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Suicides on Commuter Rail in California: Possible Patterns — A Case Study, Research Report 10-05

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MTI Report 10-05

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SUICIDES ON COMMUTER RAIL IN CALIFORNIA: POSSIBLE PATTERNS-A CASE STUDY

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16. Abstract

Suicides on rail systems constitute a significant social concern. Reports in local media, whether in newspapers, television, or radio, have brought awareness to this very sensitive and personal subject. This is also true for the San Francisco Bay Area. These events also cause severe trauma for the train operators and staff of the system as well as disruption and cost to society. The overall objective of this project was to conduct a pilot study to identify possible patterns in suicides associated with urban commuter rail systems in California. The Caltrain commuter rail system in the San Francisco Bay Area was used as the subject system for the pilot study.

The primary intent of the data analysis was to determine whether suicides along the Caltrain tracks exhibited patterns. Pattern detection in this study was conducted primarily on the basis of time and location. Because the data were readily available, the gender factor was also included in the analysis, although this is not a factor that is connected to the rail system.

It was concluded that the data did show some patterns for suicides with respect to time and location. Some of the patterns can be explained while the reasons for some are not immediately obvious. However, the patterns in the latter category did not indicate a particularly attractive location or possible source for suicides.

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EXECUTIVE SUMMARY

Suicides on rail systems constitute a significant social concern. Reports in local media, whether in newspapers, television, or radio, have brought awareness to this very sensitive and personal subject. This is also true for the San Francisco Bay Area. In recent months, a great deal of attention has been given to a series of suicides committed by teenagers from Henry M. Gunn High School at the West Meadow Drive crossing of the Caltrain commuter rail system. Much effort has been made to try to prevent further suicides from occurring. Parents and community volunteers at the tracks around the area of the West Meadow Drive crossing were holding a night watch at the time that this report was written. In addition, counseling and support services were provided for the students and families who were affected. These events also cause severe trauma for the train operators and staff of the system as well as disruption and cost to society.

The overall objective of this project was to conduct a pilot study to identify possible patterns in suicides associated with urban commuter rail systems in California. The Caltrain commuter rail system in the San Francisco Bay Area was used as the subject system for the pilot study.

Pattern detection in this study was conducted primarily on the basis of time and location. Because the data were readily available, the gender factor was also included in the analysis, although this is not a factor that is connected to the rail system. Data related to suicides as well as unintended deaths were used in the analyses. Analyzing both suicides and unintended deaths enabled a comparison and contrasting of patterns that aided in developing some insights.

It should be noted that a study to explore patterns of individual conduct regarding suicide on railroads would require postmortem autopsies. Such research was outside the scope of this study.

A summary of the major conclusions regarding possible patterns follows:

1. **Year of Occurrence**: There did not appear to be a trend over time. There may be a slight upward trend for suicides if the data from the last few years were compared to the data for the first few years, but this may be due to a concurrent increase in population or increased service by Caltrain. A similar comparison for unintended deaths showed the opposite result, in other words, there were fewer deaths during the last few years. This may be the result of having mitigated the circumstances that caused the unintended deaths.

2. **Month of the Year:** No distinct pattern was identified for suicides or for unintended deaths related to the month of the year except for a low frequency of suicides in September.

3. **Day of the Week**: Most suicides occurred during the workweek, especially on Mondays and Fridays. Fewer trains are running during the weekend, therefore there are fewer opportunities for deaths involving trains. The literature indicated that suicides are more likely to occur on Mondays because the stress of "new beginnings" may be too much for people to handle. The results of this study do not directly support this finding.

4. **Day of the Month**: The data showed some indication of a cluster of suicides at the beginning of the month. This would support the finding in the literature that most suicides occur during the first week of the month. A pattern could not be detected for unintended deaths.

5. **Time of Day**: The data appeared to indicate that the peak periods of suicides correlate fairly well with the peak periods of train operations.

6. **Milepost**: The data showed three sets of patterns.

   The largest concentration of suicides was between the Burlingame and Sunnyvale stations, approximately a 25-mile stretch of track, with a fairly uniform distribution of suicides. In contrast there was only one suicide south of Diridon Station. There were lower concentrations of suicides north of the Burlingame Station and the pattern was also less uniform than the Sunnyvale to Burlingame section. The Burlingame to Sunnyvale section is characterized by older neighborhoods and an opinion was offered that the cause of the higher incidence of suicides in this area could be that the railroad is a more integral part of the community. The area to the north of the Burlingame station has relatively more industrial development and the tracks are in tunnel in the area close to San Francisco. The almost total absence of suicides south of Diridon Station could be attributed to lower development density and much lower train frequency to the south of Diridon Station.

   In contrast to the suicides north of Diridon Station, the unintended deaths showed more clustering, which may indicate that there may be circumstances that caused these deaths, but they could also have been spurious accidents. It should be noted that it was not the objective of this study to determine causes or circumstances of unintended deaths. Moreover, eliminating causes of accidents can sometimes not be feasible from economic and other viewpoints.

   The contrast between the relatively uniform distribution of the suicides in the Sunnyvale to Burlingame section and the unintended deaths in the same section indicated that there were not specific areas that were much more attractive for suicides than others. It is also noteworthy that the data alanyzed showed that the maximum number of suicides that occurred on a 0.5-mile section of track during the last six-year period was three, which leads to the conclusion that, based on the data analyzed in this study, suicides on the tracks were relatively rare events and that it is unlikely that the suicides were caused by factors specifically associated with the railroad or that there was a significant source for suicides, such as a hospital, nearby.

7. **Proximity to Stations**: Only 20 percent of all the suicides occurred at the stations. This corresponds with the 26.2 percent of suicides that was found in the literature. The station may be a convenient point of access but not the preferred place to commit suicide. The data also showed that approximately two thirds of the suicides occurred within 0.5 of a mile from the stations. This holds true for unintended deaths as well. This result may be significant when considering prevention and mitigation of deaths because the efforts can be concentrated in close proximity to the stations.

8. **Proximity to Road Crossings**: Forty-three percent of suicides occurred within 0.1 of a mile from a road crossing and almost two-thirds within 0.3 of a mile. This may be an indication that a person committing suicide uses the road as access to the tracks and then walks a relatively small distance away from the road, possibly to avoid interference.

9. **Proximity to Stations and Road Crossings:** An analysis, wherein the proximities of suicides and unintended deaths to either stations or road crossings were combined, showed that most suicides and unintended deaths occurred within 0.3 of a mile from either a station or a road crossing.

10. **Gender**: The data revealed that males chose rail suicides 3.5 times more often than females. This result confirms the findings in the literature that males use rail suicides more often than females.

It may be concluded that the data did show some patterns for suicides with respect to time and location. Some of the patterns can be explained while the reasons for some are not immediately obvious. However, the patterns in the latter category did not indicate a particularly attractive location or possible source for suicides. In the immediate past, there were the tragic suicides associated with the students from Gunn High School within a very short period of time, but, given the relatively long periods of time for which the data were analyzed in this study, these events did not stand out at the level of aggregation used in the analyses.

It is recommended that Caltrain continue to monitor suicides to detect patterns and attempt to mitigate the circumstances where the suicides could be prevented, if such prevention methods would be feasible from economic and other viewpoints. Other commuter rail system operators may find the analyses conducted in this study helpful as a basis for detecting patterns in suicides.

