City of Palo Alto (ID # 5491)

City Council Staff Report

Report Type: Study Session **Meeting Date: 2/9/2015**

Summary Title: Study Session on Railroad Quiet Zones

Title: Study Session on Railroad Quiet Zones in Palo Alto

From: City Manager

Lead Department: Planning and Community Environment

Recommendation

This Study Session provides an opportunity for City Council discussion regarding quiet zones and no action is recommended.

Executive Summary

In the spring of 2014, a group of citizens, primarily located near the Alma Street Caltrain crossing, began asking the City of Palo Alto to consider implementing a quiet zone at that intersection. Following that initial request, Planning & Community Environment staff began evaluating quiet zones and gathering information for a City Council discussion.

Quiet zones are defined by the Federal Railroad Administration (FRA) as:

> "a section of a rail line at least one-half mile in length that contains one or more consecutive public highway-rail grade crossings at which locomotive horns are not routinely sounded when trains are approaching the crossings. The prohibited use of train horns at quiet zones only applies to trains when approaching and entering crossings and does not include train horn use within passenger stations or rail yards. Train horns may be sounded in emergency situations or to comply with other railroad or FRA rules even within a quiet zone. Quiet zone regulations also do not eliminate the use of locomotive bells at crossings."

Reference: http://www.fra.dot.gov/Page/P0689

Following communication with Caltrain staff on the matter, City staff was referred to LeeAnn Dickson, a Grade Crossing Manager at United States Department of Transportation Federal Railroad Administration. Ms. Dickson provided City staff with valuable information regarding the technical requirements for the establishment of a quiet zone. Those technical requirements are listed below:

Per the FRA, if any one of the following four Supplemental Safety Measures (SSM's) is implemented, an at-grade crossing is automatically eligible to become a quiet zone regardless of its Quiet Zone Risk Index (QZRI) score:

1. Installing quad gates
    - Four gates per crossing instead of two
2. Median Barriers
    - 100 ft. continuous barriers (provisions exist for barriers as short as 60 ft. in certain scenarios)
3. Converting from facilitating two-way traffic to one-way traffic
4. Eliminating the grade crossing (i.e. closing it)

If a given city chooses to implement one or more of the above referenced intersection improvements, the city has the right to implement a quiet zone. The right of a city to implement a quiet zone is not dependent on the rail operators impacted by the establishment of a quiet zone. Essentially, a quiet zone can be implemented by any city at a given intersection so long as that city goes through the proper noticing and comment procedure.

The noticing and comment procedure required by the FRA includes providing all stakeholders with a 60-day Notice of Intent (NOI) that the city is seeking to establish a quiet zone at a given intersection and following the NOI process a 21 day Notice of Establishment (NOE) must be provided to those operating in the corridor.

It has been the position of Caltrain that they are willing to work with local municipalities if they seek to establish a quiet zone; however, Caltrain's position thus far has been that if a quiet zone is established in the corridor that the local agency would assume liability for any incidents that occur at a quiet zone intersection. That said, City staff has not been able to obtain any written policy on this matter from Caltrain.

It's also important to reiterate that even if a quiet zone is established a railroad engineer operating in the corridor may blow the horn of his or her train at any time if there is a perceived or real safety threat. Therefore, quiet zones reduce train horn noise at a given intersection but do not eliminate it.

For additional technical information regarding quiet zones published by the FRA please see Attachment A.

Background

According to the California Public Utilities Commission (CPUC) website,

> "the FRA Train Horn Rule (49 CFR Part 222) became effective on June 24, 2005. This rule provides a step-by-step process to determine what can be done to offset the

lack of a train horn, to calculate the risk reduction associated with potential improvements, to formally document the silencing of the train horns and officially establish a quiet zone."

Reference: http://www.cpuc.ca.gov/PUC/safety/Rail/Crossings/quietzones.htm

According to the CPUC, as of April 2013 there are 36 established FRA quiet zones in California affecting 181 crossings; however, none currently exist in the Caltrain corridor.

In the fall of 2013, San Mateo did an extensive study on quiet zones and the potential implementation of quiet zones in San Mateo. From that study (Attachment B) came three significant findings:

1. The city has the right to establish a quiet zone(s) if it chooses to do so.
2. From the data San Mateo collected, it did not appear that train horns violate the federal limit on train horn noise.
3. Federal regulations do not prevent a lawsuit against the City in the event of an incident at a given quiet zone intersection if the city is the originator of the quiet zone.

According to Caltrain staff, San Mateo did not pursue any quiet zones due to infrastructure costs and potential liability costs.

Legal Aspects to the Establishment of Quiet Zones in Palo Alto

The question whether or not to implement quiet zones is, at its core, a question of policy. From a legal perspective, there is no legal prohibition on the creation of quiet zones. However, the City Attorney's Office, after careful review of relevant case law and statutes, has concluded that the establishment of quiet zones may increase the City's exposure to potential liability. While we are not aware of any reported case in which a city was deemed solely liable based upon its implementation a quiet zone, application of basic tort law suggests that a city might well be subject to increased liability for doing so. While federal regulations require the City to implement new safety measures to offset the effect of reduction in a core safety measure - the sound of the train's horn blowing - the federal statute contains no safe harbor from suit for compliance.

At the very least, the City may face a marginal increase in litigation costs to defend against novel theories of liability advanced by persons injured in quiet zones.

Finally, while the City maintains excess liability insurance coverage to cover judgments over a certain dollar threshold, the City may nevertheless be compelled to undertake significant self-insurance costs relating to quiet zones, as insurance carriers for other cities have required express carve-outs for claims and actions related to quiet zones.

Resource Impact

If the City is interested in pursuing one or more quiet zones, the City will need to provide funding for design and implementation of the necessary improvements.

Policy Implications

The Comprehensive Plan supports efforts to address noise pollution (Policy N-40) and encourages the Joint Powers Board to pursue train technologies to reduce train whistle noise (Program N-57), but does not speak to quiet zones per se.

The principal policy issues worthy of consideration in the discussion of quiet zones are (1) whether there is a real or perceived relationship between train horns and safety that could be compromised if one or more quiet zones are established; and (2) is the potential for reduced noise if train engineers refrain from blowing their horn worth the cost of improvements and potential increase in liability to the City?

Environmental Review

This is a discussion item and no action is proposed that would require review pursuant to the California Environmental Quality Act (CEQA).

Attachments:

- A - FRA Quiet Zone Brochure_9-2013(PDF)
- B - San Mateo Train Horn Noise Assessment Update_9-11-2013 (PDF)



GUIDE TO THE QUIET ZONE ESTABLISHMENT PROCESS

AN INFORMATION GUIDE

Federal Railroad Administration
1200 New Jersey Avenue S.E.
Washington, DC 20590
Telephone: 202-493-6299
www.fra.dot.gov

Federal Railroad Administration

Highway-Rail Crossing and Trespasser Programs Division

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Purpose of the Guide

This brochure was developed to serve as a guide for local decision makers seeking a greater understanding of train horn sounding requirements and how to establish quiet zones. Its purpose is to provide a general overview and thus does not contain every detail about the quiet zone establishment process. For more detailed and authoritative information, the reader is encouraged to review the official regulations governing the use of locomotive horns at public highway-rail grade crossings and the establishment of quiet zones that are contained in 49 CFR Part 222. A copy of the rule can be downloaded or printed at http://www.fra.dot.gov/eLib/Details/L02809.

About Quiet Zones



FRA is committed to reducing the number of collisions at highway-rail grade crossings, while establishing a consistent standard for communities who opt to preserve or enhance quality of life for their residents by establishing quiet zones within which routine use of train horns at crossings is prohibited.

Federal regulation requires that locomotive horns begin sounding 15–20 seconds before entering public highway-rail grade crossings, no more than one-quarter mile in advance. Only a public authority, the governmental entity responsible for traffic control or law enforcement at the crossings, is permitted to create quiet zones.

A quiet zone is a section of a rail line at least one-half mile in length that contains one or more consecutive public highway-rail grade crossings at which locomotive horns are not routinely sounded when trains are approaching the crossings. The prohibited use of train horns at quiet zones only applies to trains when approaching and entering crossings and does not include train horn use within passenger stations or rail yards. Train horns may be sounded in emergency situations or to comply with other railroad or FRA rules even within a quiet zone. Quiet zone regulations also do not eliminate the use of locomotive bells at crossings. Therefore, a more appropriate description of a designated quiet zone would be a “reduced train horn area.”

Communities wishing to establish quiet zones must work through the appropriate public authority that is responsible for traffic control or law enforcement at the crossings.

Historical Context

Historically, railroads have sounded locomotive horns or whistles in advance of grade crossings and under other circumstances as a universal safety precaution. Some States allowed local communities to create whistle bans where the train horn was not routinely sounded. In other States, communities created whistle bans through informal agreements with railroads.



In the late 1980's, FRA observed a significant increase in nighttime train-vehicle collisions at certain gated highway-rail grade crossings on the Florida East Coast Railway (FEC) at which nighttime whistle bans had been established in accordance with State statute In 1991, FRA issued Emergency Order #15 requiring trains on the FEC to sound their horns again. The number and rate of collisions at affected crossings returned to pre-whistle ban levels.

In 1994, Congress enacted a law that required FRA to issue a Federal regulation requiring the sounding of locomotive horns at public highway-rail grade crossings. It also gave FRA the ability to provide for exceptions to that requirement by allowing communities under some circumstances to establish "quiet zones."

The Train Horn Rule became effective on June 24, 2005. The rule set nationwide standards for the sounding of train horns at public highway-rail grade crossings. This rule changed the criteria for sounding the horn from distance-based to time-based. It also set limits on the volume of a train horn. The rule also established a process for communities to obtain relief from the routine sounding of train horns by providing criteria for the establishment of quiet zones. Locomotive horns may still be used in the case of an emergency and to comply with Federal regulations or certain railroad rules.

Public Safety Considerations

Because the absence of routine horn sounding increases the risk of a crossing collision, a public authority that desires to establish a quiet zone usually will be required to mitigate this additional risk. At a minimum, each public highway–rail crossing within a quiet zone must be equipped with active warning devices: flashing lights, gates, constant warning time devices (except in rare circumstances) and power out indicators.

In order to create a quiet zone, one of the following conditions must be met

1. ***The Quiet Zone Risk Index (QZRI)*** **is less than or equal to the** ***Nationwide Significant Risk Threshold (NSRT)*** with or without additional safety measures such as Supplementary Safety Measures (SSMs) or Alternative Safety Measures (ASMs) described below. The QZRI is the average risk for all public highway-rail crossings in the quiet zone, including the additional risk for absence of train horns and any reduction in risk due to the risk mitigation measures. The NSRT is the level of risk calculated annually by averaging the risk at all of the Nation's public highway-rail grade crossings equipped with flashing lights and gates where train horns are routinely sounded.
2. ***The Quiet Zone Risk Index (QZRI) is less than or equal to the Risk Index With Horns (RIWH)*** with additional safety measures such as SSMs or ASMs. The RIWH is the average risk for all public highway-rail crossings in the proposed quiet zone when locomotive horns are routinely sounded.
3. ***Install SSMs at every public highway-rail crossing***. This is the best method to reduce to reduce risks in a proposed quiet zone and to enhance safety.

SSMs are pre-approved risk reduction engineering treatments installed at certain public highway-rail crossings within the quiet zone and can help maximize safety benefits and minimize risk. SSMs include: medians or channelization devices, one-way streets with gates, four quadrant gate systems, and temporary or permanent crossing closures. Examples of SSMs are shown on the next page.

ASMs are safety systems, other than SSMs, that are used to reduce risk in a quiet zone. ASMs typically are improvements that do not fully meet the requirements to be SSMs and their risk reduction effectiveness must be submitted in writing and approved by FRA.

FRA strongly recommends that all crossings in the quiet zone be reviewed by a diagnostic team. A diagnostic team typically consists of representatives from the public authority, railroad, and State agency responsible for crossing safety and FRA grade crossing managers.

Public Safety Considerations continued

Examples of SSMs



Crossing Closure



Four Quadrant Gate System



Gates with Channelization Devices



Gates with Medians



Wayside Horns The train horn rule also provides another method for reducing the impact of routine locomotive horn sounding when trains approach public highway-rail grade crossings. A wayside horn may be installed at highway-rail grade crossings that have flashing lights, gates, constant warning time devices (except in rare circumstances), and power out indicators. The wayside horn is positioned at the crossing and will sound when the warning devices are activated. The sound is directed down the roadway, which greatly reduces the noise footprint of the audible warning. Use of wayside horns is not the same as establishing a quiet zone although they may be used within quiet zones.

Cost Considerations

The enabling Federal statute did not provide funding for the establishment of quiet zones. Public authorities seeking to establish quiet zones should be prepared to finance the installation of SSMs and ASMs used. Costs can vary from $30,000 per crossing to more than $1 million depending on the number of crossings and the types of safety improvements required.

Legal Considerations

The courts will ultimately determine who will be held liable if a collision occurs at a grade crossing located within a quiet zone, based upon the facts of each case, as a collision may have been caused by factors other than the absence of an audible warning. FRA's rule is intended to remove failure to sound the horn as a cause of action in lawsuits involving collisions that have occurred at grade crossings within duly established quiet zones.

The Quiet Zone Establishment Process

Under the Train Horn Rule, only public authorities are permitted to establish quiet zones. Citizens who wish to have a quiet zone in their neighborhood should contact their local government to pursue the establishment of a quiet zone. The following is a typical example of the steps taken to establish a quiet zone:

1. ***Determine*** which crossings will be included in the quiet zone. All public highway-rail crossings in the quiet zone must have, at a minimum, an automatic warning system consisting of flashing lights and gates. The warning systems must be equipped with constant warning time devices (except in rare circumstances) and power out indicators. The length of the quiet zone must be at least one-half mile in length.

2. ***Identify*** any private highway-rail grade crossings within the proposed quiet zone. If they allow access to the public or provide access to active industrial or commercial sites, a diagnostic review must be conducted and the crossing(s) treated in accordance with the recommendations of the diagnostic team.

3. ***Identify*** any pedestrian crossings within the proposed quiet zone and conduct a diagnostic review of those crossings too. They also must be treated in accordance with the diagnostic team's recommendations. *NOTE:* While it is not required by the regulations, FRA recommends that every crossing within a proposed quiet zone be reviewed for safety concerns.

4. ***Update*** the U.S. DOT Crossing Inventory Form to reflect current physical and operating conditions at each public, private, and pedestrian crossing located within a proposed quiet zone.

5. ***Provide*** a Notice of Intent (NOI) to all of the railroads that operate over crossings in the proposed quiet zone, the State agency responsible for highway safety and the State agency responsible for crossing safety. The NOI must list all of the crossings in the proposed quiet zone and give a brief explanation of the tentative plans for implementing improvements within the quiet zone. Additional required elements of the NOI can be found in 49 CFR 222.43(b). The railroads and State agencies have 60 days in which to provide comments to the public authority on the proposed plan.

6. ***Alternative Safety Measures*** – If ASMs are going to be used to reduce risk, an application to FRA must be made. The application must include all of the elements provided in 49 CFR 222.39(b)(1) and copies of the application must be sent to the entities listed in 49 CFR 222.39(b)(3). They will have 60 days to provide comments to FRA on the application. FRA will provide a written decision on the application typically within three to four months after it is received.

The Quiet Zone Establishment Process continued

7. ***Determine*** how the quiet zone will be established using one of the following criteria: (Note that Options 2 through 4 will require the use of the FRA Quiet Zone Calculator available at http://safetydata.fra.dot.gov/quiet/.)

1. Every public highway-rail crossing in the proposed quiet zone is equipped with one or more SSMs.
2. The Quiet Zone Risk Index (QZRI) of the proposed quiet zone is less than or equal to the Nationwide Significant Risk Threshold (NSRT) without installing SSMs or ASMs.
3. The QZRI of the proposed quiet zone is less than or equal to the Nationwide Significant Risk Threshold (NSRT) after the installation of SSMs or ASMs.
4. The QZRI of the proposed quiet zone is less than or equal to the Risk Index with Horns (RIWH) after the installation of SSMs or ASMs.



8. ***Complete*** the installation of SSMs and ASMs and any other required improvements determined by the diagnostic team at all public, private, and pedestrian crossings within the proposed quiet zone.

9. ***Ensure*** that the required signage at each public, private, and pedestrian crossing is installed in accordance with 49 CFR Sections 222.25, 222.27, and 222.35, and the standards outlined in the Manual on Uniform Traffic Control Devices. These signs may need to be covered until the quiet zone is in effect.

10. ***Establish*** the quiet zone by providing a Notice of Quiet Zone Establishment to all of the parties that are listed in 49 CFR Section 222.43(a)(3). Be sure to include all of the required contents in the notice as listed in 49 CFR Section 222.43(d). The quiet zone can take effect no earlier than 21 days after the date on which the Notice of Quiet Zone Establishment is mailed.

*****Appendix C to the Train Horn Rule provides detailed, step by step guidance on how to create a quiet zone.*****

Required Documentation

Public authorities interested in establishing a quiet zone are required to submit certain documentation during the establishment process. FRA has provided checklists for the various documents that can be found at http://www.fra.dot.gov/Elib/Details/L03055.

FRA's Regional Grade Crossing Managers are available to provide technical assistance. A State's department of transportation or rail regulatory agency also may be able to provide assistance to communities pursuing quiet zones.

Public authorities are encouraged to consult with the agencies in their State that have responsibility for crossing safety. Some States may have additional administrative or legal requirements that must be met in order to modify a public highway-rail grade crossing.

Role of Railroads

Communities seeking to establish a quiet zone are required to send a Notice of Intent and a Notice of Quiet Zone Establishment to railroads operating over the public highway-rail grade crossings within the proposed quiet zone. Railroad officials can provide valuable input during the quiet zone establishment process and should be included on all diagnostic teams. Listed below are links to the Class I Railroads and Amtrak.

BNSF Railway (BNSF)	Canadian Pacific (CP)
CSX Transportation (CSX)	Norfolk Southern (NS)
Canadian National (CN)	Union Pacific (UP)
Kansas City Southern (KCS)	Amtrak (ATK)

FINAL NOTE

The information contained in this brochure is provided as general guidance related to the Quiet Zone Establishment Process and should not be considered as a definitive resource. FRA strongly recommends that any public authority desiring to establish quiet zones take the opportunity to review all aspects of safety along its rail corridor. Particular attention should be given to measures that prevent trespassing on railroad tracks since investments made to establish a quiet zone may be negated if the horn has to be routinely sounded to warn trespassers.

POINTS OF CONTACT

General Questions:

Inga Toye, 202-493-6305
Debra Chappell, 202-493-6018
Ron Ries, 202-493-6285

Regional Contacts

Region 1 Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont
1-800-724-5991

Region 2 Delaware, Maryland, Ohio, Pennsylvania, Virginia, West Virginia , and Washington, D.C.
1-800-724-5992

Region 3 Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee
1-800-724-5993

Region 4 Illinois, Indiana, Michigan, Minnesota, and Wisconsin
1-800-724-5040

Region 5 Arkansas, Louisiana, New Mexico, Oklahoma, and Texas
1-800-724-5995

Region 6 Colorado, Iowa, Kansas, Missouri, and Nebraska
1-800-724-5996

Region 7 Arizona, California, Nevada, and Utah
1-800-724-5997

Region 8 Alaska, Idaho, Montana, North Dakota, South Dakota, Oregon, Washington, and Wyoming
1-800-724-5998

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September 2013

ADMINISTRATIVE REPORT

TO: PUBLIC WORKS COMMISSION

FROM: LARRY PATTERSON, DIRECTOR OF PUBLIC WORKS

PREPARED BY: DEPARTMENT OF PUBLIC WORKS

MEETING DATE: SEPTEMBER 11, 2013

SUBJECT: TRAIN HORN NOISE ASSESSMENT UPDATE

RECOMMENDATION: That the Public Works Commission review the Train Horn Noise Assessment Report and provide comments.

BACKGROUND: Train horn noise has been a source of neighborhood complaints. In summer of 2009, Caltrain relocated train horns from underneath the train to the top of the train to comply with federal safety regulations. The move increased the volume and the range of the sound which generated many complaints from residents along the train corridor. In response to residents' complaints, Caltrain initiated a project to restore the horns to underneath the trains. The project, completed in November 2009, restored the ambient noise level of the horns to prior levels and the horns were in full compliance with all federal regulations. Unfortunately, complaints about elevated horn noise continued. Most of the complaints were attributed to Union Pacific Railroad (UP)'s trains which operate during night hours, and a small amount were aimed at Caltrain's trains.

Public Works staff has devoted a significant amount of resources to the train horn issue. Railroad operation is regulated by the Federal Railroad Administration (FRA) and California Public Utilities Commission (CPUC). Although the City has no direct jurisdiction over the operation of Caltrain and UP, we have been diligent in facilitating the communication between our residents and railroad operators. the Public Works Commission reviewed this item at two separate meetings in 2010. At the December 8th, 2010 meeting, the public had an opportunity to have a direct conversation with representatives from UP, Caltrain, and the FRA.

We also investigated other issues brought to our attention by the community, including the implementation of a "Quiet Zone". Based on our research and study, it would be a significant monetary investment by the City to improve all the crossings in San Mateo to meet the safety standards for a quiet zone. In addition, although there is no federal requirement for a city to assume liability for accidents which may occur in a quiet zone, some railroad operators require that cities indemnify them against any claims which arise as the result of quiet zone implementation. It should also be noted that federal regulations do not prevent a lawsuit

against the City as the originator of the quiet zone. The administrative report for the December 8th 2010 meeting which provides more detailed information related to Quiet Zone implementation is included as Attachment 1 for reference.

Early this year the City again received a series of complaints related to excessive horn volume and inconsistency in train horn sounding among different train operators. In response to the complaints, the City obtained a qualified acoustics consultant and initiated a noise study in April 2013. The noise study included collection of noise measurements and evaluation of measured data. The purpose of the study was to evaluate that Caltrain and UP's horn sounding operation is in compliance with federal standards and to establish a train horn noise baseline that can be used to address future concerns due to changes in the train horn noise levels.

Both long-term and short-term noise measurements were conducted as part of the study. The long-term measurements were collected at two locations along the railroad right-of-way over the course of a month using noise monitors. These locations were selected based on the adjacent neighborhoods, adjacent land uses, historic neighborhood train noise complaints, location of railroad crossings that would initiate the conductor to sound the horn, geometry of the tracks (curves), and adjacent buildings that may distort or enhance the decibel levels of the horn. The two locations chosen were near the corner of 2nd Avenue and South Railroad Avenue in the Downtown and at the corner of 16th Avenue and South Railroad Avenue just north of the Hayward Park Caltrain Station. At the 2nd Avenue site, 2,525 train horn events were measured during the one month period, with noise levels varying from 80 dB to 114 dB. At the 16th Avenue site, a total of 572 events were recorded with noise levels varying from 80 dB to 104 dB. More events were recorded at the 2nd Avenue site due to its proximity to the Downtown San Mateo Caltrain station and the numerous at grade railroad track crossings in the Downtown.

Short-term measurements were also collected at six sites in San Mateo to correlate the noise levels experienced in the neighborhoods with source noise levels at our long-term measurement locations. These locations were selected by the City based on their proximity to historic neighborhood complaints. At each measurement location, the train horn noise levels were compared with noise levels from other activities (e.g., vehicle pass-bys). At each location, the noise levels of the train horns were typically lower than noise from car pass-bys.

In addition to the noise measurements, the consultant also reviewed historic train horn noise levels reported in several private development noise studies submitted to the City. Noise levels from these reports were gathered in several locations around San Mateo at various setbacks from the railway in association with private developments near the railroad tracks.

Overall, the results of the noise study can be summarized as follows:

- Based on the data, the train horn noise levels appear to be consistent throughout the week, with no day of the week when train horns were significantly louder than other days.
- Freight train horn noise was louder than noise from the Caltrain trains.

- This study cannot be used to directly compare noise levels with the federal train horn noise limits because the monitors would have to be directly on the railroad tracks, however, it does not appear from reviewing the data that train horns violate the federal limits.
- In the locations of our short-term noise studies, the noise levels from the train horns were often lower than those of passing cars.
- Duration of train horn sounding varied greatly depending on track conditions and train schedule. Duration of the train horns at the 2nd Avenue location varied between 7 seconds and 1 minute 18 seconds long. At the 16th Avenue location, train horn soundings lasted between 7 seconds and 51 seconds. There is no federal standard for the duration of train horn sounding.

Further information on this study is provided in the project report (Attachment 2).

NEXT STEPS: Public Works staff has devoted a significant amount of resources to the train horn issue. We have thoroughly investigated issues brought to our attention by the community and have been very diligent in facilitating the communication between our residents and the railroad operators. Based on this study, while UP trains are sounding at a higher level than Caltrain trains, all the trains are generally operating within the federal limits. No immediate action is necessary from the City at this time. Our acoustics consultant will be available at the September 11th public meeting to answer questions from the commission and the public.

