d at 600 (stating the rule is mandatory in nature).

87. *See* TRIAL BOOK, *supra* note 85, § 2-1(B), at 26 (pointing to the importance of using judicial notice at trial because "[i]n a civil case, judicial notice is conclusive on the jury").

88. *See id.* (explaining mandated judicial notice is an available tool to parties, provided they make a request and supply the court with satisfactory information to justify the court's notice of the proposed fact).

89. *See* EVID. 201(c) (proclaiming a "court must take judicial notice if a party requests it and the court is supplied with the necessary information").

90. *See* TRIAL BOOK, *supra* note 85, § 2-1(B), (D), at 26, 28 (illustrating the rule's significance since judicial notice can have the effect of excluding other "evidence that contradicts the judicially noticed fact" and such "judicial notice is conclusive on the jury"); *see also* EVID. 201(c) (requiring a court to take judicial notice so long as sufficient information has been provided and a request made by the proponent of the submitted evidence); Langdale v. Villamil, 813 S.W.2d 187, 190 (Tex. App.—Houston [14th Dist.] 1991, no writ) ("Once judicially noticed, the undisputed fact becomes a matter of law." (citing Kennedy v. Gen. Geophysical Co., 218 S.W.2d 707, 710 (Tex. Civ. App.—Galveston 1948, writ ref'd n.r.e.))).

91. A party seeking to introduce an aerial photograph from Google Maps will likely be unable to find a witness to attest to the photograph's creation and accuracy. *Cf.* Georg v. Animal Def. League, 231 S.W.2d 807, 811 (Tex. Civ. App.—San Antonio 1950, writ ref'd n.r.e.) (finding an aerial photograph was properly admitted when the creator of the photograph was available to testify about its creation and accuracy). Under the pictorial testimony method, a witness must represent personal familiarity with the photograph as a foundational element for its authentication because the determination is most concerned with whether the photograph is a fair and accurate depiction of the scene. FOUNDATIONS, *supra* note 28, § 4.15[2][a], at 179; *see also* EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 996–97 (indicating if a witness can testify as to the accuracy and fairness of the depiction, then the photograph map be admitted). Attempting to admit aerial photographs from Google Maps under that approach is likely problematic. Testimony as to the accuracy of the photograph requires an individual to be personally familiar with an aerial perspective which is challenging if the individual has not seen the particular place in such a way. Alternatively, if no such witness is available, the silent witness method is another mechanism permitting admission of a photograph. *See* FOUNDATIONS, *supra* note 28, § 4.15[3][b], at 183–84 (identifying the foundational elements for authenticating evidence under the silent witness method, including testimony about the

Texas may take judicial notice of particular information "for the first time on appeal."[92] Accordingly, if a trial court does not judicially notice a fact, an appellate court may do so.[93] Basing an appeal solely on the prospect of the appellate court taking judicial notice for the first time is too great of a risk. The admissibility of photographs, in general, is left to the discretion of the trial court.[94] Due to the lack of guiding principles regarding admittance of aerial photographs of the type produced by Google Maps, an appeal would likely fail because the burden of proving the court abused its discretion would be practically insurmountable.[95] However, if the appellate court takes judicial notice of a fact and the appellant proves the trial court abused its discretion on another ground, then on remand the trial court would be bound by the appellate court's judicial notice of a fact now regarded as a matter of law.[96] Thus, as long as judicial notice is a

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mechanics of the camera system and the development process); *see also* EVIDENCE MANUAL, *supra* note 9, § 901.02[4][C], at 997 (recognizing the silent witness theory as a useful tool when it can be established that the process or system which produced the photograph is reliable). *But see* State v. Haight-Gyuro, 186 P.3d 33, 35–36 (Ariz. Ct. App. 2008) (noting, in line with federal precedent, the proper analysis simply falls on whether a jury could conclude the picture accurately depicts the relevant scene or event (first citing United States v. Rembert, 863 F.2d 1023, 1026 (D.C. Cir. 1988); and then citing Guam v. Ojeda, 758 F.2d 403, 408 (9th Cir. 1985))).

92. *See* Office of Pub. Util. Counsel v. Pub. Util. Comm'n of Tex., 878 S.W.2d 598, 600 (Tex. 1994) (per curiam) (stating "[a] court of appeals has the power to take judicial notice for the first time on appeal" (first citing *Langdale*, 813 S.W.2d at 189–90; and then citing City of Dallas v. Moreau, 718 S.W.2d 776, 781 (Tex. App.—Corpus Christi 1986, writ ref'd n.r.e.))); *see also Langdale*, 813 S.W.2d at 190 ("It is unquestioned that an appellate court may take notice of facts not noticed by a trial court.").