BACKGROUND AND INTRODUCTION

Suicides on rail systems constitute a significant social concern. Reports in local media, whether in newspapers, television, or radio, have brought awareness to this very sensitive and personal subject. This is also true for the San Francisco Bay Area. In recent months, a great deal of attention has been given to a series of suicides committed by teenagers from Henry M. Gunn High School at the West Meadow Drive crossing of the Caltrain commuter rail system. Much effort has been made to try to prevent further suicides from occurring. Parents and community volunteers at the tracks around the area of the West Meadow Drive crossing were holding a night watch at the time that this report was written. In addition, counseling and support services were provided for the students and families that were affected.[1] These events also cause severe trauma for the train operators and staff of the system as well as disruption and cost to society.[2]

The overall objective of this project was to conduct a pilot study to identify possible patterns in suicides associated with urban commuter rail systems in California. The Caltrain commuter rail system in the San Francisco Bay Area was used as the subject system for the pilot study.

The remainder of the report is organized as follows: the next chapter is an overview of the Caltrain system, followed by a literature review related to rail suicides. Next is a chapter expaining the data collection and analysis methodology, followed by an analysis and results chapter. A summary of major conclusions and recommendations follows the analysis chapter, and the study is concluded by recommendations for further study.

THE CALTRAIN SYSTEM

Caltrain is a commuter rail system located in the San Francisco Bay Area of Northern California. The southern terminus is in Gilroy and the northern terminus is at the intersection of 4th Street and King Street in San Francisco. The total length of the Caltrain track is 77.4 miles.[3] Caltrain owns the tracks from milepost 0 to milepost 51.7 and the Union Pacific Railroad owns the tracks from the latter milepost to milepost 77.4 in Gilroy.[4]

The Caltrain system has a total of 32 stops with 29 being regular stops, two weekend-only stops at Broadway and Atherton, and a stop at Stanford Stadium that is only in operation during special events.[5] A map of the system is shown in Figure 1.[6]

On average, trains operate on a half-hourly schedule for stations from San José to San Francisco with more frequent service provided during special events and commuter times. On a normal weekday, Caltrain operates 90 trains. Caltrain provides service from Gilroy to San José only three times a day, each direction, during commuter times.[7] During the weekend, no service is provided between Gilroy and San José. According to a survey done in February of 2009, Caltrain provides service for an average of 39,000 weekday passengers.[8]

Other rail operators also use the same tracks as the Caltrain system. The Union Pacific runs freight service along the track at night and parks their rail cars at a siding during the day.[9] Two Amtrak passenger services utilize the tracks as well. The Amtrak Coast Starlight is currently scheduled to operate once per day in each direction on the section south of Santa Clara.[10] The Amtrak Capital Corridor service runs seven times every weekday in each direction on the section of track between Santa Clara and San José.[11] The Altamont Commuter Express (ACE) Rail also utilizes the latter section of the Caltrain tracks and makes three trips per weekday in each direction.[12] With the exception of Caltrain, all the passenger rail services extend beyond the tracks utilized by Caltrain.

Caltrain began operation in 1987, but the rail tracks it operates on have been around for much longer. The original rail track from San Francisco to San José was built in 1863 by the San Francisco and San José Railroad, and in 1870 was purchased by Southern Pacific.[13] In 1904, the rail line was double tracked and usage continued to increase. However, as the use of personal automobiles increased, the ridership on the rail line decreased. Southern Pacific filed a petition in 1977 to have commuter service on the rail line closed down due to increasing operating losses. The California Department of Transportation (Caltrans) wanted to preserve the commuter service, so it began to subsidize the operation in 1980. Caltrans made many improvements to the system by replacing the Southern Pacific equipment with new locomotives and rolling stock, upgrading stations, and renaming the system Caltrain.[14]

In 1987, the Peninsula Corridor Joint Powers Board (PCJPB) was formed to manage the rail lines. In 1991, the right-of-way for tracks between San Francisco and San José was purchased from Southern Pacific for $220 million. The next year, PCJPB was assigned full responsibility for Caltrain, and Amtrak was assigned to be the contract operator.[15] PCJPB

extended service into Gilroy and a new station in San José was opened to create a connection to the Santa Clara Valley Transportation Authority (VTA) Light Rail system. In 2003, a connection between Caltrain and the Bay Area Rapid Transit (BART) system was created at the Millbrae Station.[16]

Figure 1. Map of Caltrain System

LITERATURE REVIEW

The primary objective of the literature review was to obtain information on possible patterns of suicides associated with passenger rail systems with respect to location and time of the death. Other characteristics of the persons committing suicide were also included in the literature review, mainly to provide some additional background and perspective. Some solutions to suicides on rail systems were included for the same reasons. It should be noted that the information on personal characteristics and the solutions were obtained primarily from the major studies that were reviewed for patterns and other literature that focuses on these topics were not reviewed.

Rachel Abbott et al. conducted the "Suicides and Open Verdicts on the Railway Network" (SOVRN) project. This three-year project began in 1999 after concerns, from the London and North Eastern Zone of Railtrack PLC, were aired about an alarmingly high rate of rail suicides. The goals of the project were to identify trends in the characteristics of those who commit suicide on railways, assess the effects of railway suicides upon people associated with the incident, evaluate the methods of dealing with the suicides, and make recommendations on how to reduce the number of railway suicides and effectively respond to them. Abbott et al. set out to reach these objectives by auditing the open verdict cases and railway suicides on the East Coast Main Line (ECML) from London to Scotland, interviewing those who had been affected by rail suicides, and analyzing previous methods of responding to rail suicides.[17]

Abbott et al. observed the proximity of psychiatric hospitals to where suicides had taken place on the railroad tracks. The data showed that people who had committed suicide had chosen sites that were closer to their homes than psychiatric hospitals. It was also revealed that the majority of suicides had not taken place at station platforms. Only 26.2 percent of suicides had occurred at station platforms, while the remaining 73.8 percent of suicides had occurred elsewhere, the most common place being open track. Abbott et al. concluded that the majority of rail suicides happened away from station platforms because they were much more likely to be fatal. Open track suicides were more often fatal because the trains travel at higher speeds than when they approach station platforms.[18]

The results of a study, with the aim of determining how to prevent rail suicides and other accidents, were presented by O'Grady and Griesi at the 6th World Conference of Injury Prevention and Control in Montreal, Canada. The authors had surveyed mass transit companies from around the world. Fifty responses had been received from 22 different countries. The authors estimated that these responses represented approximately half of the world's major mass transit systems. All surveys had been conducted throughout the year 2000. One survey from an underground transit system in Toronto, Canada, revealed that the majority of suicides had occurred in tunnel segments of the track.[19]

An article published by Mishara in the *Canadian Journal of Psychiatry* (1999) examined suicides that had taken place on the Montreal Subway System. The author's goals were to determine the characteristics of those who commit suicides by rail, their personal and psychiatric histories, and find trends that could be used to help prevent future suicides. Mishara analyzed an investigation by the coroner's office of 129 suicides that occurred on

the Montreal Metro from 1986 to 1996. Mishara found that 70 percent of the suicide victims had chosen the Metro station closest to their homes as the place to kill themselves.[20]

The time of the day at which suicides take place showed trends in the literature reviewed. The studies done by Abbott et al. and Mishara both revealed that the majority of suicides had taken place during the early morning to late afternoon.[21] Abbott et al. explained that this pattern was due to the fact that there had been more trains in operation during these times and therefore more opportunity to commit suicide. Their data indicated that suicides were more likely to occur on Mondays and the first week of the month. Abbott et al. hypothesized that this pattern may be due to the stress of "new beginnings."[22]