A train horn noise level database has been established as part of this study. The City can utilize the database to address future train horn noise related complaints if necessary.

NOTICE PROVIDED:

A copy of this administrative report was sent to all homeowner associations, in addition to all individuals on the "Concerned Parties" list maintained in the Public Works Department.

STAFF CONTACT Susanna Chan, Deputy Director/City Engineer
schan@cityofsanmateo.org
(650) 522-7308

ATTACHMENTS

Attachment 1 – December 8, 2010 Public Works Commission Meeting Administrative Report
Attachment 2 - Train Horn Noise Assessment Report

cc: All Homeowners Associations
"Concerned Parties" list
Public Works A.R. Binder

ADMINISTRATIVE REPORT

Attachment 1

Meeting Date: December 8, 2010

APPROVED BY: Larry A. Patterson, Public Works Dir.

TO: PUBLIC WORKS COMMISSION

DATE: December 3, 2010

SUBMITTED BY: Susanna Chan, Deputy Director (650) 522-7308

SUBJECT: ***TRAIN HORN UPDATE***

RECOMMENDATION: That the Public Works Commission review the information related to train horn noise and provide staff direction on next steps.

BACKGROUND: In summer of 2009, Caltrain relocated train horns from underneath the train to the top of the train to comply with federal safety regulations. The move increased the volume and the range of the sound which generated many complaints from residents along the train corridor. In response to residents' complaints, Caltrain initiated a project to restore the horns to underneath the trains. The project, completed in November 2009, restored the ambient noise level of the horns to prior levels and the horns were in full compliance with all federal regulations.

Complaints about elevated horn noise began again in San Mateo around April of this year and have continued to date. Most of the complaints were attributed to Union Pacific Railroad (UP)'s trains, and a small amount were aimed at Caltrain's trains. Upon receipt of the complaints, the City contacted Caltrain and UP to inquire about any changes in operation. Both have confirmed that there have not been any operational changes that would generate increased horn volumes.

Railroad operation is regulated by the Federal Railroad Administration (FRA) and California Public Utilities Commission (CPUC). Although the City has no direct jurisdiction over the operation of Caltrain and UP, we are committed to facilitate the communication between our residents and railroad operators. We discussed the train horn issue at the May 12th Public Works Commission meeting, at which time the public had an opportunity to have a direct conversation with a representative from Caltrain. Unfortunately, a representative from UP was unable to attend that meeting. To continue the dialogue with the railroad operators, we rescheduled this item to the December 8 meeting. UP representatives, including Ms. Liisa Stark, Director of Public Affairs, Mr. John Valdez, Director of Terminal Operation, and Mr. Michael Iden, General Director of Cars and Locomotives Engineering, will attend the meeting. Ms. LeeAnn Dickson with the FRA will also attend the meeting and provide a short presentation regarding FRA train horn regulations. Mr. Seamus Murphy with Caltrain will participate in the meeting as well.

The City recently received a series of emails from concerned citizens which raised many questions related to train horn operation. Staff conducted research and requested assistance from UP and Caltrain in responding to citizen concerns. Our responses to the major questions are summarized below.

UP Horn Volume Reduction and Horn Relocation

It is our understanding that UP train horns are located on top of the train and volumes are set at the upper levels of the range stipulated by federal regulation (96 to 110 decibels). We requested that UP lower the horn volume to the minimum federal standard and reposition the horns from the top of the trains to a location underneath the trains (Exhibit A). UP has indicated that they cannot accommodate our request and provided an explanation in a response letter to the City (Exhibit B). UP also provided additional explanations in Exhibit C.

One of the reasons for the denial is that the company does not use a dedicated fleet of locomotives on the Peninsula. Residents will have an opportunity to better understand UP's operation on the Peninsula at the December 8th meeting as Mr. Valdez, Director of Terminal Operation, is responsible for the operation of this area.

Implementation of Quiet Zone

This topic was discussed extensively at the previous meeting and in the follow up memo to the commissioners. The most direct way to establish a "quiet zone" is to implement FRA pre-approved Supplementary Safety Measures (SSM). Pre-approved SSM are: 1) installing a four-quadrant gate system; 2) installing gates with medians or channelization devices so that cars can't access other lanes to cross the track; 3) installing gates on one-way streets to block all approaching lanes to the track; 4) temporary closure of a crossing to traffic during designated quiet periods; or 5) permanently closing the crossing to traffic (including grade separation). Typically the safety improvements are funded by the local communities that request the quiet zone.

The City has conducted research on the costs of implementing SSM. Item 3 does not apply to the City of San Mateo as it involves installation of gates on one-way streets. Items 4 and 5 which require temporary or permanent closure of crossings are not feasible for the City, especially in the downtown area. Grade separations in general are beyond the capability of the City to fund. As a result, our research has been focused on Item 1, four-quadrant gates and Item 2, gates with medians or channelization devices. The following table summarizes the findings:

	Implementation Cost	**Annual Maintenance Cost**	**Pros**	**Cons**
Four quadrant gates	$150,000 - $500,000	$5,000 - $10,000	Most adaptable	High implementation and maintenance cost
Automatic gates with non-mountable curb	$10,000 - $50,000	Minimal	Low implementation and maintenance cost	May impact access to adjacent properties

The automatic gates with non-mountable curb option appears to be the least expensive solution. According to the federal requirement, the median must extend at least 100 feet from the gate arm, or if an intersection is within 100 feet of the gate, at least 60 feet from the gate arm. Some of the at-grade crossings in the City are equipped with gates and medians; the following table summarizes the existing conditions at these crossings:

	West Side of Rail Road Track			East Side of Rail Road Track		
Crossing	**Median?**	**Mountable?**	**Length**	**Median?**	**Mountable?**	**Length**
Villa Terrace	Yes	Yes	44'	Yes	No	32'
Bellevue	Yes	No	41'	Yes	Yes	50'
1st Avenue	No			No		
2nd Avenue	No			No		
3rd Avenue	No			No		
4th Avenue	No			Yes	No	43'
5th Avenue	No			Yes	No	42'
9th Avenue	Yes	No	20'	Yes	No	20'
25th Avenue	No			Yes	No	86'

Based on the evaluation of the existing conditions, there is no crossing within San Mateo that meets federal SSM requirements. Extending the existing medians or installing new medians will affect driveway access or restrict turning movements on streets adjacent to the railroad and may potentially have significant impacts to the traffic circulation in these areas.

Although there is no federal requirement for a city to assume liability for accidents which may occur in a quiet zone, some railroad operators require that cities indemnify them against any claims which arise as the result of quiet zone implementation. It should also be noted that federal regulations do not prevent a lawsuit against the City as the originator of the quiet zone. Currently there is no quiet zone along the Caltrain corridor.

Implementation of Wayside Horns

Wayside horn is a stationary horn system activated by the railroad-street grade warning system, mounted at the crossing, rather than the locomotive, to deliver an audible warning to motorists and pedestrians. Wayside horn is not a SSM, however, it is an acceptable way to reduce train horn noise, as there would no longer be a need for manual sounding of the horn by train operators.

According to our research, the cost to install a wayside horn system ranges from $60,000 to $100,000 at each grade crossing. It may also be necessary to upgrade the signal system to accommodate the wayside horn which will require additional cost. The annual maintenance cost for a wayside horn system is approximately $500 to $1,000.

The federally required volume level for wayside horns ranges from 92 decibels to 110 decibels. Although the minimum level is lower than those equipped on the trains, the areas immediately adjacent to the wayside horns will experience more prolonged sounding.

Ownership of Right of Way, Caltrain's Authority over UP's Operation, and Regulatory Compliance

The train right of way is owned by the Joint Powers Board (JPB), a three-agency partnership (SamTrans, Muni, and Valley Transportation Authority) formed to own and operate Caltrain. Despite owning the right of way, the JPB only has the authority to restrict UP's access to the railroad within specific times for the purpose of operating freight under a condition of the purchase of the right of way from Southern Pacific Railroad in 1992. Governance of issues such as the usage of horns, the decibel levels, and the

manner in which the horns are deployed are the sole province of the FRA. Both Caltrain and UP are subject to the same federal requirements enforced by FRA.

Federal regulations allow a range of decibel level for horn sounding. The regulations do not restrict the location of the horns so long as the minimum sound level and the distinct sound pattern are maintained. It is our understanding that both Caltrain and UP operate the horns within the federally required range.

Possibility of Implementation of Window Replacement Program Similar to the Airport

Staff has investigated the Airport Residential Sound Insulation Program. The program pays for window replacement for qualified homes and is funded through a combination of Federal Aviation Administration (FAA) and airport funds. According to our research, some of the airport funds were allocated for this program as part of the mitigation measures for the airport expansion. In exchange for receiving the funds, homeowners were required to dedicate a navigation easement to the airport. Our research reveals that currently there is no similar program for the railroad.

UP Horn Testing, Horn Specifications, Configuration Details, and Maintenance Inspection Criteria

UP has provided answers to these questions and their responses are included as Exhibit C. The public will have an opportunity to ask questions related to UP operation at the meeting. In addition to Mr. Valdez who is knowledgeable about local freight operation, Mr. Iden, General Director of Cars and Locomotives Engineering, who will be joining the meeting from Chicago, has extensive experience with horn operation.

NEXT STEPS: Public Works staff has devoted a significant amount of resources to the train horn issue. We have thoroughly investigated issues brought to our attention by the community and have been very diligent in facilitating the communication between our residents and the railroad operators. The December 8th meeting will provide residents an opportunity to have a direct conversation with the railroad operators and regulator and establish direct contacts with them. We do not recommend any further action for this issue. If the Commission wishes to request that the City implement wayside horns or the quiet zone, the item can be forwarded to the City Council for further consideration.

NOTICING: A copy of this administrative report was sent to all homeowner associations, in addition to all individuals on the "Concerned Parties" list maintained in the Public Works Department.

EXHIBIT:

- **A.** Letter from City to UP
- **B.** UP Response Letter
- **C.** UP Responses to Train Horn Questions.

c: All Homeowners Associations
"Concerned Parties" list
Project File
Public Works A.R. Binder

Exhibit A

Department of Public Works
Larry A. Patterson, P. E., Director

330 West 20th Avenue
San Mateo, California 94403-1388
Telephone (650) 522-7300
FAX: (650) 522-7301
www.cityofsanmateo.org

July 8, 2010

Mr. Andy Perez
Director Port Affairs/Corporate Relations
Union Pacific Railroad
2401 E. Sepulveda Blvd
Long Beach, CA 90810

Re: ***Request for Train Horn Modifications on Union Pacific Trains***

Dear Mr. Perez:

The City of San Mateo is located in San Mateo County along the San Francisco Peninsula, and is home to three Caltrain stations (Downtown San Mateo, Hayward Park, and Hillsdale Station) and numerous at-grade roadway/rail crossings. There are several areas in San Mateo where the train tracks run in close proximity to densely populated residential neighborhoods. Over the course of the last year, citizens who reside near the train tracks have increasingly complained of loud train horns being sounded very late at night. This letter is meant to initiate discussions between the City of San Mateo and representatives from Union Pacific (UP) with hopes that we can reach a mutually agreeable solution so as to minimally impact UP operations, while providing some relief to our impacted residents.

City staff has researched UP operations and has found that UP provides two train services along the peninsula; one operates from Sunday to Friday and the other from Monday to Friday. Depending on the service needs of a particular day, southbound UP trains begin service as early as 7:30 p.m. and as late as 12:00 a.m. After servicing the peninsula stops, these trains return to the yard in South San Francisco between the hours of 11:00 p.m. to 4:00 a.m.

The City acknowledges that UP train operators are functioning within the applicable federal regulations with respect to use of the horn, and have confirmed with the FRA that current UP horn noise volume is within the permitted range. However, in the interest of providing some relief to residents located in the vicinity of the rail corridor, we request UP consider implementing two changes for trains which serve the peninsula:

1. Lower the horn volume to the minimum federal standard. It is our understanding that UP train horns are currently at the upper levels of the range stipulated by federal regulation; and

2. Reposition the horns from the top of the trains to a location underneath the trains. Caltrain made a similar modification to their locomotives at the request of local cities and impacted residents. This change has resulted in ambient noise levels which are more acceptable to nearby residents, while still being in full compliance with all federal regulations. The peninsula corridor is not a sparsely populated rural area, but rather a dense urban-suburban region; it is unnecessary to position the horn atop the train to provide the needed range of sound.

We understand that UP operates an extensive network and that trains could potentially be dispatched anywhere in the country; however, this probably does not occur on a daily basis. There is likely a core group of trains dedicated to serving the peninsula, and these are the trains we are requesting be modified.

We feel these minor changes will make a noticeable difference in the quality of life for our residents, while still preserving safety in the rail corridor. Please feel free to contact me at any time to at (650) 522-7308 or schan@cityofsanmateo.org. We look forward to discussing this further and thank you in advance for your assistance.

Sincerely,

Susanna Chan
Deputy Director of Public Works

c: San Mateo City Council
Susan M. Loftus, City Manager
Larry Patterson, Director of Public Works
LeeAnn Dickson, Crossing and Trespassing Regional Manager, FRA
Chron/File

Exhibit B
Scan, Chron, File Misc Train Issues

August 6, 2010

RECEIVED
AUG 16 2010
CITY OF SAN MATEO
PUBLIC WORKS DEPARTMENT

Ms. Susanna Chan
Deputy Director of Public Works
City of San Mateo
330 West 20th Avenue
San Mateo, CA 94403-1388

Re: Request for Train Horn Modifications on Union Pacific Locomotives

Dear Ms. Chan:

I appreciated the opportunity to speak with you on the telephone in detail about your request and our operations in the Bay Area.

This letter is in response to your letter of July 8, 2010 requesting that Union Pacific lower the horn volume and move the horn on locomotives used during freight operations on the San Francisco Peninsula.

As you stated in your letter, Federal law governs the volume of train horns. The company acknowledges the appeal of calibrating the horns for the lower end of the range of required decibels, but it would not be feasible to do this because of an increased risk that the horns could drop below the minimum volume between inspections and because a lower volume, although still compliant, would provide less warning of an approaching train. And as a practical matter, the railroad cannot ensure that only locomotives with lower horn calibrations would be used in this area because the company does not use a dedicated fleet of locomotives on the Peninsula.

This last point is also the reason why moving the horns to the bottom of locomotives is not an option. Although locomotives may spend some period of time in one area, they are not dedicated to specific routes and all locomotives are subject to relocation at any time to be used anywhere throughout the 23 states in which we operate. We must maintain consistency within our locomotive fleet and cannot move the horn.

Public and employee safety is a core value at Union Pacific, and we are adhering to the Federal standards on sounding the horn at all crossings. To address your concerns, I recommend that the city consider investigating the feasibility of establishing a Quiet Zone to eliminate the use of horns at crossings. In the meantime, I have also attached a copy of "Horn Signals: A Proven Safety Precaution" as additional information.

Please feel free to contact me at any time at (562) 490-7051 or aperez4@up.com

Sincerely,

Andy Perez

cc: LeeAnn Dickson, Crossing & Trespassing Regional Manager (FRA)

Andy Perez
Director Port Affairs

UNION PACIFIC RAILROAD COMPANY
2401 E. Sepulveda Blvd., Long Beach, CA 90810
Ph. (562) 490-7051 Fx. (562) 490-7119

Horn Signals: A Proven Safety Precaution

Our 16th President Abraham Lincoln signed the Pacific Railway Act in 1862. With the stroke of a pen he made the dream of a railroad spanning the nation a reality. President Lincoln knew that moving goods and people by train would help unite our nation. That dream is very much alive today.

In the 21st Century, moving freight by train is one of the most environmentally friendly and safest ways to get products and goods from one location to another. The average freight train takes approximately 300 semi-trucks off the road. And, operating a safe and efficient railroad is the core value of Union Pacific. Assuring safety for the public, our customers and our employees, is something we do 24/7.

Part of that safety is sounding the train horn for every highway-rail grade crossing. This train borne warning device is used to warn the public that a train is approaching.

The Federal Railroad Administration (FRA) requires that the horn be sounded 15-20 seconds prior to the locomotive occupying the crossing. Also, locomotive engineers have authority to sound the horn whenever he or she feels there is a safety concern, such as someone walking along the tracks or disregarding safety signs and signals.

The volume of the horn is also regulated by the FRA. Each locomotive horn must be in compliance with Federal regulations.

If you would like more information on FRA's *Final Rule on the Use of Locomotive Horns at Highway/Rail Grade Crossings* which went into effect on June 24, 2005, please visit: http://www.fra.dot.gov/Pages/1318.shtml.

Exhibit C

UP Responses to Train Horn Questions

Horn Testing

UP horns are tested in accordance with standards set by the FRA. In order to provide meaningful results, the testing is done following very strict guidelines, is thorough and comprehensive. Specifically, testing measurements are taken 11 feet from the knuckle of the locomotive at a height of 15 feet from the rail as specified in 49 CFR 229.129. No physical obstructions or sound reflective surfaces can be present within a 200 foot radius of the locomotive during testing. The testing environment must be controlled and must utilize proven and reliable testing methods.

Train horns must be tested in both directions. This means that the front horns and rear horns are tested through separate tests at the same location. Because the horns rely on a common air supply system to function, when tested in the front direction, the measurement is higher than when tested in the rear direction. This means that UP must be certain that all horns are within the federal allowable decibel range. If forward horn volumes test only at near minimum sound levels, then rear horns will be under the volume required by the FRA and UP would not be in compliance.

All horn testing and inspection records are made available to the FRA upon request and are kept and maintained as required by federal law at our headquarters in Omaha, Nebraska.

Horn Specifications

UP utilizes horns provided by manufactures that will operate within the allowable volume range set by the FRA. Horn standards (which must meet a target of performance) are set by manufacturers in accordance with allowable federal regulations. Specifics of horn configuration include air flow at certain pressures, piping and the horn itself. The horn sound volumes are all set within allowable ranges when the railroad receives them from the manufacturer. The horns are pneumatically actuated to either an 'on' or 'off' position, there is no 'setting' of horns by Union Pacific. Hence, horns do not have any control mechanisms which would allow sound volume to be increased or decreased.

While UP acknowledges the appeal of calibrating horns to the extreme lower end of the range of required decibels, in addition to the sound volume noted above with forward and rear horns and the common air supply system, it would not be feasible to do this because of an increased risk that the horns could drop below the minimum volume between inspections and because a lower volume, although still compliant, would provide less warning of an approaching train.

Configuration Details

UP utilizes Nathan Air Chime horns. Specifically, the horns are 3-chime K Series, a horn type reflective of the railroad industry standard. In most cases, the horns are mounted on top of the locomotive cab, with the exception of horns being center mounted on UP's low-horsepower units. Neither of these locations affects horn volumes.

Relocating the horns to the bottom of locomotives is not an option. Although locomotives may spend some period of time in one area, they are not dedicated to specific routes and all locomotives are subject to relocation at any time to be used anywhere throughout the 23 states in which UP operates. We must maintain consistency within our locomotive fleet and cannot move the horn.

In addition, horns are not able to be relocated without large scale modifications and significant cost, which would also invalidate all horn testing approvals received from the FRA.

Maintenance Inspection Criteria

Train horns are inspected and maintained at a maximum of every three years. Each locomotive is also inspected through four scheduled maintenance services annually. During this inspection process, horns are one of many train parts checked for operational use and wear and tear.

UP employees also monitor horn volumes for sound consistencies and compliance with federal regulations and report any issues regarding sound volumes that appear too low or too high. These units are then inspected expeditiously to verify horn volume compliance.

During the maintenance cycle, horn rings are changed out, working horn parts are restored and horns are essentially refurbished to a new state to ensure compliance with federal regulations.

City of San Mateo

Train Horn Noise Assessment

CSA No. 13-0186

4 September 2013

Prepared for:

Kenneth Chin
City of San Mateo Public Works Department
330 W. 20th Avenue
San Mateo, CA 94403
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Charles M. **Salter**
ASSOCIATES INC.

1.0 EXECUTIVE SUMMARY

In response to complaints that the City of San Mateo has received from residents, they have commissioned a noise study. This noise study documents the variation in train horn noise over time. In addition, the City has requested a database of train horn noise levels that can be used to address any future concerns due to changes in the train horn noise levels.

We conducted noise measurements over the course of a month at two locations. Short-term measurements were also made in several locations, including near residences that voiced concerns about train horn noise. The main railway through the city is used by both Caltrain commuter trains and freight trains; approximately 92 commuter trains and 10 freight trains pass through the city each day.

Long-term noise measurements were conducted at two locations near the railway: near the corner of 2nd Avenue and S Railroad Avenue and at the corner of 16th Avenue and S Railroad Avenue. At the 2nd Avenue site, we measured 2,525 train horn events, with noise levels varying from 80 dB to 114 dB[1]. At the 16th Avenue site, a total of 572 events were recorded with noise levels varying from 80 dB to 104 dB. Many more events were recorded at the 2nd Avenue site due to its proximity to the San Mateo Caltrain station. The 16th Avenue measurement location was located near the Hayward Park Caltrain station, which typically sees much less train activity during the daytime hours. A database of train horn noise levels recorded during our measurements is provided in the Appendix.

Short-term measurements were conducted at six sites in San Mateo to correlate the noise levels experienced in the neighborhoods with source noise levels at our long-term measurement locations. At each measurement location, we were able to compare the train horn noise levels with noise levels from other activities (e.g., vehicle pass-bys). At each location, the noise levels of the train horns were typically lower than noise from car pass-bys.

In addition to the noise measurements, we also reviewed train horn noise levels reported in several documents submitted to the City. Noise levels from these reports were gathered in several locations around San Mateo at various setbacks from the railway. The maximum noise levels from these reports are presented in the Appendix.

Overall, the results of the noise study can be summarized in the following conclusions:

- Noise levels from train horns were measured over the course of a month. Based on the data, there were no days of the week when train horns were significantly louder than other days.
- Freight train horn noise was louder than noise from the Caltrain trains.
- This study cannot be used to directly compare noise levels with the federal train horn noise limits. However, it does not appear from reviewing the data that train horns violate the federal limits.
- In the locations of our short-term noise studies, the noise levels from the train horns were often lower than those of passing cars.
- Duration of train horn sounding varied greatly depending on track conditions and train schedule. Duration of the train horns at the 2nd Avenue location varied between 7 seconds and 1 minute 18 seconds long. At the 16th Avenue location, train horn soundings lasted between 7 seconds and 51 seconds.

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[1] Decibel (dB) – A logarithmic unit used in acoustics to describe the magnitude of a sound with respect to a reference sound level. The term "Sound Level," "Noise Level" and Sound Pressure Level" (SPL) all imply a standardized reference level near the threshold of human hearing (0 decibels).

2.0 ENVIRONMENTAL NOISE FUNDAMENTALS

Over any given period of time, the noise levels in an environment will vary. One typical way to characterize the noise levels over a period of time is with the L_{eq} metric. The L_{eq} of a time period is an average of the varying noise levels during that time.

For short-term single noise events, such as train horns, the L_{eq} doesn't accurately reflect the loudness of the event. Instead, we use the L_{max} descriptor, which describes the maximum noise level experienced during a period of time.

The same L_{max} noise level may be measured during both daytime and nighttime hours, but it may be described by the listener as "louder" during some hours. This can be due in part to quieter average noise levels during the time period, such as during nighttime hours. It could also be due to the atmospheric effects (such as temperature, wind, and humidity). It is possible that noise levels can vary drastically depending on the atmospheric effects, even though the source noise levels are consistent.

At our long-term noise monitoring locations, the atmospheric effects were negligible due to the close proximity of our monitoring positions to the railway.

3.0 LONG-TERM NOISE MONITORING

Measurement Methodology

We conducted noise measurements at two locations over the course of a month from 29 April to 4 June 2013. Both locations were chosen for their proximity to the railway and distance from other noise sources. The noise monitors at each location were placed approximately 10 to 12 feet above the ground. Both noise monitors recorded L_{max} events from the train pass-bys.

