

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF ARKANSAS
FORT SMITH DIVISION**

CITY OF OZARK, ARKANSAS, a municipal
corporation

Plaintiff,

vs.

UNION PACIFIC RAILROAD COMPANY, the
ARKANSAS STATE HIGHWAY
& TRANSPORTATION DEPARTMENT
(an Agency of) The State of Arkansas,
AND THE ARKANSAS STATE HIGHWAY
COMMISSION

Defendants.

AFFIDAVIT OF GARY WOLF

CIVIL ACTION NO:2:14-CV-02196-TLB

AFFIDAVIT OF GARY P. WOLF

GARY P. WOLF, first being duly sworn, deposes and says the following:

1. My name is Gary P. Wolf. I am over the age of 18 years and am under no disability which would prevent me from testifying competently to the matters set forth herein. I have personal knowledge of the matters described below, which constitute the professional analysis of Wolf Railway Consulting, LLC ("Railway Consulting").
2. I have a B.S. in Electrical Engineering from Ohio University and an M.S. in Industrial Management from Georgia Tech University. A true and correct copy of my current resume is attached hereto as Exhibit 1.
3. I am the President of Wolf Railway Consulting, a Georgia firm specializing in the forensic analysis of train accidents, including derailments, crossing accidents, and trespasser incidents. I have performed forensic consulting services in the rail industry for over forty years. Since the

1970s, I have investigated over 500 highway grade crossing and trespasser accidents across the U.S.

4. Prior to my current position, I was President of Rail Sciences Inc. ("RSI"), later TÜV Rheinland Rail Sciences Inc. I founded RSI in 1987 as an independent railway consulting firm in Atlanta, GA. I developed RSI into the industry's premier consulting group that specializes in railway engineering issues including accident analysis.

5. I have written over 130 technical papers dealing with train accident analysis and vehicle dynamics. I am a member of the ASME Rail Transport Division General Committee, AREMA, The Air Brake Association, and was elected President of the International Railway Operating Officers Association for 2005-2006.

6. Wolf Railway Consulting was retained by the Union Pacific Railroad Company in this lawsuit to investigate the safety and operational impact of installing a crossing near the depot in Ozark, Arkansas.

7. Wolf Railway Consulting has reviewed numerous documents in performing its analysis, including:

- Complaint
- Plaintiff, City of Ozark's Response And Opposition To Separate Defendant, Union Pacific Railroad Company's, Motion To Dismiss Plaintiff's First Amended And Restated Complaint
- Plaintiff, City Of Ozark's Memorandum Of Law In Support Of Its Response And Opposition To Separate Defendant, Union Pacific Railroad Company's, Motion To Dismiss Plaintiff's First Amended And Restated Complaint

- First Amended And Restated Complaint, Request For Permanent Injunction and Writ of Mandamus
- Union Pacific Railroad Company's Motion To Dismiss
- Union Pacific Railroad Company's Reply Brief In Support Of Its Motion To Dismiss
- Union Pacific Railroad Company's Memorandum Of Law In Support Of Its Motion To Dismiss
- Union Pacific Railroad Company's Motion To Dismiss Plaintiff's First Amended Complaint And Incorporated Memorandum Of Law
- Affidavit of George B. Soliz of GBS Consulting Services, LLC
- Letter From George B. Soliz to Mrs. Sandy Key
- Deposition Transcript of George B. Soliz
- Deposition Transcript of Tommy McNutt
- Deposition Transcript of Todd Timmerman
- Deposition Transcript of Jesse B. Fultz
- Deposition Transcript of Byron Rex Anderson
- Deposition Transcript of Terry Burruss
- Deposition Transcript of William Ruck
- Deposition Transcript of Carol Sneath
- Track Profile
- Timetable
- City of Ozark Booklet – Concepts for Trail Development (Revised September, 1997)

8. Further, I traveled to the city of Ozark to inspect the location of the proposed crossing on January 19, 2015, and made a site inspection of the area.

9. The installation of the proposed crossing would have a material negative impact on the safety of the general public and railroad crews. People, including motorists and pedestrians, will be traveling over the crossing into town or back to the river. While specific plans for the development of land around the crossing are not available, it must be recognized that once the crossing is installed, Union Pacific (UP) will have little control over what is developed on other adjoining land parcels. There could be a boat marina, there could be commercial development, and there may be park facilities. While the level of activity may be small (low volume) to start with, there is no way to predict what could happen 10-20 years in the future. It is realistic to expect that boaters and visitors to the town bars and restaurants may be drinking alcoholic beverages before using the crossing, raising another level of safety risk. There could be commercial buses and trucks using the crossing. There could be fuel trucks using the crossing. Boaters pulling boat trailers could use the crossing. UP would have little control over the use of the public crossing, but UP would have to accept the consequences of any accidents that occur at the crossing. Given that the proposed crossing is in a curve, with limited sight lines when approaching from the river side, there would be heightened risk for a crossing accident at this location as opposed to other locations with better sight lines and approach angles. Also, there would be a significant elevation climb when approaching the crossing from the river side. This could add another level of safety for vehicles trying to accelerate out of the path of an oncoming train. It is difficult to quantify the increased safety risk at the crossing due to the lack of objective data on traffic volumes and development plans. However, it can be qualitatively stated that the risk of an incident between a train and a vehicle or pedestrian would be higher than if the crossing was not installed.

Plaintiff's expert, Mr. George B. Soliz, claims in his affidavit dated November 12, 2014, that installing the crossing will not create any more safety concerns than those found at any small

community railroad crossing including vandalism or pedestrian traffic (§15). Furthermore, he characterizes the risk of the safety of railroad employees and the general public at the proposed crossing site as “slight” (§2).

Mr. Soliz agrees in his deposition taken February 5, 2015, that if the crossing were installed it would be considered a low volume crossing (p.80/12). Mr. Soliz is unaware of the fact that several years ago the FRA made it a stated goal to close 25% of all low volume crossings in the United States (p.79/1).

In his deposition, Mr. Soliz testifies that it is ill-advised for people who have been drinking alcohol to cross live railroad tracks (p.106/20). Additionally, Mr. Soliz admits there is a certain risk when a vehicle uses a crossing to go over railroad tracks (p.108/15).

Mr. Soliz uses the term “minimal safety concerns” in his deposition based on his research of the FRA database which shows no accidents ever occurred at the subject crossing (p.122/16). Mr. Soliz only researched the FRA records for January 2010 through July 2014. He admits that the subject crossing was taken out during the time period he researched (p.123/15).

Mr. Soliz did not take into account that if a boat dock goes in nearby, fuel trucks may use this crossing (p.184/16).

Mr. Soliz did not perform any analysis or take into account what vandalism may occur if the crossing is installed (p.187/12).

Mr. Soliz says the safety risk of the crossing being installed is slight. However, he admits he did not make any calculations to determine the safety risks (p.121/21). He states he is not a certified safety professional (p.121/25) and doesn’t know any methods used by safety professionals to quantitatively analyze the risk of an incident (p. 122/4). Mr. Soliz did not know what FMEA (Failure Modes and Effects Analysis) stands for and did not do an FMEA analysis at this location

(p.122/5-9). Thus, under oath Mr. Soliz admits he did not look into the future and consider train and vehicle volume increases over the crossing, and did not consider the total scope of how the crossing would be used, and the situational risks of those types of activities.

A. Motorists may be using the crossing while pulling long boat trailers over the crossing. The addition of a trailer increases the amount of time it takes a driver to traverse a railroad crossing; thus, creating the need for a larger clearing sight distance and thereby directly increasing the risk of collision at the proposed crossing. It should also be taken into account that the installation of a crossing in the curve of the track at the proposed site would not allow for adequate sight distances to the east or west while traversing the proposed crossing.

I have performed an analysis to determine the clearing sight distance available at the proposed crossing looking to the east for oncoming trains. Table 41 of the *Railroad-Highway Grade Crossing Handbook* (Exhibit 2) prescribes minimum safe clearing sight distances for various types of vehicles and a pedestrian located 15 feet from the near rail. For a train speed of 45 MPH, a "Car" would require 460 feet, a "Single-unit truck" (small utility truck) would require 820 feet, a "Bus" would require 895 feet, and a "Pedestrian" would require 790 feet. Since there would be two tracks at the crossing, it is assumed that UP would cut the crossing leaving a minimum of 300 feet clearance to the first standing railcar (see Exhibit 3 for this calculation). An analysis shows that a person located roughly 15 feet south of the south siding rail would be able to spot an oncoming westbound train when it was roughly 460 feet east of the proposed crossing (see Exhibit 4 for this calculation). This distance just meets the requirements for an automobile, but there is insufficient safe clearing sight distance for a small truck, a Bus, or even a pedestrian. Next,

an analysis was performed assuming the motorist or pedestrian edged up onto the siding track (a risky proposition) to view an oncoming train. In this scenario, the clearing sight distance to an oncoming westbound train would be roughly 525 feet to the east (see Exhibit 5 for this calculation). This distance would meet the requirements for an automobile, but again, there is insufficient safe clearing sight distance for a small truck, a Bus, or a pedestrian. Finally, given the elevation differences between the river and the railroad, a further impediment to sight distance could be present. My calculations of clearing sight distance assume level approaches on both sides of the crossing and do not account for the significant elevation differences.

When at the site of the proposed crossing, I took photographs looking east and west to illustrate the reduced sight lines due to the curvature, vegetation, and possibility of cars parking in the siding. Those photographs show the unobstructed view from a position of roughly 15 feet south of the south siding rail. I then took the same photographs and superimposed a block of freight cars over the siding at a location of approximately 300 feet either side (see Exhibits 6a – 6d). All of these photographs show that the sight lines are clearly compromised by the curvature, vegetation, and potential for parked freight cars; and the available sight lines do not meet the suggested clearing sight line distances in the *Railroad-Highway Grade Crossing Handbook* (Exhibit 2).

The clearing sight distance calculations outlined above, and my photographs taken at the site, show that motorist or pedestrian safety would be clearly compromised when trying to traverse the crossing from the south with standing railcars positioned the required 300 feet from the crossing. This situation would materially affect the safety of the motoring or walking public.

Mr. Soliz, in Paragraph 10 of his affidavit, declares the sweeping curve in which the proposed crossing will be located “actually assists with sight clearance.” This is simply naïve in that Mr. Soliz fails to take into account the very real possibility that freight cars could be parked on the siding track, creating a significant sight obstruction, especially to the east. The photograph attached to Mr. Soliz’s affidavit taken on the south side of the siding clearly shows the reduction in sight distance to the east due to freight cars parked on the siding. This was explained in my sight distance calculations and exhibits attached. Furthermore, Mr. Soliz, claims that the removal of the trees and tall grass would provide a one mile unobstructed view (§10). Again, Mr. Soliz’s statement is naïve in that he fails to consider that trees and vegetation continually grow. There is no guarantee as to who would be responsible for removing vegetation on an annual basis, since there is no law requiring landowners adjacent to railroads remove vegetation. UP would have to accept the future safety risk of overgrown vegetation on property that UP does not own or control.

In his deposition, Mr. Soliz admits that there is a sweeping curve east of the depot in Ozark (p.152/23). Mr. Soliz claims the visibility on the south side of the track is severely restricted because of the trees and underbrush present (p.153/11). The obstruction on the north side of the track is far greater according to Mr. Soliz (p.153/16). Mr. Soliz claims there would not be a sight restriction for a motorist if the vegetation was removed (p. 154/15). Furthermore, Mr. Soliz claims the curve does not restrict a person’s sight distance to the east (p.155/13). Mr. Soliz admits that he took no measurements during his site inspection in August of 2013 (p.74/24-75/2). Mr. Soliz testifies he did not analyze anything in this case through the use of computers or other specialized equipment (p.77/3-7). Mr. Soliz admits under oath that he did not make any type of sight distance measurements of

any kind (p.110/18). He also admits he did not make any calculations regarding clearing sight distance (p.112/24). Furthermore, he testifies he does not know how to calculate clearing sight distances for this crossing based on the timetable speed of 45 MPH (p.113/15). Thus, given that Mr. Soliz has not performed any analysis of sight line limitations, and does not even know how to make sight distance calculations, his opinions that there are no material sight obstructions at the proposed crossing now or in the future are completely without merit.

B. As previously mentioned, the proposed position of the crossing is in a curve of the railroad track. The American Association of State Highway and Transportation Officials (AASHTO) states in its policy book entitled *A Policy on Geometric Design of Highways and Streets*; "To the extent practical, crossings should not be located on either highway or railroad curves. Railroad curvature may inhibit a driver's view down the tracks from both a stopped position at the crossing and on the approach to the crossing." Installing a crossing at the proposed site creates the possibility for a crossing accident which cannot possibly occur at the present time.