Baumert et al. wrote an article published in the *European Journal of Public Health* (2005), which explored railway suicides that occurred in Germany from 1991 to 2000. The authors studied trends among suicides and assessed how the number of railway suicides compared to other methods of suicide. They reviewed suicides that were recorded by the German Central Registry over a 10-year period and found that rail suicides accounted for seven percent of the total number of suicides in Germany.[23] No specific statistics for the percentage of total suicides caused by rail could be found for the United States. Statistics published by the Centers for Disease Control (CDC) indicated that, for the period 2002–2006, the majority of suicides occurred by firearms, suffocation and falling. Less than 10 percent were caused by other means, including rail suicides. During this period, the largest percentage of suicides committed by men occurred by firearms (57.7 percent), while the largest percentage of suicides among females occurred by poisoning (38.8 percent).[24]

The gender of those committing suicide had a pattern according to the study done by Abbott et al. They found that the ratio of males to females who had committed suicide on the UK railway systems was almost 4 to 1. This was higher than the corresponding ratio of total suicides in England and Wales, which was found to be 3 to 1.[25] O'Grady and Griesi found slightly higher numbers of male suicides compared to female suicides on railway systems, but the difference was not significant enough to draw conclusions.[26] Mishara found that out of the 129 rail suicide victims included in his study, 61 percent were men and 39 percent were women (1.5 to 1 ratio).[27] The CDC statistics indicated that, in 2006, men in the United States were four times as likely to die from suicide as females. However, females attempted suicide two to three times as often as men.[28]

Baumert et al. found that rail suicides appeared to be more common for people under the age of 65.[29] Abbott et al. found that people, who are unemployed, retired, or economically inactive made up the majority of those who commit suicide. Not having a job may give people a feeling of no purpose in their life thus increasing their chance of suicide. They also found that people who lived alone due to separation, divorce, or being widowed, accounted for one-quarter of rail suicides.[30] Mishara found similar results in his study done in Montreal, Canada. He concluded that almost two-thirds of the rail suicides had been committed by people under the age of 40. Mishara also examined the psychiatric history of the victims who had killed themselves on the Montreal Subway System. He found that 73 percent of the victims had inpatient psychiatric treatment and 27 percent had been residing in a mental health treatment facility at the time of their suicide.[31] Abbott

et al. noted similar trends between the psychiatric histories of the people who had killed themselves on the UK railway system. They found that 83 percent of victims had had significant signs of mental disorders present before they committed suicide and 17 percent had been hospital inpatients at their time of death.[32]

O'Grady and Griesi reported on a study done in Toronto, Canada which showed a direct correlation between the number of news articles about rail suicides and the number of suicides that occurred on the tracks. The authors stated that this correlation was due to "copy cats" that decided to kill themselves on the rail tracks after hearing about it in the news.[33] The graph for this correlation is shown below. Mishara's article on suicides in the Montreal Subway System found similar results stating that when media was required to stop publicizing suicides, the suicide rate dropped by 75 percent.[34]

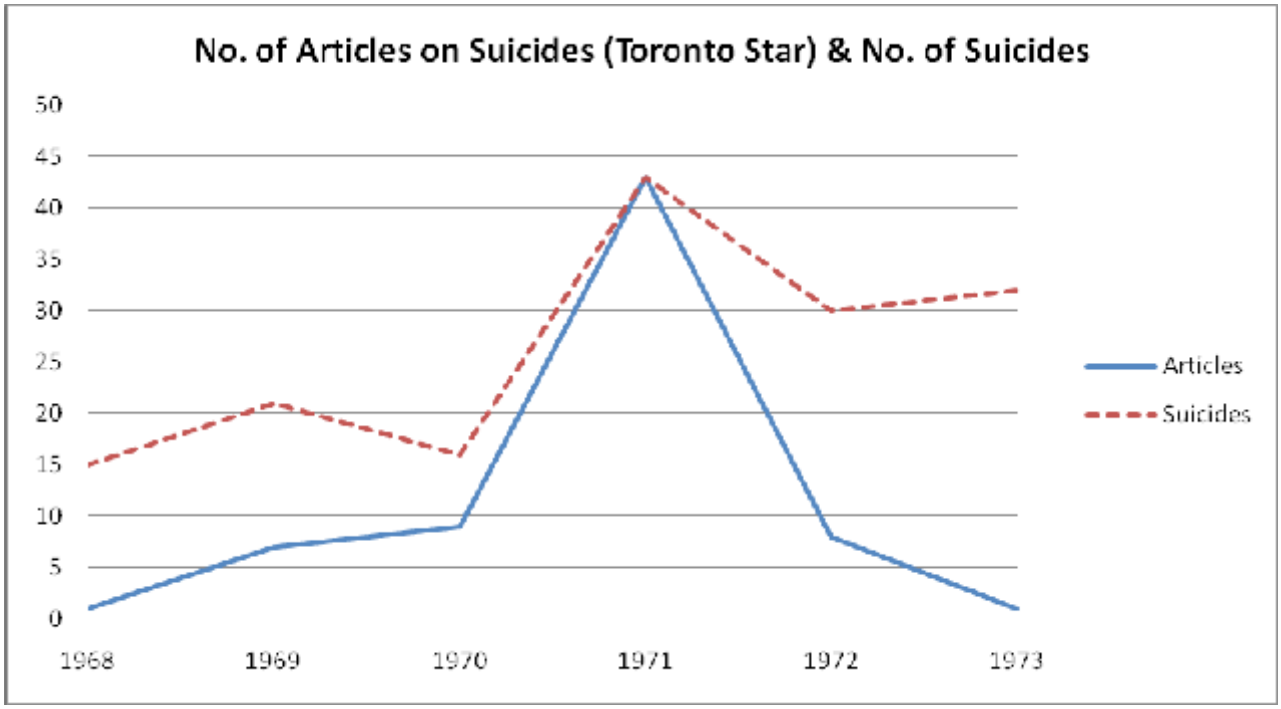

Figure 2. Correlation Between Subway Suicide Attempts and News Articles on Suicide

Although finding solutions for the prevention of suicides is not an objective of this study, it is interesting to note some of the solutions that have been proposed. Mishara, along with O'Grady and Griesi agreed that requiring the media to not report suicides was one viable solution.[36] Abbott et al. stated that another way to solve the problem of suicides at train stations was to train staff on how to recognize and intervene with potential victims.[37] O'Grady and Griesi said improved track and station design could help prevent future suicides. Train stations should be designed to prevent access to the track and surveillance and alarm systems should be installed to notify authorities if a person is found walking on the track.[38] Mishara agreed by stating that subway systems should physically limit passengers' ability to have access to the tracks. He gave the example of a subway system

in Singapore that had had a door system installed at the stations in attempt to improve air quality. The door system had created an airtight barrier between the subway station and the tracks to prevent fumes from the train from entering the station. The doors for the barrier only opened when a train had come to a stop and passengers were leaving or entering the train. In addition to improving air quality at the subway station, the door system completely eliminated suicides.[39] Baumert et al. stated that while rail suicides represented only seven percent of the total number of suicides in Germany, they often caused a "public death" that affected many more people than other forms of suicide that occur in less public places. Rail suicides affect the entire community by traumatizing train drivers as well as witnesses. In addition, there are economic impacts due to delays in the train schedule and the costs associated with clean-up. Baumert et al. thought the best method for reducing the number of railway suicides was to promote suicide prevention campaigns.[40] O'Grady and Griesi's data collected from mass transit systems around the world stated that only approximately half of train suicide attempts had been fatal. The survivors had usually suffered severe physical trauma and many times had required amputation. O'Grady and Griesi believed that this information should be communicated throughout the mental health community to deter those who were thinking of using rail as a method of suicide.[41]

DATA COLLECTION AND ANALYSIS METHODOLOGY

The primary intent of the data analysis was to determine whether suicides along the Caltrain tracks exhibited patterns. Pattern detection in this study was conducted primarily on the basis of time and location. Because the data was readily available, the gender factor was also included in the analysis, although this is not a factor that is connected to the rail system.