93. *Langdale*, 813 S.W.2d at 190 (citing Harper v. Killion, 348 S.W.2d 521, 523 (Tex. 1961)). The Third Court of Appeals—for the first time on appeal—took judicial notice of satellite maps from Google "as an aid to understanding . . . geographic features." City of Austin v. Leggett, 257 S.W.3d 456, 466 n.5 (Tex. App.—Austin 2008, pet denied). Still, for practitioners, it is important that judicial notice occurs firstly at the trial court level.

94. *See* Quinonez-Saa v. State, 860 S.W.2d 704, 706 (Tex. App.—Houston [1st Dist.] 1993, writ ref'd) ("A trial judge is to be accorded considerable discretion in ruling on the admission or exclusion of photographic evidence." (citing Huffman v. State, 746 S.W.2d 212, 222 (Tex. Crim. App. 1988))).

95. Under an abuse of discretion standard, the question is "whether the court acted without reference to any guiding rules and principles." Downer v. Aquamarine Operators, Inc., 701 S.W.2d 238, 241–42 (Tex. 1985) (citing Craddock v. Sunshine Bus Lines, 133 S.W.2d 124, 126 (Tex. 1939)); *see also* W. Wendell Hall, et al., *Hall's Standards of Review in Texas*, 42 ST. MARY'S L.J. 3, 16–19 (2010) (indicating trial courts render decisions with great discretion and broad legal parameters, which the abuse of discretion standard recognizes, and thus, an appellate court's finding of an abuse of discretion requires a determination "that the facts and circumstances presented 'extinguish any discretion [or choice] in the matter'" (citations omitted)). If a party appeals the exclusion of an aerial photograph from Google maps, it would seem impossible for him to meet the burden to overturn the trial court's ruling because there are no guiding rules or principles the trial court must act in accordance with.

96. *See Langdale*, 813 S.W.2d at 190 ("Once judicially noticed, the undisputed fact becomes a

viable option, the party seeking to admit an aerial photograph may be able to participate in the appellate process outside of the abuse of discretion standard.[97]

D. *Texas Rules of Evidence*

The Texas Rules of Evidence, while sufficient to supervise authenticity as it relates to the admission of photographs under the pictorial testimony method and the silent witness method, fail to provide a clear rule governing the admission of aerial photographs from Google Maps.[98] Trial courts are afforded wide latitude when ruling on the admissibility of photographic evidence.[99] Thus, providing trial courts with guidance on the admissibility of aerial photographs from Google Maps is imperative. The preferred method in Texas, like most states, for determining the reliability of processes or systems, such as an automated camera surveillance system, is the silent witness theory found in Rule 901(b)(9).[100]

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matter of law." (citing Kennedy v. Gen. Geophysical Co., 218 S.W.2d 707, 710 (Tex. Civ. App.—Galveston 1948, writ ref'd n.r.e.))).

97. *See Office of Pub. Util. Counsel*, 878 S.W.2d at 600 (declaring judicial notice may be given for the first time by an appellate court (first citing *Langdale*, 813 S.W.2d at 189–90; and then citing *Moreau*, 718 S.W.2d at 781); *see also Downer*, 701 S.W.2d at 241–42 (noting the abuse of discretion standard is a difficult burden to meet due to its requirement the court must have "acted without reference to any guiding rules and principles" (citing Craddock v. Sunshine Bus Lines, 133 S.W.2d 124, 126 (Tex. 1939))); *Quinonez-Saa*, 860 S.W.2d at 706 (expressing, on the issue of exclusion or admission of photographic evidence, a trial court is given considerable discretion (citing *Huffman*, 746 S.W.2d at 222)).

98. *See* TEX. R. EVID. 901(b) (providing methods for authentication of evidence, but failing to note what constitutes a valid process or system that produces an accurate result); *see also* FOUNDATIONS, *supra* note 28, § 4.15[2][a], at 179 (examining the pictorial testimony method as an available approach for a party seeking to admit photographs into evidence); EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 996–97 (identifying the pictorial witness testimony as a 'means to authenticate pictures when a witness with the requisite familiarity can provide testimony showing the illustration to be accurate, and noting if the proponents of photographic evidence do not have a witness to attest to the photograph's accuracy, the photograph may still be admitted under the silent witness method by proving to the court the photograph was produced by a reliable system or process).

99. *Quinonez-Saa*, 860 S.W.2d at 706.