Mr. Soliz testifies in his deposition that he is not familiar with AASHTO (p.163/3); yet, he disagrees with AASHTO's claim that a curve inhibits a person's ability to see down the tracks (p.164/25). It is unclear how Mr. Soliz, who admits to having no familiarity with highway design, can disagree with the guidance presented from the AASHTO handbook.

Mr. Soliz states that tangent track would allow for greater sight distance (p.156/2). Mr. Soliz agrees that if you were a driver approaching the crossing from south to north you would have to turn your head more than 90 degrees to look back to the east (p.158/12). Mr. Soliz opines that he would put a crossing in on tangent track if he had his choice

(p.164/18). Thus, while at first disagreeing that a curve inhibits sight lines, Mr. Soliz seems to recant that testimony and agree that sight lines are better at straight tangent track than a curve.

C. There is a significant elevation difference from the river up to and over the proposed crossing. Any roadway approaches will presumably be designed and built by parties other than UP. AASHTO and American Railway Engineering and Maintenance-of-Way Association (AREMA) guidelines suggest that the roadway elevation difference between the rail and a point 30 feet from the rail should not exceed three inches. AASHTO and AREMA promulgated these guidelines for safety reasons. Thus, UP will have little or no control over the roadway approaches and configuration. It is a known fact that crossings that are “humped” can cause certain long trailer vehicles to get “hung up” or stuck on the crossing, presenting a significant safety risk to approaching trains. Thus, even though UP will have no control over the roadway design, UP would have to accept the safety risk of inadequate design, inadequate roadway maintenance, or improper operation of trailer rigs over the crossing.

Mr. Soliz testifies that a motorist would be traveling uphill when crossing the tracks from south the north (p.168/22). Mr. Soliz does not believe the grade approach would create any hazards (p.169/1), but admits it was not something he considered when putting together his affidavit (p.169/7). Furthermore, as previously stated, Mr. Soliz took no measurements to validate his opinion. Thus, Mr. Soliz fails to acknowledge the common industry knowledge (AASHTO and AREMA) that uphill grade approaches to railroad tracks should be avoided if possible due to the increase risk of stalling, getting stuck, or even impairment of sight lines.

D. Based on the booklet "City of Ozark, Concepts for Trail Development," revised September, 1997 (see Exhibit 7), the City of Ozark desires to install a hiking trail between the railroad tracks and the river. If the river is as close as fifteen - seventeen feet to the siding and the trail as proposed is five feet wide, this would put some trail users approximately ten - twelve feet from the rail. Railcars and locomotives extend two and a half feet outside the rails. This would place trail users only 7.5 – 9.5 feet from moving equipment. In my opinion, this would constitute an undue and needless safety risk.

Mr. Soliz testifies that from his discussions with Sandy Key, Executive Director of Main Street Ozark, there would be trails, walking trails, and maybe a little park developed near the proposed crossing (p.102/9). Mr. Soliz testifies he did not do anything to analyze how many pedestrians might use the crossing on average each day (p.103/23).

E. Another potential safety hazard generated by installing a crossing is the risk that a train approaching the crossing might have to initiate emergency braking when confronted with a vehicle using or stuck on the crossing, or a pedestrian walking over or along the track at the crossing. Emergency braking is the strongest and fastest acting brake that a train engineer can apply as a last resort to avoid an accident. Since emergency braking is stronger and quicker than normal service braking, there is the potential of developing adverse in-train forces as a mile long train is brought to a rapid stop. This is somewhat analogous to a driver slamming on the brakes and potentially going into an uncontrollable skid or swerve. In a train, severe dynamic forces from emergency braking can cause a derailment. The possibility of derailment is increased in a long curve such as exists at this proposed crossing location.

I performed an analysis to simulate the dynamic forces developed in a westbound train if it had to apply emergency braking for a potential situation at the proposed crossing. For purposes of analysis, a nominal 98 car train, with 9,886 trailing tons, 6,139 ft. long, and four locomotives was simulated. This would be consistent with QNLNP trains operating westbound over the Van Buren Sub. The exact grade and curve data for the track between MP 463 and MP 466 was entered into the analysis. As information, on approach to Ozark, part of the train would be on a +0.54% upgrade, and part of the train would be on a -0.30% downgrade. Also, the train would be stretched over two curves, one 3 degrees and one 2 degrees. The train was simulated moving at 45 MPH when it approached the proposed crossing location near MP 464.6 and a full emergency brake application was made. The analysis shows that the train would require approximately 2,240 feet to stop, and the maximum draft force during the stop would be 420,000 pounds, and the maximum buff run-in force would be -316,000 pounds. A draft force of 420,000 pounds (420 kips) would exceed the nominal knuckle strength of a Grade E knuckle and likely cause failure and train separation. A buff force of -316 kips would be considered excessive, and could likely cause wheel climb derailment to an empty car in the 3 degree curve. Any time that excessive buff compressive forces are applied to a train in a curve, the chance of derailment is much higher than if the same force was applied on straight track. A possible derailment in this curve presents a further risk if any cars derailed into the river alongside the south side of the track. At places, the distance from the track to the river is less than 25 feet, and any derailment would likely end up in the river.

This analysis shows that adding the proposed crossing would present a greater risk of derailment than if the crossing was not there. Any time there is a curve, and a nearby

waterway, the risk of derailment and attendant environmental damage is increased when excessive buff or draft forces are developed in a train undergoing emergency braking. And any time a public crossing is present, the risk of having to apply emergency braking for some type of situation at the crossing is increased. A closed crossing eliminates this risk.

Mr. Soliz is aware that putting a train into sudden emergency braking for a potential crossing accident could cause adverse dynamic in-train forces that could derail a train (p. 188/16). Mr. Soliz agrees that if an engineer applies emergency brakes on a straight track, there is a possibility for derailling (p.189/1). Mr. Soliz also agrees that the chances of derailling with emergency braking increases in a curve as compared to straight track (p. 189/13).

Mr. Soliz testifies he did not perform any simulation analysis of the possible in-train forces due to emergency braking if the train's emergency brakes had to be put on at this location (p.190/3). He admits that he personally does not know how to perform such an analysis (p.190/6).

Mr. Soliz states that if an engineer had to apply the brakes at this crossing to try to avoid an accident, he could not determine the increased likelihood that the train would derail as opposed to being on straight track (p.192/6). Mr. Soliz says he cannot quantify the risk in that scenario at this location (p.192/10). Mr. Soliz is not sure that can be done. Mr. Soliz does agree that if the crossing is installed and an engineer had to apply emergency braking to avoid an accident, there is a risk that the train is going to derail (p.193/22).

Mr. Soliz testifies he is not aware of certain derailments that included hazmat release into waterways, except for a UP derailment back in the 1990s (p.205-207). Despite this knowledge, Mr. Soliz does not take the possibility of hazmat release into account in

any type of risk assessment if the crossing were to be installed (p.208/21). Mr. Soliz admits he does not know how many hazmat cars operate through Ozark on a daily basis (p.208/ 17). Mr. Soliz testifies that if a UP train derailed hazmat railcars into the Arkansas River while traveling through Ozark because the engineer had to apply the emergency brakes, it could cause severe environmental contamination if there was a hazmat release (p.211/9).

Mr. Soliz testifies that any time a train goes into emergency braking, the potential for unwanted severe slack action is present (p.216/11). Thus, even though Mr. Soliz opines in Paragraph 2 of his affidavit that the installation of this crossing would not increase safety risk, he does agree in his sworn testimony that there is a very real risk that putting a train into emergency braking would increase the risk of derailment. Therefore, by Mr. Soliz's own admissions, installing this crossing would materially impact safety at this location and increase the risk of derailment and potential hazmat release into the river.

F. The installation of the proposed crossing would necessitate separating cars at the crossing (called "cutting" the crossing) for 300 feet either side, if the train was going to block the crossing for longer than 10 minutes. The method for cutting the cars would require the conductor or trainman to dismount the locomotive cab, walk roughly ½ mile back to the cars (see Exhibit 8 for this distance calculation) to be separated and perform the necessary maneuver. This action would place the trainman in jeopardy of injury as most railroad injuries occur during switching operations. Also, many railroad injuries such as slips, trips, and falls occur during walking on ballast. A conductor has more risk of injury when he is on the ground walking than sitting in a locomotive cab. If the risk of injury to the conductor is increased it can directly affect safety and/or train operations. This operation of cutting the crossing by definition would be classified as "switching" work.

According to a June 2005 FRA report entitled “Safe Placement of Train Cars, a Report,” “The most common cause of fatalities of railroad employees is being crushed, run over in ‘switching’ operations (p.13).” According to the Switching Operations Fatality Analysis (SOFA) working group report of March 2011, there were approximately 36 such fatalities over the past twenty years. The installation of this proposed crossing would require that switching operations be performed from time to time in order to cut the crossing.

Mr. Soliz agrees that if the crossing is cut, the conductor has to get on the ground and walk back to make the separation (p.136/8). Mr. Soliz agrees that most employee injuries of trainmen are due to slips, trips and falls (p.136/21). Furthermore, Mr. Soliz agrees that slips, trips and falls happen to trainmen just by walking through the ballast where there is no debris (p.137/5). Thus, even though Mr. Soliz opines in his affidavit that the installation of this crossing would not increase safety risk, he does agree in his sworn testimony that it would increase the risk of injury to a railroad worker having to cut the crossing.

Mr. Soliz agrees that separating and reconnecting a train falls into the category of switching operations (p.137/10). He does not agree that the most common cause of fatalities to railroad employees is being crushed, or run over, in a switching operation (p.139/22). Perhaps Mr. Soliz is not familiar with the SOFA report, but the statistic of approximately 36 fatalities to railroad workers during switching operations is undeniable. Thus, requiring railroad workers to walk back and cut this crossing, uncoupling and recoupling cars, would increase the risk of injury or fatality to railroad workers and have a material negative impact on safety. This risk does not exist today.

G. The safest crossing is a closed crossing, or one that doesn't exist. The FRA has been aggressive the past 15-20 years in advocating the closing of unneeded or dangerous crossings across the U.S. This aggressive stance and funding has resulted in a significant decline in grade crossing accidents and fatalities. There have been no stated plans for warning systems at this proposed crossing, and even the highest level of crossing protection (gates and flashing lights) does not guarantee safety. Roughly 50% of crossing accidents occur at crossings with gates and lights. Thus, installing this crossing, even with gates and flashing lights, will increase the risk that an incident will occur.

Kenneth Mead, Inspector General of the U.S. Department of Transportation made a statement to the U.S. House of Representatives Transportation and Infrastructure Committee in 2005, to wit, "The number of grade crossing collisions declined by 39 percent and fatalities fell by 47 percent to 332 deaths in 2003. Most of the progress FRA achieved came from closing about 41,000 crossings."

The 2007 edition of the *Railroad-Highway Grade Crossing Handbook* states, "The first alternative that should always be considered for an at-grade crossing is elimination... Elimination of the crossing provides the highest level of crossing safety." In his deposition, Mr. Soliz declares that he cannot agree with that statement 100% (p.87/16).

The statistics of improved crossing safety through elimination and closure are undeniable based on federal statistics, even though Mr. Soliz does not agree with them. To install this proposed crossing would be contrary to the stated goals of the FRA, and would obviously increase the risk of an accident at this location.

Mr. Soliz agrees that flashing lights and gates only provide warning that a train is approaching, but a closed crossing will prevent an accident 99 times out of 100 (p.84/11-15).

Mr. Soliz testifies that he is sure closure of low volume crossings had some effect on the accident rate going down (p.83/3).

10. Installing this proposed crossing would materially impact railroad operations as well. Capacity issues regarding storage and the availability for train meets would be grossly hindered by the installation of a crossing at this location. At present, UP is able to access the siding track and utilize its entire length without the impediment of an at-grade crossing.

A. I have performed an analytical assessment of rail line capacity with and without the proposed crossing. Rail line capacity is a measure of the number of trains that can pass through a given section of track in one hour. With the crossing installed, there is a very real possibility that UP would be limited in using the siding at Ozark due to the operational constraints of having to cut the crossing (as explained elsewhere in this report).

Based on a nominal train speed of 50 MPH on the Van Buren Sub (ignoring the short 45 MPH restriction through Ozark), and based on the fact that this is ABS (Absolute Block System) territory with nominal 9,000 ft. block spacing, and assuming a two block train separation, a rail line capacity calculation was performed with and without the siding at Ozark. The calculation can be found in Exhibit 9 attached hereto.

The results of this analysis show that without the siding at Ozark, the effective capacity between Alix and Poping is 1.66 trains per hour. However, with the siding in operation at Ozark, the capacity between Alix and Ozark improves to 2.4 trains per hour,

an improvement of 44%. Additionally, with the siding at Ozark the capacity between Ozark and Popping improves to 3.62 trains per hour, an improvement of 118%.

From this analysis, if UP was unable to effectively utilize the siding at Ozark for train meeting and passing, it would have a significant material impact on train operating capacity of somewhere between 44% and 118%.