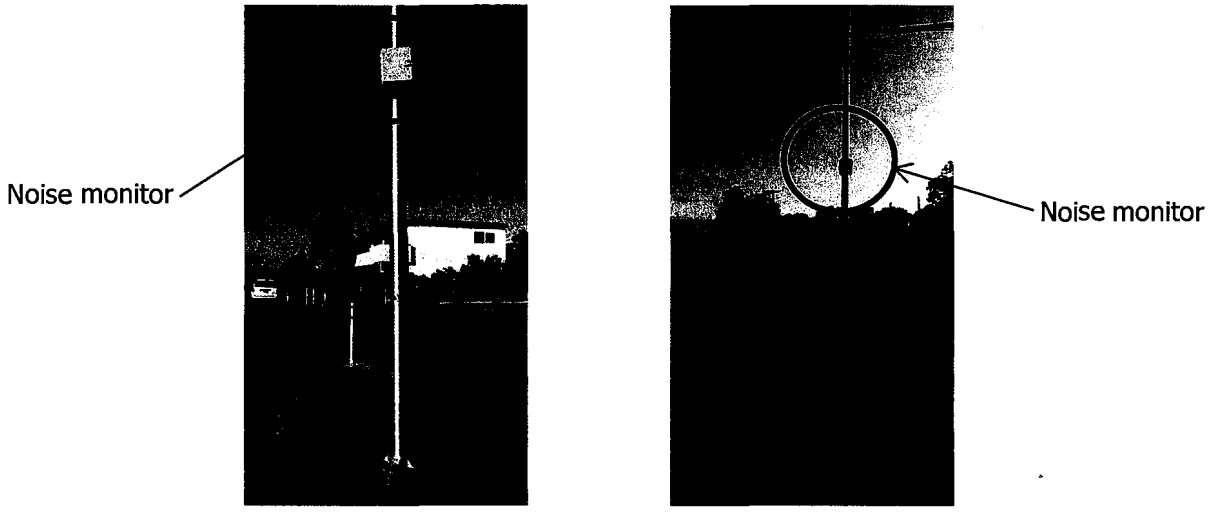
Measurement location 1 was placed near the corner of 2nd Avenue and S Railroad Avenue, approximately 40 feet from the centerline of 2nd Avenue and 40 feet from the centerline of the railway. This location is one block south of the San Mateo Caltrain station.

Measurement Location LT1



Measurement location 2 was placed near the corner of 16th Avenue and S Railroad Avenue, approximately 95 feet from the centerline of the railway. This measurement location was approximately 40 feet from the centerline of 16th Avenue and 95 feet from the centerline of the railway. The Hayward Park Caltrain station is 900 feet to the south.

Measurement Location LT2



Assessment of Measured Noise Levels

For our assessment, we defined "daytime" hours as between 7 am and 7 pm, "evening" hours as between 7 pm and 10 pm, and "nighttime" hours as between 10 pm and 7 am. For each of these time periods, we calculated the average and the most common maximum noise levels for comparison.

At the 2nd Avenue measurement location, the maximum noise levels measured during the month-long measurement period were:

Table 1: Measured L_{max} Noise Levels at 2nd Avenue Location

Time of Day	Maximum noise level (dB)	Minimum noise level (dB)	Average maximum noise level (dB)	Most common maximum noise level (dB)
Daytime	111	80	99	101
Evening	114	88	101	103
Nighttime	113	84	100	101

Although the maximum noise levels due to the train horns vary, the data shows that the evening hours are slightly louder at the 2nd Avenue location. Overall, the noise levels measured at the 16th Avenue location were approximately 10 dB quieter than those measured at the 2nd Avenue location because trains tended to sound their horns farther from the measurement location.

At the 16th Avenue measurement location, the maximum noise levels measured during the month-long measurement period were:

Table 2: Measured L_{max} Noise Levels at 16th Avenue Location

Time of Day	Maximum noise level (dB)	Minimum noise level (dB)	Average maximum noise level (dB)	Most common maximum noise level (dB)
Daytime	102	80	87	90
Evening	104	81	91	90
Nighttime	94	81	87	89

At this location, the data shows that the evening hours are also slightly louder.

Caltrain operates on this section of the railway between 5 am and 1 am. The freight lines do not operate on a set schedule, but will also operate during this time period. However, between 1 am and 5 am, the freight lines are the only trains operating on this section railway. We reviewed the data with respect to these non-Caltrain hours. The most common maximum noise levels for the freight trains were approximately 7 dB louder than the Caltrain trains during the nighttime hours.

From the data, it is impossible to compare noise levels from various train operators because the train operators choose to sound the train horn in different locations, resulting in a variation in noise levels. For the hours that Caltrain was operating, we measured a wide range of noise levels, from 81 to 111 dB. We measured a range of freight train horn noise levels between 90 to 112 dB (during the non-Caltrain hours).

Durations of the train horns was measured using the "trigger" feature of our sound level meters. The measurements were conducted using Rion NL-32 sound level meters set to turn on as the sound level reached a certain trigger point. For both locations, the trigger point was originally set at 80 dB. After reviewing the first week of data (which ended on 3 May), the trigger point was set to 87 dB at Location 1 to reduce the number of excedences caused by vehicular traffic. No changes were made at Location 2. The duration is the amount of time that the sound level experienced a noise level above the trigger point.

A database of maximum train horn event noise levels recorded during our measurements is provided in the Appendix.

4.0 SHORT-TERM NOISE MONITORING CASE STUDIES

Measurement Methodology

We conducted attended short-term noise monitoring at several locations around San Mateo to measure the environmental effects on the train horn noise. A summary of the measurement locations is shown in **Table 3**, below. The short-term noise monitors were each placed on a tripod, approximately 5 feet above the ground.

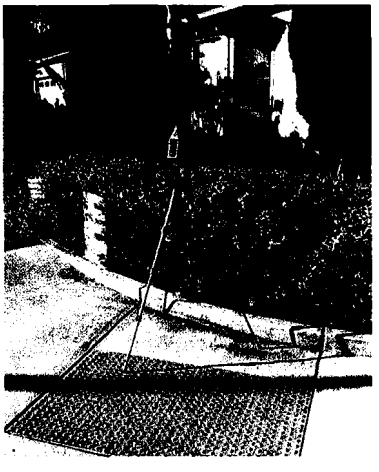
Table 3: Short-term Noise Monitoring Locations

Location Number	Nearest Intersection	Approx. Distance from Railway
ST1	S Grant Street and W Grant Place	1,600 ft
ST2	Turner Terrace and E Poplar Avenue	1,200 ft
ST3	9th Avenue and Rosewood Drive	550 ft
ST4	2nd Avenue and S Grant Street	1,600 ft
ST5	1st Avenue and N Delaware Street	900 ft
ST6	St Matthews Avenue and N San Mateo Drive	1,200 ft

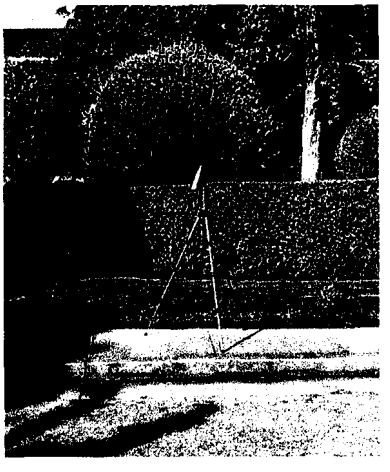
Assessment of Measured Noise Levels

At measurement locations ST1, ST2, and ST3, the measured train horn L_{max} noise levels were nearly always quieter than the L_{max} noise levels of passing traffic. Photos of these three measurement locations are below.

Location ST1



Location ST2



Location ST3

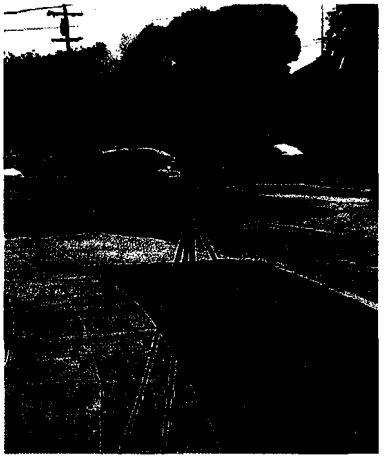


At these three measurement locations, the maximum train horn noise levels were from at-grade crossings that were not directly correlated with our long-term measurement locations. In order to compare the noise levels experienced in the community with our long-term noise measurements, we also conducted measurements at locations ST4, ST5, and ST6 (shown below).

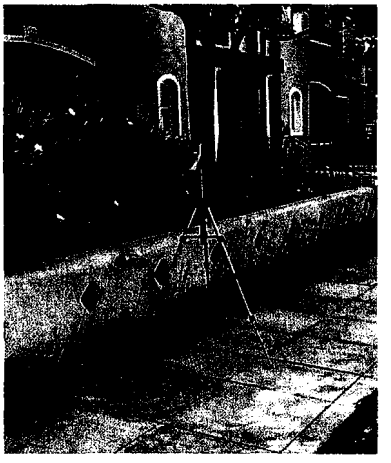
Location ST4



Location ST5



Location ST6



At these measurement locations, noise levels from the train were typically quieter than noise levels from vehicle pass-bys. When compared with the noise levels at the long-term monitoring position, the noise reductions due to distance, atmospheric effects, and barriers to the noise source amounted to approximately 29 to 43 dB. These noise reductions are in line with our predictions of the noise levels with minimal atmospheric effects. For our predictions, we calculated noise levels including shielding reductions and distance dropoff from a point source.

Measurements at each location included multiple train horn noise events, contributing to the range of noise levels that are shown in the Appendix.

5.0 REVIEW OF HISTORICAL NOISE STUDIES

We reviewed several historical noise studies as part of our assessment. Of particular interest were noise studies that addressed noise explicitly from trains. This information has been added to the database and is included in the Appendix.

Overall, it is not possible to compare the noise levels from the historical noise studies to the noise levels from this long-term noise study. The historical noise studies do not explicitly state what factors contribute to their measured noise levels. In some cases, the measured noise levels due to the trains were from train engines, rather than train horns as presented in this noise study. In other cases, the measurement locations were shielded from the noise source, providing additional noise reduction.

However, in some cases, the conclusions from the historical noise studies can be compared with the information presented in this noise study. For instance, the Rosen Goldberg Der & Lewitz noise study states that "L_{max} levels were similar for both commuter and freight trains...[h]owever, freight train passbys are usually longer in duration than commuter train passbys". At the measurement location where this study was based, train pass-by noise was solely due to engine noise and had no contribution to train horn noise. When comparing noise due solely from the train horns, our study found that trains during non-Caltrain hours are approximately 7 dB louder than Caltrain trains during the nighttime hours (see Section 3, above).

6.0 CONCLUSIONS

Over the course of this month-long noise study, more than 3,000 train horn noise levels were recorded at two long-term noise monitoring locations. After reviewing the data, the train horn noise levels appear to be consistent, with no one day seeming particularly loud when compared to other days.

The appendix presents the train horn noise levels and the associated Caltrain train scheduled to be arriving or passing through the station at that time. The freight trains do not operate on a published schedule, but are the only trains operating on the tracks between 1 am and 5 am. Based on the data, the noise levels from the freight trains are approximately 7 dB louder on average than the noise levels from the Caltrain trains. We understand that Caltrain has relocated their train horns to the bottom of the train and lowered the noise levels in an attempt to reduce neighborhood noise intrusion. The freight trains operating on this railway have their train horns located on the front of the engine and have set the noise levels to meet the federal maximum noise level. The freight trains operate along several rail corridors and have stated that they may need the increased ability to warn drivers and pedestrians of their approach.

The Federal Railroad Administration (FRA) requires that train horn noise levels be between 96 and 110 dB when measured at 100 feet in front of the train[2]. In addition, the FRA requires that the train horns be sounded in a standardized pattern of 2 long blasts, 1 short blast, and 1 long blast. The FRA does not state what amount of time constitutes a "long blast" or a "short blast"[3].

Noise levels for individual trains horns measured for this study varied significantly, from 81 dB to 112 dB. The primary reason for this is the distance at which the train operator chose to sound the horn. The long-term measurements cannot be directly compared to the FRA standards due to this difference in the location of the train horn sounding. Based on a review of the data, there is no reason to believe that train horns are violating the federal noise standards.

The duration of the train horn sounds varied greatly over the course of the measurement period (between 0:07 and 1:18 at the 2nd Avenue location and between 0:07 and 0:51 at the 16th Avenue location). Operators sounded the horns for various reasons, including to warn people or animals on the tracks, to announce their arrival or departure from the station, and when passing through the station on an express schedule.

We conducted short-term measurements at several locations in San Mateo on two days. In all cases, the reductions in noise levels were in line with the expected reduction due to distance and shielding. The short-term noise measurements did not show any environmental factors.

Complaints were received from residents of San Mateo that claimed noise levels were louder during the night time hours. During the short-term measurements, we observed that noise from the train horns was typically quieter than noise from passing cars. No freight train pass-bys were recorded during the short-term measurements. The observation that train noise levels were louder at night could be due in part to the quieter average noise levels experienced during the nighttime hours, allowing for increased noise intrusion. Also, the freight trains (which operate during the nighttime hours) are approximately 7 dB louder than noise from the Caltrain trains.

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2 "Use of Locomotive Horns at Highway-Rail Grade Crossings; Final Rule," 71 *Federal Register* 159 (17 August 2006), pp. 47666.

3 "The Train Horn Rule and Quiet Zones." *Federal Railroad Administration*. Web. 26 August 2013. <http://www.fra.dot.gov/Page/P0104>.

Appendix Section 1.0

RESULTS OF LONG-TERM MEASUREMENTS
2nd and Railroad Location

Location: 2nd and Railroad
Date: 29 April 2013

Time	Lmax	Duration	Direction	Train
18:57:50	104	0:44	SB	386
18:59:54	100	0:23		
19:03:58	94	0:29	NB	385
19:12:38	90	0:25	NB	287
19:18:20	102	0:15	SB	288
19:31:33	98	0:24	NB	289
19:36:50	106	0:30		
19:44:14	102	0:26	NB	191
20:03:06	99	0:41	SB	190
20:13:13	104	0:30		
20:26:03	103	0:28	NB	193
21:13:12	99	0:38	SB	192
21:25:09	102	0:31	NB	195
22:12:04	96	0:28	SB	194
22:25:17	99	0:28	NB	197
22:30:19	106	0:37		
23:12:24	103	0:44	SB	196
23:23:31	100	0:25	NB	199
23:57:41	99	0:28		

Location: 2nd and Railroad
Date: 30 April 2013

Time	Lmax	Duration	Direction	Train
0:34:08	99	0:31	SB	198
5:23:43	100	0:32	NB	101
5:27:15	99	0:56	SB	102
5:57:43	101	0:26	SB	104
5:58:51	97	0:39	NB	103
6:19:06	101	0:18	NB	305
6:37:41	90	0:21	SB	206
6:38:21	102	0:41	NB	309
6:55:03	100	0:17	SB	208
6:55:31	91	0:19	NB	207
7:06:51	94	0:28	SB	210
7:14:26	104	0:47	NB	211
7:20:31	102	0:29	NB	313
7:32:58	99	0:29	NB	215
7:37:43	97	0:13	SB	314
7:40:26	99	0:27	NB	319
7:44:51	104	0:48	SB	216
7:55:41	101	0:37	SB	218
8:07:55	105	0:29	NB	221
8:08:43	98	0:39	SB	220
8:19:58	101	0:14	SB	322
8:23:46	103	0:19	NB	323
8:33:06	101	0:31	NB	225
8:38:22	101	0:32	NB	329
8:45:25	88	0:17	SB	226
8:56:57	101	0:17	SB	228
8:58:08	99	0:40	NB	227
9:07:43	85	0:08	SB	230
9:08:18	97	0:28	NB	231
9:11:28	96	0:25		
9:20:19	92	0:15	SB	332
9:38:56	103	0:44	SB	134
10:02:51	100	0:44	SB	236
10:09:27	96	0:21	NB	135
10:36:26	102	0:29	NB	237
10:39:17	95	0:26	SB	138
11:10:39	94	0:27	NB	139
11:39:47	101	0:20	SB	142
12:08:00	101	0:30	NB	143
12:39:37	97	0:25	SB	146
13:12:51	91	0:25	NB	147
13:40:23	96	0:49	SB	150
14:04:36	94	0:25	NB	151
14:39:03	103	0:41	SB	152
15:03:11	100	0:28	SB	254
15:07:41	100	0:24	NB	155
15:33:19	93	0:22	NB	257
15:38:45	91	0:18	SB	156

Time	Lmax	Duration	Direction	Train
16:03:02	102	0:31	NB	159
16:06:21	100	0:24	SB	258
16:29:39	93	0:14	SB	360
16:38:38	103	0:31	NB	261
16:42:29	98	0:24	SB	262
16:48:49	93	0:24	NB	263
16:57:46	103	0:33	SB	366
17:01:00	104	0:16	NB	365
17:04:36	104	0:43	SB	264
17:14:04	100	0:28	NB	267
17:18:47	101	0:17	SB	268
17:20:18	95	0:17	NB	371
17:35:10	104	0:38	SB	268
17:45:46	94	0:25	SB	272
17:49:18	102	0:30	NB	273
17:57:18	101	0:36	SB	376
18:06:44	101	0:58	SB	274
18:08:56	103	0:15	NB	375
18:17:28	102	0:31	NB	277
18:20:57	103	0:15	SB	278
18:21:57	104	0:21	NB	381
18:34:42	96	0:14	NB	279
18:37:24	100	0:25		
18:44:15	103	0:44	SB	282
18:47:05	103	0:28	NB	283
18:57:10	101	0:44	SB	386
19:00:31	105	0:18	NB	385
19:04:06	101	0:40	SB	284
19:11:33	100	0:23	NB	287
19:19:55	96	0:14	SB	288
19:27:17	110	0:32		
19:31:30	109	0:30	NB	289
19:33:00	102	0:27		
19:47:26	98	0:26	NB	191
20:03:40	97	0:29	SB	190
20:32:02	105	0:29	NB	193
21:13:29	89	0:46	SB	192
21:28:06	97	0:30	NB	193
22:14:24	100	0:40	SB	194
22:26:06	93	0:27	NB	197
22:30:54	101	0:29		
23:09:31	112	0:21		
23:11:39	100	0:44	SB	196
23:24:16	102	0:30	NB	199

Location: 2nd and Railroad
Date: 1 May 2013

Time	Lmax	Duration	Direction	Train
0:34:02	93	0:20	SB	198
5:23:47	96	0:28	NB	101
5:28:02	99	0:37	SB	102
5:56:33	99	0:45	SB	104
5:59:10	98	0:34	NB	103
6:18:59	98	0:18	NB	305
6:39:01	100	0:35	NB	309
6:54:10	97	0:17	SB	208
6:55:30	96	0:30	NB	207
7:08:41	93	0:22	SB	210
7:10:02	101	0:43	NB	211
7:20:16	103	0:19	SB	312
7:21:54	97	0:14	NB	313
7:34:39	94	0:25	NB	215
7:36:39	102	0:14	SB	314
7:40:42	93	0:14	NB	319
7:43:35	100	0:36	SB	216
7:56:03	90	0:25	SB	218
7:58:19	107	0:19	NB	217
8:07:43	98	0:20	SB	220
8:10:01	107	0:36	NB	221
8:21:40	99	0:13	SB	322
8:23:02	103	0:19	NB	323
8:33:05	101	0:31	NB	225
8:39:27	100	0:14	NB	329
8:41:19	100	0:29	SB	226
8:46:24	97	0:24		
8:58:19	100	0:35	SB	228
9:10:31	105	0:40	NB	231
9:21:06	105	0:15	SB	332
9:21:59	99	0:29		
9:36:32	81	0:07	NB	233
9:40:50	98	0:29	SB	134
10:03:50	97	0:29	SB	236
10:07:16	93	0:22	NB	135
10:32:09	91	0:22		
10:42:08	89	0:08	SB	138
11:09:09	96	0:22	NB	139
11:39:35	90	0:14	SB	142
12:10:01	93	0:27	NB	143
12:39:20	96	0:31	SB	146
13:10:03	101	0:28	NB	147
13:41:33	99	0:29	SB	150
14:08:54	103	0:24	NB	151
14:41:40	102	0:38	SB	152
15:04:25	103	0:32	SB	254
15:05:07	96	0:24	NB	155
15:33:38	96	0:26	NB	257
15:39:07	93	0:18	SB	156
16:02:43	99	0:34	SB	258
16:04:22	107	0:32	NB	159
16:29:44	105	0:16	SB	360
16:34:25	98	0:27	NB	261
16:43:12	99	0:40	SB	262
16:47:19	99	0:24	NB	263
16:57:29	97	0:28	SB	366
17:01:10	97	0:15	NB	365
17:04:33	93	0:29	SB	264
17:13:24	106	0:25	NB	267
17:19:51	101	0:30	SB	268
17:35:50	101	0:15	SB	370
17:38:36	102	0:28	NB	269
17:45:24	105	0:38	SB	272
17:48:53	99	0:23	NB	273
17:57:11	102	0:36	SB	376
18:02:36	101	0:16	NB	375
18:03:55	101	0:54	SB	274
18:14:48	105	0:32	NB	277
18:19:40	92	0:13	SB	278
18:20:21	100	0:23	NB	381
18:35:34	101	0:33	SB	380
18:37:28	101	0:16	NB	279
18:45:20	103	0:50	SB	282
18:46:55	101	0:24	NB	283
18:57:15	97	0:37	SB	386
19:01:52	100	0:16	NB	385
19:08:00	100	0:41	SB	284
19:12:41	99	0:25	NB	287
19:24:13	102	0:19	SB	288
19:29:31	109	0:30		
19:34:11	100	0:30	NB	289
19:48:09	102	0:30	NB	191
20:01:34	99	0:46	SB	190
20:23:20	112	0:36		
20:24:06	104	0:34	NB	193
20:50:47	111	0:20		
21:13:00	91	0:22	SB	192
21:26:15	96	0:28	NB	195
22:14:14	98	0:33	SB	194
22:28:05	102	0:28	NB	197
23:11:49	90	0:08	SB	196
23:27:49	103	0:37	NB	199
23:33:34	106	0:42		

Location: 2nd and Railroad
Date: 2 May 2013

Time	Lmax	Duration	Direction	Train
0:34:44	96	0:27	SB	198
5:25:44	92	0:28	NB	101
5:26:56	98	0:36	SB	102
5:57:45	106	0:47	SB	104
5:58:49	100	0:42	NB	103
6:18:47	101	0:18	NB	305
6:36:50	102	1:04	SB	206
6:54:41	99	0:17	SB	208
6:56:45	98	0:27	NB	207
7:08:08	102	0:34	SB	210
7:09:58	99	0:26	NB	211
7:19:33	103	0:18	SB	312
7:21:52	101	0:16	NB	313
7:33:29	99	0:28	NB	215
7:37:49	88	0:18	SB	314
7:38:25	101	0:14	NB	319
7:46:21	89	0:14	SB	216
7:56:03	103	0:44	SB	218
8:06:48	97	0:23	SB	220
8:08:58	100	0:54	NB	221
8:19:51	102	0:15	SB	322
8:20:49	105	0:18	NB	323
8:33:40	96	0:29	NB	225
8:37:23	92	0:14	SB	324
8:44:11	103	0:36	SB	226
8:56:00	95	0:18	SB	228
9:02:09	103	0:19	NB	227
9:11:40	100	0:40	NB	231
9:12:32	102	0:41	SB	230
9:20:59	103	0:15	SB	332
9:37:32	93	0:25	NB	233
9:40:09	104	0:32	SB	134
10:05:51	97	0:30	SB	236
10:11:45	100	0:27	NB	135
10:36:11	100	0:30	SB	138
10:38:10	101	0:31	SB	138
11:07:21	96	0:26	NB	139
11:39:18	101	0:29	SB	142
12:09:46	96	0:23	NB	143
12:42:00	97	0:30	SB	146
13:08:21	99	0:32	NB	147
13:41:36	103	0:40	SB	150
14:10:09	102	0:28	NB	151
14:39:32	101	0:37	SB	152
15:04:11	100	0:37	NB	155
15:33:48	101	0:32	NB	257
15:40:54	98	0:28	SB	156
16:03:02	98	0:46	NB	159

Time	Lmax	Duration	Direction	Train
16:04:13	98	0:30	SB	258
16:32:08	101	0:15	SB	360
16:34:26	97	0:23	NB	261
16:42:12	102	0:40	SB	262
16:51:53	101	0:26	NB	263
16:57:02	98	0:38	SB	366
16:59:43	103	0:16	NB	365
17:05:47	100	0:38	SB	264
17:11:31	98	0:26	NB	267
17:20:27	103	0:16	SB	268
17:21:25	99	0:16	NB	371
17:34:59	101	0:14	SB	370
17:38:36	98	0:12	NB	269
17:44:24	103	0:41	SB	272
17:50:10	97	0:26	NB	273
17:56:47	102	0:43	SB	376
18:01:49	105	0:17	NB	375
18:04:00	98	0:42	SB	274
18:14:58	91	0:26	NB	277
18:20:11	102	0:14	SB	278
18:21:09	101	0:23	NB	381
18:33:54	99	0:15	SB	380
18:36:44	101	0:27	NB	279
18:45:16	103	0:47	SB	282
18:47:37	99	0:25	NB	283
18:57:23	99	0:36	SB	386
19:01:13	103	0:17	NB	385
19:07:08	103	0:46	SB	284
19:11:58	102	0:26	NB	287
19:19:32	98	0:14	SB	288
19:30:49	108	0:42	NB	289
19:35:43	108	0:24		
19:36:23	103	0:25		
19:44:16	101	0:27	NB	191
20:02:18	97	0:43	SB	191
20:25:49	100	0:23	NB	193
21:16:49	101	0:52	SB	192
21:26:40	101	0:28	NB	195
22:12:12	99	0:32	SB	194
22:25:17	106	0:32	NB	197
22:33:30	109	0:33		
23:13:14	102	0:49	SB	196
23:28:38	84	0:08	NB	199