100. Rule 901(b)(9) provides Texas's statutory equivalent to the silent witness theory under which a photograph can be admitted without the necessity of testimony from a witness who took the photograph or saw the events unfold in front of them. *See* EVID. 901(b)(9) (providing evidence can be authenticated by showing the process or system from which the evidence derives produces an accurate result); EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 997 (commenting on Texas's rule for implementing the silent witness method and discussing when it is appropriate for a party to use this method); *see also* FOUNDATIONS, *supra* note 28, § 4.15[3][a], at 183 (indicating the silent witness method "is becoming increasingly popular"). Other states' courts and federal courts rely on the silent witness method as well, albeit, with slightly varying approaches. State v. Haight-Gyuro,

But questions remain as to whether the production involved in generating aerial images from Google Maps meets Texas's standards of reliability and accuracy.[101] Without a standard acceptance of Google Maps as a reliable process or system, issues remain concerning the availability of witnesses to testify about the process of production, authenticity, or accuracy of an aerial photograph.[102]

IV. SUGGESTIONS FOR HOW TEXAS SHOULD APPROACH AERIAL PHOTOGRAPHS

Texas, while lacking case law dealing directly with the admission of aerial photographs, currently has the evidentiary rules in place to manage issues concerning accuracy and authenticity.[103] However, these rules are limited by the ability of witnesses to testify about their personal familiarity with a scene from an aerial perspective and the availability of witnesses with the requisite knowledge about the mechanics or processes of a system in proving its reliability. Texas courts faced with evidentiary issues regarding a witness's inability to testify as to the accuracy and authenticity of an aerial photograph could presumably, under the silent witness theory, admit aerial photographs taken from Google Maps.[104] Google Maps,

186 P.3d 33, 35–37 (Ariz. Ct. App. 2008).

101. While precedent approves of authenticating photographs or videos produced from automated systems when testimony about the installation, maintenance, and production is provided, courts will likely be unable to use such methods in regards to Google aerial images because such witness testimony regarding the equipment will be unavailable. *See* United States v. Taylor, 530 F.2d 639, 641–42 (5th Cir. 1976) (acknowledging the bank employees could not testify about the accuracy of security film since they were locked in a vault during the bank robbery, and thus, concluding the photographs and videos were permissibly admitted based upon testimony of those involved with the surveillance camera equipment from the time of installation until the time of development); United States v. Stephens, 202 F. Supp. 2d 1361, 1368 (N.D. Ga. 2002) (determining the Federal Rules of Evidence are satisfied with the admission of evidence from automated equipment so long as a witness testifies about the type of camera used, its reliability, and the level of quality produced from the equipment).

102. *See* Kindred v. State, 524 N.E.2d 279, 298 (Ind. 1988) (relying on testimony from a witness who managed the recording device and could testify as to the processes involved in recording and production); *see also* Corsi v. Town of Bedford, 58 A.D.3d 225, 232 (N.Y. App. Div. 2008) (determining the foundation for an aerial photograph insufficient even when an expert testified that he had found the photograph from a group of photographs made available to him from people who fly).

103. *See* EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 997 (stating "[w]hen a witness is not available to testify as to the authenticity or accuracy of a picture, the proponent may nonetheless authenticate the picture through the 'silent witness' method, which permits the proponent to show that the picture resulted from a reliable process or system").

104. *See id.* (identifying the theory available to judges and attorneys concerned with the admissibility of an aerial photographs from Google Maps).

being so heavily relied upon by the vast majority of society, is the type of "reliable process or system" the silent witness theory deems worthy of authentication without an available witness "to testify as to the authenticity or accuracy of a picture."[105] Although, even under the silent witness theory, there must still be evidence submitted to prove Google Maps is a reliable system capable of producing accurate recordings.[106]

Texas courts could approach the evidentiary issues that accompany aerial photographs by concentrating on the reliability of the process or system that produces the evidence or by judicial notice.[107] Texas's approach to the silent witness method lists possible methods to authenticate evidence, but that list is not exhaustive.[108] However, the

105. *Id.*; *see also* Hollis v. Sec'y, Dep't of Corr., No. 6:11-CV-1977-ORL-37, 2014 WL 407980, at *5–7 (M.D. Fla. Feb. 3, 2014) (denying a claim of error for the admittance of ATM photographs by applying Florida law and using the silent witness theory); Bryant v. State, 810 So. 2d 532, 536 (Fla. Dist. Ct. App. 2002) (stating, in the absence of a testifying witness who has seen what the photograph depicts, substantiation of surrounding circumstances may nonetheless be sufficient).