Train operations in the Ozark area may increase in the future. The amount of crude oil shipments across the U.S. has continually increased. One day, Amtrak might decide to use these tracks for their operations. The Ozark siding could be increased in length to accommodate additional train traffic on the Van Buren Sub, and putting a crossing in the middle would severely effect this siding's ability to be used at peak efficiency and would materially impact train operations.

Mr. Soliz does not dispute UP Manager of Train Operations Bill Huston, who claims that the main line and siding in Ozark were used for train meets (p.150/12). Mr. Soliz has not decided where or how two trains would meet (p.152/2). Mr. Soliz is not an expert in train meet and pass operations (p.152/17). Mr. Soliz has never been a supervisor of corridor operations or superintendent of operations or a train dispatcher (p.150/16-18). Mr. Soliz has no expertise in rail line capacity and performed no capacity calculations. Therefore, he has no basis for making the claim that the crossing would not materially impact operations.

Mr. Soliz testifies he did not do anything to calculate the full utilization of the trackage in the area (p.126/6), nor did he measure the total footage capacity of the sidetrack (p.126/20).

Mr. Soliz also testifies that losing 600 feet of storage capacity can have a negative impact on operations (p.224/16).

Mr. Soliz testified he did not have expertise regarding installing a crossing over a siding and how that can adversely impact railroad operations (p.109/22 - p.110/5).

B. The installation of a crossing at the proposed site would force UP to separate cars (to be stored on the siding) at the crossing to allow vehicular traffic to pass over the crossing. Arkansas Statute 23-12-2007 3(b) deems it unlawful for a railroad company to obstruct a street crossing for more than ten minutes. In order to store railcars in the siding, UP would be forced to leave a 300 foot gap on either side of the crossing.

Lost capacity on this siding would not only affect railcar storage capabilities, it would also impact the siding's ability to be used for train meets. The inability for UP to use the siding for train meets could affect scheduling and the basic movement of commodities. A calculation was performed that shows the length of the Ozark siding track is approximately 4,300 feet from switch point to switch point. Removing roughly 250 feet from each end to cover the clear point distance, leaves approximately 3,800 feet of usable siding length. If UP was required to cut the proposed crossing 300 feet each side of the crossing, this would reduce the usable space in the siding by roughly 625 feet including the width of the crossing. This would equate to a reduction in usable siding capacity of approximately 16%, which would have a material impact on railroad operations.

If UP was required to cut the proposed crossing 300 feet on either side due to being in the siding greater than 10 minutes, it would require that a trainman walk from the lead locomotive back to the crossing, a distance of approximately 2,600 feet, or ½ mile. Assuming a person can walk on the ballast and slope of the ballast at a rate of nominally 2

MPH, it would require roughly 15 minutes to walk back to the crossing, approximately five minutes to perform the cut and shove to clear the crossing, and approximately five minutes to secure handbrakes. Assuming the person remains at the crossing (depending on timing of meet and dispatch priorities) it would require another 10 minutes to release hand brakes and reconnect the train, in addition to another 15 minutes to walk up to the head end of the train. Thus, the entire operation would require an additional 50 minutes of time to make a meet at the Ozark crossing. This would increase the labor cost of train operations and materially affect the efficiency of moving trains across the Van Buren Sub.

When a train is to be reconnected after standing for four or more hours, the crew members would have to perform an initial terminal brake test on the cut of cars that were not connected to the train, or subject to compressed air. In order to do an initial terminal brake test, both sides of the train must be inspected and the crew must check the piston travel. If the crew does cut the crossing, and it is less than four hours, they have to complete a set and release of the brakes. If the train is separated by 300 feet on both sides, the conductor has to be on the ground at the joint to reconnect the train. Once the couplers come together, the conductor has to go in between the cars and lace the air hoses by putting the two glad hands together. Likewise, if trains have to be separated at the crossing, the conductor would have to set a sufficient number of hand brakes on the cut of cars that are separated. These procedures would increase the amount of labor time to move trains, have a negative material effect on train operations, and increase the risk of crew injury.

Mr. Soliz claims that the amount of time that operations would be delayed would be minimal (p.127/22). Mr. Soliz admits that he did not do any calculations to determine what type of train delays would result if trains had to be separated at the crossing and then

reconnected (p.128/5). Mr. Soliz admits he did not do a study as to how often UP uses the siding at Ozark for train meets or storing equipment (p.128/10).

Mr. Soliz admits that a train would be delayed if put in a siding for a meet (p.134/11). Mr. Soliz admits that if a train barely fits in the siding and the crossing were to be installed (such that the train could no longer fit in the siding) a meet can no longer occur at that location (p.135/24).

Mr. Soliz testifies that if the crossing is installed, it could stop some train meets at this location (p.224/2). If the crossing's existence causes train meets to cease at this location, there can be a negative impact on railroad operations (p.224/7).

Mr. Soliz testifies that when a train is reconnected after standing for more than four hours, the crew members would have to perform an initial terminal brake test on the cut of cars that were not connected to the train, or subject to compressed air (p.171/2).

Mr. Soliz admits that he did not do any type of analysis, or statistics, on how long it would take on average to reconnect the train and conduct whatever inspections are required by the FRA before the train can be pull out again (p.179/19).

Mr. Soliz testified he is not an expert in train dispatching, train operations, the scheduling of trains, or the economic impact of train delays (p.52/10-14).

11. In summary, Mr. Soliz opines in his affidavit that the effect on loss of track capacity of this proposed siding would be "minimal" and the safety risk is "slight" (§2). However, Mr. Soliz admits he did virtually no analysis or calculations of the impact on train delay, rail line capacity, track storage capacity, or operations. He also admits under oath that losing capacity on the siding, and requiring crews to have to cut the crossing could have a negative impact on operations. Thus, at first Mr. Soliz brushes off safety concerns and negative impact on operations, but when

presented with quantifiable facts, recants his opinion and agrees that the effects on operations would be negative.

It is my opinion that installing this proposed crossing would create potential safety hazards for the railroad as well as the motoring public. Installation would deprive UP of storage space and the ability to conduct train meets in the existing siding. Safety issues for UP crews would be created that do not exist at this moment. The risk of derailments due to emergency braking would increase.

12. The installation of the proposed crossing in Ozark would have a material negative impact on the safety of the public and train crews, and would have a material impact on railroad operations and capacity. To wit:

- a) There would be insufficient clearing sight distance for certain vehicles and pedestrians approaching the tracks from the south. This sight distance limitation is due to the curve in the track, vegetation on adjacent land parcels, freight cars parked in the siding track, or a combination of all three of these factors.
- b) There would be a significant elevation change on the south roadway approach that could reduce sight distance, and could cause certain long vehicles to get hung up on the crossing.
- c) The risk of derailment and environmental damage would be increased due to the possibility that emergency braking would be applied for situational risks at the crossing.
- d) Railroad crews would be exposed to injury due to having to walk a ½ mile back to the crossing and cut the crossing, and couple and recouple freight cars.
- e) Installing the proposed crossing would be in direct opposition of the FRA's clear goal of eliminating unnecessary crossings; as the safest crossing is a closed crossing.

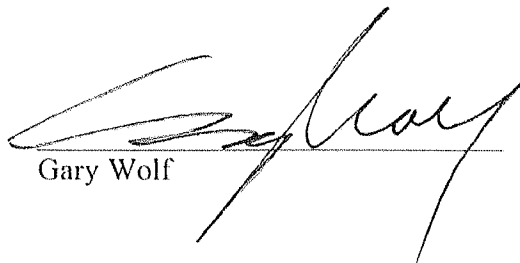
f) Rail Line capacity would be significantly reduced (44-118%) on this segment of the Van Buren Sub if the Ozark siding could not be utilized by UP for train meets due to having to cut the crossing. Likewise, the Ozark siding storage capacity would be reduced roughly 16 % by having to cut the crossing 300 feet either side.

g) If a train meet of over 10 minutes was to occur at the Ozark siding, the train would have to be cut at the proposed crossing. This would require roughly 1 man-hour of time to make the cut and eventually re-assemble the train. This would increase the labor costs for UP, and would increase the transit times of trains over the Van Buren Sub.

h) All of the conclusions contained in this Affidavit are stated to a reasonable degree of engineering certainty based upon my education, training, and professional experience.

FURTHER AFFIANT SAITH NOT.

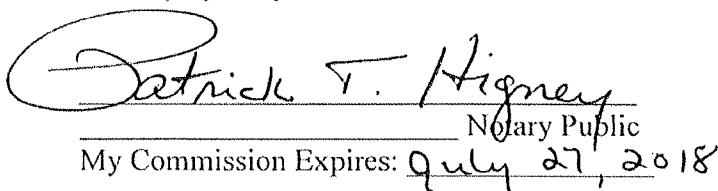
This the 31st day of March, 2015.

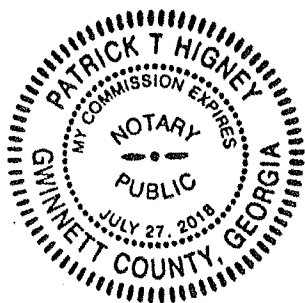

Gary Wolf

Gwinnett COUNTY, GEORGIA

Signed and sworn to (or affirmed) before me this day by Gary Wolf.

Date: 3/31/2015


Notary Public
My Commission Expires: July 27, 2018



GARY P. WOLF

**WOLF RAILWAY CONSULTING LLC.
2838 WASHINGTON ST.
AVONDALE ESTATES, GA 30002**

EDUCATION

<i>M. S. Industrial Management, Georgia Tech, Atlanta, GA</i>	1971-1973
Emphasis in areas of Operations Research, Quantitative Methods, Financial Analysis and Computer Simulation. Awarded Graduate Research Assistantship.	
<i>B. S. Electrical Engineering, Ohio University, Athens, OH</i>	1967-1971
Power major with emphasis on Machinery, Power Distribution, Control Systems. 4 years Varsity Basketball, NIT, NCAA Tournaments	

SUPPLEMENTARY EDUCATION

▪Canadian Rail Summit, Montreal Canada,	2014
▪ARM Wheel Rail Seminar, Las Vegas NV	2014
▪Rail Safety Seminar, Orlando FL	2014
▪ARM Wheel/Rail Seminar, Chicago, IL	2013
▪Principles of Wheel/Rail Dynamics, Chicago	2013
▪Rail Safety International Seminar, Orlando, FL	2013
▪AREMA Technical Conference, Chicago IL	2012
▪ARM Wheel Rail Seminar, Chicago IL	2012
▪Principles of Wheel/Rail Dynamics, Chicago IL	2012
▪Rail Safety and Incident Investigation Seminar, Orlando FL	2012
▪Heavy Haul Technical Conference, Calgary AB	2011
▪Principles of Wheel/Rail Dynamics, Chicago IL	2011
▪ARM Wheel Rail Seminar Chicago-IL	2011
▪AREMA Technical Conference, Orlando FL	2010
▪High Speed Rail Conference, Champaign, IL	2010
▪Principles of Wheel/Rail Dynamics, Chicago IL	2010
▪ARM Wheel Rail Seminar, Chicago IL	2010
▪Principles of Wheel/Rail Dynamics, Chicago IL	2009
▪Progressive Railroad Wheel/Rail Interaction Seminar, Chicago IL	2009
▪ARM Wheel/Rail Seminar, Chicago IL	2008
▪Principles of Wheel/Rail Dynamics, Chicago IL	2008
▪Amsted Rail Conference, Tucson AZ	2007
▪Roller Bearing Symposium, ASME, Chicago IL	2007
▪AAR Loss & Damage Conference, Nashville TN	2007
▪Rail Vehicle Dynamics, Chicago IL	2007
▪ARM Wheel/Rail Seminar, Chicago IL	2007
▪VAMPIRE Technical Training, Omaha NE	2007
▪Vampire Technical Conference, Chicago IL	2006
▪ARM Vehicle Dynamics Seminar, Chicago IL	2006
▪ARM Wheel/Rail Interface Seminar, Chicago IL	2006
▪Track/Train Dynamics for the New Millennium, Chicago IL	2006
▪Rail/Wheel Transit Seminar, Boston MA	2005
▪VAMPIRE User Conference and Seminar, Chicago IL	2005
▪ARM Wheel/Rail Interface Seminar, Chicago IL	2005