Location: 2nd and Railroad
Date: 3 May 2013

Time	Lmax	Duration	Direction	Train
0:26:29	108	0:38		
0:34:26	90	0:23	SB	198
5:26:07	100	0:27	NB	101
5:27:05	99	0:47	SB	102
5:59:23	92	0:35	SB	104
6:00:15	102	0:49	NB	103
6:23:05	104	0:18	NB	305
6:37:13	104	0:27	SB	206
6:39:37	102	0:41	NB	309
6:55:00	94	0:22	SB	208
7:07:10	97	0:33	SB	210
7:08:54	100	0:31	NB	211
7:19:30	98	0:17	SB	312
7:20:24	98	0:12	NB	313
7:32:56	101	0:30	NB	215
7:36:15	97	0:13		
7:37:42	98	0:27	SB	314
7:42:54	95	0:18	SB	216
7:54:58	103	0:15	SB	218
7:57:53	101	0:31	NB	217
8:08:06	102	1:01	SB	220
8:20:24	103	0:15	SB	322
8:21:41	103	0:18	NB	323
8:31:23	94	0:23	NB	225
8:37:03	103	0:15	SB	324
8:41:16	104	0:29	SB	226
8:43:55	101	0:46	SB	226
8:56:32	105	0:32	NB	227
9:07:15	96	0:49	SB	230
9:08:41	97	0:14	NB	231
9:21:24	98	0:15	SB	332
9:40:28	101	0:37	SB	134
10:03:18	97	0:28	SB	236
10:06:09	97	0:25	NB	135
10:37:36	99	0:21	SB	138
10:40:15	95	0:25		
11:06:40	98	0:27	NB	139
11:41:09	82	0:07	NB	237
12:08:33	94	0:23	NB	143
12:39:31	96	0:32	SB	146
13:08:55	93	0:25	NB	147
13:39:14	100	0:31	SB	150
14:10:09	93	0:25	NB	151
14:41:04	94	0:26	SB	152
15:03:10	98	0:26	SB	254
15:08:10	102	0:27	NB	155
15:34:11	99	0:23	NB	257
15:39:06	82	0:07	SB	156

Time	Lmax	Duration	Direction	Train
16:04:56	103	0:45	SB	258
16:05:44	103	0:29	NB	159
16:29:59	101	0:14	SB	360
16:40:24	95	0:23	NB	261
16:43:36	100	0:26	SB	262
16:50:46	100	0:25	NB	263
16:57:22	95	0:15	SB	366
17:02:08	104	0:19	NB	365
17:05:22	82	0:08	SB	264
17:14:33	99	0:25	NB	267
17:20:57	103	0:32	SB	268
17:35:30	96	0:13	SB	370
17:43:34	104	0:45	SB	272
17:49:15	80	0:07	Accident on Tracks	
17:56:52	90	0:07	Accident on Tracks	
18:05:16	103	0:07	Accident on Tracks	
18:19:16	102	0:12	Accident on Tracks	
18:35:51	101	0:47	Accident on Tracks	
18:47:52	98	0:15	Accident on Tracks	
18:52:11	97	0:15	Accident on Tracks	
18:57:54	103	0:30	Accident on Tracks	
19:05:05	99	0:23	Accident on Tracks	
19:14:02	101	0:23	Accident on Tracks	
19:41:51	105	0:15	Accident on Tracks	
19:49:33	100	0:14	Accident on Tracks	
19:53:49	98	0:13	Accident on Tracks	
20:10:25	100	0:22	Accident on Tracks	
20:26:19	100	0:11	Accident on Tracks	
20:30:23	100	0:09	Accident on Tracks	
20:42:04	100	0:15	Accident on Tracks	
20:45:16	103	0:13	Accident on Tracks	
20:49:43	109	0:16	Accident on Tracks	
21:19:46	101	0:24	Accident on Tracks	
21:24:20	109	0:39	Accident on Tracks	
21:26:00	99	0:08	Accident on Tracks	
21:30:20	96	0:12	Accident on Tracks	
21:32:20	111	0:24	Accident on Tracks	
22:16:51	94	0:08	SB	194
22:33:07	102	0:19	NB	197
22:59:58	112	0:16		
23:15:28	104	0:24	SB	196
23:27:19	98	0:13	NB	199
23:47:03	95	0:14		

Location: 2nd and Railroad
Date: 4 May 2013

Time	Lmax	Duration	Direction	Train
0:27:11	97	0:12		
0:31:36	101	0:21		
0:36:46	104	0:25	SB	198
1:23:55	107	0:39		
1:57:55	104	0:17		
8:01:18	93	0:13	NB	421
8:51:54	96	0:22	SB	422
8:57:55	100	0:10	NB	423
9:49:50	96	0:13	SB	424
10:07:00	101	0:11	NB	425
10:51:52	102	0:20	SB	426
11:02:04	100	0:15	NB	427
11:14:46	101	0:14	NB	801
11:51:25	105	0:25	SB	428
12:01:37	101	0:18	NB	429
12:22:30	102	0:24	SB	802
12:50:41	99	0:20	SB	430
13:01:28	93	0:15	NB	431
13:52:18	97	0:13	SB	432
13:59:32	100	0:12	NB	433
14:50:17	92	0:07	SB	434
15:01:17	101	0:19	NB	435
15:48:59	98	0:20	SB	436
15:58:30	103	0:11	NB	437
16:06:47	100	0:15		
16:50:22	98	0:22	SB	438
17:00:06	97	0:13	NB	439
17:04:13	95	0:18		
17:51:24	101	0:23	SB	440
17:58:44	104	0:27	NB	441
18:14:21	94	0:11	NB	803
18:51:53	98	0:22	SB	442
19:06:31	100	0:20	NB	443
19:21:09	99	0:13	SB	804
19:50:39	103	0:26	SB	444
19:56:47	96	0:12	NB	445
20:48:56	102	0:23	SB	446
20:58:40	100	0:09	NB	447
21:49:56	104	0:26	SB	448
21:57:13	98	0:18	NB	449
22:50:42	100	0:24	SB	450
23:03:59	98	0:13		
23:25:40	101	0:15	NB	451
23:37:35	96	0:12	SB	454

Location: 2nd and Railroad
Date: 5 May 2013

Time	Lmax	Duration	Direction	Train
0:32:10	103	0:14		
0:36:57	93	0:09		
9:52:17	94	0:13	SB	424
9:58:42	94	0:08	NB	425
10:50:31	102	0:15	SB	426
11:01:54	101	0:19	NB	427
11:14:58	92	0:07	NB	801
11:51:45	94	0:10	SB	428
12:02:50	97	0:11	NB	429
12:21:57	101	0:23	SB	802
12:52:10	99	0:09	SB	430
13:49:58	91	0:13	SB	432
14:00:13	99	0:16	NB	433
14:50:24	95	0:14	SB	434
14:56:29	97	0:15	NB	435
15:04:06	103	0:19		
15:48:59	105	0:24	SB	436
15:56:47	99	0:17	NB	437
16:01:12	104	0:18		
16:06:59	98	0:12		
16:50:32	98	0:12	SB	438
17:01:16	99	0:20	NB	439
17:50:48	106	0:27	SB	440
18:01:59	100	0:17	NB	441
18:12:57	106	0:25	NB	803
18:49:47	100	0:24	SB	442
18:56:11	101	0:13	NB	443
19:21:23	100	0:22	SB	804
19:37:01	114	0:21		
19:52:23	96	0:24	SB	444
19:58:59	89	0:09	NB	445
20:41:08	96	0:15		
20:54:15	101	0:21	SB	446
21:00:56	97	0:24	NB	447
21:20:20	108	0:26		
21:52:30	100	0:24	SB	448
21:56:22	100	0:26	NB	449
22:44:38	101	0:14		

Location: 2nd and Railroad
Date: 6 May 2013

Time	Lmax	Duration	Direction	Train
5:23:50	99	0:15	NB	101
5:28:13	98	0:14	SB	102
5:58:51	90	0:07	SB	104
6:00:58	102	0:23	NB	103
6:18:58	102	0:15	NB	305
6:37:40	93	0:12	SB	206
6:38:02	101	0:18	NB	309
6:55:20	97	0:13	SB	208
6:55:53	98	0:13	NB	207
7:06:41	100	0:10	SB	210
7:09:03	103	0:21	NB	211
7:19:49	99	0:14	SB	312
7:21:34	93	0:11	NB	313
7:32:52	96	0:09	NB	215
7:36:22	94	0:08	SB	314
7:37:56	98	0:08	NB	319
7:48:51	99	0:11	SB	216
7:56:11	105	0:21	SB	218
8:02:53	105	0:16	NB	217
8:08:44	94	0:11	SB	220
8:12:00	97	0:15	NB	221
8:20:04	98	0:13	SB	322
8:26:38	98	0:12	NB	323
8:37:14	101	0:14	NB	225
8:38:50	106	0:23	SB	324
8:45:59	99	0:10	NB	329
8:46:20	94	0:11	SB	226
8:59:24	92	0:10	SB	228
9:03:01	101	0:14	NB	227
9:10:18	99	0:23	SB	230
9:13:28	93	0:12	NB	231
9:22:04	98	0:13	SB	332
9:40:24	100	0:23	NB	233
9:42:00	104	0:17	SB	134
10:04:04	99	0:19	SB	236
10:20:41	96	0:11	NB	135
10:35:22	96	0:12		
10:39:44	101	0:30	SB	138
11:06:11	95	0:12	NB	139
11:43:05	100	0:16	SB	142
12:07:16	97	0:12	NB	143
12:39:31	97	0:13	SB	146
13:06:50	102	0:12	NB	147
13:38:57	103	0:14	SB	150
14:11:22	101	0:13	NB	151
14:41:33	103	0:27	SB	152
15:03:05	97	0:11	SB	254
15:05:25	102	0:18	NB	155
15:40:37	105	0:26	NB	257
15:48:36	105	0:26	SB	156

Time	Lmax	Duration	Direction	Train
16:03:44	103	0:17	SB	258
16:10:32	107	0:25		
16:29:46	99	0:13	SB	360
16:39:35	98	0:12	NB	261
16:43:19	90	0:07	SB	262
16:49:42	100	0:11	NB	263
16:57:15	101	0:24	SB	366
17:00:51	102	0:13	NB	365
17:04:21	99	0:12	SB	264
17:13:04	97	0:13	NB	267
17:19:45	100	0:13	SB	268
17:21:20	100	0:16	NB	371
17:35:59	101	0:10	SB	370
17:42:04	97	0:17	NB	269
17:44:24	105	0:24	SB	272
17:51:49	98	0:17	NB	273
17:58:57	98	0:26	SB	376
18:03:58	103	0:15	NB	375
18:06:58	95	0:10	SB	274
18:12:42	97	0:14	NB	277
18:20:27	107	0:17	NB	381
18:21:40	99	0:17	SB	278
18:35:08	99	0:09	SB	380
18:38:33	101	0:21	NB	279
18:43:35	97	0:12	SB	282
18:48:50	100	0:08	NB	283
18:57:27	102	0:13	SB	386
19:03:31	101	0:16	NB	385
19:04:28	102	0:26	SB	284
19:12:02	105	0:26	NB	287
19:19:06	101	0:13	SB	288
19:32:23	104	0:15	NB	289
19:36:29	107	0:35		
19:44:34	105	0:25	NB	191
20:04:13	103	0:23	SB	190
20:23:55	111	0:28		
20:26:30	102	0:17	NB	193
21:00:39	100	0:13		
21:13:23	96	0:23	SB	192
21:29:30	94	0:11	NB	195
22:12:37	101	0:21	SB	194
22:24:09	102	0:14	NB	197
22:37:56	98	0:13		
23:00:39	100	0:22		
23:14:09	100	0:21	SB	196
23:27:08	99	0:17	NB	199
23:34:38	111	0:24		

Location: 2nd and Railroad
Date: 7 May 2013

Time	Lmax	Duration	Direction	Train
0:06:56	103	0:15		
0:34:17	101	0:24	SB	198
1:22:11	108	1:00		
5:23:51	96	0:15		
5:28:05	97	0:18	NB	101
5:58:37	101	0:41	SB	104
6:18:31	98	0:14	NB	305
6:37:38	92	0:08	SB	206
6:40:08	97	0:17	NB	309
6:54:49	97	0:12	SB	208
6:55:57	97	0:10	NB	207
7:06:55	102	0:15	NB	211
7:09:38	99	0:16	SB	210
7:19:36	103	0:14	SB	312
7:20:09	101	0:16	NB	313
7:31:51	109	0:24	NB	215
7:36:23	98	0:10	SB	314
7:42:58	92	0:09	NB	319
7:44:13	96	0:11	SB	216
7:56:10	100	0:27	SB	218
8:07:16	98	0:11	SB	220
8:10:05	102	0:10	NB	221
8:20:03	100	0:13	SB	322
8:37:04	94	0:10	SB	324
8:44:36	102	0:23	SB	226
8:58:28	100	0:26	SB	228
9:03:04	103	0:19	NB	227
9:09:01	91	0:08	SB	230
9:09:09	100	0:12	NB	231
9:25:23	101	0:11	SB	332
9:31:58	102	0:17	NB	233
9:39:20	104	0:15		
9:40:18	106	0:21	SB	134
9:50:34	96	0:20		
9:55:31	91	0:10		
10:03:58	100	0:22	SB	236
10:06:58	94	0:20	NB	135
10:34:25	93	0:08	SB	138
10:43:27	102	0:28		
11:09:29	100	0:10	NB	139
11:41:06	103	0:31	SB	142
12:05:14	92	0:15	NB	143
12:39:37	97	0:14	SB	146
13:16:33	99	0:12	NB	147
13:40:11	98	0:18	SB	150
14:09:21	98	0:19	NB	151
14:38:47	99	0:24	SB	152
15:08:33	88	0:08	SB	254
15:10:25	98	0:15	NB	155
15:38:14	102	0:15	NB	257
15:40:33	100	0:23	SB	156
16:03:46	97	0:11	NB	159
16:04:52	103	0:22	SB	258
16:29:49	100	0:11	SB	360
16:35:05	103	0:20	NB	261
16:46:52	102	0:15	SB	262
16:51:07	102	0:16	NB	263
16:57:26	100	0:24	SB	366
16:59:58	101	0:13	NB	365
17:06:12	97	0:11	SB	264
17:11:52	89	0:11	NB	267
17:19:15	105	0:13	SB	268
17:20:37	102	0:14	NB	371
17:36:50	102	0:11	SB	370
17:37:49	105	0:16	NB	269
17:46:40	99	0:22	SB	272
17:49:30	99	0:10	NB	273
17:57:16	101	0:22	SB	376
18:05:07	98	0:12	NB	375
18:06:56	98	0:22	SB	274
18:13:29	97	0:08	NB	277
18:19:37	102	0:14	SB	278
18:21:45	105	0:14	NB	381
18:37:32	105	0:22	SB	380
18:39:01	98	0:10	NB	279
18:46:21	99	0:20	SB	282
18:48:27	99	0:16	NB	283
18:56:44	97	0:22	SB	386
18:59:49	101	0:13	NB	385
19:04:17	100	0:23	SB	284
19:12:42	105	0:20	NB	287
19:19:37	95	0:09	SB	288
19:32:33	96	0:20	NB	289
19:45:32	95	0:14	NB	191
20:02:12	92	0:21	SB	190
20:06:50	102	0:25		
20:28:12	105	0:22	NB	193
20:31:24	112	0:38		
20:42:01	108	0:32		
20:44:00	98	0:13		
21:15:56	103	0:23	SB	192
21:25:02	98	0:19	NB	195
22:13:00	99	0:13	SB	194
22:26:23	105	0:15	NB	197
22:30:19	101	0:14		
22:49:22	94	0:20		
23:13:09	105	0:24	SB	196
23:26:16	104	0:14	NB	199
23:33:12	101	0:25		

Location: 2nd and Railroad
Date: 8 May 2013

Time	Lmax	Duration	Direction	Train
0:32:47	99	0:24	SB	198
0:36:47	100	0:14		
0:43:00	113	0:18		
1:46:13	108	0:34		
2:07:31	103	0:18		
2:37:49	99	0:07		
4:23:02	103	0:23		
5:23:51	95	0:20	NB	101
5:27:35	98	0:23	SB	102
5:57:39	103	0:24	SB	104
5:58:38	93	0:09	NB	103
6:18:42	96	0:14	NB	305
6:37:15	99	0:13	SB	206
6:38:38	100	0:13	NB	309
6:54:51	103	0:16	SB	208
6:55:29	101	0:20	NB	207
7:07:03	102	0:18	SB	210
7:10:33	100	0:23	NB	211
7:20:03	101	0:11	SB	312
7:20:22	104	0:16	NB	313
7:31:27	94	0:18	NB	215
7:37:35	104	0:14	SB	314
7:48:35	103	0:15	SB	216
7:55:21	101	0:21	NB	319
7:57:26	99	0:12	SB	218
8:09:47	102	0:25	SB	220
8:10:14	102	0:26	NB	221
8:19:03	96	0:14	SB	322
8:35:02	104	0:15	NB	225
8:38:24	97	0:13	SB	324
8:40:07	95	0:12	NB	329
8:45:12	93	0:09	SB	226
8:57:02	106	0:28	SB	228
8:59:08	108	0:16	NB	227
9:09:23	97	0:24	SB	230
9:21:44	95	0:12	SB	332
9:38:50	104	0:12	NB	233
9:39:46	105	0:25	SB	134
9:52:16	99	0:14		
10:06:25	92	0:08	SB	236
10:06:32	101	0:17	NB	135
10:10:25	93	0:13		
10:38:34	104	0:23	SB	138
10:42:42	95	0:10		
10:51:24	88	0:08		
11:06:18	103	0:12	NB	139
11:10:35	99	0:12		
11:39:08	96	0:09	SB	142
12:16:44	97	0:17	NB	143
12:40:11	95	0:12	SB	146
13:12:42	101	0:19	NB	147
13:39:08	101	0:23	SB	150

Time	Lmax	Duration	Direction	Train
14:05:43	111	1:02	NB	151
14:06:27	100	0:15		
14:38:41	91	0:07	SB	152
15:02:51	103	0:25	SB	254
15:04:19	102	0:17	NB	155
15:33:26	104	0:15	NB	257
15:40:44	94	0:24	SB	156
16:05:13	98	0:20	NB	159
16:06:40	104	0:26	SB	258
16:22:19	98	0:14		
16:29:31	96	0:12	SB	360
16:34:57	101	0:20	NB	261
16:44:27	105	0:23	SB	262
16:46:48	108	0:23	NB	263
16:58:28	100	0:23	SB	366
17:03:30	98	0:12	SB	264
17:11:33	100	0:28	NB	267
17:19:20	102	0:14	SB	268
17:19:47	102	0:14	NB	371
17:34:49	101	0:10	SB	370
17:36:13	102	0:20	NB	269
17:45:09	102	0:16	SB	272
17:47:12	103	0:12	NB	273
17:56:52	102	0:34	SB	376
18:03:14	99	0:14	NB	375
18:03:51	99	0:22	SB	274
18:13:21	100	0:20	NB	277
18:18:54	102	0:14	SB	278
18:19:34	104	0:11	NB	381
18:35:35	98	0:15	SB	380
18:36:13	98	0:09	NB	279
18:43:13	95	0:12	SB	282
18:48:50	102	0:14	NB	283
18:56:42	101	0:24	SB	386
19:02:25	104	0:14	NB	385
19:04:07	97	0:18	SB	284
19:12:43	99	0:14	NB	287
19:18:31	103	0:11	SB	288
19:29:34	107	0:27		
19:30:22	98	0:18	NB	289
19:35:58	111	0:21		
19:44:15	99	0:09	NB	191
20:05:53	102	0:23	SB	190
20:32:23	102	0:14	NB	193
21:12:19	100	0:23	SB	192
21:29:06	110	0:27	NB	195
22:14:51	97	0:16	SB	194
22:25:26	100	0:10	NB	197
22:46:27	111	0:24		
23:11:06	103	0:24	SB	196
23:23:52	97	0:13	NB	199

Location: 2nd and Railroad
Date: 9 May 2013

Time	Lmax	Duration	Direction	Train
0:12:10	106	0:16		
0:32:21	98	0:23	SB	198
1:41:28	90	0:07		
1:41:38	101	0:11		
3:50:44	96	0:10		
3:50:56	100	0:11		
5:23:39	95	0:14	NB	101
5:26:59	97	0:18	SB	102
6:18:39	96	0:14	NB	305
6:38:28	98	0:14	SB	206
6:38:44	107	0:19	NB	309
6:54:51	103	0:15	SB	208
6:55:53	100	0:13	NB	207
7:07:41	100	0:22	SB	210
7:09:31	97	0:10	NB	211
7:20:43	101	0:13	NB	313
7:21:34	101	0:15	SB	312
7:31:10	106	0:22	NB	215
7:36:07	97	0:08	SB	314
7:37:13	96	0:13	NB	319
7:43:14	102	0:23	SB	216
7:56:50	100	0:13	NB	217
7:57:18	102	0:21	SB	218
8:08:47	101	0:22	SB	220
8:10:07	99	0:11	NB	221
8:20:00	103	0:13	NB	323
8:20:27	103	0:14	SB	322
8:35:07	97	0:10	NB	225
8:39:22	101	0:13	NB	329
8:45:33	106	0:24	SB	226
8:55:38	97	0:11	SB	228
8:57:20	108	0:16	NB	227
9:09:06	100	0:14	SB	230
9:09:44	88	0:11	NB	231
9:20:51	95	0:12	SB	332
9:36:04	94	0:08	NB	233
9:40:48	99	0:23	SB	134
10:01:55	99	0:11	SB	236
10:14:06	94	0:09	NB	135
10:33:49	102	0:14	SB	138
10:44:52	100	0:13		
11:08:59	100	0:15	NB	139
11:40:38	95	0:21	SB	142
12:10:23	105	0:16	NB	143
12:40:00	102	0:29	SB	146
13:12:00	96	0:15	NB	147
14:07:32	88	0:07	NB	151
14:38:42	101	0:22	SB	152
15:05:51	103	0:21	SB	254
15:06:56	104	0:12	NB	155
15:33:37	100	0:11	NB	257
15:38:25	98	0:13	SB	156
16:03:43	103	0:24	NB	159
16:04:38	103	0:16	SB	258
16:30:37	99	0:12	SB	360
16:38:12	96	0:21	NB	261
16:42:39	98	0:15	SB	262
16:48:36	101	0:16	NB	263
16:57:03	97	0:12	SB	366
17:02:22	99	0:13	NB	365
17:03:47	90	0:07	SB	264
17:12:37	98	0:13	NB	267
17:19:19	102	0:13	SB	268
17:22:00	102	0:14	NB	371
17:34:28	100	0:10	SB	370
17:37:36	99	0:13	NB	269
17:48:47	96	0:10	SB	272
18:03:40	96	0:28	NB	375
18:04:13	102	0:12	SB	376
18:10:22	102	0:25	SB	274
18:17:56	107	0:13	NB	277
18:20:15	101	0:30	NB	381
18:23:03	103	0:26	SB	278
18:36:41	98	0:08	SB	380
18:40:30	100	0:13	NB	279
18:44:32	104	0:16	SB	282
18:50:08	109	0:22	NB	283
18:56:50	102	0:42	SB	386
19:02:22	95	0:13	NB	385
19:06:28	101	0:13	SB	284
19:11:35	99	0:11	NB	287
19:19:47	102	0:09	SB	288
19:28:29	108	0:28		
19:32:00	100	0:14	NB	289
19:36:32	112	0:39		
19:50:57	99	0:13	NB	191
20:04:03	99	0:23	SB	190
20:25:18	105	0:18	NB	193
20:51:38	98	0:14		
21:13:12	92	0:07	SB	192
21:27:27	98	0:11	NB	195
22:17:14	100	0:23	SB	194
22:26:52	102	0:14	NB	197
22:48:51	109	0:19		
23:00:01	96	0:12		
23:18:22	96	0:18	SB	196
23:24:37	101	0:23	NB	199
23:34:30	89	0:07		