As will be seen later in the report, data related to suicides as well as unintended deaths were used in the analyses. Analyzing both suicides and unintended deaths enabled a comparison and contrasting of patterns that aided in developing some insights.

It should be noted that a study to explore patterns of individual conduct regarding suicide on railroads would require postmortem autopsies. Such research was outside the scope of this study.

The objective of detecting patterns is ultimately to identify the underlying causes of these patterns. Once the underlying causes are understood, attempts can be made to design solutions for the prevention of these deaths. As background to the data analysis and formulations of the conclusions, it is useful to broadly understand the factors that can cause unintended deaths versus suicides and what may be done to mitigate the two types of fatalities.

In the case of unintended deaths, there are factors associated with the rail system that can be the cause of the fatalities. These include physical attributes of the system (e.g. at-grade crossings with streets versus grade-separated crossings), operational factors (e.g. speed of operation), and environmental factors (e.g. sight distance at crossings). In some instances, these factors could be principal contributors to unintended deaths and could lead to a repetition of deaths at a specific location or at a specific period in time. An example of this could be a road crossing where there is inadequate stopping sight distance for the vehicles on the road. Inadequate stopping sight distance may lead to collisions with trains at a specific location and possibly during specific periods in time. Analysis of the history of the location and time of unintended deaths could show clusters of deaths, which could indicate the existence of an underlying contributing factor, such as inadequate stopping sight distance. The rail operator and other responsible agencies could attempt to find solutions to prevent or reduce the associated deaths, if economically and otherwise feasible.

There are factors, not directly under the control of the rail operator that can cause unintended deaths, such as vehicles stalling on the tracks, drivers going around a gate, or pedestrians making unlawful crossings. Even though this behavior is outside the control of the rail operator, making crossings grade-separated or providing pedestrian bridges, if feasible, could reduce or prevent these deaths.

The factors that cause suicides are external to the system. A concentration of suicides at a specific location may indicate an ease of committing suicide at that location or that there is a source of suicide candidates nearby. If such a concentration of suicides could be

located, then the suicides could be prevented or reduced by changing either the physical or operational characteristics of the rail system to prevent access, or through intervention at locations where clusters of suicides are present. The community may accomplish this intervention at specific sources of suicides, such as psychiatric hospitals or schools, or though general suicide-prevention actions.

The following data sets were obtained from Caltrain:

- A list of all deaths, from August 1992 to December 2009. The milepost, nature of fatality, and date were provided for each fatality. The nature of a fatality was classified as "suicide," "unintended," "homicide," or "pending." The data for the deaths that were classified as "homicide" or "pending" were eliminated from the data set. Other information about each individual death was also provided, but these data were not complete for the entire set. This information includes: time of the day, day/night, day of the week, gender, age, race, day/night, moon phase, and rail service associated with the death. Comments were also made in a few cases about the nature of the fatality, or personal characteristics of the person involved. Of these data, only the time of the day, and gender were utilized, because the remainder of the items contained too few data points or were considered irrelevant for this study. The data obtained from Caltrain were rearranged to facilitate analysis and are presented in Appendix A.

- Detailed maps of the tracks.[42]

- A list of stations, provided by Caltrain, which is contained in Appendix B.

- A list of at-grade road crossings of the track, owned by Caltrain, from milepost 0.00 to milepost 44.22. The mileposts of the remainder of the at-grade road crossings were provided separately by Caltrain staff.[43] The data are shown in Appendix C.

- A Caltrain schedule, presented in Appendix D.[44]

PATTERN ANALYSIS AND RESULTS

The data for unintended deaths and suicides were analyzed to determine whether there were patterns with respect to:

- Year of occurrence
- Month of the year
- Day of the week
- Day of the month
- Time of day
- Milepost
- Proximity to stations
- Proximity to road crossings
- Proximity to stations and road crossings
- Gender

A total of 200 deaths, from August 1992 to December 2009, were reported to have occurred on the Caltrain tracks from Gilroy to San Francisco. Only 193 deaths were analyzed in this report, due to the elimination of the data for deaths that were classified as "homicide" or "pending." There were two homicides and five pending cases. It should be noted that the elimination of the pending cases could affect the analyses and the conclusions, but because they are few in number, the effect will be relatively small. Once they are classified and found to be clustered in time or location, the conclusions of this report should be reconsidered. Of the 193 deaths that were analyzed, 123 were suicides and 70 were unintended. On the average, this amounted to 10 total deaths, six being suicides and four unintended, on an annual basis. From a data-analysis perspective, it may be concluded that these events are relatively rare.

Although rail deaths are rare, they are significant and need to be addressed. Because suicides constitute 64 percent of all fatalities along the tracks, the public's concern over the suicides is understandable. The rarity of the events complicates the task of pattern detection, especially when only a few years' worth of data is considered. When attempting to make conclusions about safety improvements to a site, it is customary to take into account only the data for a period when significant changes to the infrastructure, operations, and the environment have not occurred. Typically this period does not extend more than three to six years into the past. However, since the main goal of this study was to identify broad trends, it was decided to use the entire database for analysis in all cases and only the last six years' worth of data in some cases. Although physical and operational changes have taken place during this period, the Caltrain service, which is the main user of the tracks between Gilroy and San Francisco, operated along the entire length of the track during the entire period of analysis, 1992 to 2009.

YEAR OF OCCURRENCE

The unintended deaths and suicides were classified according to the year in which they occurred. It should be noted that the data for 1992 do not reflect a full year. Data for 1992 include deaths starting in August and six of the deaths in 2009 were still pending and are not included. The results of the analysis are presented in Table 1 as well as in Figures 3 and 4.

It is difficult to conclude whether there is a clear increasing or decreasing trend for unintended deaths or suicides. There may be a slight upward trend for suicides, if the data for the last few years are compared to the data for the first few years, but this may be due to a concurrent increase in population. A similar comparison for unintended deaths per year shows the opposite result, i.e. there are fewer deaths during the last few years. This may be the result of eliminating causes of deaths at some locations.

Table 1. Suicides and Unintended Deaths Per Year

Year	Suicides	Unintended
1992	4	1
1993	6	4
1994	4	5
1995	10	9
1996	4	5
1997	5	2
1998	6	3
1999	4	3
2000	7	10
2001	9	5
2002	4	1
2003	7	3
2004	8	1
2005	8	2
2006	9	8
2007	6	2
2008	13	3
2009	9	3