Exhibit 1

▪ARM Vehicle Dynamics Seminar, Chicago IL	2005
▪IAROO Technical Conference, Monterrey, Mexico	2005
▪Rail/Wheel Transit Seminar, Baltimore, MD	2004
▪Vampire Vehicle Dynamics Seminar, Chicago IL	2004
▪2004 Southeastern Rail-Highway Safety Conference & Workshop", Atlanta GA	2004
▪ARM Wheel/Rail Interface Seminar, Chicago	2004
▪ARM Vehicle Dynamics Short Course	2004
▪Global Rail Accident Investigation Forum, London England	2003
▪International Heavy Haul Conference, Dallas TX	2003
▪VAMPIRE Vehicle Dynamics Seminar, Atlanta	2002
▪VAMPIRE Training Seminar, Derby England	2002
▪AREMA Technical Conference, Chicago IL	2001
▪ARM Wheel Rail Interface Seminar, Chicago	2001
▪AREMA Technical Conference, Dallas, TX	2000
▪ARM Wheel Rail Interface Seminar, Chicago IL	2000
▪Heavy Axle Load Seminar, ASLRRA , Pueblo CO	1999
▪International Heavy Haul Assc. Wheel/Rail Seminar, Moscow Russia	1999
▪NTSB International Symposium on Transportation Recorders, Washington DC	1999
▪ARM Wheel Rail Interface Seminar, Chicago IL	1998
▪ARM Wheel Rail Interface Seminar, Chicago IL	1997
▪AAR Research Review, Pueblo CO	1997
▪LOCOTROL Training Seminar, Melbourne, FL	1997
▪ARM Wheel Rail Interface Seminar, Chicago IL	1997
▪ARM Rail Grinding Seminar, Chicago, IL	1996
▪Distributed Power Systems Seminar, Melbourne, FL	1996
▪Workshop on Heavy Axle Loads, AAR/TTC Pueblo CO	1995
▪Wheel/Rail Lubrication Seminar, Kansas City, MO	1994
▪Freight Car Trucks for the 21st Century, Univ. of Illinois	1994
▪High Performance Freight Train Braking, University of Illinois	1992
▪Workshop on Heavy Axle Loads, TTC/IHHA, Pueblo CO	1990
▪Operation, Maintenance & Economics of Freight Train Air Brake Systems, Univ. of Illinois	1990
▪Rail Vehicle Dynamics Short Course, AAR, Chicago IL	1989
▪Traffic Accident Analysis and Reconstruction, George Washington University	1988
▪Locotrol Technical Seminar, Harris Corp., Melbourne FL	1988
▪Train Energy Model (TEM) /RECAP Seminar, Chicago IL	1987
▪Mechanical Basic Freight Car Training	1987
▪Norfolk Southern Operating Rules Training	1986
▪Train Dynamics Analyzer (TDA) Seminar, Freightmaster, Ft. Worth	1986
▪Norfolk Southern Locomotive Engineer Training	1985
▪Diesel Locomotive Electrical and Mechanical Systems, Chattanooga TN	1983
▪FAST Engineering Conference, Denver CO	1981
▪Track/Train Dynamics Conference, Chicago IL	1979
▪Southern Railroad Locomotive Engineer Training Program	1978
▪AAR Seminar on Longitudinal Train Dynamics and Use of Track/Train Dynamics Simulation Models, Chicago IL	1977

WORK EXPERIENCE

WOLF RAILWAY CONSULTING, LLC, Atlanta, GA 2013-Present
President

Founder of independent railway consulting firm specializing in a number of rail related topics, especially accident and incident investigation.

TUV-RAIL SCIENCES, INC., Atlanta, GA 1987-2013
President

Founder of independent railway consulting firm specializing in the application of Advanced Analytical Techniques for the solution of railway operational problems. Rail Sciences Inc.'s areas of expertise include accident and derailment analysis, failure and metallurgical analysis, vehicle dynamics, operations planning and analysis, line capacity and schedule feasibility, computer model development, economic analysis, locomotive engineer training, instrumentation and testing, track inspection and mechanical inspections.

NORFOLK SOUTHERN CORPORATION, Atlanta, GA 1987
Applications Manager, Operations Research Department

Directly responsible for execution of all Track/Train Dynamic Studies. Supervise other O. R. and Senior O. R. Analysts on a project basis, including development of project plans, implementation, and analysis phase, and final presentation of results. These projects include Line Capacity Analysis, Network Simulation, Locomotive/Car Distribution, Dispatching Optimization, Route Rationalization, Economic Analysis of New Freight Car/HPIT Technology, and Assessment of A. T. C. S. Technology.

SOUTHERN RAILWAY/NORFOLK SOUTHERN CORPORATION, Atlanta, GA 1976-1986
Senior Operations Research Analyst, Operations Research Department

Responsible for use and application of Track/Train Dynamic Simulation Models such as TOS, DTAM, TDA, and QLTS. Models are used to study cause and prevention of derailments, crossing accidents, injury claims, and train handling problems. Also perform studies and make calculations of Train Braking capabilities for use in Signal Spacing and Crossing Accident cases. Participate in field testing and validation of New Locomotive and Freight Car Technology. Also utilize TPC and TEM Models for generalized studies such as fuel consumption, running time and tonnage ratings.

Qualified as Locomotive Engineer and periodically perform such duties. Frequently called upon to testify as Expert Witness in outside litigation and company investigations. Develop and present in-house training programs on THR Tape Interpretation, Train Handling Techniques, and Accident Investigation.

SOUTHERN RAILWAY COMPANY, Atlanta, GA 1973-1976
Industrial Engineer, Industrial Engineering Department

SOUTHERN RAILWAY COMPANY, Atlanta, GA 1970
Student Mechanical Engineer, Mechanical Engineering Department

CINCINNATI GAS & ELECTRIC COMPANY, Cincinnati, OH Summer
Student Engineer, Power Distribution Division 1968, 1969

PROFESSIONAL ACTIVITIES

▪American Society of Mechanical Engineers, General Committee	1989-Present
▪American Railway Engineering and Maintenance Association,	1989-Present
▪Member, NUCARS Users Advisory Committee	1988-2001
▪Vice-Chairman, Train Simulation Advisory Committee, AAR-TTD Research Program	1987
▪Chairman-Derailment Investigation Committee, AAR Track/Train Dynamics Research Program	1986-1987
▪AAR Track/Train Dynamics Implementation Officer	1984-1987

- Member, Air Brake Association 1982-Present
- Member, Railway Fuel and Operating Officers Association. Elected Regional Consultant in 1979-1988
1983; elected to Executive Committee, 1985.
- International Association of Railway Operating Officers, Regional Consultant, Vice-President, 1988- Present
Elected President 2006
- Member, American Railway Engineering Association 1974-1976

PUBLICATIONS / PRESENTATIONS

- “Wide Gage and Switch Related Derailments”, American Association of Railroad Superintendents, Chicago IL 2014
- “Basic Rail Vehicle Suspension Parameters”, ARM Principles Seminar, Las Vegas NV 2014
- “Prevention of Yard, Terminal, & Industry Derailments”, International Association of Railway Operating Officers, Montreal Canada, 2014
- “Origins and Dynamics of Wide Gage Derailments”, Rail Safety Seminar, Orlando FL, 2014
- “Railway Automated Inspection, Detection, and Monitoring Technology”, Progressive RR Webinar, February 2014
- “Preparing a Regional Railroad for Heavy Haul Operation”, ARM Seminar, Chicago IL 2013(co-authored with Peter Ray)
- “Derailment Case Studies”, Rail Safety International Seminar, Orlando FL, 2013
- “Heavy Haul Railroading Around the World”, International Association of Railway Operating Officers, Chicago IL, 2012
- “Innovative Track Deflection Measurement System – On Track Testing Results”, AREMA, Chicago IL 2012 (Co-authored with Cory Hogan)
- “Ballast Testing”, Advanced Rail Management Seminar, Chicago IL 2012 (Co-authored with Cory Hogan)
- “Derailment Investigation Procedures”, Rail Safety and Incident Investigation Seminar”, Orlando FL 2012
- “Derailment Risk Prediction Based on Actual Track and Vehicle Performance Measurements” , Rail Safety and Incident Investigation Seminar, Orlando FL 2012
- “Simplified Derailment Simulation analysis using On-Line VAMPIRE”, International Association of Railway Operating Officers, Minneapolis MN, 2011(Co-authored with Cory Hogan)
- “Real Time Derailment Risk Assessment Using Vehicle and Track Fault Monitoring With Dynamic Simulation over Long Corridors”, International Rail Safety Conference, Melbourne Australia, 2011 (Co-authored with Cory Hogan)
- “Derailment Analysis”, Wheel/Rail Interaction Principles Seminar, Chicago IL 2011
- “New Tools and Techniques for Analyzing Derailments”, North American Rail Summit, Montreal Canada 2010
- “5 Common Train Handling Mistakes and How to Prevent Them”, International Association of Railway Operating Officers, Montreal Canada 2010
- “Using Modern Technology to Solve Derailments”, Wheel/Rail Interaction Principles Seminar, Chicago IL 2010
- “Using Dynamic Simulation Modeling to Predict the Impossible”, International Association of Railway Operating Officers”, Chicago IL 2009
- “Things that go bump in the Turnout – Turnout Maintenance on Heavy Haul and Transit Applications”, Wheel/Rail Interaction Principles Seminar, Chicago IL 2009 (co-authored with Matthew Dick)
- “Lowering Derailment Risk with Improved Track and Vehicle Performance/Maintenance Standards”, Wheel/Rail Interaction Heavy Haul Seminar, Chicago, IL 2009
- “Current Modeling Issues with Track Geometry Car Data”, VAMPIRE Technical Conference, Chicago IL, 2008 (co-authored with Matthew Dick, Cory Hogan, Jack Chislett)
- “Derailment Risk Prediction and Maintenance Planning based on Actual Track and Vehicle Performance Measurements”, ASME RTD/ASCE/IEEE Conference, Wilmington DE, 2008 (Co-authored with Matthew Dick)
- “Computational Analysis of Coupler Force and Train Speed Influences on Curving Resistance”. ARM Conference, Chicago IL 2008 (Co-authored with Matthew Dick and Jack Chislett)
- “Truck Hunting Theory, Causes, & Symptoms”, Amsted Rail Conference, Tuscon, AZ, 2007
- “A New Generation of Locomotive Training Simulators”, International Association of Railway Operating Officers, Chicago IL, 2007

- “Understanding the Measurement of Shock and Vibration Damage Parameters”, AAR Loss and Damage Conference, Nashville TN, 2007
- “Service Environment Failure Modes”, ARM Seminar, Chicago IL 2007
- “Effect of Track Geometry Variation on Derailment Potential”, ARM Seminar, Chicago, IL 2007
- “Tools and Technique for Optimizing the Wheel/Rail Interface”, Interface Journal, 2007
- “New AAR Rules for Freight Car Trucks”, Interface Journal 2007
- “Derailment Issues and Concerns”, AARS, South Carolina, 2006
- “Wheel Climb and Frog Related Derailments”, Interface Journal 2006
- “VAMPIRE Analysis of Vehicle Dynamics at Multiple Speeds using Track Geometry Data over large Distances”, VAMPIRE User Conference, Chicago IL 2006
- “Analysis and Inspection of Switch Point Derailments”, Interface Journal, 2006
- “Curve Superelevation – Problems and Solutions”, Interface Journal, 2006
- “Remote Control Locomotive (RCL) Pullback Transponder Placement Analysis”, IAROO 2005, Chicago IL (Co-authored with Warren Egan)
- “The Truck Bolster Bowl – Is it a Bowl or a Bearing?”, Interface Journal, 2005
- “Effect of Wheel & Rail Profile on Vehicle Performance”, ARM, Chicago IL 2005
- “Basic Track Geometry Measurements & Parameters”, ARM Principles Seminar, Chicago IL, 2005
- “Rail Vehicle Suspension Parameters”, ARM Principles of Wheel/Rail Interaction Conference, Chicago IL 2005
- “Vehicle Side Bearings – Function, Performance & Maintenance”, Interface Journal, 2005
- “Principles of Wheel/Rail Friction Management”, IAROO Technical Conference Monterrey Mexico
- “Causes and Prevention of Track Buckling”. Interface Journal, 2005
- “Harmonic Rock and Roll Derailments – Causes and Prevention”, Interface Journal, 2005
- “Modern Analytical Derailment Investigation Techniques”, Georgia Society of Professional Engineers, 2004
- “Wide Gage Derailments – Symptoms, Causes, and Prevention, Parts 1 & 2.”, Interface Journal, 2004
- “Principles of Rail/Wheel Friction Management”, ARM Rail Transit Seminar, Baltimore MD, 2004
- “Derailment Investigation and Prevention – Investigation Procedures and Tools for Modern Investigation”, American Short Line RR Association”, San Antonio Texas, 2004
- “Causes, Results, and Prevention of Truck Warp”, Interface Journal, 2004
- “Innovative Uses of VAMPIRE”, VAMPIRE Dynamics Seminar, Chicago IL 2004
- “Rail Cant and it’s effect on Derailment Potential”, Interface Journal, 2004
- “Derailment Investigation & Prevention”, American Association of RR Superintendents Annual Meeting, Napa CA 2004
- “Rail Vehicle Dynamics”, ARM Seminar on Wheel/Rail Mechanics, Chicago IL 2004
- “Rail Cant and it’s Effect on Derailment Potential”, ARM Wheel/Rail Interface Seminar, Chicago IL 2004
- “Why Investigate? Introducing the benefits of Improved Investigation Techniques”, Global Rail Accident Investigation Forum, 2003, London England
- “Using Parametric Simulation to Optimize Suspension Design”, American Society of Mechanical Engineers (ASME) Rail Transportation Division”, Washington DC 2003 (co-authored with G.W. Rosenberger, P.E. Klauser, George Binns)
- “Top of Rail Friction Control: Test Results and Strategies”, IAROOA 2003, Chicago IL
- “Evaluating Effects of Top of Rail Friction Modifier, Different Rail Profiles, and Alternate Curve Elevations on Track Lateral and Vertical Forces”, ARM Rail/Wheel Interface Seminar, Chicago IL, 2003 (Co-authored with S.G. Atkinson)
- “Use and Validation of VAMPIRE Vehicle Dynamics Model, VAMPIRE North American Users Conference, Atlanta GA, 2002, (Co-authored with G.W. Rosenberger)
- “Commingleing of Roadrailer Service”, IAROOA, 2002, Chicago (Co-authored with John Quilty and Frank P. Hernandez, TFM)
- “Alaska Railroad Safety Audit & Derailment Risk Assessment”, IAROOA, 2001
- “Heavy Haul Railroading from Around the World”, Pittsburgh Air Brake Club, 2001
- “Empty Tank Car Derailments – Causes and Analysis”, IAROOA, September 2000
- “Derailment Analysis Techniques” Presented to AAR Mechanical Conference, Mexico City, Mexico, July 2000 (Co-authored with Moises Mendoza, RSI)
- “An Integrated Approach to a Comprehensive Wheel/Rail Management System,” ARM Infozone, Chicago IL 2000
- “Dynamic Response of High Speed Rail Vehicles over Perturbed Track”, Connections 2000 Rail/Wheel Interface Seminar, Chicago IL, May 2000 (Co-authored with Foster Peterson, RSI and Jon Jaemby, TTX)