Location: 2nd and Railroad
Date: 10 May 2013

Time	Lmax	Duration	Direction	Train
0:32:47	98	0:19	SB	198
0:48:01	108	0:16		
1:45:09	108	0:41		
2:51:32	90	0:08		
5:23:38	93	0:07	NB	101
5:28:47	99	0:24	SB	102
5:56:54	104	0:23	SB	104
5:59:22	99	0:15	NB	103
6:18:38	95	0:12	NB	305
6:36:19	89	0:07	SB	206
6:37:11	105	0:17	NB	309
6:54:17	102	0:14	SB	208
6:58:18	100	0:13	NB	207
7:06:41	97	0:09	SB	210
7:08:34	99	0:11	NB	211
7:20:04	98	0:10	SB	312
7:20:26	100	0:15	NB	313
7:32:00	98	0:13	NB	215
8:26:10	97	0:15	Accident on Tracks	
8:33:26	95	0:15	Accident on Tracks	
8:41:49	101	0:21	Accident on Tracks	
8:59:04	102	0:13	Accident on Tracks	
9:23:34	103	0:44	Accident on Tracks	
9:30:11	96	0:13	Accident on Tracks	
9:30:26	93	0:07	Accident on Tracks	
9:30:35	97	0:15	Accident on Tracks	
9:30:51	92	0:07	Accident on Tracks	
9:36:08	101	0:16	Accident on Tracks	
9:42:33	93	0:09	Accident on Tracks	
9:58:09	91	0:08	Accident on Tracks	
10:03:01	87	0:07	Accident on Tracks	
10:06:14	100	0:24	Accident on Tracks	
10:08:10	96	0:09	Accident on Tracks	
10:12:09	94	0:10	Accident on Tracks	
10:12:30	99	0:16	Accident on Tracks	
10:16:18	104	0:24	Accident on Tracks	
10:17:26	105	0:17	Accident on Tracks	
10:21:17	104	0:23	Accident on Tracks	
10:42:59	92	0:12	Accident on Tracks	
10:43:13	95	0:12	Accident on Tracks	
10:43:47	101	0:09	Accident on Tracks	
11:06:39	94	0:11	Accident on Tracks	
11:39:46	103	0:25	Accident on Tracks	
12:09:10	102	0:13	Accident on Tracks	
12:40:06	97	0:15	SB	146
12:50:08	106	0:14		
13:04:29	102	0:09		
13:06:34	100	0:14	NB	147
13:42:44	99	0:21	SB	150
14:41:52	102	0:23	SB	152
15:03:43	100	0:18	SB	254
15:14:11	99	0:11	NB	155
15:32:24	95	0:11	NB	257
15:40:10	101	0:14	SB	156
16:04:59	98	0:23	NB	159
16:05:54	103	0:09	SB	258
16:29:43	101	0:13	SB	360
16:42:15	102	0:25	NB	261
16:45:34	105	0:20	SB	262
16:53:18	96	0:11	NB	263
16:56:55	99	0:12	SB	366
17:03:05	99	0:13	NB	365
17:05:29	90	0:10	SB	264
17:13:21	98	0:20	NB	267
17:22:18	99	0:14	SB	268
17:36:16	103	0:10	SB	370
17:38:54	108	0:27	NB	269
17:43:03	102	0:23	SB	272
17:50:07	102	0:13	NB	273
17:57:12	93	0:22	SB	376
18:00:51	102	0:13	NB	375
18:05:10	100	0:23	SB	274
18:13:16	92	0:11	NB	277
18:20:00	99	0:14	SB	278
18:20:38	101	0:15	NB	381
18:34:30	101	0:14	SB	380
18:35:57	99	0:13	NB	279
18:44:26	98	0:20	SB	282
18:47:07	101	0:11	NB	283
18:57:56	99	0:11	SB	386
19:02:56	102	0:14	NB	385
19:06:47	97	0:12	SB	284
19:12:09	93	0:13	NB	287
19:19:42	102	0:14	SB	288
19:32:28	100	0:13	NB	289
19:33:36	108	0:28		
19:43:38	103	0:13	NB	191
19:44:01	103	0:18		
20:05:33	101	0:22	SB	190
20:24:52	97	0:14	NB	193
20:53:33	101	0:13		
21:12:38	100	0:18	SB	192
21:26:52	97	0:09	NB	195
22:16:20	98	0:23	SB	194
22:25:48	103	0:15	NB	197
22:32:22	103	0:13		
22:51:05	111	0:18		
22:58:25	88	0:07		
22:58:35	99	0:25		
23:14:37	93	0:08	SB	196
23:26:35	88	0:07	NB	199
23:32:45	89	0:08		
23:32:52	105	0:21		
23:50:58	109	0:17		

Location: 2nd and Railroad
Date: 11 May 2013

Time	Lmax	Duration	Direction	Train
0:34:10	96	0:16	SB	198
0:40:27	98	0:13		
1:05:19	102	0:15		
8:00:33	101	0:16	NB	421
8:51:03	101	0:23	SB	422
9:02:27	107	0:23	NB	423
9:52:06	98	0:22	SB	424
10:03:54	101	0:12	NB	425
10:12:35	95	0:13		
10:49:24	102	0:24	SB	426
10:59:16	102	0:13	NB	427
11:04:17	103	0:15		
11:20:29	99	0:13	NB	801
11:51:26	99	0:23	SB	428
11:58:34	99	0:16	NB	429
12:09:16	99	0:12		
12:21:40	95	0:14	SB	802
12:50:22	100	0:19	SB	430
13:05:09	100	0:08	NB	431
13:52:56	96	0:14	SB	432
14:01:13	99	0:12	NB	433
14:51:00	103	0:30	SB	434
15:00:33	97	0:11	NB	435
15:52:23	101	0:22	SB	436
15:59:43	100	0:21	NB	437
16:45:31	89	0:12		
16:51:56	102	0:23	SB	438
17:04:58	98	0:15	NB	439
17:16:48	100	0:23		
17:54:31	92	0:08	SB	440
17:58:58	101	0:12	NB	441
18:14:10	101	0:11	NB	803
18:18:28	94	0:15		
18:50:55	101	0:28	SB	442
18:58:14	98	0:12	NB	443
19:21:49	103	0:23	SB	804
19:49:51	95	0:23	SB	444
19:56:58	101	0:12	NB	445
20:50:50	100	0:23	SB	446
21:00:59	100	0:14	NB	447
21:49:09	103	0:23	SB	448
21:57:33	100	0:13	NB	449
22:49:40	88	0:07	SB	450
23:28:02	100	0:09	NB	451

Location: 2nd and Railroad
Date: 12 May 2013

Time	Lmax	Duration	Direction	Train
0:36:30	89	0:07	SB	454
8:52:59	97	0:24	SB	422
8:58:02	102	0:18	NB	423
9:49:40	95	0:16	SB	424
10:02:46	96	0:13	NB	425
10:09:19	103	0:13		
10:51:07	102	0:19	SB	426
10:59:41	110	0:23	NB	427
11:04:21	98	0:11		
11:17:35	97	0:08	NB	801
11:50:18	102	0:23	SB	428
11:58:32	98	0:13	NB	429
12:02:58	101	0:12		
12:21:38	97	0:14	SB	802
12:50:14	100	0:22	SB	430
13:50:40	97	0:20	SB	432
14:01:17	96	0:13	NB	433
14:50:07	94	0:11	SB	434
14:56:53	103	0:11	NB	435
15:51:53	95	0:24	SB	436
15:59:06	99	0:08	NB	437
16:46:49	97	0:16	SB	438
16:53:18	99	0:23	NB	439
17:00:09	96	0:12		
17:18:34	100	0:12		
17:50:02	93	0:08	SB	440
17:57:46	100	0:11	NB	441
18:14:51	98	0:11	NB	803
18:20:41	107	0:13		
18:51:06	95	0:23	SB	442
18:58:17	100	0:13	NB	443
19:00:56	109	0:18		
19:21:35	96	0:17	SB	804
19:48:45	92	0:12	SB	444
20:12:22	105	0:17	NB	445
20:51:52	100	0:25	SB	446
20:57:19	100	0:09	NB	447
21:04:33	107	0:23		
21:50:06	97	0:16	SB	448
21:56:34	95	0:12	NB	449

Location: 2nd and Railroad
Date: 13 May 2013

Time	Lmax	Duration	Direction	Train
5:24:19	94	0:08	NB	101
5:27:53	99	0:16	SB	102
5:58:44	105	0:20	SB	104
6:03:17	102	0:13	NB	103
6:19:16	101	0:15	NB	305
6:37:47	101	0:29	NB	309
6:55:16	106	0:15	SB	208
6:56:18	98	0:23	NB	207
7:07:50	98	0:20	SB	210
7:20:18	103	0:17	SB	312
7:34:22	95	0:12	NB	215
7:36:45	99	0:11	SB	314
7:39:06	92	0:07	NB	319
7:43:44	108	0:27	SB	216
7:56:04	100	0:17	SB	218
7:57:29	101	0:14	NB	217
8:07:31	97	0:13	SB	220
8:09:52	102	0:22	NB	221
8:20:28	98	0:12	SB	322
8:22:59	105	0:14	NB	323
8:36:46	104	0:22	NB	225
8:37:15	99	0:13	SB	324
8:42:34	104	0:10	NB	329
8:45:25	103	0:24	SB	226
8:57:15	104	0:15	SB	228
8:59:13	98	0:14	NB	227
9:09:06	96	0:21	SB	230
9:22:15	102	0:13	NB	231
9:39:44	96	0:21	SB	134
10:03:56	101	0:23	SB	236
10:09:23	101	0:12	NB	135
10:36:44	100	0:09	SB	138
10:45:16	99	0:16		
11:10:41	102	0:14	NB	139
11:42:32	97	0:19	SB	142
12:08:42	98	0:11	NB	143
12:40:46	103	0:24	SB	146
13:11:33	102	0:12	NB	147
13:39:42	98	0:13	SB	150
14:11:12	104	0:13	NB	151
14:38:53	95	0:11	SB	152
15:05:21	96	0:14	NB	155
15:19:34	101	0:11		
15:37:51	96	0:12	SB	257
15:38:43	100	0:15	SB	156
16:02:04	101	0:08	NB	159
16:05:41	99	0:22	SB	258
16:30:25	102	0:15	SB	360

Time	Lmax	Duration	Direction	Train
16:36:52	99	0:10	NB	261
16:42:05	98	0:20	SB	262
16:48:09	101	0:13	NB	263
16:57:26	102	0:24	SB	366
17:01:01	103	0:14	NB	365
17:06:37	106	0:23	SB	264
17:13:53	104	0:14	NB	267
17:19:27	102	0:12	SB	268
17:20:18	104	0:14	NB	371
17:39:15	102	0:21	NB	269
17:44:04	99	0:22	SB	272
17:50:51	97	0:12	NB	273
17:57:10	102	0:24	SB	376
18:04:34	99	0:22	NB	375
18:08:46	106	0:14	SB	274
18:17:14	90	0:22	NB	381
18:21:12	101	0:07	SB	278
18:35:41	99	0:18	NB	279
18:44:36	102	0:24	SB	282
18:46:56	92	0:07	NB	283
18:58:01	96	0:19	SB	386
19:02:47	107	0:14	NB	385
19:05:40	98	0:22	SB	284
19:11:54	98	0:12	NB	287
19:19:01	100	0:13	SB	288
19:32:08	107	0:32	NB	289
19:43:47	105	0:20	NB	191
20:01:44	97	0:23	SB	190
20:06:04	111	0:30		
20:26:06	110	0:23	NB	193
21:12:12	101	0:18	SB	192
21:26:27	101	0:16	NB	195
22:08:34	110	0:17		
22:12:39	95	0:15	SB	194
22:26:35	103	0:18	NB	197
23:13:04	97	0:20	SB	196
23:24:11	101	0:12	NB	199

Location: 2nd and Railroad
Date: 14 May 2013

Time	Lmax	Duration	Direction	Train
0:07:11	109	0:55		
0:32:46	98	0:23	SB	198
5:24:49	103	0:15	NB	101
5:28:08	100	0:22	SB	102
5:59:06	90	0:07	SB	104
6:18:43	101	0:15	NB	305
6:37:58	88	0:07	SB	206
6:38:06	98	0:15	NB	309
6:55:49	97	0:22	SB	208
6:56:14	101	0:14	NB	207
7:07:56	98	0:21	SB	210
7:10:16	103	0:22	NB	211
7:21:10	99	0:10	SB	312
7:21:53	106	0:17	NB	313
7:36:25	103	0:19	NB	215
7:41:56	87	0:10	NB	319
7:44:47	100	0:23	SB	216
7:55:18	102	0:15	SB	218
7:56:06	98	0:19	NB	217
8:10:21	96	0:24	SB	220
8:20:21	96	0:12	SB	322
8:21:31	105	0:17	NB	323
8:33:16	103	0:24	NB	225
8:40:17	99	0:13	SB	324
8:41:59	101	0:16	NB	329
8:47:56	97	0:23	SB	226
8:59:07	99	0:20	SB	228
9:01:26	99	0:14	NB	227
9:09:13	102	0:24	SB	230
9:11:34	100	0:14	NB	231
9:19:43	102	0:13	SB	332
9:38:46	105	0:22	NB	233
9:39:47	99	0:10	SB	134
10:04:42	95	0:12	SB	236
10:08:13	96	0:12	NB	135
10:37:22	102	0:17	SB	138
10:40:22	99	0:12		
11:08:55	95	0:14	NB	139
11:41:20	102	0:23	SB	142
12:07:38	104	0:18	NB	143
12:41:48	98	0:12	SB	146
13:06:35	100	0:11	NB	147
13:39:13	98	0:22	SB	150
14:08:10	97	0:09	NB	151
14:38:37	102	0:22	SB	152
15:04:56	97	0:27	SB	254
15:05:22	90	0:14	NB	155
15:34:26	100	0:11	NB	257

Time	Lmax	Duration	Direction	Train
15:40:42	95	0:12	SB	156
16:01:29	104	0:18	NB	159
16:03:59	98	0:15	SB	258
16:29:12	104	0:14	SB	360
16:39:02	101	0:08	NB	261
16:42:06	102	0:26	SB	262
16:47:14	95	0:14	NB	263
16:57:25	104	0:25	SB	366
16:59:34	100	0:13	NB	365
17:03:57	90	0:08	SB	264
17:13:28	103	0:17	NB	267
17:18:17	101	0:14	SB	268
17:20:52	100	0:14	NB	371
17:34:58	100	0:10	SB	370
17:38:37	98	0:11	NB	269
17:44:22	104	0:26	SB	272
17:49:03	100	0:10	NB	273
18:01:04	103	0:24	NB	375
18:02:04	102	0:14	SB	376
18:08:16	102	0:24	SB	274
18:15:42	102	0:10	NB	277
18:20:29	104	0:22	SB	278
18:31:15	97	0:22	SB	380
18:36:34	97	0:09	NB	279
18:45:12	101	0:22	SB	282
18:47:16	102	0:19	NB	283
18:56:55	101	0:24	SB	386
19:00:28	105	0:13	NB	385
19:04:01	101	0:21	SB	284
19:11:32	100	0:12	NB	287
19:18:49	98	0:09	SB	288
19:32:32	107	0:30	NB	289
19:38:42	111	0:23		
19:47:00	101	0:18	NB	191
20:02:00	101	0:24	SB	190
20:27:58	103	0:16	NB	193
21:13:42	97	0:15	SB	192
21:25:32	98	0:13	NB	195
22:11:59	101	0:21	SB	194
22:25:50	95	0:11	NB	197
23:11:47	103	0:23	SB	196
23:23:12	101	0:13	NB	199
23:32:17	112	0:32		

Location: 2nd and Railroad
Date: 15 May 2013

Time	Lmax	Duration	Direction	Train
0:34:49	95	0:13	SB	198
1:15:31	104	0:29		
5:23:27	92	0:08	NB	101
5:59:19	99	0:16	SB	104
6:01:49	99	0:23	Accident on tracks	
6:20:09	101	0:15	Accident on tracks	
6:37:01	95	0:09	Accident on tracks	
6:55:24	100	0:23	Accident on tracks	
7:04:14	100	0:11	Accident on tracks	
7:07:39	105	0:20	Accident on tracks	
7:22:40	90	0:10	Accident on tracks	
7:33:42	100	0:12	Accident on tracks	
7:38:14	103	0:13	Accident on tracks	
7:39:56	100	0:10	Accident on tracks	
7:43:33	98	0:08	Accident on tracks	
7:49:12	99	0:23	Accident on tracks	
7:55:55	102	0:14	Accident on tracks	
7:58:25	95	0:10	Accident on tracks	
7:58:35	98	0:11	Accident on tracks	
8:07:28	89	0:13	Accident on tracks	
8:07:43	103	0:21	Accident on tracks	
8:10:27	106	0:11	Accident on tracks	
8:19:44	101	0:14	Accident on tracks	
8:26:06	101	0:15	Accident on tracks	
8:33:52	102	0:13	Accident on tracks	
8:44:10	99	0:20	SB	226
8:59:22	102	0:14	SB	228
8:59:47	96	0:11	NB	227
9:11:12	102	0:11	SB	230
9:11:41	96	0:21	NB	231
9:20:34	101	0:12	SB	332
9:35:44	95	0:08	NB	233
9:38:49	101	0:12	SB	134
10:03:16	100	0:27	SB	236
10:09:18	98	0:13	NB	135
10:31:39	96	0:09		
10:40:11	99	0:25	SB	138
11:04:28	101	0:24	NB	139
11:42:05	102	0:11	SB	142
12:08:18	97	0:13	NB	143
12:40:48	98	0:16	SB	146
13:09:40	103	0:17	NB	147
13:39:54	102	0:13	SB	150
14:08:29	97	0:11	NB	151
14:40:32	105	0:23	SB	152
15:03:36	101	0:20	SB	254
15:10:11	100	0:09	NB	155
15:40:26	97	0:22	NB	257

Time	Lmax	Duration	Direction	Train
15:42:40	103	0:14	SB	156
16:02:16	99	0:22	NB	159
16:02:54	100	0:14	SB	258
16:30:45	100	0:13	SB	360
16:34:01	100	0:14	NB	261
16:43:09	106	0:26	SB	262
16:47:11	96	0:12	NB	263
16:57:20	103	0:26	SB	366
16:59:47	100	0:14	NB	365
17:05:40	98	0:23	SB	264
17:13:20	103	0:15	NB	267
17:18:00	99	0:13	SB	268
17:20:17	99	0:15	NB	371
17:35:39	96	0:11	SB	370
17:37:46	104	0:13	NB	269
17:44:46	99	0:23	SB	272
17:49:07	97	0:21	NB	273
17:57:00	102	0:28	SB	376
18:02:27	108	0:17	NB	375
18:04:01	100	0:24	SB	274
18:16:58	92	0:07	NB	277
18:19:04	98	0:13	SB	278
18:21:43	99	0:11	NB	381
18:34:33	98	0:14	SB	380
18:35:35	97	0:08	NB	279
18:46:11	99	0:25	SB	282
18:49:21	104	0:14	NB	283
18:57:02	97	0:22	SB	386
18:59:15	96	0:13	NB	385
19:06:32	104	0:33	SB	284
19:12:01	95	0:15	NB	287
19:19:40	104	0:12	SB	288
19:26:56	108	0:24		
19:34:16	101	0:18	NB	289
19:37:48	112	0:29		
19:44:02	98	0:11	NB	191
20:01:48	102	0:22	SB	190
20:23:41	98	0:11	NB	193
21:13:48	94	0:10	SB	192
21:27:20	97	0:11	NB	195
21:35:28	101	0:17		
22:08:36	111	0:23		
22:14:16	98	0:19	SB	194
22:24:23	101	0:15	NB	197
23:11:38	94	0:07	SB	196
23:11:44	95	0:15		
23:28:54	102	0:14	NB	199

Location: 2nd and Railroad
Date: 16 May 2013

Time	Lmax	Duration	Direction	Train
0:25:31	100	0:18		
0:32:18	106	0:41	SB	198
5:23:53	95	0:07	NB	101
5:33:27	96	0:12	SB	102
6:00:35	101	0:22	SB	104
6:01:53	102	0:13	NB	103
6:18:34	99	0:14	NB	305
6:37:49	102	0:24	SB	206
6:54:48	104	0:13	SB	208
6:55:35	100	0:30	NB	207
7:08:06	106	0:23	SB	210
7:08:57	98	0:24	NB	211
7:19:19	96	0:14	SB	312
7:19:50	101	0:13	NB	313
7:33:51	107	0:17	NB	215
7:37:59	102	0:14	SB	314
7:45:05	89	0:07	NB	319
7:45:12	98	0:18	SB	216
7:57:12	109	0:21	NB	217
7:58:38	98	0:16	SB	218
8:08:51	98	0:09	SB	220
8:12:47	104	0:31	NB	221
8:20:29	101	0:13	SB	322
8:21:26	96	0:10	NB	323
8:33:30	101	0:15	NB	225
8:41:58	108	0:26	NB	329
8:45:38	97	0:13	SB	226
8:49:18	103	0:26		
8:55:48	100	0:19	SB	228
8:57:00	102	0:14	NB	227
9:08:08	99	0:15	SB	230
9:08:42	102	0:16	NB	231
9:19:32	100	0:12	SB	332
9:37:33	101	0:09	NB	233
9:42:49	101	0:22	SB	134
10:05:18	104	0:26	NB	135
10:18:08	97	0:14		
10:39:07	97	0:13	SB	138
10:42:49	95	0:10		
10:42:59	100	0:13		
11:07:17	93	0:15	NB	139
11:44:04	101	0:10	SB	142
12:41:39	103	0:24	SB	146
13:04:31	100	0:12	NB	147
13:39:40	95	0:22	SB	150
14:16:04	101	0:19	NB	151
14:38:05	101	0:22	SB	152
15:02:57	94	0:09	SB	254
15:32:49	97	0:09	NB	257
15:38:30	99	0:16	SB	156
16:02:31	101	0:12	NB	155
16:02:58	98	0:16	SB	258
16:29:07	100	0:13	SB	360
16:35:34	104	0:21	NB	261
16:42:24	101	0:23	SB	262
16:47:37	104	0:13	NB	263
16:57:19	101	0:14	SB	366
17:01:24	101	0:14	NB	365
17:05:07	101	0:23	SB	264
17:11:57	101	0:13	NB	267
17:19:17	99	0:14	SB	268
17:19:43	101	0:11	NB	371
17:35:10	99	0:13	SB	370
17:37:28	99	0:12	NB	269
17:43:48	102	0:21	SB	272
17:48:53	100	0:16	NB	273
17:56:45	102	0:25	SB	376
18:04:38	101	0:21	NB	375
18:05:48	98	0:14	SB	274
18:13:52	89	0:07	NB	277
18:19:54	100	0:13	SB	278
18:22:17	103	0:13	NB	381
18:33:25	98	0:18	SB	380
18:34:27	94	0:11	NB	279
18:44:55	102	0:24	SB	282
18:45:44	104	0:16	NB	283
18:57:19	103	0:47	SB	386
19:01:31	103	0:13	NB	385
19:06:15	98	0:14	SB	284
19:11:29	100	0:15	NB	287
19:31:06	109	0:34		
19:32:40	102	0:13	NB	289
19:43:38	101	0:12	NB	191
20:04:21	92	0:08	SB	190
20:22:46	110	0:30		
20:26:57	103	0:19	NB	193
21:12:07	100	0:25	SB	192
21:27:55	102	0:24	NB	195
22:12:21	99	0:22	SB	194
22:26:17	95	0:07	NB	197
22:34:31	112	0:24		
23:11:11	103	0:23	SB	196
23:26:02	100	0:11	NB	199