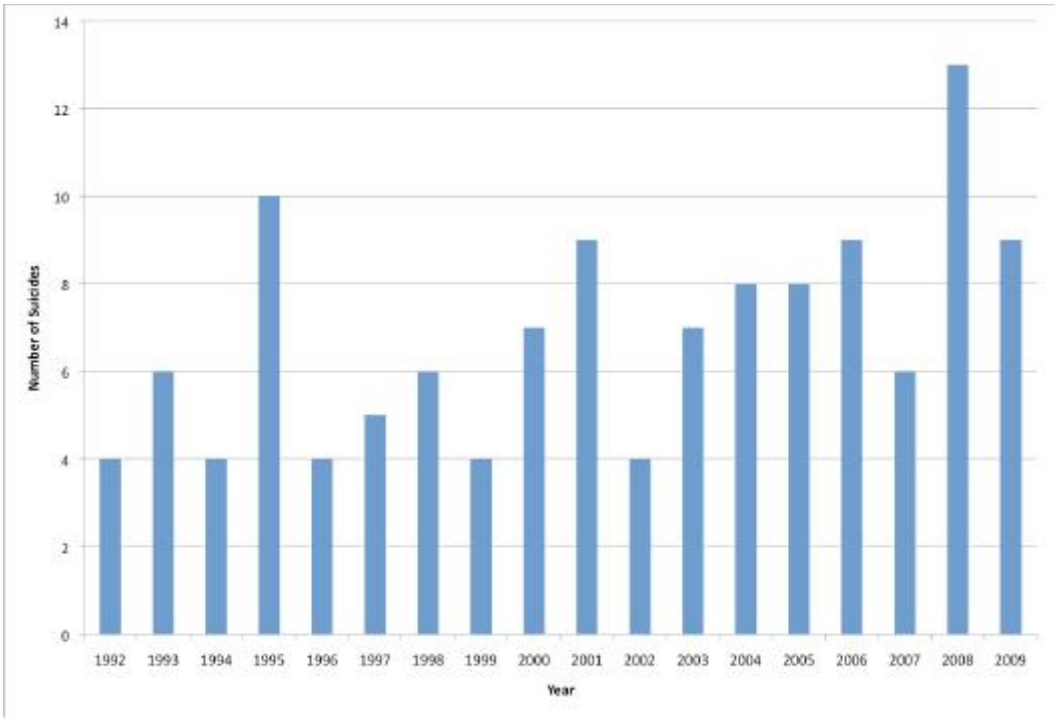

Figure 3. Number of Suicides Per Year
(note: 1992 and 2009 do not contain data for the full year)

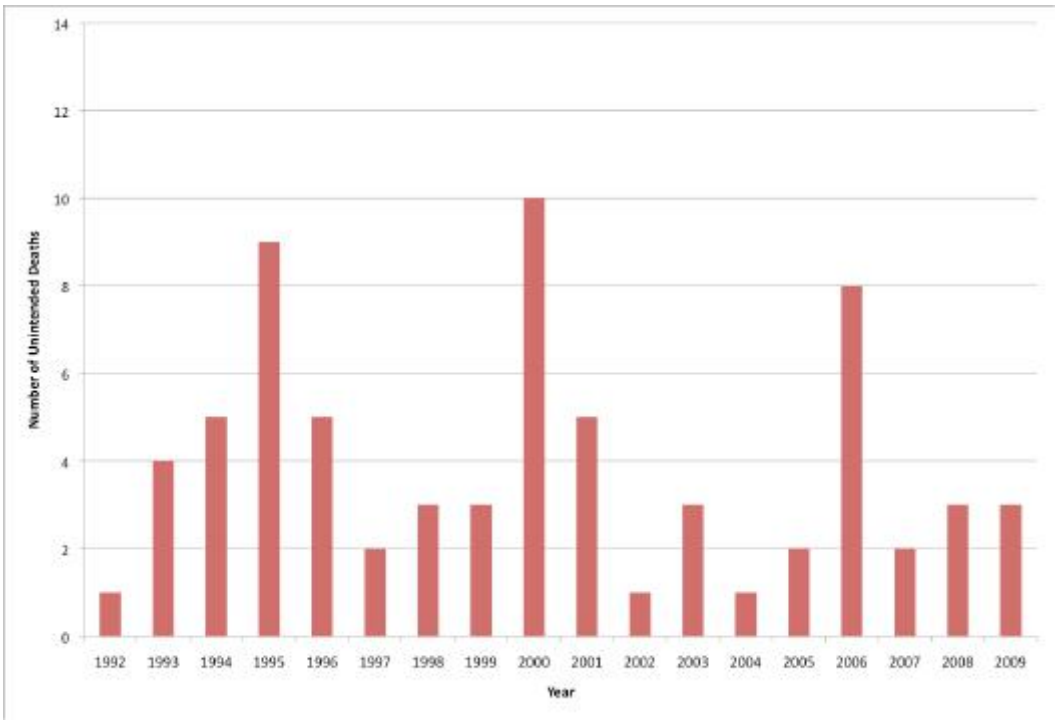

Figure 4. Number of Unintended Deaths Per Year
(note:1992 and 2009 do not contain data for the full year)

MONTH OF THE YEAR

All suicides and unintended deaths were classified according to the month of the year. Suicides and unintended deaths occurring in each month are presented in Table 2 and also in Figures 5 and 6. Suicides were most prevalent in March, May and October and the smallest number was recorded in September. The largest number of unintended deaths occurred in January.

A distinct pattern could not be identified for suicides or unintended deaths, except for the low number of suicides in September and the high number of unintended deaths in January. It may be speculated that the low number of suicides in September may be related to the beginning of the school year and that younger people, who have suicidal tendencies, may be less apt to commit suicide at that time. However, such a conclusion could only be proven by further investigation that is outside the scope of this project. The spike in the number of unintended deaths in January could possibly be the result of intoxicating-substance abuse during the festive period at the beginning of January. However, there are other festive periods that do not exhibit this same pattern. It could also possibly be the result of "new beginnings," an issue that was discussed in the literature review. More detailed investigation of the circumstances and causes of these deaths would be required to determine the reason for the larger number of deaths in January.

Table 2. Suicides and Unintended Deaths By Month

Month	Suicides	Unintended
January	10	11
February	8	8
March	14	4
April	9	5
May	14	4
June	9	6
July	12	6
August	9	6
September	2	6
October	16	6
November	13	4
December	7	4