106. *See Taylor*, 530 F.2d at 641–42 (finding sufficient the testimony of witnesses who were not present for a robbery when they could testify "as to the manner in which the film was installed in the camera, how the camera was activated, the fact that the film was removed immediately after the robbery, the chain of its possession, and the fact that it was properly developed"); *see also Bryant*, 810 So. 2d at 536 (outlining the following factors as significant in meeting the requirement of photographic evidence being a fair and accurate representation of a scene: "(1) evidence establishing the time and date of the photographic evidence; (2) any evidence of editing or tampering; (3) the operating condition and capability of the equipment producing the photographic evidence as it relates to the accuracy and reliability of the photographic product; (4) the procedure employed as it relates to the preparation, testing, operation, and security of the equipment used to produce the photographic product, including the security of the product itself; and (5) testimony identifying the relevant participants depicted in the photographic evidence" (quoting Wagner v. State, 707 So.2d 827, 831 (Fla. Dist. Ct. App. 1998))); Reavis v. State, 84 S.W.3d 716, 719–20 (Tex. App.—Fort Worth 2002, no pet. h.) (noting federal courts, in preference of the silent witness theory, have rejected the argument that because the testifying witness did not personally witness particular events he cannot testify as to the accuracy of a photographic depiction); *Kindred*, 524 N.E.2d at 298 (finding security videotapes from a bank were properly admitted when: (1) the production process was self-contained; (2) a bank employee testified that he managed the videotape equipment regularly; and (3) the tapes established the times the evidence was collected); Torres v. State, 442 N.E.2d 1021, 1024 (Ind. 1982) (holding only a "'*strong* showing of the photograph's competency and authenticity must be established'" (quoting Bergner v. State, 397 N.E.2d 1012, 1017 (Ind. Ct. App. 1979))).

107. *See* TEX. R. EVID. 201 (establishing Texas's rule and procedures involved for a court to take judicial notice of a particular piece of evidence); *see also id.* R. 901(b)(9) (illustrating that requirements of authentication can be met by introducing "[e]vidence describing a process or system and showing that it produces an accurate result"); *Reavis*, 84 S.W.3d at 719–20 (discussing the theory of authentication that has developed which allows the introduction of photographs into evidence when it is accompanied by "evidence that the process or system that produced the photo or video is reliable"); TRIAL BOOK, *supra* note 85, § 2-1(B), at 26 (noting the key points to be considered when a party is seeking to admit evidence by judicial notice from a court).

108. FED. R. EVID. 901(b) (outlining examples that meet the requirement of authentication

easiest and most logical way for Texas courts to eliminate issues from arising regarding the admissibility of Google Maps photographs and satellite images is to formally take judicial notice of Google as a source "whose accuracy cannot reasonably be questioned."[109] This would require action from the Texas Supreme Court. Considering the Court has just recently made formal changes to the evidentiary rules, such a change to the rules is more likely occur through appellate judicial decisions.

A. *Questions for the Future—Eye in the Sky*

Even though it seems attorneys and judges may have access to the tools required to deal with the issues that will likely arise during the admission of aerial photographs in regards to Google Maps, MapQuest, or aerial photographs from government agencies, questions remain about the application of those tools with any legitimate level of certainty.[110] For example, there is currently substantial disputes in the legal field regarding the use of drones.[111] Like the initial controversy over aerial photographs

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under federal rules and noting the list is not comprehensive); *see also Reavis*, 84 S.W.3d at 719 (clarifying that Rule 901(b) of the Texas Rules of Evidence, like the federal rules, provides a list of examples as illustrations, not limitations).

109. FED. R. EVID. 201(b) (allowing courts to take judicial notice of facts from sources who cannot reasonably be questioned and when facts are generally known in a trial court's territorial jurisdiction); EVID. 201 (outlining the requirements for necessary information that allows a court to take judicial notice of a given fact and noting the discretion that a court has in doing so); *see* United States v. Perea-Rey, 680 F.3d 1179, 1182 n.1 (9th Cir. 2012) (concluding Google Maps images and satellite images met the requirements as a source that cannot be reasonably questioned).

110. *See* EVID. 201(b) (providing perhaps the best option for litigants seeking to admit aerial photographs from systems like Google Maps but providing no clear answer or level of predictability). For a more thorough analysis on the legal implications regarding the private use of drones, see generally Benjamin D. Mathews, *Potential Tort Liability for Personal Use of Drone Aircraft*, 46 ST. MARY'S L.J. 573 (2015).