- "Field Investigation and Analytical Analysis of Gold Creek and Canyon Derailments on Alaska Railroad" (Proprietary), Presented to State of Alaska Legislative Assembly, Juneau Alaska, January 2000
- "Issues and Concerns of 286,000 lb. Cars from a Practical Perspective", American Short Line and Regional Railroad Workshop on Heavy Axle Loads, Pueblo CO, November 1999
- "Deployment of AC Power: Effect on Train Operations and Track Structure", International Association of Railway Operating Officers Association, Chicago IL, 1999
- "Application and Validation of the Automated Truck Performance Measurement System (ATPMS) to Four Heavy Haul Rail Lines", International Heavy Haul Association Wheel/Rail Interface Conference, Moscow, Russia, June 1999 (Co-authored with F. Peterson, RSI, Norm Hooper, BC Rail, & Byron Hartt, QCM)
- "Issues with Event Recorder Technology for Railway Accident Reconstruction", Invited Speaker to NTSB International Symposium on Transportation Recorders, Washington DC, May 1999
- "The Relationship Among Operating Procedures, Track Geometry, Rail Profile, and Rail Wear Rates", Rail/Wheel Interface Seminar, Chicago IL, May 1999 (co-authored with Foster Peterson)
- "Distributed Power - Issues, Concerns, and Benefits", Transportation Research Board (TRB), Washington DC, January 1999
- "An Analytical Approach to Derailment Risk Assessment", International Association of Railway Operating Officers, Chicago IL, September 1998, (Co-authored with Andy Dykes, Ph. D.)
- "Optimizing Curve Superelevation to Reduce Rail Wear and Maintenance", Rail/Wheel Interface Seminar, Chicago IL, May 1998 (co-authored with Foster Peterson)
- "Effect of Rail Wear, Rail Profile, and Rail Lubrication on Wheel Climb and Rail Rollover Derailments", Rail/Wheel Interface Seminar, Chicago IL, May 1998
- "Strategic Issues for Optimizing Train Dispatching Decisions", INFORMS, Railroad Applications Special Interest Group, Institute for Operations Research and Management Sciences, Montreal, Que, April 1998
- "Application and Validation of the Automated Truck Performance Measurement System", American Society of Mechanical Engineers, (ASME) The Institute of Electrical and Electronic Engineers (IEEE), Philadelphia PA, April 1998 (co-authored with Foster Peterson)
- "Best Practices for Derailment Prevention", Railway Age, April 1998
- "Derailment Prevention: Early Detection is the Key", Railway Age, February, 1998
- "New Strategies for Derailment Prevention", Railway Age, December 1997
- "Modern Derailment Investigation Techniques", American Society of Mechanical Engineers, Atlanta Ga December 1997
- "Automated Wayside Measurement of Wheelsets to Monitor Lateral Loadings", Rail/Wheel Interface Seminar, Chicago IL, May 1997
- "Automated Truck Performance Measurement Technology", International Association of Railway Operating Officers, Chicago IL, September 1997
- "Optimizing Locotrol Train Performance", GE-Harris Distributed Power Seminar, Melbourne, FL, February 1997 (co-authored with Foster Peterson)
- "AC Traction Power Update", International Association of Railway Operating Officers, Chicago, IL September 1996
- "Rail Grinding, Rail Lubrication, & Lateral Rail Restraint - Effect on Gage Spreading and Rail Rollover from a Practical Viewpoint," Roadmasters and B&B Association, Chicago, IL September 1996
- "Technical Train Issues - Stop Distance Calculations and Event Recorders", American Bar Association, Orlando, FL 1996
- "The Effect of Rail Grinding & Rail Lubrication on Wheel / Rail Forces and Truck Warp", Advanced Rail Management Rail Grinding Seminar, Chicago, IL April 1996
- "Operational Considerations with Locotrol - Line Capacity, Track Loading Forces & Train Marshalling", Harris Distributed Power Systems Seminar, Melbourne, FL 1996
- "Rail Rollover/Gage Widening Derailments: Symptoms, Causes, and Prevention", International Association of Railway Operating Officers, Chicago IL September 1995
- "Final Report - Derailment of AAR FAST HAL Train, Section 25 of HTL", AAR, March 1995, Proprietary & Confidential
- "Spent Fuel Cask Car Derailment Probability Assessment" Department of Energy, Savannah River Site; Proprietary & Confidential, VECTRA Services, August 1995 (co-authored with J.S. Chislett)
- "Train Make-up Analysis", Vehicle Track Systems IO Officers Meeting, Pittsburgh, PA May 1995

- "Improving Heavy Haul Asset Management through Line Capacity and Train Performance Models" International Heavy Haul Association, Omaha NE, June 1994 (co-authored with P. E. Klauser)
- "Human Factors Analysis In Derailment Investigation", International Association of Railway Operating Officers, Chicago IL, September 1994
- Train Operation & Energy Simulator Validations, AAR IO Meeting, Ft. Worth, TX 1994
- "Track Related Derailment Causes", Roadmasters and Maintenance of Way Association, Chicago IL 1994
- "Third Generation Computer Models for Strategic Rail Operations Planning", World Congress on Railway Research, Paris France, 1994 (co-authored with P.E. Klauser)
- "Derailment Concerns on Mixed Passenger and Freight Rail Corridors", Railway Age Conference on Mixed Freight and Passenger Service: The Potential, the Problems, Washington DC 1994
- "Double Stack Derailment Causes," International Association of Railway Operating Officers, September 1993.
- "Locomotive Engineer Certification Update Panel," International Association of Railway Operating Officers, September 1993.
- "Double Stack Dynamics Task Force - Its Findings and Recommendations," Co-authored with R. A. Cartwright and R. R. Newman, Car Department Officers Association, September 1993.
- "TTEX/RTTX Derailment Study: Impact and Static Squeeze Tests," Co-authored with P. E. Klauser, Proprietary for TTX Corp., August 1993.
- "Final Report - Testing, Evaluation & Recommendations - Curving Performance of 125 Ton DS Cars," DDTF Task Force, February 1993.
- "New Wheels = Better Performance," IAROOA Manifest, 1993.
- "Derailment Investigation for Supervisors," American Association of Railroad Superintendents, Kansas City, MO, January 1993.
- "Development and Application of an Advanced Microprocessor Based Line Capacity and Train Scheduling Model," Third International Conference on Computer Aided Design, Manufacture and Operation in the Railway and Other Advanced Mass Transit Systems, Comrail '92, Washington, DC, Co-authored with R. W. Baugher, 1992.
- "Derailment Procedures for Supervisors," International Association of Railway Operating Officers, 1992.
- "Derailment Investigation Using NUCARS-Validation Through Reality," NUCARS User Group Meeting, Chicago Heights, IL, 1992.
- "Event Recorders: Past and Present," National Association of Railroad Trial Counsel, 1992.
- "Derailment Cause Finding Seminar," AAR Track Train Dynamics Implementation Officers, Chicago 1991.
- "Short Time Ratings and Minimum Continuous Speed," International Association of Railway Operating Officers Annual Proceedings, 1991.
- "Truck Warp Test Results," Co-Authored with B. E. Smith TTC, DDTF Task Force, December 1991.
- "Constant Contact Side Bearing Characterizations," DDTF Task Force, October 1991.
- "125 Ton Double Stack Derailment Prevention, Truck Turning Moment Test Results," Co-Authored with Robert Martin TTC, DDTF Task Force, June 1991.
- "Empty Tank Car Derailment Analysis and Prevention," International Association of Railway Operating Officers, 1990.
- "Data Gathering Techniques," American Railway Engineering Association, Committee 32-Systems Engineering, Toronto Canada, August 1989.
- "Double Stack Derailment Analysis," Track/Train Dynamics I.O. Meeting, 1988.
- "Innovative Engineering Concepts for Unit Train Service: The Slackless Drawbar Train and Continuous Center Sill Trough Train," 4th International Heavy Haul Conference, Brisbane Australia, September 1989 (co-authored with K. C. Kieres).
- "NUCARS Model Applications," TTD Meeting, Chicago, IL, 1988.
- "Validation of the Train Energy Model (TEM)," Track/Train Dynamics I.O. Meeting, 1987.
- "The Locomotive Independent Brake-Friend or Foe?" Railway Fuel and Operating Officers Association Annual Proceedings, 1987.
- "The Use of Locomotive Event Recorders and Computer Simulation in Accident Investigation," National Association of Railroad Trial Counsel (NARTC) Annual Meeting, 1987.
- "Shoving-Do's and Don'ts," RF&OOA Manifest, May-June 1987, Vol. XXVIII, No. 1.
- "Simulation: A Tool for Controlling the Transportation Operating Plan," International Railway Congress Association (IRCA), Copenhagen, Denmark, 1987.
- "Design, Application and Testing of Slackless Drawbars on Norfolk Southern," Track/Train Dynamics spring I.O. Meeting, Chicago, IL, 1987.

- "Vertical Lift Derailments," AAR Track/Train Dynamics I.O. Meeting, Vancouver, Canada, 1986.
- "Fuel Conservation for the Train Dispatcher," Annual Proceedings of Railway Fuel and Operating Officers Association, 1986.
- "Control That Slack-At High Speed or Low Speed," two-part article in RF&OOA Manifest, Jan/Feb and Mar/Apr 1986, Vol. XXVII, No's 1 and 2.
- "Causes and Prevention of Low Speed Derailments," Annual Proceedings of Railway Fuel and Operating Officers Association, 1985 (co-authored with J. Thiverge, CN Rail).
- "Simulation: A Tool for Railroad Operations," Annual Proceedings of American Association of Railroad Superintendents, 1985.
- "Computer Simulation in Train Operations," Annual Meeting of American Council of Railroad Women, 1984.
- "Application of Track/Train Dynamic Computer Simulation Models," AAR Longitudinal Train Dynamics Seminar, June 1981.
- "Manual Calculations-Freight Train Stopping Distances," Annual Proceedings of Railway Fuel and Operating Officers Association, 1980.

Table 4-1. Clearing Sight Distance (in feet)

Train speed	Car	Single-unit truck	Bus	WB-50 semitruck	65-foot double truck	Pedestrian**
10	105	185	200	225	240	180
20	205	365	400	450	485	355
25	255	455	500	560	605	440
30	310	550	600	675	725	530
40	410	730	795	895	965	705
50	515	910	995	1,120	1,205	880
60	615	1,095	1,195	1,345	1,445	1,060
70	715	1,275	1,395	1,570	1,680	1,235
80	820	1,460	1,590	1,790	1,925	1,410
90	920	1,640	1,790	2,015	2,165	1,585

* A single track, 90-degree, level crossing.

** Walking 1.1 meters per second (3.5 feet per second) across two sets of tracks 15 feet apart, with a 2-second reaction time to reach a decision point 3 meters (10 feet) before the center of the first track, and clearing 3 meters (10 feet) beyond the centerline of the second track.
Two tracks may be more common in commuter station areas where pedestrians are found.

Source: Guidance on Traffic Control Devices at Highway-Rail Grade Crossings.
Washington, DC: Federal Highway Administration, Highway/Rail Grade Crossing Technical Working Group, November 2002.