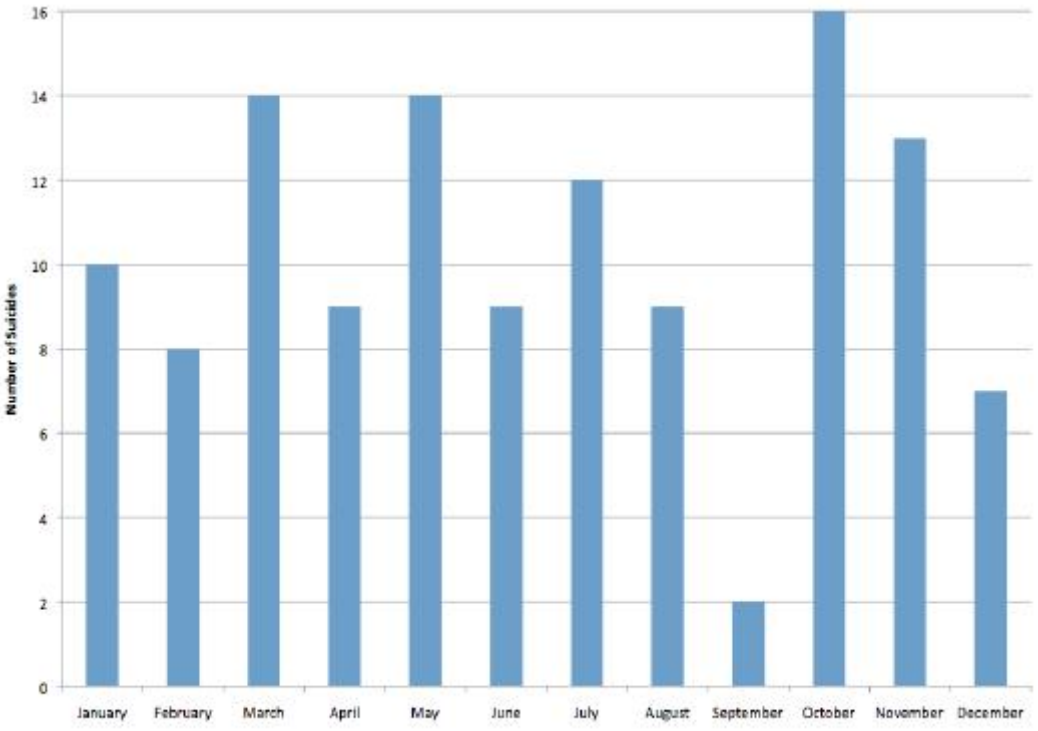

Figure 5. Suicides by Month of the Year

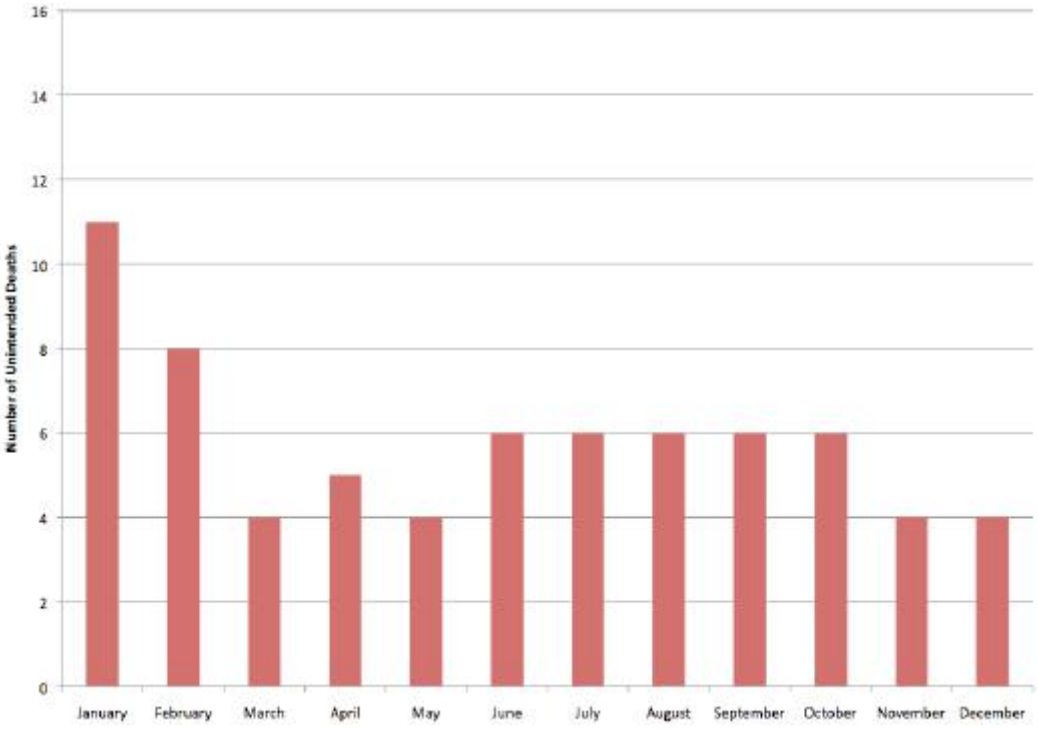

Figure 6. Unintended Deaths by Month of the Year

DAY OF THE WEEK

All suicides and unintended deaths were classified according to day of the week. Table 3 as well as Figures 7 and 8 contain the results of the analysis.

Day-of-week data were provided for some suicides and unintended deaths. The missing days were identified using old calendars. These data were added into the data set contained in Appendix A. It can be seen that most suicides occur during the workweek, especially on Mondays, Tuesdays, and Fridays. Fewer trains are running during the weekend, therefore there is less opportunity for a death involving a train. Abbott et al. found that suicides are more likely to occur on Mondays, and, as stated before, they hypothesized that this may be due to the stress of "new beginnings."[45] Although it was found that more suicides occurred on Mondays than on other days, the number of suicides on Mondays was comparable to the number on Fridays. The results of this study therefore do not support their finding.

Table 3. Suicides and Unintended Deaths by Day of the Week

Day of the Week	Suicides	Unintended
Sunday	9	4
Monday	24	16
Tuesday	19	8
Wednesday	16	13
Thursday	15	10
Friday	22	12
Saturday	18	7