111. *See Texas Law Gets Tough on Public, Private Drone Use*, FOX NEWS (Sept. 14, 2013), http://www.foxnews.com/politics/2013/09/14/texas-law-gets-tough-on-public-private-drone-use (detailing how Texas has confronted the use of drones by both private citizens and public entities, and noting most state legislatures are proposing to resolve the current debate on "the increasing presence of unmanned aircraft in civilian airspace" with legislation "protecting people from overly intrusive surveillance by law enforcement"). The admissibility of drone footage will likely become an issue grappled with by courts nationwide, as was exemplified by a recent case where a private drone operator caught footage depicting red river water that led to charges being brought against a Dallas area company for allegedly polluting the river with pigs' blood. *See* Kashmir Hill, *Potential Drone Use: Finding Rivers of Blood*, FORBES (Jan. 25, 2012, 11:50 AM), http://www.forbes.com/sites/kashmirhill/2012/01/25/potential-drone-use-finding-rivers-of-blood/#8fadce630271 (reporting a drone enthusiast's footage launched a criminal investigation into a meat packing company); *see also* Robert Wilonsky, *Meat-Packers Charged with Dumping Pig's Blood in Trinity River Now Say It Was Valuable Product, Not Waste*, DALL. MORNING NEWS: CITY HALL BLOG (Dec. 20, 2013 2:49 PM), http://cityhallblog.dallasnews.com/2013/12/meat-packers-charged-with-dumping-pig-blood-in-

from planes and satellites, much of the debate over drones is focused on individual privacy rights and the Fourth Amendment.[112] Other issues have arisen regarding property rights, specifically instances when a person, presumably exercising his right to prevent trespass over his land, damages a drone of his neighbor.[113] However, notwithstanding the apparent privacy-interest issues involved, evidentiary disputes should soon follow.[114] Thus, the question for Texas courts will be to determine the admissibility of photographs or videos taken by these privately or publicly owned drones.[115]

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trinity-river-now-say-it-was-valuable-product-not-waste.html (indicating a hearing was scheduled to quash the drone operator from testifying). *But see Documents: Slaughterhouse Officials Not Told of Pig's Blood for 41 Days*, WFAA.COM (May 15, 2014 7:19 PM), http://legacy.wfaa.com/story/news/local/2014/08/21/14213088 (reporting the felony charges were dropped due to a criminal investigator trespassing on the company's private property, but failing to mention if the court ever ruled on the admissibility of the drone footage).

112. *See* California v. Ciraolo, 476 U.S. 207, 213–14 (1986) (reviewing Fourth Amendment privacy concerns in regards to naked-eye aerial observations and an aerial photograph taken by officers who flew a private plane "within public navigable airspace" over the defendant's backyard); Dow Chem. Co. v. United States, 476 U.S. 227, 228 (1986) (noting constitutional issues may arise where surveillance of private property is accomplished through the use of "highly sophisticated surveillance equipment not generally available to the public, such as satellite technology," if a warrant is not first obtained); *see also Texas Law Gets Tough on Public, Private Drone Use*, *supra* note 111 (explaining the underlying policy behind Texas's drone legislation was the view that the Constitution does not provide for "the right to invade someone else's privacy"). *See generally* Hillary B. Farber, *Eyes in the Sky: Constitutional & Regulatory Approaches to Domestic Drone Deployment*, 64 SYRACUSE L. REV. 1, 18–27 (2014) (exploring Fourth Amendment privacy concerns resulting from law enforcement's use of drones in light of longstanding precedent governing surveillance by means of other technology); Chris Schlag, Comment, *The New Privacy Battle: How the Expanding Use of Drones Continues to Erode Our Concept of Privacy and Privacy Rights*, J. TECH. L. & POL'Y, no. 2, 2013, at 1, 12–17 (analyzing privacy concerns in the context of drone usage under Fourth Amendment precedent).

113. *See* Ryan Cummings, *Hillview Man Arrested for Shooting down Drone; Cites Right to Privacy*, WDRB (July 31, 2015, 11:50 AM), http://www.wdrb.com/story/29650818/hillview-man-arrested-for-shooting-down-drone-cites-right-to-privacy (discussing incident where a homeowner was arrested for shooting down a drone after it allegedly "trespassed" into the yards of five houses low enough to see below a patio); James Vincent, *Judge Rules Kentucky Man Had the Right to Shoot Down His Neighbor's Drone*, VERGE (Oct. 28, 2015, 9:21 AM), http://www.theverge.com/2015/10/8/625468/rone-slayer-kentucky-cleared-charges (indicating a judge dismissed criminal charges against a man—a man who some dubbed the "drone slayer"—because the judge believed the man had a "right to shoot" down his neighbor's drone as it hovered over his property); *see also* Eric Limer, *How to Shoot down a Drone*, POPULAR MECHANICS (Aug. 6, 2015), http://www.popularmechanics.com/flight/drones/how-to/a16756/how-to-shoot-down-a-drone (detailing the methods of taking a drone down, but cautioning it may not be legal to do so as the "question of whether you out have the right to shoot that sucker down" is complicated and could lead to criminal charges).