Location: 2nd and Railroad
Date: 17 May 2013

Time	Lmax	Duration	Direction	Train
2:02:13	103	0:33		
5:23:56	96	0:13	NB	101
5:29:58	102	0:23	SB	102
5:57:15	99	0:21	SB	104
5:58:49	95	0:19	NB	103
6:19:08	103	0:14	NB	305
6:36:54	101	0:13	SB	206
6:38:25	103	0:24	NB	309
6:55:25	100	0:13	SB	208
7:10:45	99	0:25	SB	210
7:19:52	102	0:13	SB	312
7:20:32	100	0:15	NB	313
7:35:05	99	0:13	NB	215
7:36:59	98	0:08	SB	314
7:39:27	96	0:13	NB	319
7:43:21	94	0:22	SB	216
7:56:09	107	0:16	NB	217
8:06:35	100	0:23	NB	221
8:09:41	100	0:12	SB	220
8:19:35	103	0:13	SB	322
8:20:44	103	0:15	NB	323
8:31:59	100	0:12	NB	225
8:36:57	101	0:14	SB	324
8:39:04	103	0:12	NB	329
8:43:42	100	0:22	SB	226
8:56:59	108	0:16	SB	228
8:58:08	95	0:13	NB	227
9:06:50	95	0:13	SB	230
9:08:13	96	0:10	NB	231
9:20:42	100	0:14	SB	332
9:39:13	101	0:20	NB	233
9:39:46	97	0:15	SB	134
10:03:28	99	0:22	SB	236
10:06:57	96	0:07	NB	135
10:39:23	100	0:13	SB	138
11:08:56	89	0:08	NB	139
11:38:20	93	0:07		
11:38:30	98	0:12	SB	142
12:08:49	96	0:09	NB	143
12:15:56	111	0:31		
12:42:50	101	0:15	SB	146
13:09:58	101	0:22	NB	147
13:39:01	99	0:10	SB	150
13:51:08	109	0:17		
14:04:14	102	0:10	NB	151
14:40:50	102	0:24	SB	152
15:05:35	103	0:09	SB	254
15:06:26	100	0:10	NB	155
15:33:51	102	0:11	NB	257
15:39:03	106	0:12	SB	156
16:02:45	96	0:20	NB	159
16:03:04	105	0:16	SB	258
16:29:27	99	0:13	SB	360
16:37:03	101	0:12	NB	261
16:41:45	94	0:15	SB	262
16:47:40	103	0:21	NB	263
16:56:55	97	0:12	SB	366
17:01:11	101	0:14	NB	365
17:05:05	103	0:23	SB	264
17:14:09	104	0:15	NB	267
17:19:58	103	0:17	SB	268
17:21:42	100	0:14	NB	371
17:35:07	98	0:09	NB	269
17:36:04	109	0:22		
17:43:08	99	0:22	SB	272
17:47:08	100	0:14	NB	273
17:56:49	96	0:16	SB	376
18:03:32	105	0:13	NB	375
18:04:34	99	0:22	SB	274
18:13:42	98	0:10	NB	277
18:20:32	101	0:12	SB	278
18:34:09	92	0:21	SB	380
18:34:59	102	0:12	NB	279
18:44:02	97	0:20	SB	282
18:47:39	98	0:11	NB	283
18:58:07	98	0:23	SB	386
19:00:23	103	0:13	NB	385
19:04:26	98	0:24	SB	284
19:11:48	98	0:12	NB	287
19:18:16	94	0:11	SB	288
19:27:00	109	0:18		
19:31:28	107	0:23	NB	289
19:31:52	96	0:12		
19:44:22	110	0:22	NB	191
20:04:12	96	0:12	SB	190
20:24:25	99	0:09	NB	193
20:50:54	103	0:15		
21:12:38	101	0:21	SB	192
21:24:24	103	0:12	NB	195
22:05:42	111	0:18		
22:12:50	97	0:14	SB	194
22:25:17	102	0:18	NB	197
23:11:49	100	0:20	SB	196
23:25:27	100	0:14		

Location: 2nd and Railroad
Date: 18 May 2013

Time	Lmax	Duration	Direction	Train
0:34:01	101	0:26	SB	198
8:49:27	99	0:22	SB	422
9:00:12	102	0:14	NB	423
10:12:25	103	0:13		
10:53:34	101	0:17	SB	424
11:08:09	102	0:15	NB	425
11:18:29	108	0:14	NB	801
11:55:03	92	0:09	SB	426
12:08:52	99	0:13	NB	427
12:30:56	103	0:29	SB	802
13:02:23	94	0:19	NB	429
13:50:35	101	0:12	SB	432
14:05:11	100	0:12	NB	433
14:49:05	101	0:23	SB	434
15:01:34	100	0:13	NB	435
15:50:25	96	0:23	SB	436
15:59:23	100	0:12	NB	437
16:48:36	99	0:29	SB	438
17:04:32	102	0:13	NB	439
17:51:54	97	0:23	SB	440
17:57:11	102	0:14	NB	441
18:16:13	99	0:11	NB	803
18:49:02	98	0:21	SB	442
18:57:39	99	0:14	NB	443
19:28:23	100	0:22	SB	804
19:51:05	103	0:25	SB	444
19:58:49	98	0:10	NB	445

Location: 2nd and Railroad
Date: 22 May 2013

Time	Lmax	Duration	Direction	Train
9:40:10	100	0:21	SB	134
9:47:18	100	0:10		
9:50:22	98	0:13		
10:07:32	98	0:17	SB	236
10:12:05	92	0:07	NB	135
10:38:52	100	0:23	SB	138
10:40:56	106	0:17		
10:50:49	97	0:11		
11:04:47	109	0:14	NB	139
11:09:33	88	0:13		
11:42:05	96	0:09	SB	142
12:12:46	101	0:14	NB	143
12:40:08	97	0:13	SB	146
13:11:00	98	0:13	NB	147
13:40:15	97	0:18	SB	150
14:10:00	100	0:11	NB	151
14:41:38	95	0:15	SB	152
15:03:46	101	0:13	SB	254
15:05:41	94	0:08	NB	155
15:34:50	100	0:11	NB	257
15:42:33	103	0:29	SB	156
16:04:03	93	0:08	NB	159
16:04:10	98	0:16	SB	258
16:22:42	97	0:12	SB	360
16:38:23	96	0:08	NB	261
16:44:06	103	0:22	SB	262
16:49:06	101	0:14	NB	263
16:58:37	100	0:24	SB	366
17:01:00	102	0:13	NB	365
17:09:25	104	0:24	SB	264
17:12:06	102	0:11	NB	267
17:19:50	101	0:13	SB	268
17:23:29	106	0:13	NB	371
17:35:02	93	0:09	SB	370
17:38:28	103	0:10	NB	269
17:45:25	99	0:23	SB	272
17:48:26	98	0:12	NB	273
17:57:08	105	0:24	SB	376
18:02:56	96	0:13	NB	375
18:06:03	99	0:17	SB	274
18:19:11	103	0:13	SB	278
18:19:27	99	0:16		
18:23:54	106	0:17	NB	381
18:35:58	100	0:13	SB	380
18:37:08	98	0:17	NB	279
18:45:10	98	0:12	SB	282
18:47:43	103	0:14	NB	283
18:56:58	100	0:22	SB	386

Time	Lmax	Duration	Direction	Train
18:59:21	99	0:13	NB	285
19:03:54	97	0:15	SB	284
19:13:04	98	0:13	NB	287
19:18:29	104	0:11	SB	288
19:32:52	96	0:14	NB	289
19:37:18	104	0:29		
19:44:52	96	0:10	NB	191
20:01:43	98	0:21	SB	190
20:15:39	111	0:44		
20:26:11	108	0:24	NB	193
21:12:57	100	0:18	SB	192
21:25:41	105	0:14	NB	195
22:14:49	93	0:09	SB	194
22:25:02	106	0:10	NB	197
23:12:37	99	0:23	SB	196
23:27:01	101	0:21	NB	199
23:45:23	109	0:19		

Location: 2nd and Railroad
Date: 23 May 2013

Time	Lmax	Duration	Direction	Train
0:32:47	98	0:18	SB	198
1:40:44	107	0:40		
5:23:47	96	0:13	NB	101
5:28:00	97	0:17	SB	102
5:59:52	94	0:10	SB	104
6:04:34	91	0:08	NB	103
6:18:29	98	0:14	NB	305
6:37:01	101	0:27	SB	206
6:39:08	105	0:12	NB	309
6:54:26	103	0:14	SB	208
6:55:55	94	0:11	NB	207
7:08:37	98	0:10	SB	210
7:10:14	96	0:08	NB	211
7:20:37	100	0:13	SB	312
7:20:59	100	0:14	NB	313
7:33:11	99	0:14	NB	215
7:36:05	102	0:13	SB	314
7:37:45	98	0:10	NB	319
7:42:58	98	0:14	SB	216
7:56:11	103	0:23	NB	217
7:57:44	101	0:15	SB	218
8:06:20	90	0:13	SB	220
8:11:24	99	0:22	NB	221
8:21:15	109	0:27	NB	323
8:31:10	96	0:15	NB	225
8:39:05	91	0:07	SB	324
8:39:14	98	0:14	NB	329
8:46:09	100	0:23	SB	226
8:55:54	102	0:21	SB	228
8:57:13	99	0:14	NB	227
9:10:12	95	0:13	SB	230
9:11:01	97	0:19	NB	231
9:19:55	98	0:09	SB	332
9:39:59	93	0:09	NB	233
9:40:08	104	0:27	SB	134
10:02:04	100	0:18	SB	236
10:06:58	91	0:10	NB	135
10:07:10	89	0:08		
10:39:02	103	0:12	SB	138
10:48:14	101	0:11		
11:08:08	100	0:15	NB	139
11:39:09	95	0:13	SB	142
12:10:27	106	0:18	NB	143
12:39:21	93	0:17	SB	146
13:04:35	96	0:09	NB	147
13:41:04	105	0:17	SB	150
14:40:03	99	0:25	SB	152
15:04:59	96	0:08	SB	254

Time	Lmax	Duration	Direction	Train
15:06:34	94	0:13	NB	155
15:33:39	96	0:10	NB	257
15:38:32	100	0:13	SB	156
16:03:46	92	0:24	NB	159
16:03:55	103	0:15	SB	258
16:08:00	101	0:13		
16:29:44	98	0:10	SB	360
16:36:17	98	0:16	NB	261
16:45:21	90	0:24	SB	262
16:46:51	98	0:08	NB	263
16:57:30	97	0:11	SB	366
17:01:14	100	0:13	NB	365
17:04:30	98	0:16	SB	264
17:14:00	96	0:18	NB	267
17:19:06	107	0:20	SB	268
17:34:52	104	0:11	SB	370
17:35:55	98	0:09	NB	269
17:44:15	104	0:28	SB	272
17:50:02	96	0:12	NB	273
17:57:09	99	0:23	SB	376
18:00:52	102	0:13	NB	375
18:08:07	101	0:27	SB	274
18:12:53	98	0:13	NB	277
18:20:22	98	0:12	SB	278
18:21:59	102	0:15	NB	381
18:35:10	100	0:14	SB	380
18:37:05	98	0:12	NB	279
18:48:23	105	0:17	SB	282
18:49:07	98	0:22	NB	283
19:00:52	99	0:14	NB	385
19:08:23	98	0:19	SB	284
19:13:37	97	0:12	NB	287
19:18:32	94	0:11	SB	288
19:30:29	103	0:16	NB	289
19:30:49	103	0:20		
19:42:37	107	0:20		
19:45:27	100	0:22	NB	191
20:03:35	99	0:24	SB	190
20:25:26	106	0:17	NB	193
21:13:19	94	0:07	SB	192
21:25:37	98	0:11	NB	195
22:12:10	102	0:25	SB	194
22:26:20	104	0:17	NB	197
23:02:49	109	0:22		
23:11:02	101	0:23	SB	196
23:25:02	102	0:18	NB	199

Location: 2nd and Railroad
Date: 24 May 2013

Time	Lmax	Duration	Direction	Train
0:26:46	108	0:16		
0:35:14	98	0:18	SB	198
5:24:06	93	0:10	NB	101
5:29:09	98	0:16	SB	102
5:56:53	103	0:24	SB	104
5:58:43	97	0:20	NB	103
6:18:39	100	0:15	NB	305
6:37:05	103	0:24	SB	206
6:54:29	95	0:25	NB	207
6:55:47	101	0:13	SB	208
7:09:25	88	0:07	SB	210
7:09:33	101	0:14	NB	211
7:15:53	101	0:13		
7:20:42	101	0:13	SB	312
7:21:19	99	0:10	NB	313
7:32:50	98	0:18	NB	215
7:36:13	103	0:11	SB	314
7:39:32	98	0:13	NB	319
7:43:03	95	0:21	SB	216
7:55:23	100	0:14	SB	218
7:56:52	99	0:23	NB	217
8:07:18	89	0:07	SB	220
8:09:56	104	0:11	NB	221
8:18:55	95	0:13	SB	322
8:21:21	102	0:13	NB	323
8:32:24	102	0:20	NB	225
8:36:41	99	0:12	SB	324
8:39:49	102	0:10	NB	329
8:46:32	96	0:23	SB	226
8:56:26	98	0:13	SB	228
8:58:08	103	0:15	NB	227
9:07:51	97	0:11	SB	230
9:11:42	98	0:10	NB	231
9:20:59	101	0:13	SB	332
9:37:30	97	0:17	NB	233
9:40:15	101	0:09	SB	134
10:03:19	97	0:18	SB	236
10:11:58	101	0:15	NB	135
10:33:00	93	0:12		
10:38:58	100	0:12	SB	138
11:07:31	106	0:26	NB	139
11:41:35	103	0:23	SB	142
12:06:15	99	0:13	NB	143
12:39:24	97	0:14	SB	146
13:13:42	96	0:14	NB	147
13:39:11	96	0:14	SB	150
14:08:54	105	0:16	NB	151
14:43:28	106	0:25	SB	152
15:02:47	99	0:20	SB	254

Time	Lmax	Duration	Direction	Train
15:06:53	108	0:21	NB	155
15:34:42	90	0:08	NB	257
15:43:06	103	0:34	SB	156
16:03:24	100	0:21	NB	159
16:05:12	102	0:20	SB	258
16:29:16	102	0:13	SB	360
16:40:00	102	0:26	NB	261
16:42:04	101	0:24	SB	262
16:50:27	100	0:12	NB	263
16:57:17	99	0:14	SB	366
17:03:33	103	0:13	NB	365
17:06:00	98	0:21	SB	264
17:12:53	91	0:08	NB	267
17:20:41	101	0:14	SB	268
17:21:14	98	0:13	NB	371
17:34:49	103	0:11	SB	370
17:43:27	104	0:23	SB	272
17:56:51	101	0:23	SB	376
17:59:21	100	0:12	NB	375
18:03:45	101	0:32	SB	274
18:11:36	100	0:09	NB	277
18:18:43	102	0:14	SB	278
18:21:41	106	0:16	NB	381
18:34:21	98	0:09	SB	380
18:39:37	93	0:07	NB	279
18:44:46	96	0:13	SB	282
18:49:39	108	0:25	NB	283
18:57:06	101	0:13	SB	386
19:00:23	108	0:15	NB	385
19:05:44	93	0:10	SB	284
19:12:29	98	0:15	NB	287
19:19:52	99	0:09	SB	288
19:27:47	103	0:18		
19:31:36	102	0:14	NB	289
19:44:19	90	0:08	NB	191
20:04:04	99	0:24	SB	190
20:24:02	97	0:12	NB	193
21:01:02	104	0:13		
21:04:02	97	0:14		
21:14:12	98	0:23	SB	192
21:30:24	101	0:18	NB	195
21:35:49	105	0:21		
22:17:50	99	0:17	SB	194
22:26:49	106	0:13	NB	197
22:40:06	105	0:14		
23:07:23	100	0:23	SB	196
23:23:39	96	0:22		
23:25:00	101	0:10	NB	199
23:28:51	100	0:11		

Location: 2nd and Railroad
Date: 25 May 2013

Time	Lmax	Duration	Direction	Train
0:32:30	102	0:14	SB	198
0:35:52	102	0:24		
7:56:25	99	0:14	NB	421
8:52:20	101	0:12	SB	422
8:59:13	100	0:21	NB	423
9:52:07	99	0:11	SB	424
10:02:08	99	0:11	NB	425
10:04:49	100	0:14		
10:49:14	100	0:21	SB	426
10:52:39	100	0:09	NB	427
11:05:03	105	0:18		
11:18:34	98	0:11	NB	801
11:55:17	99	0:29	SB	428
12:03:53	97	0:10	NB	429
12:23:02	97	0:21	SB	802
12:50:37	96	0:18	SB	430
13:00:05	98	0:09	NB	431
13:53:29	104	0:23	SB	432
14:00:29	97	0:12	NB	433
14:53:09	103	0:25	SB	434
14:58:57	102	0:12	NB	435
15:34:04	104	0:16		
15:52:37	100	0:23	SB	436
16:01:45	98	0:10	NB	437
16:50:16	102	0:23	SB	438
17:00:46	101	0:15	NB	439
17:27:36	100	0:14		
18:01:54	96	0:08	SB	440
18:10:18	97	0:21	NB	441
18:13:55	101	0:13	NB	803
18:15:06	101	0:24		
18:52:00	102	0:25	SB	442
18:54:37	103	0:22	NB	443
18:56:55	99	0:11		
19:01:30	95	0:08		
19:27:04	103	0:24	SB	804
19:51:32	110	0:23	SB	444
19:54:47	108	0:24	NB	445
20:52:25	99	0:24	SB	446
21:00:04	100	0:09	NB	447
21:49:49	100	0:24	SB	448
21:59:23	102	0:13	NB	449
22:44:29	111	0:14	SB	450
22:50:32	98	0:22		
23:24:50	100	0:10	NB	451

Location: 2nd and Railroad
Date: 26 May 2013

Time	Lmax	Duration	Direction	Train
0:37:52	98	0:21	SB	454
8:54:43	104	0:24	SB	422
8:56:32	99	0:15	NB	423
9:48:52	102	0:21	SB	424
10:04:59	92	0:13	NB	425
10:22:36	101	0:13		
10:54:02	105	0:22	SB	426
11:00:18	101	0:16	NB	427
11:04:11	99	0:07		
11:22:21	96	0:07	NB	801
11:55:33	102	0:20	SB	428
11:56:47	94	0:12	NB	429
12:02:25	107	0:14		
12:32:26	103	0:14	SB	802
12:56:26	95	0:12	SB	430
12:57:54	98	0:21	NB	431
13:54:33	96	0:16	SB	432
14:01:08	96	0:15	NB	433
14:49:07	103	0:24	SB	434
15:02:37	99	0:11	NB	435
15:49:41	105	0:15	SB	436
15:56:29	97	0:11	NB	437
16:51:19	104	0:24	SB	438
16:56:07	102	0:11	NB	439
17:25:51	101	0:13		
17:42:22	98	0:14		
17:52:04	96	0:12	SB	440
17:54:28	100	0:18		
17:55:48	101	0:13	NB	441
18:13:12	101	0:10	NB	803
18:52:33	96	0:22	SB	442
18:57:44	101	0:16	NB	443
19:27:38	100	0:13	SB	804
19:29:56	98	0:16		
19:33:36	101	0:11		
19:49:27	102	0:20	SB	444
19:56:53	102	0:14	NB	445
20:50:19	98	0:22	SB	446
20:56:24	98	0:10	NB	447
21:50:17	102	0:24	SB	448
21:59:09	98	0:13	NB	449
23:31:37	101	0:29	NB	451

Location: 2nd and Railroad
Date: 27 May 2013

Time	Lmax	Duration	Direction	Train
8:49:34	98	0:18	SB	422
8:55:54	97	0:14	NB	423
9:15:15	110	0:29		
10:48:29	98	0:21	SB	426
10:56:52	87	0:07	NB	427
11:17:17	99	0:10	NB	801
11:52:30	101	0:23	SB	428
11:56:39	96	0:11	NB	429
12:27:09	99	0:13	SB	802
12:48:56	99	0:16	SB	430
12:56:26	98	0:08	NB	431
13:49:28	99	0:19	SB	432
13:57:34	94	0:11	NB	433
14:49:11	100	0:14	SB	434
15:01:22	94	0:12	NB	435
15:50:34	105	0:24	SB	436
15:57:09	111	0:18	NB	437
16:49:04	100	0:21	SB	438
16:57:28	101	0:12	NB	439
17:49:22	103	0:24	SB	440
18:01:32	93	0:15	NB	441
18:13:54	97	0:13	NB	803
18:51:00	101	0:23	SB	442
18:57:05	98	0:14	NB	443
19:27:04	101	0:16	SB	804
19:48:37	97	0:21	SB	444
19:58:50	90	0:07	NB	445
20:53:34	98	0:16	SB	446
20:56:22	104	0:31	NB	447
21:50:48	90	0:08	SB	448
21:56:27	102	0:14	NB	449

Location: 2nd and Railroad
Date: 28 May 2013

Time	Lmax	Duration	Direction	Train
5:23:28	99	0:12	NB	101
5:26:58	98	0:20	SB	102
5:56:26	96	0:14	SB	104
5:59:14	95	0:07	NB	103
6:18:23	101	0:15	NB	305
6:36:45	98	0:23	SB	206
6:54:19	95	0:13	SB	208
6:55:17	102	0:22	NB	207
7:06:25	101	0:25	SB	210
7:09:26	96	0:25	NB	211
7:19:37	100	0:15	SB	312
7:32:10	97	0:12	NB	215
7:35:58	98	0:08	SB	314
7:37:52	101	0:14	NB	319
7:44:49	100	0:24	SB	216
7:55:53	100	0:16	NB	217
7:56:48	107	0:18	SB	218
8:07:35	101	0:09	SB	220
8:10:51	101	0:24	NB	221
8:20:38	103	0:14	SB	322
8:33:33	104	0:15	NB	225
8:38:13	101	0:10	NB	329
8:45:49	100	0:11	SB	226
8:57:32	105	0:14	SB	228
8:58:36	102	0:21	NB	227
9:07:56	99	0:08	SB	230
9:08:18	97	0:10	NB	231
9:20:01	99	0:11	SB	332
9:35:51	96	0:14	NB	233
9:39:45	99	0:24	SB	134
10:04:05	101	0:19	SB	236
10:05:51	96	0:07	NB	135
10:36:06	101	0:11		
10:38:06	100	0:22	SB	138
11:07:45	96	0:15	NB	139
11:40:30	102	0:24	SB	142
12:10:38	99	0:13	NB	143
12:39:26	100	0:15	SB	146
13:06:50	91	0:07	NB	147
13:43:05	95	0:22	SB	150
14:07:59	95	0:13	NB	151
14:41:22	101	0:26	SB	152
15:03:53	102	0:23	SB	254
15:10:23	94	0:08	NB	155
15:32:36	103	0:17	NB	257
15:39:28	102	0:20	SB	156
16:01:50	105	0:28	NB	159
16:03:23	96	0:12	SB	258

Time	Lmax	Duration	Direction	Train
16:29:11	97	0:11	SB	360
16:38:10	101	0:12	NB	261
16:41:33	87	0:07	SB	262
16:49:47	101	0:17	NB	263
16:57:03	104	0:24	SB	366
17:01:24	101	0:13	NB	365
17:05:00	102	0:19	SB	264
17:11:10	102	0:12	NB	267
17:19:22	102	0:14	SB	268
17:20:04	104	0:14	NB	371
17:34:41	100	0:12	SB	370
17:35:08	101	0:13	NB	369
17:46:39	100	0:24	NB	273
17:48:27	102	0:13	SB	272
17:56:35	102	0:24	SB	376
18:06:17	101	0:23	SB	274
18:13:52	99	0:10	NB	277
18:19:52	99	0:13	SB	278
18:20:44	102	0:14	NB	381
18:34:21	94	0:11	SB	380
18:44:02	100	0:23	SB	282
18:46:27	100	0:08	NB	283
18:56:40	102	0:26	SB	386
19:00:31	104	0:15	NB	385
19:06:01	102	0:27	SB	284
19:10:57	100	0:10	NB	287
19:18:41	98	0:09	SB	288
19:38:22	104	0:15	NB	289
19:46:45	109	0:27	NB	191
20:03:24	94	0:23	SB	190
20:11:13	102	0:29		
20:27:46	103	0:14	NB	193
21:14:02	96	0:15	SB	192
21:27:19	102	0:12	NB	195
21:34:11	111	0:23		
22:12:27	98	0:22	SB	194
22:27:14	93	0:13	NB	197
23:13:55	94	0:08	SB	196
23:23:35	101	0:12	NB	199

Location: 2nd and Railroad
Date: 29 May 2013

Time	Lmax	Duration	Direction	Train
0:34:10	94	0:14	SB	198
0:37:36	110	0:22		
2:27:59	112	0:31		
5:23:25	90	0:10	NB	101
5:26:34	98	0:16	SB	102
5:56:09	96	0:23	SB	104
6:01:16	96	0:14	NB	103
6:18:43	102	0:14	NB	305
6:37:06	99	0:16	SB	206
6:38:17	101	0:09	NB	309
6:54:08	100	0:12	SB	208
6:55:21	97	0:14	NB	207
7:06:35	106	0:08	NB	211
7:08:13	93	0:20	SB	210
7:19:45	100	0:12	SB	312
7:21:56	98	0:14	NB	313
7:32:45	93	0:14	NB	215
7:36:13	102	0:12	SB	315
7:37:53	98	0:14	NB	319
7:43:59	102	0:24	SB	216
7:54:43	103	0:16	SB	218
7:58:54	92	0:07	NB	217
7:59:03	99	0:12		
8:07:10	90	0:13	SB	220
8:07:46	104	0:19	NB	221
8:19:33	104	0:18	SB	322
8:35:18	104	0:09	NB	225
8:36:11	99	0:13	SB	324
8:39:15	104	0:13	NB	329
8:44:00	97	0:13	SB	226
8:55:28	103	0:13	SB	228
8:57:12	97	0:14	NB	227
9:08:02	102	0:23	SB	230
9:19:26	99	0:13	SB	332
9:35:41	89	0:08	NB	233
9:43:08	104	0:24	SB	134
10:05:06	101	0:28	SB	236
10:07:08	101	0:12	NB	135
10:31:52	93	0:07		
10:38:59	97	0:15	SB	138
11:08:48	102	0:10	NB	139
11:39:08	96	0:22	SB	142
12:08:03	92	0:14	NB	143
12:39:23	98	0:13	SB	146
13:10:02	105	0:21	NB	147
13:38:34	100	0:16	SB	150
14:09:40	101	0:20	NB	151
14:39:41	103	0:26	SB	152
15:05:31	100	0:23	NB	155
15:32:51	100	0:14	NB	257
15:39:15	100	0:22	SB	156