Train speed	Car	Single-unit truck	Bus	WB-50 semitruck	65-foot double truck	Pedestrian**
					truck	
45	460	820	895			790

Exhibit 2

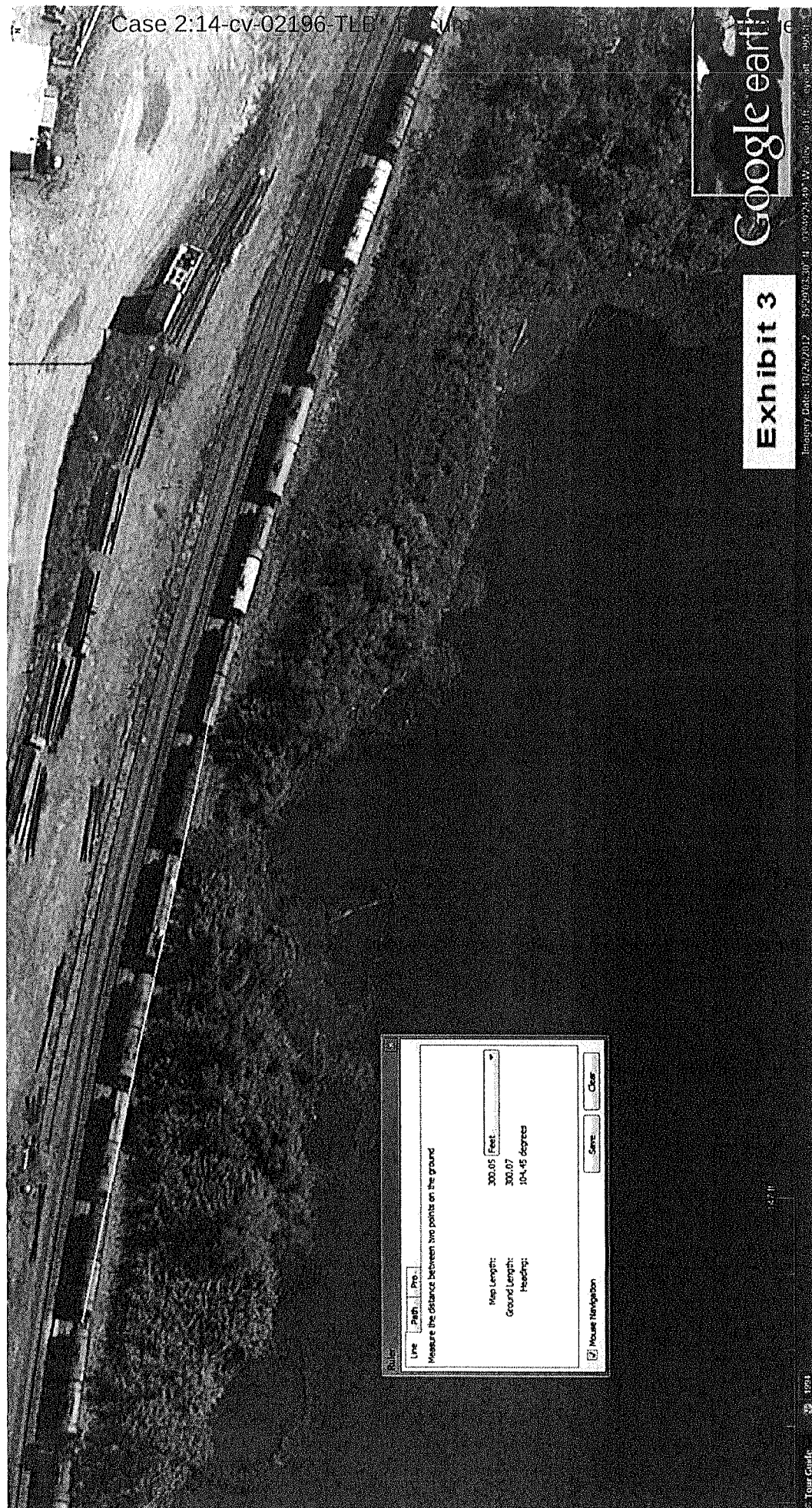


Exhibit 3

Legend Date: 10/24/2012 3529003.307 N 1039923.497 W 3185 361 ft 3965 ft

Ruler

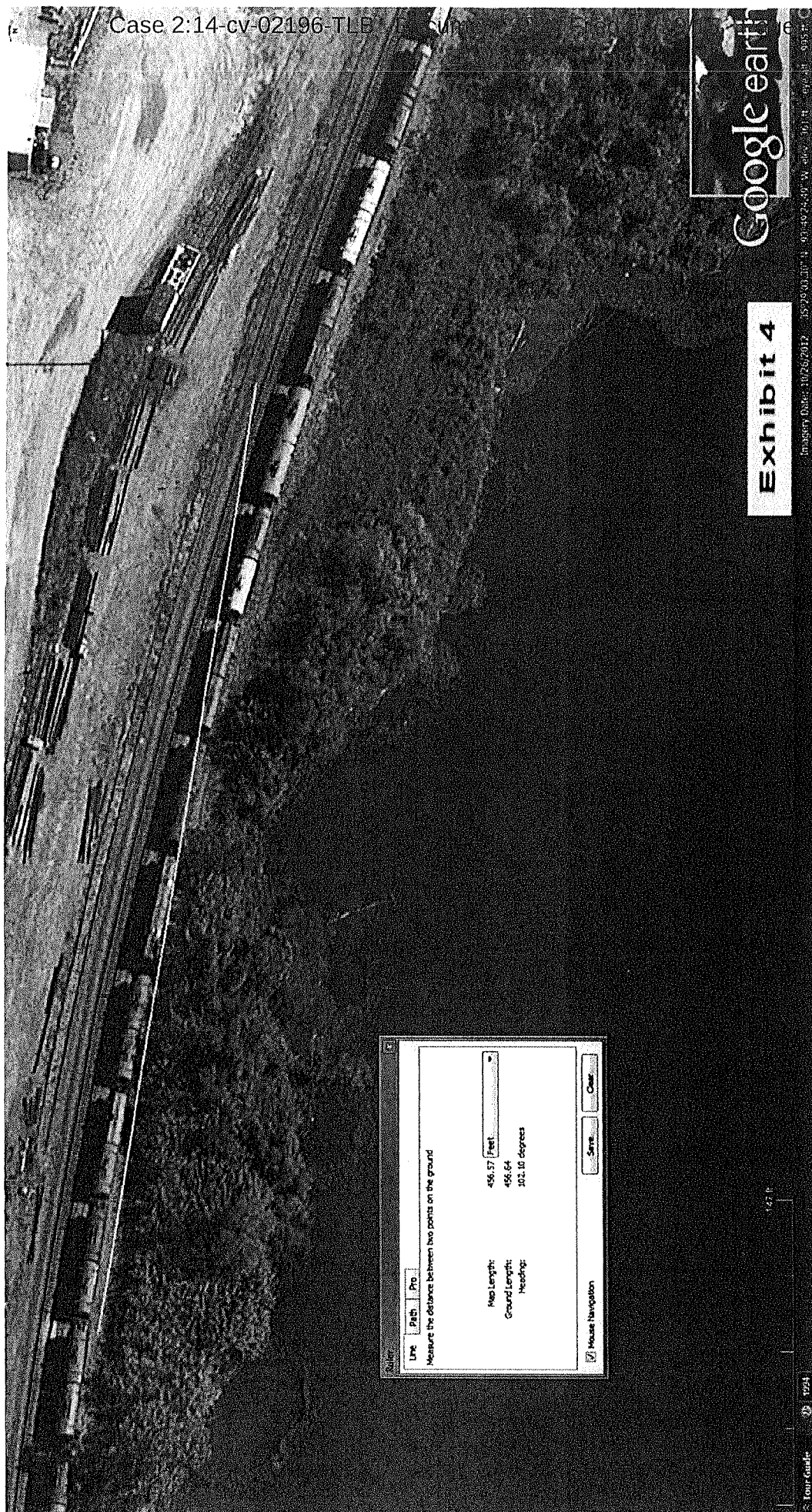
Line Path Area

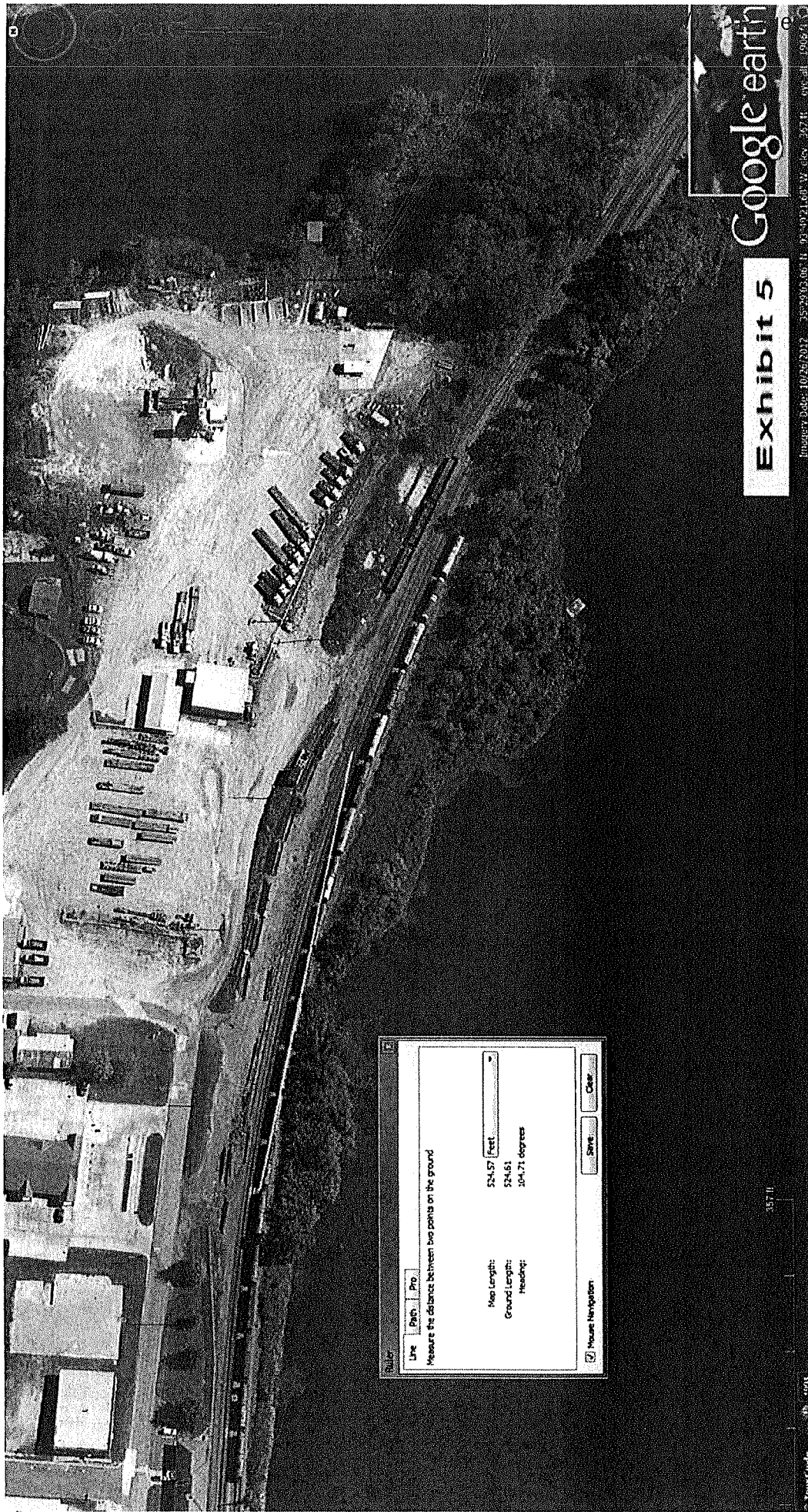
Measure the distance between two points on the ground