114. *See generally* Timothy M. Ravich, *Courts in the Drone Age*, 42 N. KY. L. REV. 161 (2015) (analyzing the admissibility of evidence obtained by drones and anticipating this technological innovation will alter "traditional legal theories and processes").

115. *See id.* at 190 (favoring an approach whereby courts "apply the same evidentiary standards

B. *Judicial Notice*

While it may be reasonably simple to admit aerial photographs from Google Maps by judicial notice, a privately owned drone is unlikely to carry with it the same weight of veracity and may be more susceptible to reasonable doubt.[116] Courts may quickly come to face issues such as tampering or alteration of the final product when determining admissibility.[117] To avoid this, a party seeking to admit the photographs would have to provide substantial proof to make judicial notice by a court mandatory.[118]

C. *Reliability of the Process or System*

While admission of aerial photographs generated by privately owned drones through judicial notice may be difficult, it is likely the reliability of the system analysis may prove beneficial.[119] As previously noted, courts

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to drone forensics as now applies to data and information gained or produced by aerial surveillance generally and other technologies such as cameras, smart phones, and computer-generated visual evidence" rather than one that unduly restricts drone evidence).

116. *See* TEX. R. EVID. 201(b)(2) (permitting a court to take judicial notice of a fact "not subject to reasonable dispute because it . . . can be accurately and readily determined from sources whose accuracy cannot reasonably be questioned"); *see also* Ponderosa Pines Ranch, Inc. v. Hevner, 2002 MT 184, ¶ 22, 311 Mont. 82, 53 P.3d 381 (explaining the authentication requirement is satisfied by showing the evidence is what it is claimed to be, and holding the trial court did not err by taking judicial notice of aerial photographs since they were accompanied by a U.S. Department of Agriculture certification). *Compare* Fox, *supra* note 1 (indicating Google dominates the internet and the smartphone mobile market with 54% of smartphone owners using Google Maps, which is a user base larger than any other app), *with* Ravich, *supra* note 114, at 165 (questioning whether courts will afford drone evidence obtained by a private operator different treatment than drone evidence obtained by governmental actors), *and Texas Law Gets Tough on Public, Private Drone Use*, *supra* note 111 (summarizing how state legislatures are restricting primarily law enforcements use of drones, rather than private operators use).

117. *See* Hall v. State, 829 S.W.2d 407, 408–09 (Tex. App.—Waco 1992, no pet.) (detailing numerous elements that have been of interest to Texas courts in laying the predicate for recordings, including the absence of changes, additions, or deletions).

118. *See* EVID. 201(c) (requiring courts to take judicial notice upon the receipt of necessary information); TRIAL BOOK, *supra* note 85, § 2-1(B), at 26 (summarizing how a party can obtain mandatory judicial notice upon making a request and providing "sufficient information . . . to justify the court's finding the fact to be noticed is capable of accurate and ready determination [through] sources whose accuracy cannot reasonably be questioned").

119. As precedent develops, it will be interesting to see whether courts will require the drone to be publicly owned or governmentally approved in order to admit drone produced evidence. *See* Ravich, *supra* note 114, at 161 ("[W]hat if a drone uses facial recognition or other biometric matching technology to acquire evidence for use in a civil or criminal proceeding? Does it matter if the operator is a private American citizen or a government official?"). Both the federal and Texas Rules of Evidence permit evidence to be authenticated by "[e]vidence describing a process or system and showing that it produces an accurate result." FED. R. EVID. 901(b)(9); EVID. 901(b)(9).

have historically allowed the admittance of photographs from reliable systems owned by private citizens, particularly with ATM photographs, security system footage, and standard point-and-shoot cameras.[120] However, the issues faced in admitting photographs taken by drones are unique because courts will have to consider the reliability of the system while also lacking witnesses who had the same perspective as the camera since a drone is remotely controlled.[121] Considering the amount of judicial discretion given to trial judges in the admittance of photographs, this issue may not be crucially dispositive.[122] Nonetheless, when the system producing the photograph is a drone, which is a remotely controlled device that is completely separate from its photographer and potentially out of the photographer's line of sight entirely, a court would have to weigh a very different set of circumstances since the court would have both the photographer's testimony as well as the reliability of the system to consider.[123]

Accordingly, courts could find recordings generated by privately owned drones can be proven reliable through testimony from the drone's owner or operator or by someone with knowledge of the mechanics and processes of the drone. *See* United States v. Taylor, 530 F.2d 639, 642 (5th Cir. 1976) (concluding photographic evidence derived from a privately owned process or system was properly authenticated when accompanied by testimony that established its reliability).