Time	Lmax	Duration	Direction	Train
16:01:34	101	0:15	NB	159
16:03:12	103	0:21	SB	258
16:28:37	98	0:12	SB	360
16:34:53	97	0:15	NB	261
16:42:18	97	0:22	SB	262
16:47:53	94	0:09	NB	263
16:57:01	99	0:13	SB	366
17:03:30	97	0:13	NB	365
17:04:45	98	0:15	SB	264
17:14:00	102	0:14	NB	267
17:19:24	99	0:13	SB	268
17:20:16	99	0:16	NB	371
17:35:34	101	0:11	SB	370
17:37:37	105	0:22	NB	269
17:45:11	102	0:21	SB	272
17:48:05	102	0:13	NB	273
17:56:37	102	0:28	SB	376
18:03:10	100	0:23	NB	375
18:04:30	104	0:14	SB	274
18:16:44	100	0:16	NB	277
18:19:20	103	0:12	SB	278
18:21:53	100	0:18	NB	381
18:35:06	97	0:11	SB	380
18:36:03	99	0:08	NB	279
18:43:52	103	0:23	SB	282
18:47:02	109	0:22	NB	283
18:56:22	99	0:24	SB	386
18:59:50	97	0:13	NB	385
19:06:39	104	0:25	SB	284
19:12:11	93	0:13	NB	287
19:18:29	100	0:14	SB	288
19:25:43	102	0:19		
19:31:18	98	0:14	NB	289
19:46:03	105	0:18	NB	191
20:03:17	99	0:22	SB	190
20:25:05	98	0:14	NB	193
20:34:44	112	0:41		
20:51:34	102	0:13		
21:12:25	93	0:10	SB	192
21:26:47	102	0:13	NB	195
22:15:28	97	0:17	SB	194
22:28:49	101	0:10	NB	197
22:37:12	108	0:24		
23:16:35	100	0:29	SB	196
23:26:25	100	0:20	NB	199
23:38:46	110	0:23		
23:53:58	98	0:13		

Location: 2nd and Railroad
Date: 30 May 2013

Time	Lmax	Duration	Direction	Train
0:16:24	99	0:23		
0:22:38	105	0:57		
1:10:46	98	0:24		
1:17:37	106	0:14		
5:23:16	92	0:19	NB	101
5:26:29	97	0:24	SB	102
5:55:37	100	0:25	SB	104
5:58:53	106	0:24	NB	103
6:18:05	98	0:13	NB	305
6:36:42	93	0:24	SB	206
6:53:53	104	0:14	SB	208
6:55:33	98	0:21	NB	207
7:06:01	98	0:14	SB	210
7:07:02	104	0:25	NB	211
7:19:36	101	0:15	SB	312
7:31:28	97	0:11	NB	215
7:37:05	89	0:08	SB	314
7:38:19	99	0:11	NB	319
7:45:49	93	0:17	SB	216
7:55:19	97	0:19	SB	218
7:55:49	97	0:14	NB	217
8:07:14	100	0:24	SB	220
8:09:33	100	0:11	NB	221
8:19:05	100	0:12	SB	322
8:20:36	101	0:15	NB	323
8:32:09	98	0:09	NB	225
8:36:04	100	0:13	SB	324
8:43:47	102	0:21	NB	329
8:44:14	95	0:09	SB	226
8:58:53	98	0:24	SB	228
9:00:00	105	0:14	NB	227
9:09:35	96	0:20	SB	230
9:11:00	100	0:08	NB	231
9:21:50	98	0:12	SB	332
9:39:43	98	0:11	NB	233
9:40:36	93	0:09	SB	134
9:49:25	97	0:14		
10:05:24	101	0:23	SB	236
10:06:42	99	0:15	NB	135
10:35:03	90	0:15		
10:40:54	100	0:24	SB	138
10:52:28	96	0:15		
11:06:01	105	0:10	NB	139
11:13:04	94	0:08		
11:40:43	100	0:16	SB	142
12:10:08	102	0:21	NB	143
12:40:01	98	0:14	SB	146
13:09:00	92	0:09	NB	147
13:39:08	99	0:15	SB	150
14:10:56	100	0:08	NB	151
14:43:14	101	0:15	SB	152
15:03:06	102	0:22	SB	254

Time	Lmax	Duration	Direction	Train
15:10:24	90	0:08	NB	155
15:33:27	100	0:11	NB	257
15:40:06	100	0:21	SB	156
16:04:49	99	0:21	NB	159
16:08:58	93	0:12	SB	258
16:20:37	101	0:13		
16:30:45	100	0:13	SB	360
16:36:08	106	0:18	NB	261
16:43:37	101	0:22	SB	262
16:47:34	102	0:12	NB	263
16:57:33	100	0:18	SB	366
17:01:07	99	0:13	NB	365
17:06:30	97	0:23	SB	264
17:13:57	100	0:15	NB	267
17:18:09	101	0:13	SB	268
17:23:01	100	0:14	NB	371
17:34:56	100	0:09	SB	370
17:42:25	92	0:10	NB	269
17:44:29	88	0:09	SB	272
17:52:14	99	0:11	NB	273
17:57:20	100	0:22	SB	376
18:03:17	96	0:12	NB	375
18:06:24	95	0:21	SB	274
18:17:29	101	0:15	NB	277
18:19:43	99	0:13	SB	278
18:27:53	101	0:14	NB	381
18:34:26	98	0:09	SB	380
18:41:08	97	0:13	NB	279
18:44:45	104	0:22	SB	282
18:51:10	97	0:08	NB	283
18:57:31	99	0:33	SB	386
19:02:13	99	0:13	NB	385
19:05:35	101	0:12	SB	284
19:15:22	101	0:11		
19:19:47	98	0:09	SB	288
19:31:08	98	0:12	NB	289
19:35:38	105	0:25		
19:47:14	102	0:15		
19:47:31	103	0:15	NB	191
20:06:06	94	0:21	SB	190
20:27:59	104	0:15	NB	193
21:18:16	99	0:23	SB	192
21:26:56	102	0:14	NB	195
22:12:46	98	0:22	SB	194
22:27:37	95	0:07	NB	197
22:41:44	109	0:18		
23:12:40	101	0:22	SB	196
23:27:03	95	0:19	NB	199
23:32:02	97	0:16		

Location: 2nd and Railroad
Date: 31 May 2013

Time	Lmax	Duration	Direction	Train
0:21:17	107	0:18		
0:35:50	92	0:11	SB	198
5:24:02	99	0:12	NB	101
5:26:53	98	0:17	SB	102
5:58:28	102	0:42	SB	104
6:18:59	103	0:16	NB	305
6:37:23	99	0:11	SB	206
6:37:46	98	0:17	NB	309
6:55:43	93	0:18	SB	208
6:56:00	91	0:08	NB	207
6:57:24	97	0:19	NB	207
7:07:25	97	0:11	SB	210
7:09:58	102	0:31	NB	211
7:20:25	99	0:09	SB	312
7:20:45	100	0:19	NB	313
7:33:26	105	0:22	NB	215
7:37:21	95	0:13	SB	314
7:38:54	95	0:08	NB	319
7:44:39	101	0:30	SB	216
7:57:59	101	0:10	SB	218
7:58:19	96	0:09	NB	217
8:07:47	102	0:23	SB	220
8:08:40	97	0:18	NB	221
8:22:36	101	0:21	NB	323
8:33:00	97	0:12	NB	225
8:36:53	98	0:11	SB	324
8:39:42	100	0:16	NB	329
8:47:33	99	0:22	SB	226
8:55:45	103	0:17	SB	228
8:58:56	101	0:17	NB	227
9:07:25	95	0:12	SB	230
9:13:22	99	0:23	NB	231
9:19:14	101	0:13	SB	332
9:41:44	101	0:18	NB	233
9:46:27	100	0:16	SB	134
10:03:12	98	0:21	SB	236
10:05:52	91	0:12	NB	135
10:40:48	97	0:20	SB	138
10:46:12	94	0:12		
11:52:01	104	0:24		
12:05:02	103	0:14	NB	143
12:40:37	97	0:16	SB	146
13:08:22	97	0:12	NB	147
13:41:14	89	0:07	SB	150
14:11:59	101	0:11	NB	151
14:40:06	98	0:21	SB	152
15:04:49	96	0:10	SB	254
15:07:27	108	0:12	NB	155
15:32:45	101	0:13	NB	257
15:39:22	100	0:22	SB	156
16:04:24	103	0:25	NB	159
16:05:51	103	0:16	SB	258
16:29:13	102	0:12	SB	360
16:35:41	105	0:10	NB	261
16:42:35	99	0:17	SB	262
16:46:33	97	0:10	NB	263
16:57:23	97	0:12	SB	366
17:00:02	96	0:13	NB	365
17:05:52	99	0:24	SB	264
17:13:21	101	0:12	NB	267
17:18:47	96	0:13	SB	268
17:21:19	101	0:13	NB	371
17:36:48	102	0:11	SB	370
17:41:19	109	0:17	NB	269
17:43:43	103	0:31	SB	272
17:51:06	101	0:21	NB	273
17:57:16	103	0:19	SB	376
18:01:59	99	0:13	NB	375
18:05:34	96	0:23	SB	274
18:12:44	93	0:07	NB	277
18:18:38	102	0:13	SB	278
18:24:45	98	0:14	NB	381
18:35:51	100	0:10	SB	380
18:42:57	97	0:10	NB	279
18:44:37	98	0:16	SB	282
18:52:55	96	0:08	NB	283
18:57:06	99	0:20	SB	386
19:03:02	100	0:14	NB	385
19:04:32	96	0:22	SB	284
19:13:13	95	0:11	NB	287
19:18:30	101	0:14	SB	288
19:33:41	100	0:10	NB	289
19:44:21	98	0:15	NB	191
20:03:06	94	0:09	SB	190
20:27:30	101	0:15	NB	193
21:14:36	97	0:22	SB	192
21:24:54	99	0:11	NB	195
22:14:27	98	0:21	SB	194
22:28:21	103	0:17	NB	197
23:12:04	104	0:24	SB	196
23:25:55	103	0:21	NB	199

Location: 2nd and Railroad
Date: 1 June 2013

Time	Lmax	Duration	Direction	Train
0:33:46	101	0:22	SB	198
7:55:48	89	0:11	NB	421
8:50:54	101	0:24	SB	422
8:57:47	100	0:11	NB	423
9:56:44	95	0:10	SB	424
9:58:11	97	0:14	NB	425
10:48:31	100	0:18	SB	426
10:59:16	97	0:13	NB	427
11:18:07	98	0:12	NB	801
11:52:36	100	0:21	SB	428
11:57:28	97	0:11	NB	429
12:20:46	101	0:22	SB	802
12:49:49	100	0:16	SB	430
13:50:39	103	0:19	SB	432
13:57:28	102	0:12	NB	433
14:50:18	97	0:23	SB	434
15:03:06	102	0:11	NB	435
15:49:09	99	0:24	SB	436
16:02:06	93	0:14	NB	437
16:51:13	98	0:10	SB	438
17:03:30	91	0:13	NB	439
17:51:09	103	0:21	SB	440
17:57:45	102	0:16	NB	441
18:13:50	99	0:12	NB	803
18:51:56	101	0:20	SB	442
18:56:08	100	0:11	NB	443
19:21:07	100	0:22	SB	804
19:49:02	103	0:20	SB	444
19:59:00	88	0:07	NB	445
20:49:42	99	0:23	SB	446
20:56:10	100	0:10	NB	447
21:48:30	88	0:08	SB	448
22:23:13	106	0:11		
22:49:09	98	0:23	SB	450
23:28:37	100	0:09	NB	451

Location: 2nd and Railroad
Date: 2 June 2013

Time	Lmax	Duration	Direction	Train
0:37:29	97	0:22	SB	454
8:49:38	92	0:10	SB	422
8:56:10	97	0:18	NB	423
9:49:23	98	0:22	SB	424
10:01:34	88	0:08	NB	425
10:49:56	96	0:15	SB	426
10:57:41	100	0:11	NB	427
11:49:09	100	0:23	SB	428
11:59:22	102	0:09	NB	429
12:11:13	111	1:18		
12:21:07	97	0:15	SB	802
12:51:13	99	0:08	SB	430
13:02:05	101	0:12	NB	431
13:49:49	101	0:15	SB	432
13:55:32	106	0:24		
14:04:01	102	0:18	NB	433
14:50:07	95	0:21	SB	434
14:56:21	94	0:12	NB	435
15:48:22	96	0:16	SB	436
16:00:08	104	0:14	NB	437
16:49:32	101	0:23	SB	438
16:58:57	103	0:18	NB	439
17:50:09	101	0:15	SB	440
17:59:55	102	0:12	NB	441
18:13:14	96	0:13	NB	803
18:50:47	100	0:23	SB	442
18:56:40	90	0:11	NB	443
19:20:26	97	0:20	SB	804
19:49:54	100	0:22	SB	444
19:57:36	104	0:16	NB	445
20:39:28	112	0:33		
20:51:18	94	0:10	SB	446
21:01:33	94	0:10	NB	447
21:48:40	105	0:24	SB	448
21:59:50	98	0:11	NB	449

Location: 2nd and Railroad
Date: 3 June 2013

Time	Lmax	Duration	Direction	Train
0:57:00	95	0:25		
3:04:33	98	0:13		
4:22:54	106	0:18		
5:26:44	104	0:19		
5:27:13	95	0:09	SB	102
5:56:30	102	0:24	SB	104
6:00:24	96	0:12	NB	103
6:18:45	100	0:14	NB	305
6:36:57	104	0:19	SB	206
6:54:59	96	0:15	SB	208
6:57:30	101	0:24	NB	207
7:08:31	98	0:13	SB	210
7:10:11	101	0:24	NB	211
7:20:16	104	0:12	NB	313
7:21:07	101	0:16	SB	312
7:31:35	90	0:07	NB	215
7:36:27	95	0:08	SB	314
7:37:32	96	0:08	NB	319
7:44:06	103	0:15	SB	216
7:56:54	100	0:19	SB	218
7:57:16	109	0:16	NB	217
8:11:10	90	0:09	SB	220
8:11:18	98	0:12	NB	221
8:19:32	97	0:12	SB	322
8:20:35	96	0:13	NB	323
8:33:06	105	0:15	NB	225
8:38:01	98	0:12	SB	324
8:40:36	102	0:14	NB	329
8:44:46	103	0:21	SB	226
8:57:13	94	0:10	SB	228
8:59:35	108	0:16	NB	229
9:09:17	101	0:25	SB	230
9:10:28	104	0:14	NB	231
9:21:53	103	0:13	SB	332
9:40:56	93	0:09	NB	233
9:43:46	102	0:13	SB	134
10:03:21	100	0:20	SB	236
10:07:18	94	0:08	NB	135
10:36:18	99	0:16	SB	138
10:39:04	101	0:23		
11:07:26	97	0:08	NB	139
11:39:38	100	0:16	SB	142
12:10:39	96	0:08	NB	143
12:38:49	96	0:15	SB	146
13:09:13	92	0:08	NB	147
13:40:37	100	0:15	SB	150
14:09:33	103	0:11	NB	151
14:38:57	97	0:13	SB	152
15:02:27	96	0:23	SB	254
15:04:29	104	0:12	NB	155
15:33:47	101	0:13	NB	257
15:38:48	101	0:12	SB	156
16:03:37	103	0:18	SB	258
16:06:16	106	0:22	NB	159
16:28:25	102	0:13	SB	360
16:34:05	102	0:20	NB	261
16:42:50	101	0:20	SB	262
16:47:07	91	0:11	NB	263
16:57:04	102	0:24	SB	366
16:59:06	100	0:15	NB	365
17:04:16	97	0:22	SB	264
17:11:56	96	0:11	NB	267
17:18:35	102	0:13	SB	268
17:19:29	100	0:17	NB	371
17:35:00	108	0:26	NB	269
17:44:09	101	0:22	SB	272
17:50:51	102	0:13	NB	273
17:58:30	99	0:22	SB	376
18:01:22	101	0:13	NB	375
18:06:51	100	0:24	SB	274
18:13:11	97	0:12	NB	277
18:18:59	101	0:12	SB	278
18:20:29	103	0:15	NB	381
18:34:30	99	0:11	SB	380
18:37:57	104	0:17	NB	279
18:43:55	94	0:14	SB	282
18:47:42	96	0:12	NB	283
18:57:44	87	0:07	SB	386
18:59:06	89	0:07		
19:00:52	96	0:13	NB	385
19:04:17	97	0:14	SB	284
19:11:51	100	0:11	NB	287
19:18:18	96	0:12	SB	288
19:31:41	103	0:13	NB	289
19:46:03	105	0:28	NB	191
20:05:45	102	0:27	SB	190
20:13:37	105	0:34		
20:27:50	107	0:29	NB	193
21:13:49	101	0:21	SB	192
21:28:01	98	0:12	NB	195
22:17:10	104	0:26	SB	194
22:23:59	97	0:08	NB	197
23:12:31	95	0:13	SB	196
23:23:56	100	0:14	NB	199
23:34:16	109	0:24		

Location: 2nd and Railroad
Date: 4 June 2013

Time	Lmax	Duration	Direction	Train
0:32:04	101	0:27	SB	198
5:25:05	92	0:08	NB	101
5:33:59	98	0:18	SB	102
5:56:39	101	0:25	SB	104
6:01:43	97	0:14	NB	103
6:18:31	95	0:12	NB	305
6:36:32	98	0:13	SB	206
6:36:44	98	0:23	NB	309
6:54:12	96	0:12	SB	208
6:55:44	93	0:11	NB	207
7:08:01	102	0:22	SB	210
7:10:02	100	0:11	NB	211
7:19:08	96	0:12	NB	313
7:21:38	100	0:15	SB	312
7:31:25	106	0:26	NB	215
7:36:43	100	0:12	SB	314
7:37:43	96	0:17	NB	319
7:43:51	102	0:22	SB	216
7:55:20	104	0:15	SB	218
7:56:29	97	0:13	NB	217
8:09:14	98	0:14	SB	220
8:13:34	100	0:14	NB	221
8:19:53	99	0:12	SB	322
8:22:22	101	0:15	NB	323
8:33:33	100	0:18	NB	225
8:36:33	97	0:11	SB	324
8:40:07	101	0:13	NB	329
8:43:20	102	0:24	SB	226
8:56:51	103	0:25	SB	228
9:07:31	102	0:19	SB	230
9:14:06	96	0:08	NB	231
9:18:55	103	0:13	SB	332
9:37:50	99	0:10	NB	233
9:38:12	102	0:25	SB	134
10:03:40	96	0:09	SB	236
10:14:42	99	0:12	NB	135
10:32:19	95	0:10		
10:40:50	102	0:16	SB	138
11:08:24	100	0:13	NB	139
11:40:57	105	0:25	SB	142
12:41:03	103	0:16	SB	146
13:05:47	97	0:11	NB	147
13:40:03	99	0:12	SB	150
14:07:56	95	0:09	NB	151
14:38:46	98	0:21	SB	152
15:01:58	97	0:09	SB	254
15:12:00	101	0:16	NB	155
15:33:27	103	0:11	NB	257

Time	Lmax	Duration	Direction	Train
15:39:55	98	0:19	SB	156
16:02:26	100	0:18	NB	159
16:03:05	95	0:08	SB	258
16:28:55	101	0:14	SB	360
16:36:36	103	0:17	NB	261
16:44:00	104	0:24	SB	262
16:46:53	100	0:16	NB	263
16:57:16	103	0:25	SB	366
17:02:01	101	0:12	NB	365
17:04:17	95	0:22	SB	264
17:11:19	90	0:08	NB	267
17:17:54	98	0:12	SB	268
17:19:40	100	0:13	NB	371
17:34:02	98	0:10	SB	370
17:39:24	101	0:18	NB	269
17:48:50	101	0:21	SB	272
17:50:48	100	0:10	NB	273
17:57:02	102	0:24	SB	376
18:05:23	98	0:13	SB	274
18:18:06	101	0:13	SB	278
18:21:51	110	0:20	NB	381

Appendix Section 2.0

RESULTS OF LONG-TERM MEASUREMENTS
16th and Railroad Location

Location: 16th and Railroad
Date: 29 April 2013

Time	Lmax	Duration	Direction	Train
18:46:15	93	0:13	NB	283
19:05:28	86	0:08	SB	284
19:19:06	92	0:10	SB	288
23:22:29	87	0:13	NB	199

Location: 16th and Railroad
Date: 30 April 2013

Time	Lmax	Duration	Direction	Train
0:35:39	89	0:09	SB	198
7:16:17	87	0:10	NB	313
7:57:05	91	0:08	SB	218
8:10:17	85	0:10	SB	220
8:20:42	89	0:11	NB	323
8:46:59	93	0:13	SB	226
9:21:06	84	0:08	SB	332
10:04:14	91	0:12	NB	135
16:30:25	85	0:12	SB	360
16:43:54	90	0:11	NB	263
17:36:22	81	0:08	NB	269
17:47:22	85	0:13	NB	273
17:58:56	83	0:11	SB	376
18:21:44	89	0:10	SB	278
18:45:48	89	0:11	NB	283
18:58:42	86	0:09	NB	385
19:20:44	84	0:09	SB	288
19:28:42	103	0:17	NB	289
23:09:07	82	0:07	SB	196

Location: 16th and Railroad
Date: 1 May 2013

Time	Lmax	Duration	Direction	Train
5:58:10	86	0:11	NB	103
6:57:03	82	0:07	SB	208
7:37:25	81	0:09	NB	319
7:45:10	88	0:09	SB	216
7:57:22	81	0:07	SB	218
8:08:23	84	0:07	SB	220
9:12:16	91	0:09	NB	323
9:21:52	91	0:11	SB	332
10:05:15	87	0:09	NB	135
10:43:38	85	0:08	SB	138
13:42:56	88	0:09	SB	150
15:05:45	89	0:08	NB	155
16:04:02	87	0:09	SB	258
16:30:30	92	0:09	SB	360
16:58:58	87	0:12	NB	365
17:20:37	89	0:09	SB	268
17:36:36	92	0:11	SB	370
17:47:01	89	0:09	NB	273
18:38:14	87	0:11	SB	380
18:58:45	87	0:09	SB	376
19:25:05	84	0:07	SB	288
19:31:04	82	0:08	NB	289
20:24:36	102	0:32	NB	193

Location: 16th and Railroad
Date: 2 May 2013

Time	Lmax	Duration	Direction	Train
0:36:14	85	0:08	SB	198
5:56:57	81	0:09	NB	103
6:38:15	91	0:10	NB	309
7:18:35	81	0:07	NB	313
7:22:38	92	0:12	SB	312
7:39:12	85	0:08	NB	319
7:57:31	87	0:08	SB	218
8:10:50	89	0:12	SB	220
8:20:31	88	0:13	SB	322
8:45:40	84	0:10	SB	226
9:13:04	84	0:08	SB	230
9:21:47	86	0:10	SB	332
16:04:37	87	0:08	SB	258
16:43:41	94	0:12	SB	262
16:58:35	86	0:11	SB	366
17:22:12	90	0:09	SB	268
17:46:01	84	0:08	NB	273
17:58:14	86	0:11	SB	376
18:20:55	89	0:09	SB	278
18:34:38	91	0:09	NB	279
18:58:50	87	0:11	SB	386
19:08:45	91	0:11	SB	284
19:20:20	86	0:08	SB	288
19:37:20	102	0:17	NB	289