Map Length:	300.05	Feet
Ground Length:	300.07	
Heading:	104.45	degrees

☒ Mouse Navigation

Save Clear

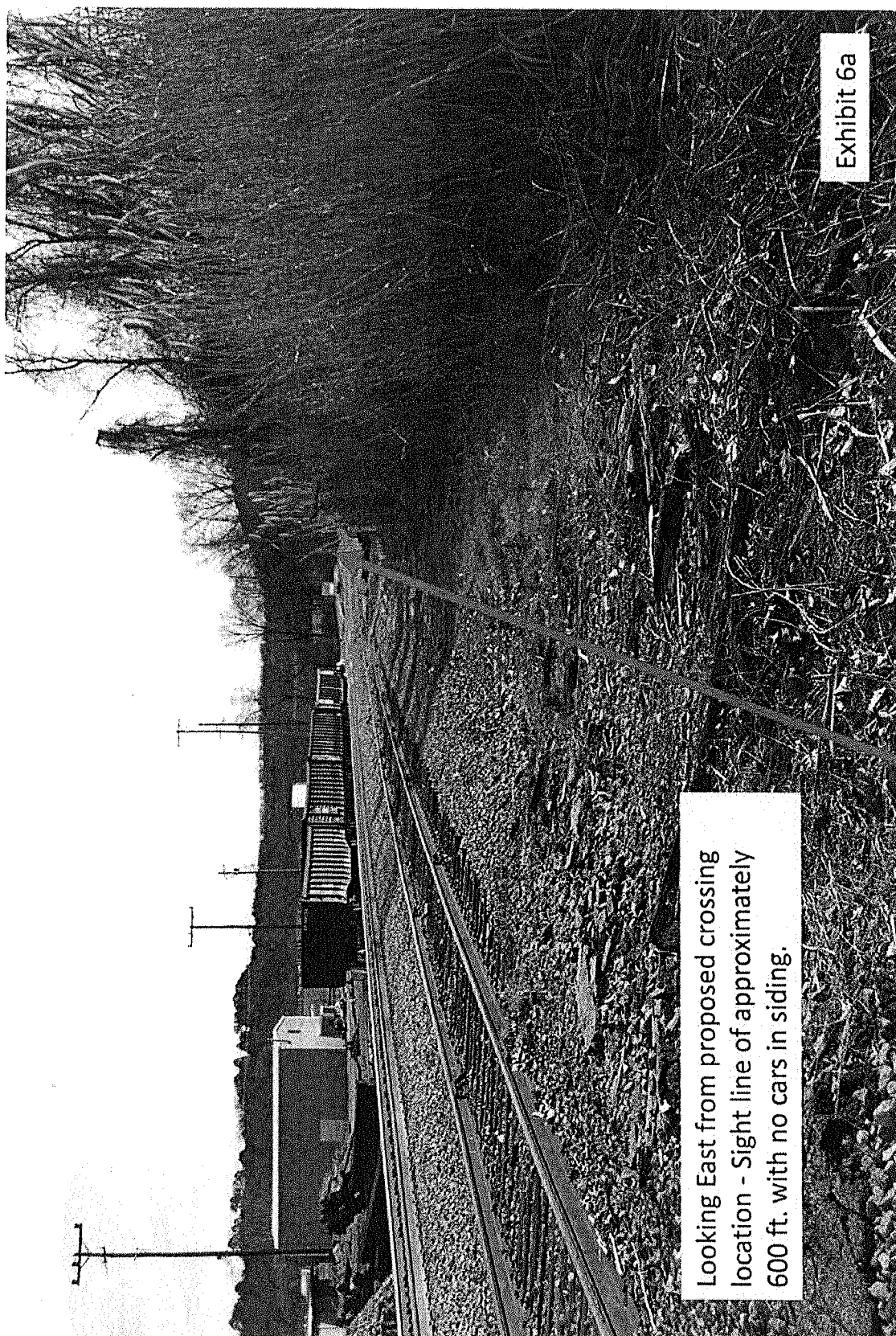


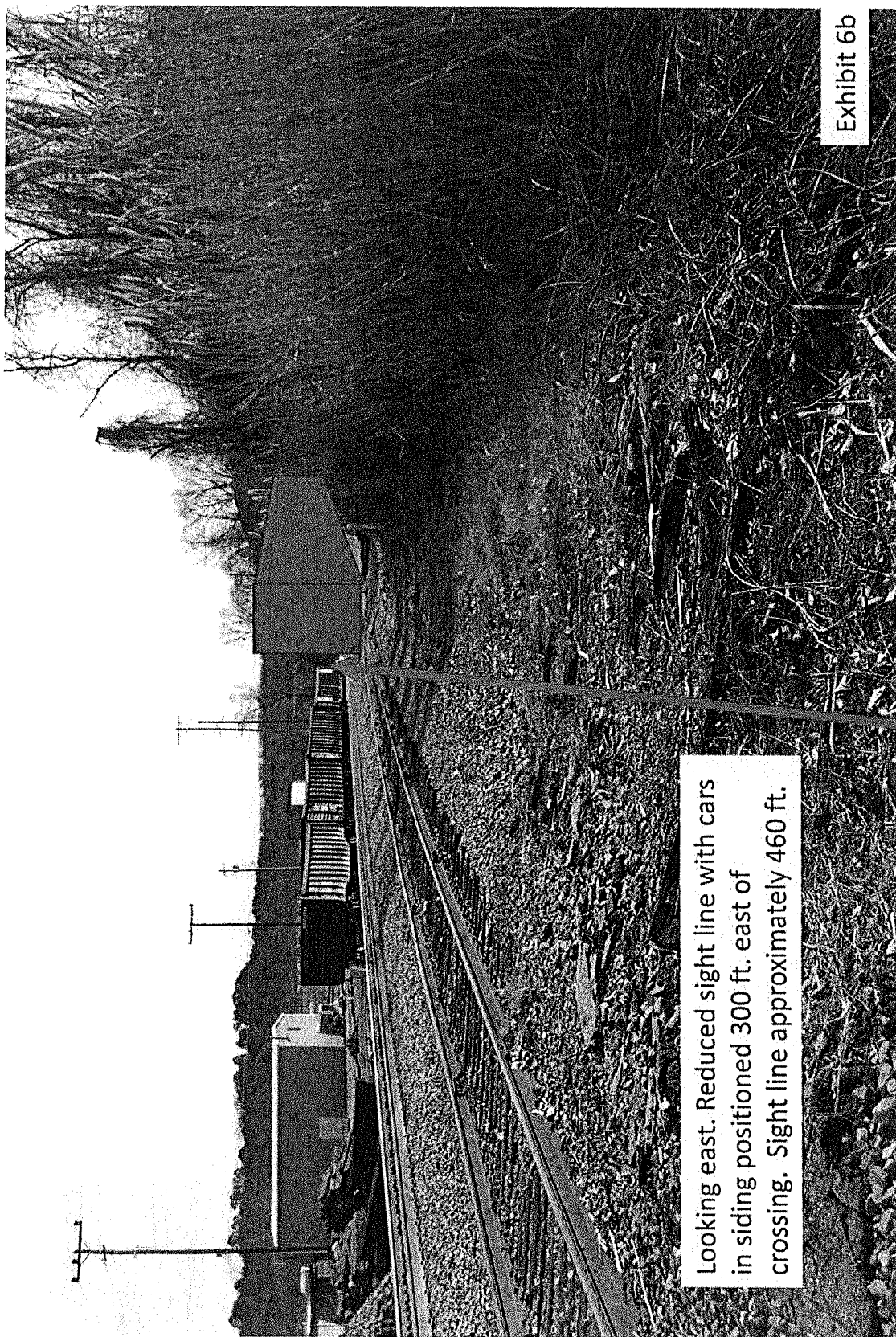


Google earth

Exhibit 5

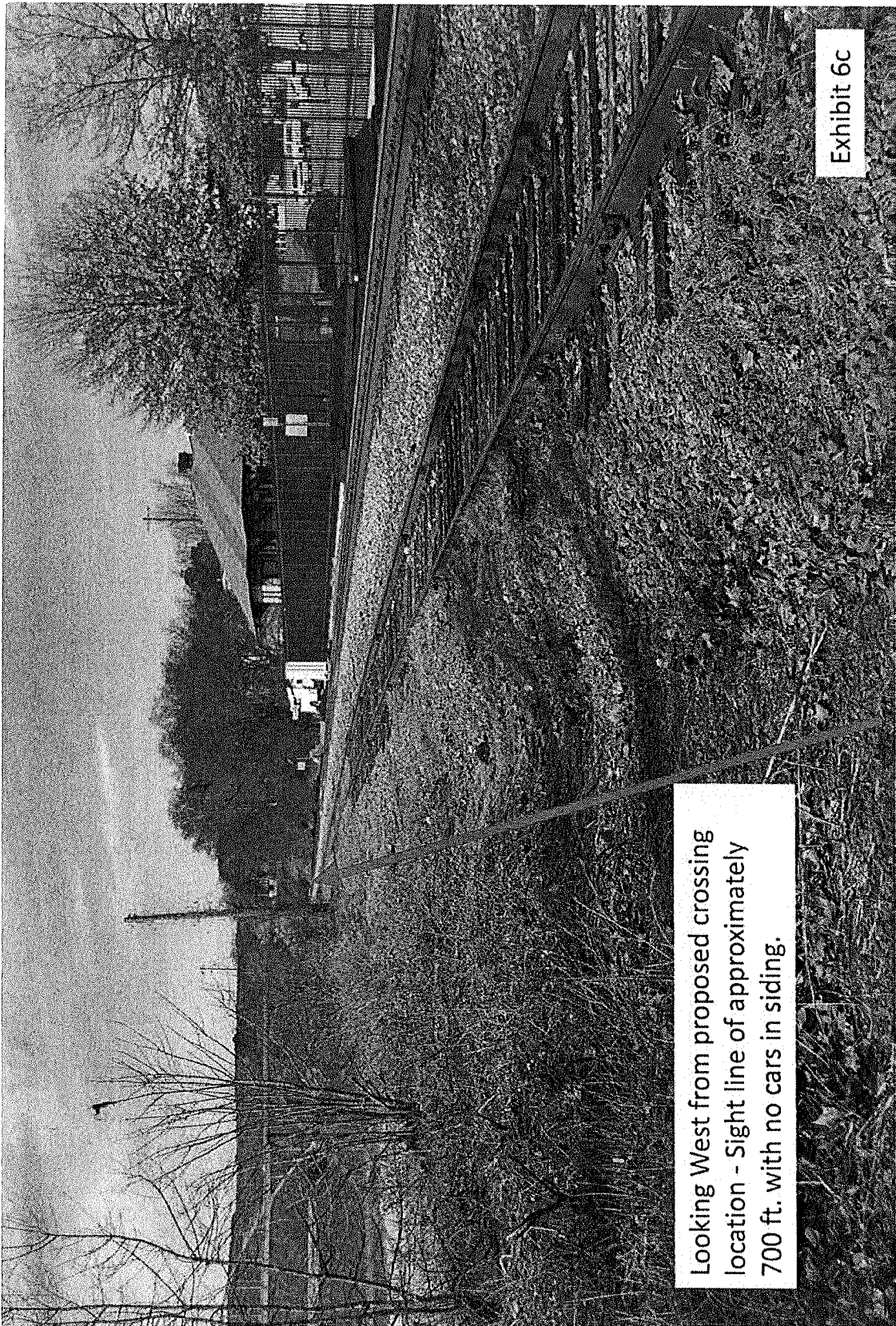
History Date: 10/26/2012 15:29:03.06 H 93-4971.68 W Dec 257 H 1906.03





Looking east. Reduced sight line with cars in siding positioned 300 ft. east of crossing. Sight line approximately 460 ft.

Exhibit 6b



Looking West from proposed crossing location - Sight line of approximately 700 ft. with no cars in siding.