120. *See* United States v. Rembert, 863 U.S. 1023, 1028 (D.C. Cir. 1988) (concluding the trial court did not abuse its discretion by admitting photographs derived from an ATM surveillance system since circumstantial evidence was provided to show the reliability of the system and the accuracy of the scene); *Taylor*, 530 F.2d at 641–42 (affirming the admittance of evidence recorded by a privately owned surveillance system to be admitted where there was testimony or evidence that established the mechanics of the system and its reliability); *see also* United States v. Harris, 55 M.J. 433, 438–39 (C.A.A.F. 2001) (considering the twenty-five year historical development of the silent witness theory before formally adopting the silent witness method for the military courts as a means to authenticate videos and photographs from automated recording systems).

121. *See* S.D.G. v. State, 936 S.W.2d 371, 381 (Tex. App.—Houston [14th Dist.] 1996, writ denied) (concluding a photograph or videotape may be admitted upon proof it accurately represents the scene, and concluding such testimony can be provided by any witness, not only the photographer); *see also* FOUNDATIONS, *supra* note 28, § 4.15[2][a], at 179 (stating testimony from the photographer or a detailed explanation about the camera used to record the scene or event is not required when authenticating evidence through the pictorial testimony method).

122. *See* Quinonez-Saa v. State, 860 S.W.2d 704, 706 (Tex. App.—Houston [1st Dist.] 1993, writ ref'd) (recognizing the admission of photographic evidence is left to the discretion of the court).

123. Since the drone's operator is unlikely to have seen the scene depicted in the photograph, courts will probably require testimony from a witness who can verify the photograph's accuracy or, if such a witness is unavailable, evidence showing the system is reliable. *See* FOUNDATIONS, *supra* note 28, § 4.15[2][a], at 179 (noting that producing the photographer is not required of the proponent, but rather he may provide evidence of the system's reliability or testimony establishing the photograph is an accurate depiction of the scene); *see also* EVIDENCE MANUAL, *supra* note 9, § 901.02[4][c], at 997 (providing a witness would not need to see the photograph taken to establish the photograph's foundation for admittance).

V. CONCLUSION

There is no simple answer to the question of how judges and lawyers in the State of Texas are to deal with admitting aerial photographs into evidence, especially considering many jurisdictions across the United States apply a variety of methods.[124] Current application of the evidentiary rules governing the admissibility of aerial photographs does not provide practitioners with any level of certainty due to the difficulty of finding a witness who (1) can testify as to the reliability of the production system or (2) has the necessary personal familiarity with the scene or landscape from an aerial perspective.[125]

This particular issue is largely left to the discretion of the court in determining admissibility.[126] However, without any guiding rules of law or principles for a court to follow when making its determination, a party may be unable to legitimately participate in the appellate process.[127] Under an abuse of discretion standard, an appellate court will likely be

124. *See* United States v. Oslund, 453 F.3d 1048, 1054 (8th Cir. 2006) (using a more meticulous multi-factor test to determine whether a recording was reliable, and holding the testimony of the individual who made the recording was not required); *see also* State v. Haight-Gyuro, 186 P.3d 33, 36 (Ariz. Ct. App. 2008) (highlighting the variations in the silent witness method state by state, and adopting a flexible, less formulaic approach for applying the silent witness theory which focuses the judicial inquiry on whether a jury could conclude the evidence was accurate); Tewes v. Pine Lane Farms, Inc., 522 N.W.2d 801, 805–06 (Iowa 1994) (rejecting a party's attempt to authenticate an aerial photograph under the business records exception merely with measurements handwritten by a certifier, who did not testify, since the measurements were written in preparation for litigation and not in the regular course of business); Mousel v. Ten Bensel, 238 N.W.2d 632, 633 (Neb. 1976) (clarifying, to lay the foundation to admit an aerial photograph, it is sufficient to have a witness familiar with the scene or subject matter testify as to whether the depiction is a true and accurate representation of the scene); Corsi v. Town of Bedford, 58 A.D.3d 225, 232 (N.Y. App. Div. 2008) (permitting aerial photographs to be admitted, in the absence of testimony about its accuracy, under the business records exception to hearsay if evidence is provided as to why the photograph was taken and how it was taken); Georg v. Animal Def. League, 231 S.W.2d 807, 811 (Tex. Civ. App.—San Antonio 1950, writ ref'd n.r.e.) (noting an aerial photograph was properly admitted when the individual who created the photograph testified about its accuracy and method of creation).