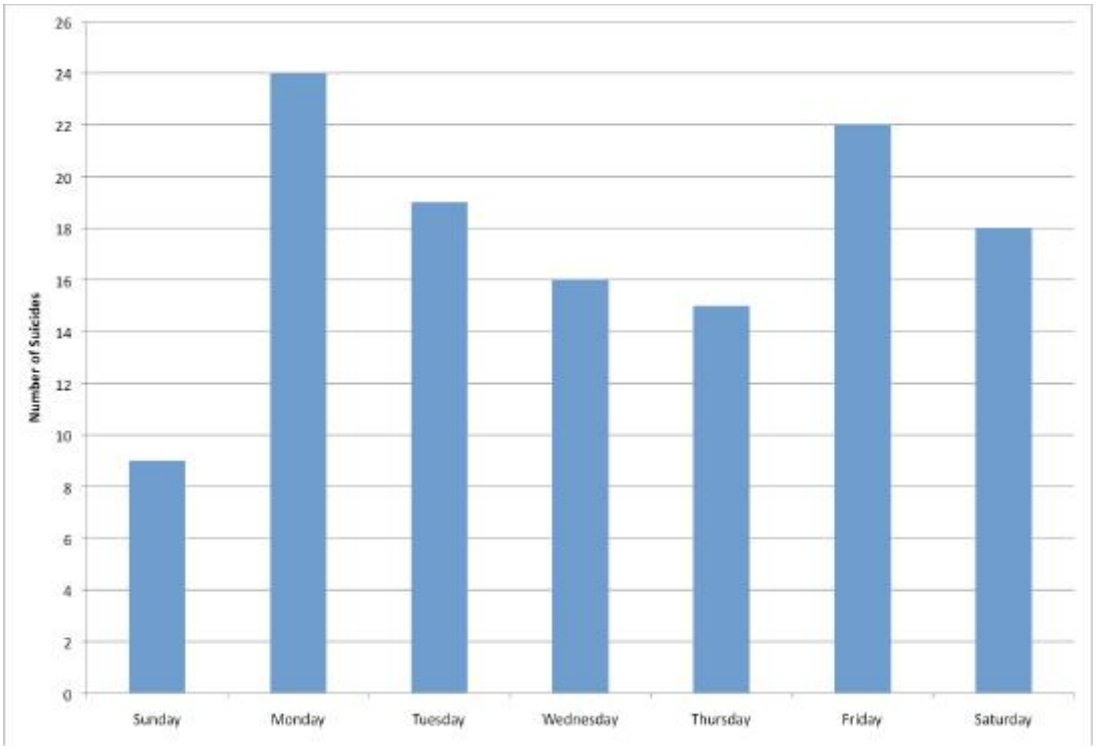

Figure 7. Number of Suicides by Day of the Week

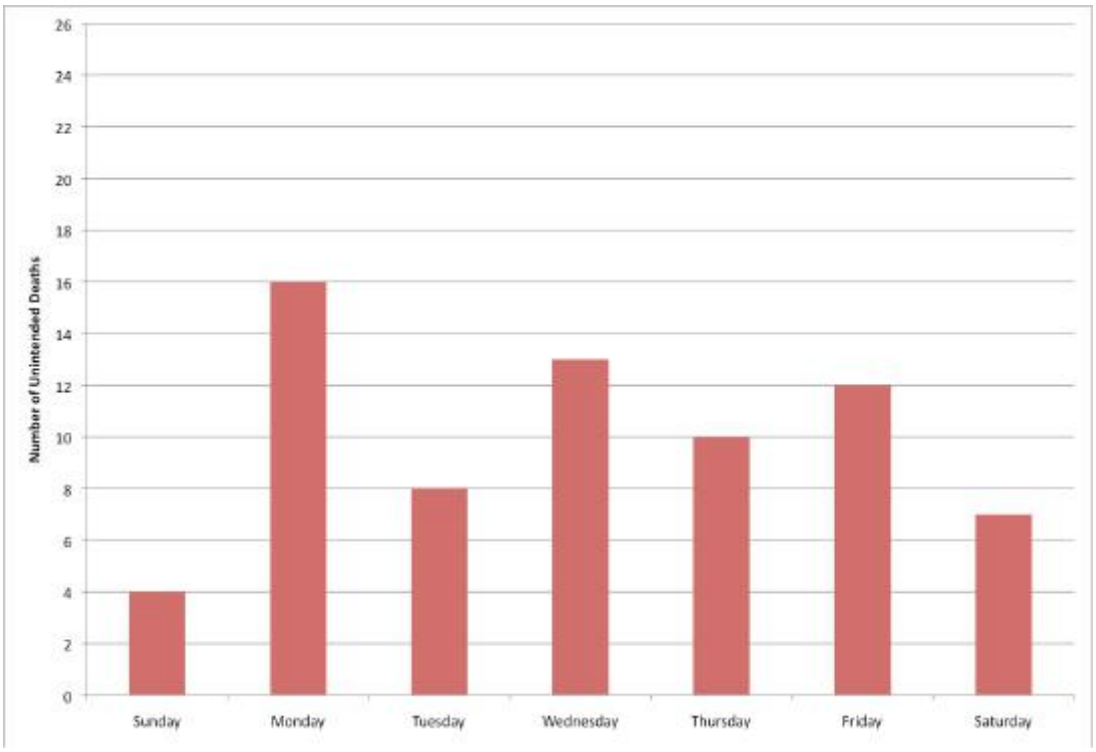

Figure 8. Number of Unintended Deaths by Day of the Week

DAY OF THE MONTH

Day of month data were provided for all 193 deaths and the results of the analysis are presented in Table 4 as well as in Figures 9 and 10.

There appears to be some indication of a cluster of suicides at the beginning of the month. This would support the finding of Abbott et al. that most suicides occur during the first week of the month, possibly due to the stress of "new beginnings."[46] No clearly discernable pattern for unintended deaths was found.

Table 4. Suicides and Unintended Deaths by Day of the Month

Day of Month	Suicides	Unintended
1	2	1
2	1	5
3	5	3
4	6	3
5	5	2
6	9	5
7	8	0
8	4	2
9	4	1
10	1	1
11	2	4
12	4	2
13	5	2
14	3	3
15	3	3
16	4	4
17	4	1
18	3	1
19	2	4
20	4	2
21	3	0
22	5	4
23	3	3
24	3	3
25	8	2
26	4	2
27	2	0
28	5	2
29	4	4
30	6	0
31	1	1