Exhibit 6c

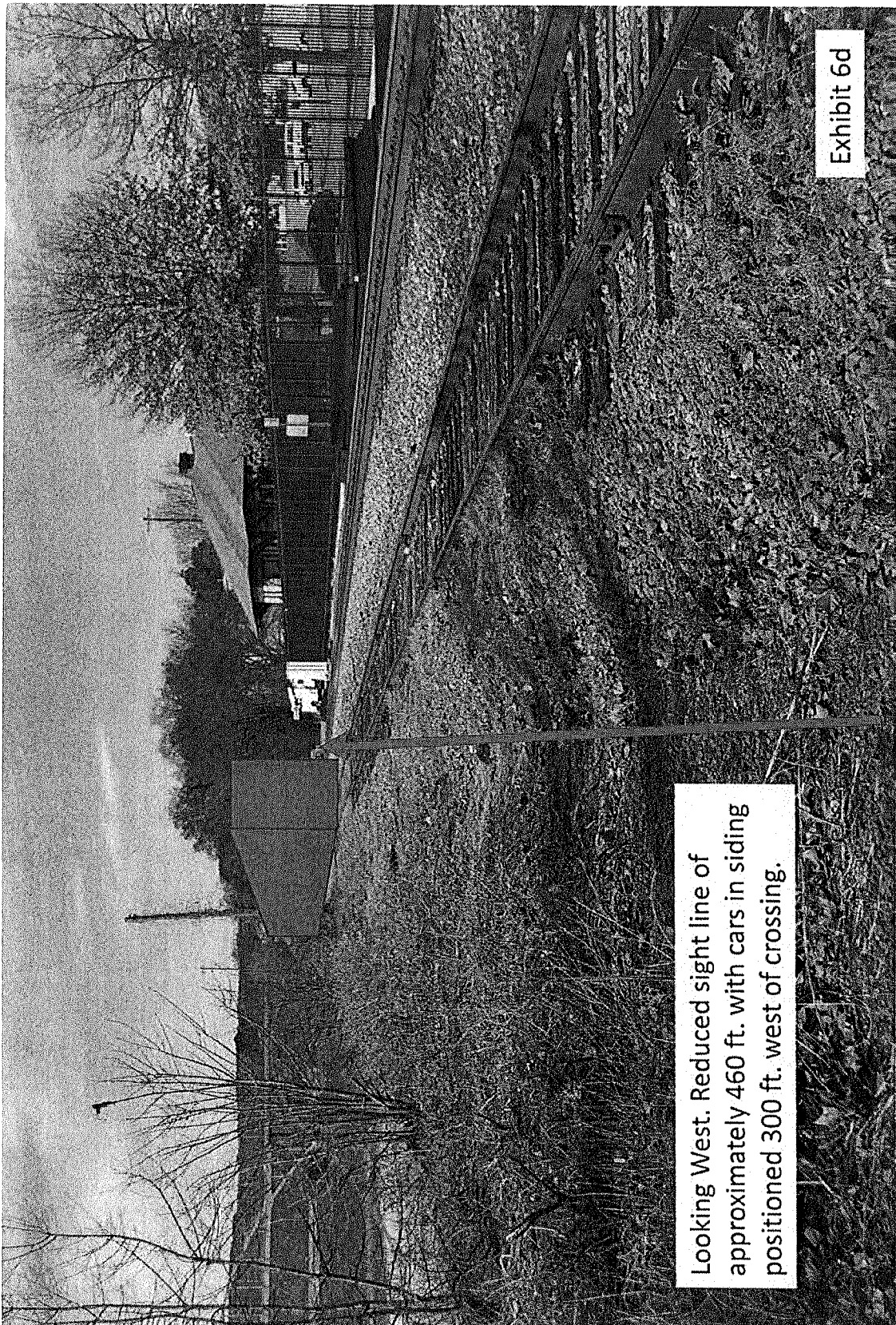
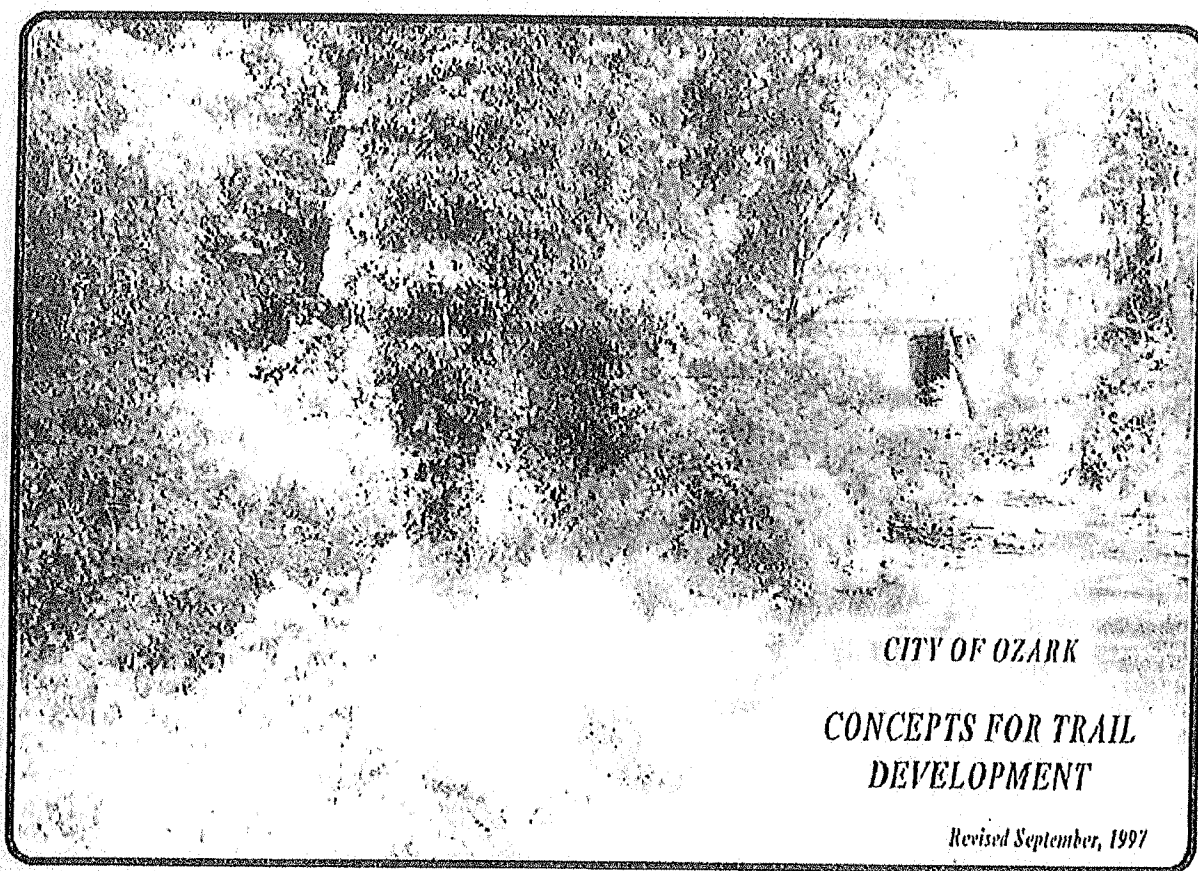
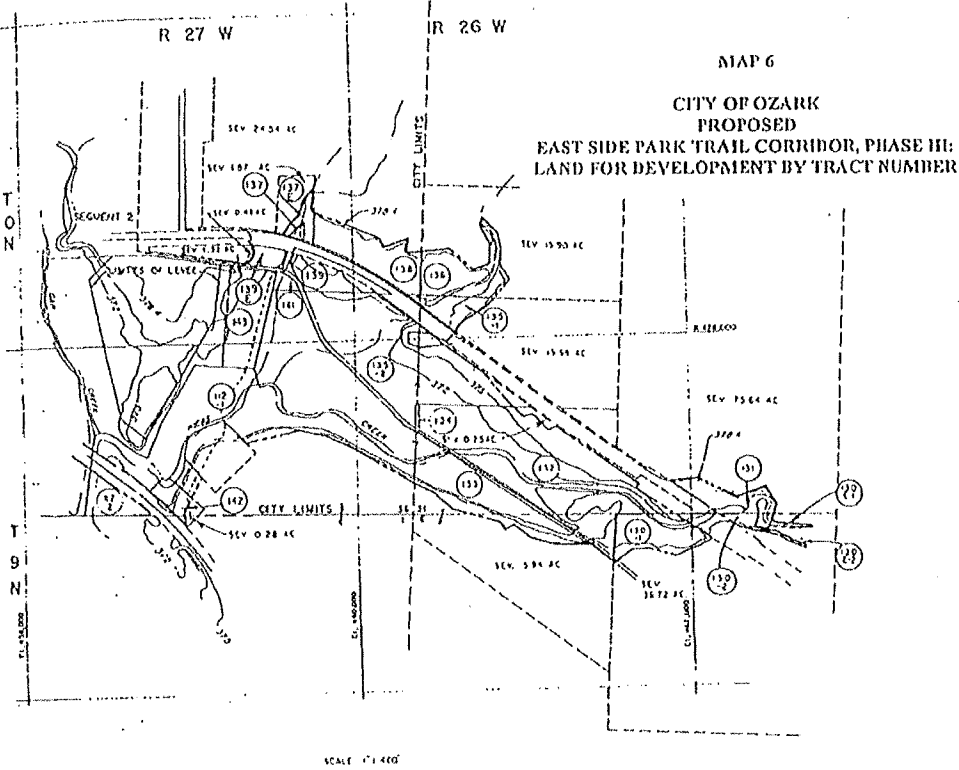
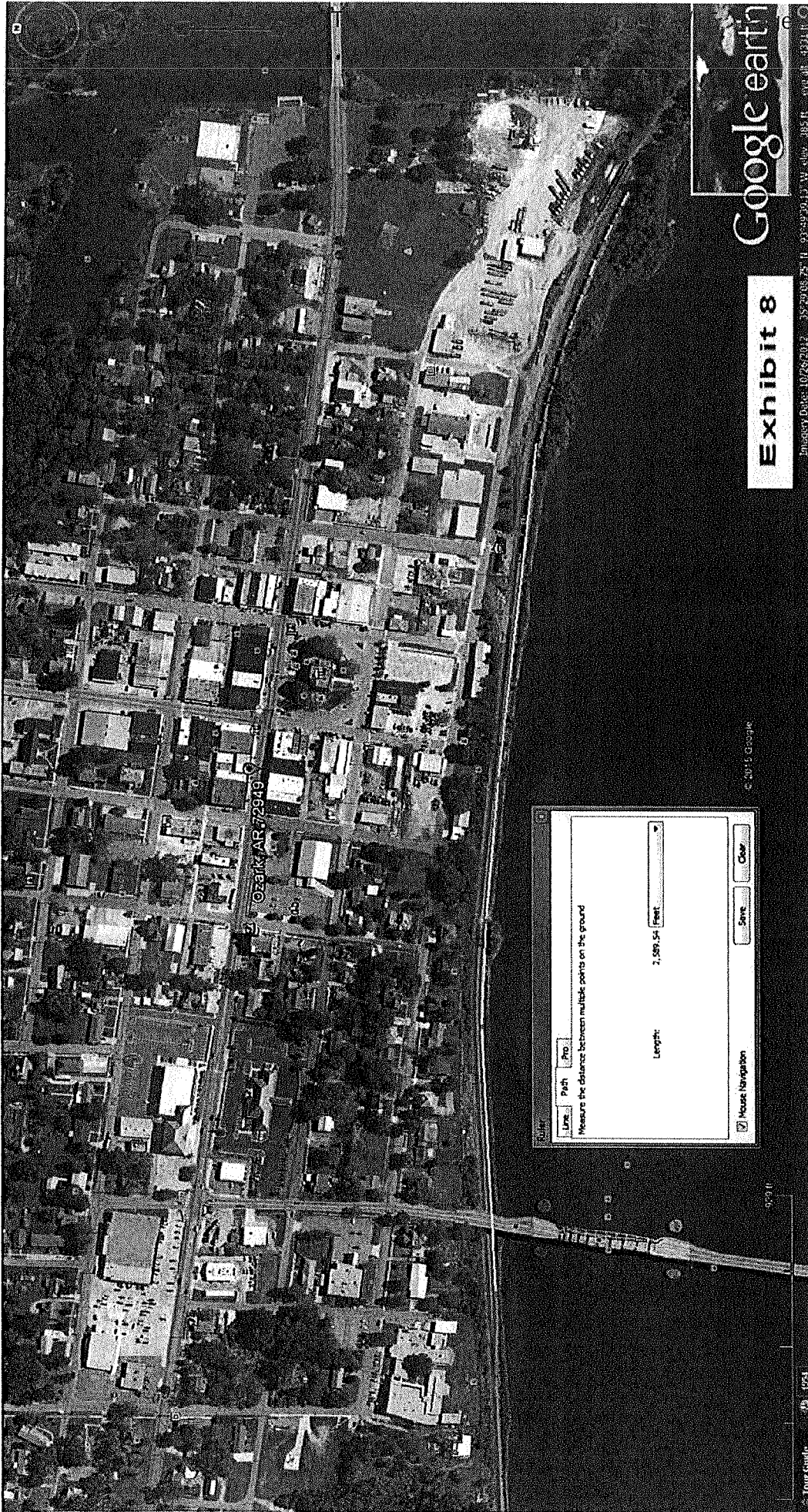


Exhibit 6d

Looking West. Reduced sight line of approximately 460 ft. with cars in siding positioned 300 ft. west of crossing.







Google earth

Exhibit 8

Imagery Date: 10/26/2012 35°29'08.75" N 93°49'30.13" W elev: 385 ft eye alt: 4324 ft

$$Capacity = \frac{V(\text{mph}) \times 1.467 \times 3600}{2(S \times 5280) + (N \times B \times D_{\text{Block}})}$$

where V = Train Speeds

S = Distance between passing tracks

N = 1 Train East, 1 Train West, etc

B = BLOCK Separation (i.e. 2, 3 etc)

D_{Block} = Nominal Distance in Feet Between Blocks

for 11.6 mile spacing

$$C_{11.6} = \frac{50(1.467)(3600)}{2(11.6 \times 5280) + (1 \times 2 \times 9000 \text{ Ft})}$$

$$= 1.66 \text{ Trains/HR}$$

for 7 mile spacing

$$C_7 = \frac{50(1.467)(3600)}{2(7 \times 5280) + (1 \times 2 \times 9000)}$$

$$= 2.4 \text{ Trains/HR}$$

for 3.5 mile spacing

$$C_{3.5} = \frac{50(1.467)(3600)}{2(3.5 \times 5280) + (1 \times 2 \times 9000)}$$