125. *See Moore*, 125 S.E.2d at 676 (reversing the admission of an aerial photograph since there was no testimony from the photographer, no interpretation by an expert was provided, and no evidence was presented indicating how, when, or why the photograph was made); *see also* Kindred v. State, 524 N.E.2d 279, 298 (Ind. 1988) (concluding video recordings were properly admitted although the date displayed on the recording was incorrect, there was no testimony as to who loaded, activated, and unloaded the tapes at the time, and the state did not conclusively foreclose the tapes were unaltered due to a chain of custody issue).

126. *See Quinonez-Saa*, 860 S.W.2d at 706 (acknowledging considerable discretion is given to trial courts in the determining of whether photographic evidence will be admitted).

127. *See* Downer v. Aquamarine Operators, Inc. 701 S.W.2d 238, 241–42 (Tex. 1985) (noting the test for abuse of discretion is whether "the court acted without reference to any guiding rules and principles" (citing Craddock v. Sunshine Bus Lines, Inc., 133 S.W.2d 124, 126 (Tex. 1939))).

forced to perceive any potential error as harmless because there is currently no guiding principle for a lower court to disregard.[128]

The proper solution is for Texas and federal courts to take official judicial notice of aerial images from Google Maps and provide judges and attorneys with much needed precedent and guiding principles.[129] While an avenue does exist to allow litigants to appeal a trial court's decision to exclude an aerial photograph—namely having an appellate court take judicial notice of an aerial photograph for the first time on appeal[130]—this leaves attorneys and judges in Texas with no assurance as to how to proceed at the trial level. Judicial economy, at all levels of our legal system, requires the issue to be resolved by taking judicial notice of aerial images from Google Maps—one of the most renowned and widespread resources available, which is used by millions on a daily basis.[131] When the requirement for judicial notice is for a source to be one "whose accuracy cannot be questioned," there are few examples more emblematic than Google Maps.[132]

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128. Were a litigant to appeal a trial court's exclusion of an aerial photograph from Google Maps and argue the photograph was improperly excluded, the appellate court would struggle to find any error harmful since no guiding rules on aerial photographs currently exist for a lower court to disregard in its decision. *See id.* (limiting the abuse of discretion standard to an inquiry as to whether the lower court did not make its decision in accordance with guiding rules and principles, rather than permitting a reviewing court to supplant the trial court's opinion with its own).

129. *See* United States v. Perea-Rey, 680 F.3d 1179, 1182 n.1 (9th Cir. 2012) (determining Google, the producer of the aerial image at issue, was not a source that could be reasonably questioned, and thus, taking judicial notice of the aerial image from Google Maps); *see also* City of Austin v. Leggett, 257 S.W.3d 456, 466 n.5 (Tex. App.—Austin 2008, pet denied) (taking judicial notice of satellite maps for the first time on appeal).

130. In Texas, an appellate court "has the power to take judicial notice for the first time on appeal." Office of Pub. Util. Counsel v. Pub. Util. Comm'n of Tex., 878 S.W.2d 598, 600 (Tex. 1994) (per curiam) (first citing Langdale v. Villamil, 813 S.W.2d 187, 189–90 (Tex. App.—Houston [14th Dist.] 1991, no writ); and then citing City of Dall. v. Moreau, 718 S.W.2d 187, 190 (Tex. App.—Corpus Christi 1986, writ ref'd n.r.e.)); *see also* Langdale v. Villamil, 813 S.W.2d 187, 190 (Tex. App.—Houston [14th Dist.] 1991, no writ) (permitting an appellate court to take judicial notice of facts regardless of whether the trial court took such notice). If an appellate court takes judicial notice of a fact (here, the aerial photograph from Google Maps) and remands on another ground, the trial court would be bound by the reviewing court's judicial notice since the fact would be regarded as a matter of law. *See* Langdale v. Villamil, 813 S.W.2d 187, 190 (Tex. App.—Houston [14th Dist.] 1991, no writ) ("Once judicially noticed, the undisputed fact becomes a matter of law." (citing Kennedy v. Gen. Geophysical Co., 213 S.W.2d 707, 710 (Tex. Civ. App.—Galveston 1948, writ ref'd n.r.e.))).

131. *See* Fox, *supra* note 1 ("Google Maps is the most used smartphone app, employed by 54% of smartphone users.").

132. TEX. R. EVID. 201(b)(9); *see also* Dan Frommer, *supra* note 80 ("Google is the top mobile app publisher.").