Location: 16th and Railroad
Date: 3 May 2013

Time	Lmax	Duration	Direction	Train
5:28:31	86	0:08	SB	102
7:10:22	88	0:10	SB	210
7:21:06	88	0:10	SB	312
7:44:19	83	0:11	SB	216
7:59:24	84	0:15	SB	218
8:09:30	84	0:10	SB	220
8:37:46	85	0:11	NB	329
8:45:27	89	0:09	SB	226
11:42:52	90	0:09	NB	237
16:06:30	88	0:09	SB	258
16:30:45	85	0:10	SB	360
16:39:32	86	0:10	NB	261
16:45:01	83	0:09	SB	262
17:45:08	89	0:12	SB	272
17:58:30	83	0:09	Accident on Tracks	
18:20:03	90	0:12	Accident on Tracks	
18:36:38	84	0:11	Accident on Tracks	
18:49:21	87	0:11	Accident on Tracks	
20:11:57	90	0:12	Accident on Tracks	
21:26:42	87	0:10	Accident on Tracks	
21:33:47	95	0:19	Accident on Tracks	

Location: 16th and Railroad
Date: 4 May 2013

Time	Lmax	Duration	Direction	Train
1:57:03	85	0:09		
10:53:18	91	0:08	SB	426
14:51:48	87	0:09	SB	434
15:50:23	81	0:08	SB	436
19:22:28	86	0:11	SB	804
22:52:10	89	0:13	SB	450

Location: 16th and Railroad
Date: 5 May 2013

Time	Lmax	Duration	Direction	Train
9:56:42	81	0:07	NB	425
15:50:34	89	0:08	SB	436
17:52:27	81	0:09	SB	442
18:11:51	84	0:07	NB	803
19:22:50	91	0:12	SB	804
19:38:28	102	0:16		
19:53:57	94	0:07	SB	444
21:54:03	87	0:12	SB	448

Location: 16th and Railroad
Date: 6 May 2013

Time	Lmax	Duration	Direction	Train
7:50:09	86	0:10	SB	216
8:10:00	84	0:10	SB	220
8:20:49	83	0:11	SB	322
8:47:38	83	0:10	SB	226
9:22:52	85	0:10	SB	332
10:05:30	88	0:09	SB	236
12:40:54	80	0:09	SB	146
16:05:05	83	0:10	SB	258
16:30:33	94	0:10	SB	360
16:44:47	88	0:11	SB	262
17:36:45	85	0:08	SB	370
17:45:51	85	0:11	SB	272
18:00:26	86	0:13	SB	376
18:22:26	89	0:08	SB	278
18:35:55	88	0:09	SB	380
18:44:52	90	0:10	SB	282
19:10:58	82	0:07	NB	287
19:19:52	87	0:10	SB	288
19:38:13	89	0:18		
22:14:10	89	0:08	SB	194
22:38:41	83	0:10		

Location: 16th and Railroad
Date: 7 May 2013

Time	Lmax	Duration	Direction	Train
0:35:42	92	0:13	SB	198
6:39:04	89	0:10	SB	206
7:11:04	89	0:10	SB	210
7:30:44	80	0:07	NB	215
7:45:28	86	0:10	SB	216
8:08:34	87	0:10	SB	220
8:20:48	87	0:09	SB	322
8:46:00	84	0:13	SB	226
9:10:28	87	0:11	SB	230
10:45:02	88	0:08		
13:41:38	84	0:07	SB	150
16:06:10	92	0:11	SB	258
16:58:54	93	0:11	SB	366
17:19:48	90	0:10	SB	268
17:37:37	86	0:07	SB	370
17:48:01	88	0:11	SB	272
17:58:42	87	0:12	SB	376
18:20:22	90	0:12	SB	278
18:36:34	99	0:18	NB	279
18:39:47	85	0:08	SB	380
18:47:43	94	0:10	SB	282
18:58:12	90	0:09	SB	386
20:32:43	102	0:33		
20:43:43	93	0:12		
23:34:44	88	0:08		

Location: 16th and Railroad
Date: 8 May 2013

Time	Lmax	Duration	Direction	Train
5:29:02	86	0:08	SB	102
7:50:00	88	0:09	SB	216
7:54:29	90	0:15	NB	319
8:20:04	82	0:08	SB	322
9:22:26	86	0:10	SB	332
9:53:09	90	0:09		
14:06:10	102	0:50		
14:40:09	87	0:09	SB	152
15:04:16	90	0:10	SB	254
16:08:08	92	0:10	SB	258
16:23:03	87	0:10		
16:30:12	87	0:12	SB	360
16:45:50	84	0:13	SB	262
16:59:54	88	0:11	SB	366
17:35:34	86	0:07	SB	370
17:46:28	90	0:10	SB	272
18:36:59	80	0:08	SB	380
19:05:25	88	0:08	SB	284
19:19:16	84	0:10	SB	288
19:31:06	82	0:07		
19:37:20	103	0:18		

Location: 16th and Railroad
Date: 9 May 2013

Time	Lmax	Duration	Direction	Train
0:11:25	82	0:07		
0:33:49	88	0:09	SB	198
5:28:23	82	0:07	SB	102
6:39:47	88	0:13	SB	206
7:22:16	88	0:12	SB	312
7:36:49	90	0:08	SB	314
7:44:30	87	0:10	SB	216
8:10:12	91	0:10	SB	220
8:21:09	87	0:13	SB	322
8:46:54	87	0:14	SB	226
12:41:15	86	0:09	SB	146
13:42:26	81	0:09		
16:04:58	89	0:13	SB	258
17:20:02	91	0:07	SB	268
18:05:45	87	0:09	SB	376
18:11:52	83	0:14	SB	274
18:25:28	88	0:07	SB	278
18:37:24	86	0:08	SB	380
18:45:49	86	0:10	SB	282
18:58:23	88	0:12	SB	386
19:20:28	87	0:09	SB	288
19:37:47	101	0:39		
23:00:44	82	0:09		

Location: 16th and Railroad
Date: 10 May 2013

Time	Lmax	Duration	Direction	Train
5:58:08	90	0:22	SB	104
6:37:43	91	0:14	SB	206
7:09:48	90	0:11	NB	211
7:20:47	83	0:07	SB	312
8:28:00	84	0:08	Accident on Tracks	
8:59:51	95	0:11	Accident on Tracks	
10:13:58	85	0:07	Accident on Tracks	
10:22:43	85	0:11	Accident on Tracks	
13:05:16	87	0:10	NB	147
15:05:08	89	0:11	SB	254
16:07:20	91	0:12	SB	254
16:30:30	87	0:10	SB	360
17:19:35	84	0:09	NB	371
17:37:03	92	0:10	SB	370
17:44:31	89	0:10	SB	272
18:35:19	86	0:11	NB	279
18:59:19	88	0:10	SB	386
19:20:31	88	0:11	SB	288
19:34:31	82	0:08		
19:45:17	101	0:25		
22:33:11	88	0:09		
23:00:09	87	0:14		

Location: 16th and Railroad
Date: 11 May 2013

Time	Lmax	Duration	Direction	Train
8:52:38	86	0:08	SB	422
10:13:22	85	0:08		
12:23:02	87	0:11	SB	802
13:54:36	91	0:07	SB	432
18:52:21	89	0:10	SB	422
19:23:17	89	0:12	SB	804
22:51:16	87	0:13	SB	450

Location: 16th and Railroad
Date: 12 May 2013

Time	Lmax	Duration	Direction	Train
10:10:04	88	0:08		
12:22:57	89	0:10	SB	802
12:51:47	87	0:08	SB	430
16:47:58	86	0:10	SB	438
17:19:59	86	0:14		
19:02:17	95	0:19		
19:22:58	89	0:10	SB	804
19:50:21	85	0:09	SB	444

Location: 16th and Railroad
Date: 13 May 2013

Time	Lmax	Duration	Direction	Train
7:37:32	83	0:08	SB	314
7:45:12	94	0:13	SB	216
7:57:26	88	0:07	NB	217
8:21:13	90	0:11	SB	322
8:38:02	92	0:10	SB	324
8:46:54	93	0:10	SB	226
9:23:01	92	0:12	NB	231
10:46:39	85	0:08		
11:44:04	88	0:09	SB	142
14:40:12	86	0:09	SB	152
15:40:05	90	0:11	SB	156
16:07:02	88	0:09	SB	258
16:31:15	87	0:10	SB	360
16:58:54	95	0:10	SB	366
17:20:13	83	0:09	SB	268
17:58:40	89	0:10	SB	376
18:21:57	90	0:13	SB	278
18:36:29	87	0:08	SB	380
18:59:21	91	0:11	SB	386
19:07:01	90	0:10	SB	284
19:19:45	90	0:10	SB	288
19:33:53	81	0:11	N	289
20:07:47	101	0:17		

Location: 16th and Railroad
Date: 14 May 2013

Time	Lmax	Duration	Direction	Train
0:34:15	88	0:09	SB	198
5:29:35	88	0:10	SB	102
7:11:43	88	0:12	NB	211
7:22:05	90	0:09	SB	312
7:57:22	88	0:09	SB	218
8:11:38	89	0:10	SB	220
8:21:03	82	0:13	NB	323
8:49:22	86	0:09	SB	226
9:10:22	91	0:30	SB	230
16:43:34	86	0:11	SB	262
17:18:53	90	0:21	SB	268
17:45:41	89	0:11	SB	272
18:32:45	87	0:10	SB	380
18:36:07	82	0:08	NB	279
18:46:35	88	0:12	NB	283
19:19:33	87	0:10	SB	288
19:34:15	90	0:14	NB	289
19:40:00	95	0:16		

Location: 16th and Railroad
Date: 15 May 2013

Time	Lmax	Duration	Direction	Train
6:56:54	88	0:07	cident on tracks	
7:05:01	88	0:09	cident on tracks	
7:05:41	84	0:07	cident on tracks	
8:08:58	87	0:10	cident on tracks	
8:20:29	91	0:11	cident on tracks	
8:37:56	83	0:10	cident on tracks	
8:45:22	90	0:12	SB	226
9:21:20	89	0:11	SB	332
9:40:09	88	0:10	SB	134
10:04:47	89	0:11	SB	236
10:30:39	87	0:13		
10:41:39	86	0:08	SB	138
13:41:10	87	0:09	SB	150
15:04:52	91	0:10	SB	254
16:03:41	87	0:10	SB	258
16:31:28	85	0:12	SB	360
16:44:33	87	0:13	SB	262
16:58:47	95	0:10	SB	366
17:07:12	83	0:10	SB	264
17:18:45	83	0:08	SB	268
17:36:25	85	0:08	SB	370
17:46:11	90	0:10	SB	272
18:36:18	88	0:10	SB	380
18:47:33	86	0:16	NB	283
18:58:19	86	0:10	SB	386
19:20:22	89	0:19	SB	288
19:39:07	101	0:27		

Location: 16th and Railroad
Date: 16 May 2013

Time	Lmax	Duration	Direction	Train
0:33:44	83	0:12	SB	198
7:20:33	90	0:11	SB	312
7:38:43	89	0:12	SB	314
7:46:30	88	0:11	SB	216
8:00:07	91	0:08	SB	218
8:14:19	84	0:16	SB	220
8:22:06	86	0:10	SB	322
8:50:44	91	0:11		
8:57:15	85	0:07	NB	227
12:43:15	88	0:07	SB	146
16:43:49	88	0:10	SB	262
17:20:20	89	0:15	SB	268
17:58:11	90	0:15	SB	376
18:20:36	84	0:11	SB	278
18:58:51	92	0:13	SB	386
19:19:57	87	0:09		
19:32:52	88	0:15	NB	289
20:24:09	104	0:24	NB	193
21:13:37	91	0:10	SB	192

Location: 16th and Railroad
Date: 17 May 2013

Time	Lmax	Duration	Direction	Train
5:31:29	87	0:07	SB	102
7:57:53	81	0:07	NB	217
8:11:05	91	0:11	SB	220
9:21:27	85	0:10	SB	332
10:40:48	85	0:07	SB	138
13:40:18	83	0:08	SB	150
13:52:24	101	0:12		
16:30:08	89	0:12	SB	360
16:58:08	92	0:13	SB	366
17:06:33	84	0:07	SB	264
17:35:49	88	0:09		
17:44:32	89	0:09	SB	272
17:58:16	87	0:10	SB	376
18:21:15	91	0:10	SB	278
18:45:25	90	0:11	SB	282
19:18:58	91	0:11	SB	288
19:28:10	100	0:16		
19:32:09	81	0:07		
19:32:49	85	0:15		

Location: 16th and Railroad
Date: 18 May 2013

Time	Lmax	Duration	Direction	Train
12:33:38	93	0:08	SB	802
17:53:20	85	0:07	SB	440

Location: 16th and Railroad
Date: 22 May 2013

Time	Lmax	Duration	Direction	Train
9:51:24	89	0:09		
13:41:45	87	0:09	SB	150
14:43:03	88	0:09	SB	152
15:05:05	92	0:10	NB	155
16:23:30	86	0:10	SB	360
16:45:30	90	0:14	SB	262
17:00:06	89	0:22	NB	365
17:20:30	92	0:17	SB	268
17:46:53	89	0:11	SB	272
17:58:39	86	0:11	SB	376
18:36:45	88	0:11	SB	380
19:39:02	83	0:15		

Location: 16th and Railroad
Date: 23 May 2013

Time	Lmax	Duration	Direction	Train
5:29:26	81	0:09	SB	102
6:38:34	89	0:10	SB	206
7:21:22	90	0:12	SB	312
7:36:52	88	0:11	SB	314
7:59:12	85	0:13	SB	218
8:12:53	88	0:10	NB	221
8:22:01	90	0:11	NB	323
8:47:36	88	0:13	SB	226
10:03:16	87	0:11	SB	236
12:40:44	83	0:08	SB	146
13:42:33	81	0:07	SB	150
15:06:27	90	0:10	NB	155
15:39:55	86	0:08	SB	156
16:05:17	93	0:12	SB	258
16:30:31	83	0:07	SB	360
16:46:56	88	0:10	SB	262
16:58:47	87	0:11	SB	366
17:05:55	88	0:09	SB	264
17:35:35	90	0:12	SB	370
18:09:39	91	0:10	SB	274
18:35:56	89	0:10	SB	380
18:50:34	89	0:12	SB	282
19:43:52	101	0:17		

Location: 16th and Railroad
Date: 24 May 2013

Time	Lmax	Duration	Direction	Train
5:58:24	89	0:08	NB	103
6:57:08	88	0:08	SB	208
7:10:51	91	0:11	SB	210
7:37:00	92	0:10	SB	314
7:44:29	87	0:09	SB	216
8:47:59	90	0:10	SB	226
9:09:09	83	0:10	SB	230
9:21:47	90	0:09	SB	332
9:41:34	87	0:09	SB	134
10:04:41	86	0:10	SB	236
10:40:17	92	0:09	SB	138
14:45:01	91	0:08	SB	152
16:06:36	88	0:11	SB	258
16:30:01	92	0:11	SB	360
16:43:28	89	0:12	SB	262
16:58:31	92	0:14	SB	366
17:35:35	94	0:10	SB	370
17:44:55	83	0:10	SB	272
18:19:29	87	0:11	SB	278
18:35:06	86	0:09	SB	380
18:47:57	93	0:20	SB	282
18:58:28	84	0:10	SB	386
19:20:37	89	0:09	SB	288
22:40:52	92	0:09		
23:30:31	93	0:15		

Location: 16th and Railroad
Date: 25 May 2013

Time	Lmax	Duration	Direction	Train
0:37:25	89	0:08		
10:05:33	83	0:12		
12:24:19	85	0:11	SB	802
17:28:22	89	0:10		
18:16:38	83	0:13		
19:28:32	91	0:10	SB	804
19:53:05	90	0:08	NB	445
22:51:57	85	0:11		

Location: 16th and Railroad
Date: 26 May 2013

Time	Lmax	Duration	Direction	Train
10:23:20	89	0:10		
12:33:40	89	0:14	SB	802
17:53:24	81	0:07	SB	440
19:31:15	92	0:14		
19:35:02	90	0:12		

Location: 16th and Railroad
Date: 27 May 2013

Time	Lmax	Duration	Direction	Train
12:28:24	90	0:12	SB	802
12:50:16	88	0:13	SB	430
13:50:51	86	0:07	SB	432
15:52:05	88	0:09	SB	436
16:50:27	90	0:14	SB	438
19:28:21	90	0:14	SB	804
20:54:40	88	0:14	SB	446

Location: 16th and Railroad
Date: 28 May 2013

Time	Lmax	Duration	Direction	Train
5:28:19	84	0:08	SB	102
7:10:52	88	0:12	NB	211
7:20:23	85	0:10	SB	312
7:46:06	84	0:09	SB	216
7:57:14	85	0:07	SB	218
8:47:01	88	0:12	SB	226
9:09:33	82	0:10	SB	230
9:34:48	95	0:16	NB	233
10:05:22	88	0:12	SB	236
11:42:01	86	0:08	SB	142
13:44:21	83	0:12	SB	150
15:40:46	90	0:09	SB	156
16:04:37	84	0:11	SB	258
16:42:56	87	0:11	SB	262
16:58:28	88	0:10	SB	366
17:20:07	84	0:09	SB	268
17:35:24	90	0:09	SB	370
17:49:53	92	0:11	SB	272
17:58:06	86	0:09	SB	376
18:21:27	91	0:10	SB	278
18:45:23	93	0:13	SB	282
19:19:24	89	0:09	SB	288
20:13:21	85	0:10		
21:35:21	101	0:19		

Location: 16th and Railroad
Date: 29 May 2013

Time	Lmax	Duration	Direction	Train
7:04:34	81	0:08	NB	211
7:45:22	88	0:12	SB	216
8:09:07	92	0:10	SB	220
8:20:13	90	0:12	SB	322
8:45:14	89	0:11	SB	226
9:09:25	91	0:10	SB	230
9:20:07	83	0:11	SB	332
10:06:40	85	0:10	SB	236
10:40:19	85	0:08	SB	138
13:39:54	84	0:09	SB	150
15:06:53	90	0:10	SB	254
16:04:35	85	0:11	SB	258
16:29:16	85	0:12	SB	360
16:43:38	87	0:13	SB	262
16:58:16	88	0:10	SB	366
17:06:10	85	0:08	SB	264
17:36:29	87	0:29	SB	370
17:46:27	85	0:11	SB	272
17:58:11	87	0:10	SB	376
18:20:01	92	0:09	SB	278
18:36:43	89	0:10	SB	380
18:57:49	87	0:10	SB	386
19:19:12	90	0:12	SB	288
20:35:59	103	0:51		
23:54:39	85	0:10		

Location: 16th and Railroad
Date: 30 May 2013

Time	Lmax	Duration	Direction	Train
1:12:14	84	0:09		
6:38:03	90	0:12	SB	206
7:20:32	93	0:12	SB	312
7:39:02	87	0:08	SB	314
7:56:34	86	0:11	SB	218
8:36:47	81	0:09	SB	324
8:44:59	90	0:11	SB	226
9:00:20	84	0:14	SB	228
9:51:03	87	0:09		
16:21:26	88	0:09		
16:45:08	90	0:10	SB	262
17:35:45	82	0:07	SB	370
17:41:05	91	0:15	NB	269
17:46:07	90	0:13	SB	272
17:58:52	88	0:10	SB	376
18:35:13	81	0:10	SB	380
18:46:16	85	0:09	SB	282
18:59:03	90	0:12	SB	376
19:20:36	85	0:08	SB	288
19:37:19	84	0:13		
19:48:30	94	0:19	NB	191
22:43:07	94	0:15		

Location: 16th and Railroad
Date: 31 May 2013

Time	Lmax	Duration	Direction	Train
5:28:19	85	0:08	SB	102
7:12:09	90	0:12	SB	210
7:39:12	83	0:10	SB	314
7:46:37	84	0:11	SB	216
8:00:10	91	0:09	SB	218
8:09:33	82	0:12	SB	220
8:37:47	87	0:09	SB	324
8:49:01	86	0:10	SB	226
9:00:22	93	0:07	SB	228
9:20:02	90	0:10	SB	332
13:42:41	84	0:10	SB	150
16:30:00	90	0:10	SB	360
16:44:03	86	0:09	SB	262
16:58:43	91	0:10	SB	366
17:19:35	85	0:09	SB	268
17:37:37	93	0:09	SB	370
18:19:25	91	0:11	SB	278
18:36:37	87	0:11	SB	380
18:46:00	90	0:11	SB	282
19:19:19	90	0:12	SB	288

Location: 16th and Railroad
Date: 1 June 2013

Time	Lmax	Duration	Direction	Train
10:49:54	85	0:08	SB	426
14:51:48	85	0:09	SB	434
17:52:32	84	0:10	SB	440
19:22:35	87	0:10	SB	804

Location: 16th and Railroad
Date: 2 June 2013

Time	Lmax	Duration	Direction	Train
11:50:41	86	0:07	SB	428
12:22:29	90	0:09	SB	802
13:51:21	81	0:07	SB	432
13:57:46	95	0:17		
16:51:10	84	0:07	SB	438
19:21:52	93	0:10	SB	804
20:40:59	96	0:28		

Location: 16th and Railroad
Date: 3 June 2013

Time	Lmax	Duration	Direction	Train
5:58:00	81	0:08	SB	104
6:58:58	87	0:13	SB	208
7:19:19	83	0:07	SB	312
7:21:52	88	0:10	SB	312
7:37:13	80	0:07	SB	314
8:21:22	88	0:11	SB	323
8:46:12	85	0:10	SB	226
8:58:47	91	0:13	SB	228
9:22:40	82	0:07	SB	332
10:04:46	90	0:09	SB	236
15:03:54	88	0:09	SB	254
16:04:16	83	0:08	SB	258
16:29:11	90	0:12	SB	360
16:44:13	85	0:13	SB	262
17:05:39	89	0:09	SB	264
17:19:20	91	0:11	SB	268
17:36:01	94	0:08	NB	269
17:45:36	92	0:10	SB	272
17:59:56	85	0:13	SB	376
18:08:25	88	0:09	SB	274
18:35:16	84	0:11	SB	380
18:45:13	85	0:11	SB	282
18:59:17	93	0:10		
19:19:03	87	0:10	SB	288
20:16:48	85	0:12		
23:32:51	83	0:07		

Location: 16th and Railroad
Date: 4 June 2013

Time	Lmax	Duration	Direction	Train
6:38:09	90	0:13	SB	206
7:22:23	92	0:11	SB	312
7:37:28	89	0:12	NB	319
7:45:08	91	0:13	SB	216
8:14:52	84	0:12	NB	221
8:20:37	91	0:09	SB	322
8:44:47	91	0:09	SB	226
9:08:54	91	0:13	SB	230
10:42:16	87	0:10	SB	138
12:42:30	89	0:11	SB	146
13:41:26	89	0:10	SB	150
14:05:46	85	0:07	NB	151
15:09:49	82	0:07	NB	155
16:04:36	86	0:10	SB	258
16:29:41	86	0:10	SB	360
16:45:28	90	0:11	SB	262
16:58:36	94	0:10	SB	366
17:18:36	86	0:12	SB	268
17:34:47	85	0:09	SB	370
17:50:12	85	0:10	SB	272
17:58:31	91	0:10	SB	376
18:07:01	90	0:09	SB	274
18:16:00	80	0:07	SB	278
18:35:16	86	0:09	SB	380

Appendix Section 3.0

RESULTS OF SHORT-TERM MEASUREMENTS

Location number	Measurement length	Noise level without traffic	Vehicle passby L_{max}	Train horn L_{max}[1]
M1	25 min	42 – 44 dB	55 – 61 dB	47 – 51 dB
M2	15 min[2]	43 – 44 dB	58 – 64 dB	45 – 59 dB[3]
M3	25 min	43 – 44 dB	59 – 69 dB	46 – 61 dB[3]
M4	20 min	46 – 48 dB	62 – 69 dB	51 – 64 dB
M5	25 min	46 – 47 dB	54 – 64 dB	53 – 74 dB
M6	25 min	47 – 48 dB	63 – 65 dB	51 – 56 dB

Note 1: At each measurement location, 5 to 10 train horn noise levels were recorded

Note 2: Measurement length shortened due to noise from yard maintenance activities at a nearby location

Note 3: Train horns were audible from several at-grade crossings, contributing to the large range in train horn noise levels

Appendix Section 4.0

DATA FROM HISTORICAL NOISE STUDIES

Report	Reported L_{max}*
Rosen Goldberg Der & Lewitz, "2901-2905 South El Camino Real, San Mateo, CA Site Noise Assessment," 25 January 2008.	99 dBA at 75 ft, (typical 82 to 88 dBA)
Charles M. Salter Associates, "Nueva High School Preliminary Environmental Noise Study," 25 June 2012.	73 dBA at 500 ft
Cerami & Associates, "92 and Delaware Street: San Mateo, California Acoustical Report," 10 December 2008.	77 dBA at 500 ft
Rosen Goldberg Der & Lewitz, "2000 South Delaware Street, San Mateo, CA Site Noise Assessment," 12 October 2010.	68 to 70 dB at 680 ft

* Note: L_{max} distances are to the centerline of the tracks, as stated in the reports