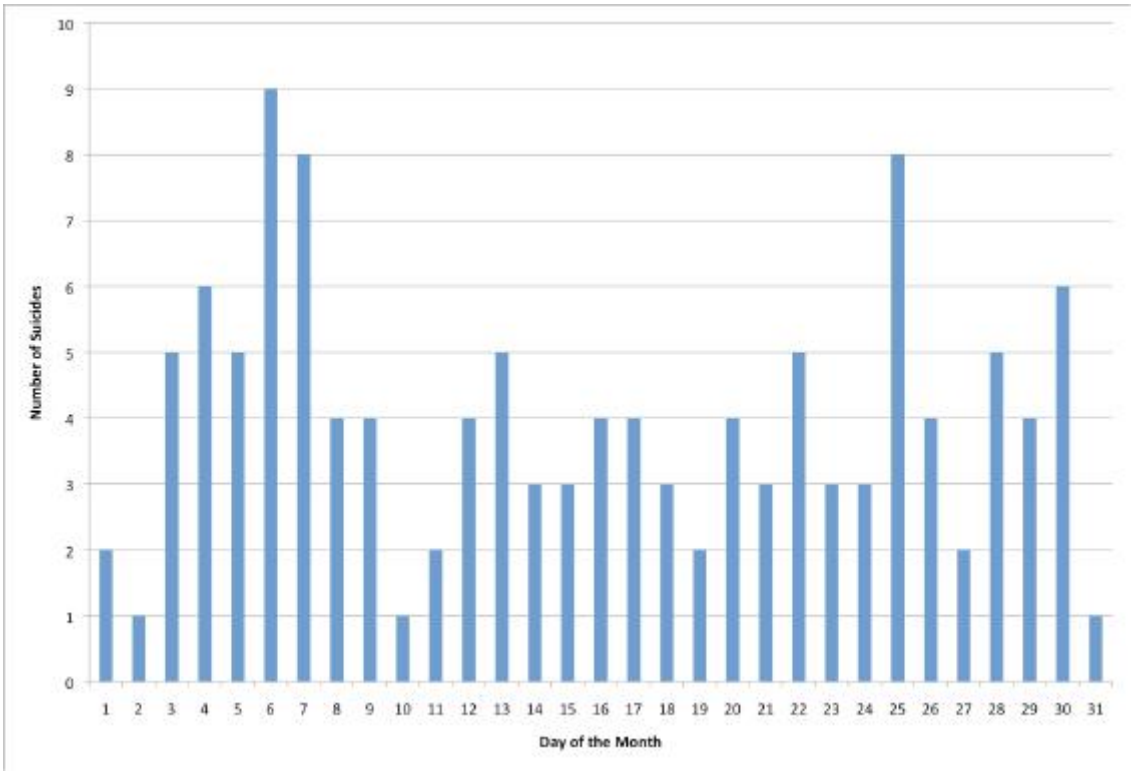

Figure 9. Number of Suicides by Day of the Month

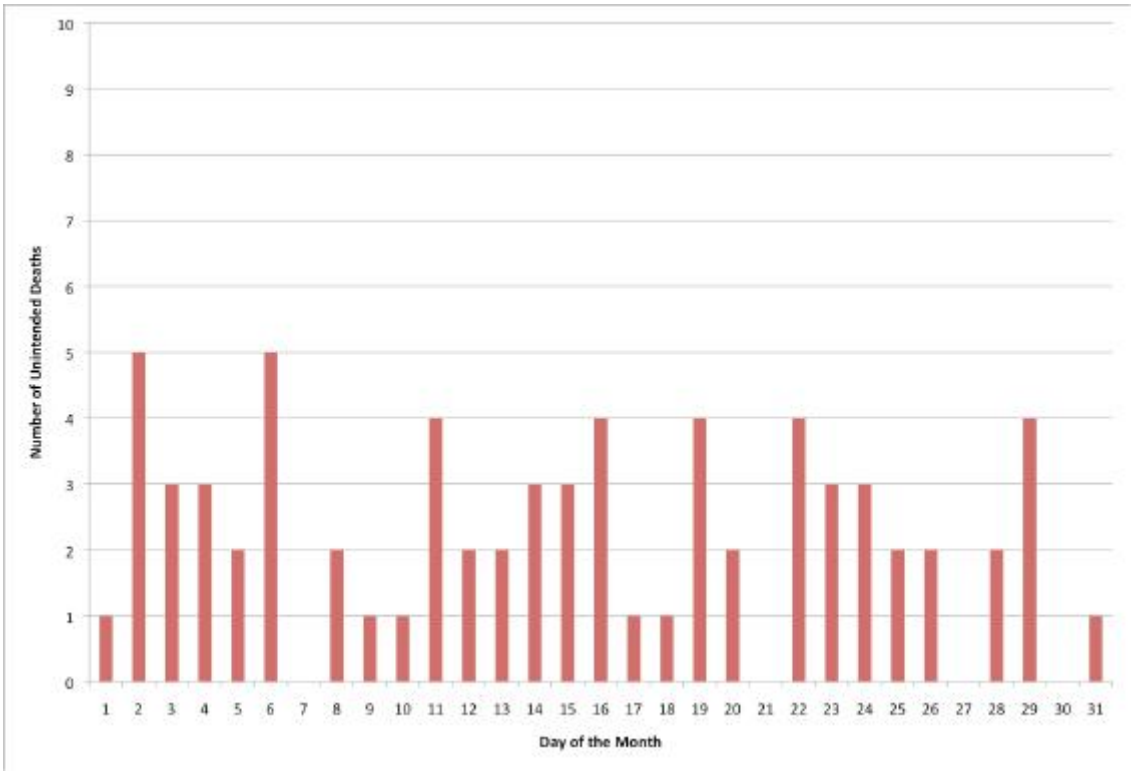

Figure 10. Number of Unintended Deaths by Day of the Month

TIME OF DAY

Time of day data were provided for only 37 suicides and 16 unintended deaths. The data are contained in Table 5 and Figure 11, together with the number of hours that Caltrain was running during the hour in question. The numbers of hours were calculated based on the train schedule in force on February 4, 2010.[47] The schedule is shown in Appendix D. For example, for the hour starting at 10:00 a.m., the 5.27 hours of operation was the sum of the time during that hour that any Caltrain train operated during the week, regardless of the direction. This measure was considered a pseudo-measure for exposure to trains.

The data appear to indicate that the peak periods of suicides correlate fairly well to the peak periods of operation. This conclusion is similar to the conclusion of Abbott et al., i.e. that suicides are most likely to occur in late morning or early afternoon.[48] The pattern is not that clear for unintended deaths, but that may be because of the relatively small data sample.

Table 5. Suicides and Unintended Deaths by Time of Day

Hour	Suicides	Unintended
00:00	1	0
01:00	1	0
02:00	0	0
03:00	0	0
04:00	0	0
05:00	2	0
06:00	1	2
07:00	3	1
08:00	3	0
09:00	2	0
10:00	0	0
11:00	2	1
12:00	0	0
13:00	2	0
14:00	0	1
15:00	2	0
16:00	4	3
17:00	3	3
18:00	4	4
19:00	2	0
20:00	2	0
21:00	2	0
22:00	1	0
23:00	0	1

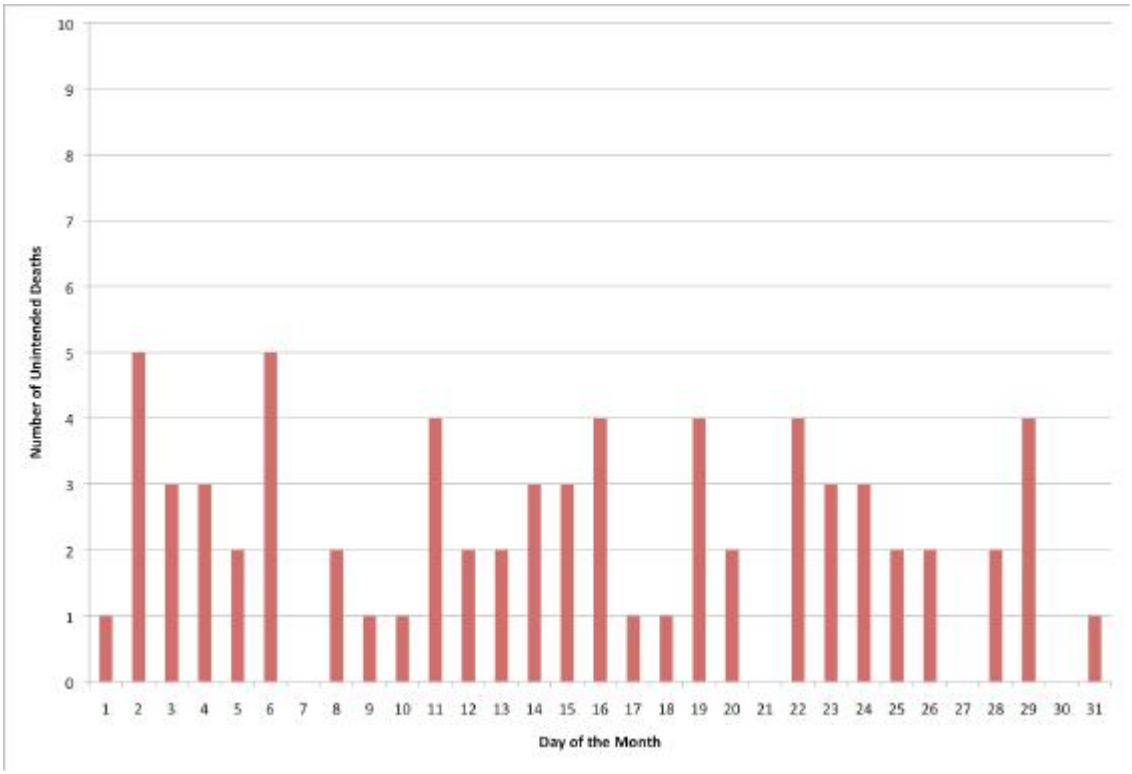

Figure 11. Unintended Deaths and Suicides Compared to Total Running Time, by Time of the Day
(Note: total running time for Caltrain trains only)

MILEPOST

The suicides for the period 1992 through 2009 were allocated to 0.5-mile increments along the entire length of the tracks. The results of the analysis are presented in Figure 12. The approximate locations of the stations are also indicated in the figure.

The data shown in Figure 12 indicate that the largest concentrations of suicides occur between the Burlingame and Sunnyvale stations, approximately a 25-mile section of the track. It is striking that there was only one suicide south of the Diridon Station. This outcome may be attributed to the relatively lower population density, lower number of trains per day, smaller number of stations per mile of track, and the smaller number of road crossings per mile. There are 27 stations north of Diridon Station (0.57 per mile) and six stations to the south (0.20 per mile). There are 47 road crossings (0.99 per mile) north of and 35 (1.17 per mile) to the south of Diridon station. However, such a disparity in suicide concentrations cannot be explained by these factors alone. In a March 29, 2010 discussion with Mark Simon, Caltrain's executive officer for public affairs, he expressed the opinion that this phenomenon could partially be explained by the fact that the communities north of the Diridon Station were older and that the rail system is more central to these communities, which grew up around a railroad first built in 1863.

There are also relatively fewer suicides north of Burlingame, which may be partly explained by the fact that part of the track is in tunnel, which limits access, and the fact that there are relatively fewer residential areas and relatively more commercial areas than south of the

Burlingame Station.

The results of a similar analysis for unintended deaths are presented in Figure 13. There are also more deaths in the northern part, but in contrast to the suicides, they are relatively more concentrated in clusters. There are relatively more unintended deaths than suicides north of the Burlingame Station and south of the Diridon Station.

The results of a similar analysis performed for the period 2004 through 2009 (approximately six years' worth of data) show similar patterns. These data are shown in Figures 14 and 15. The unintended death data show fewer clusters, possibly because of mitigation of the factors that could cause unintended deaths.

The contrast between the relatively uniform distribution of the suicides in the Sunnyvale to Burlingame section and the unintended deaths in the same section indicate that there were not specific areas that were significantly more attractive for suicides than others, based on the data analyses. It is also noteworthy that the data set analyzed that the maximum number of suicides that occurred on a 0.5-mile section of track during the last six-year period was three, which leads to the conclusion that, based on the data analyzed in this study, suicides on the tracks were relatively rare events and that it is highly unlikely that the suicides were caused by factors associated with the railroad or that there was a significant source for suicides.

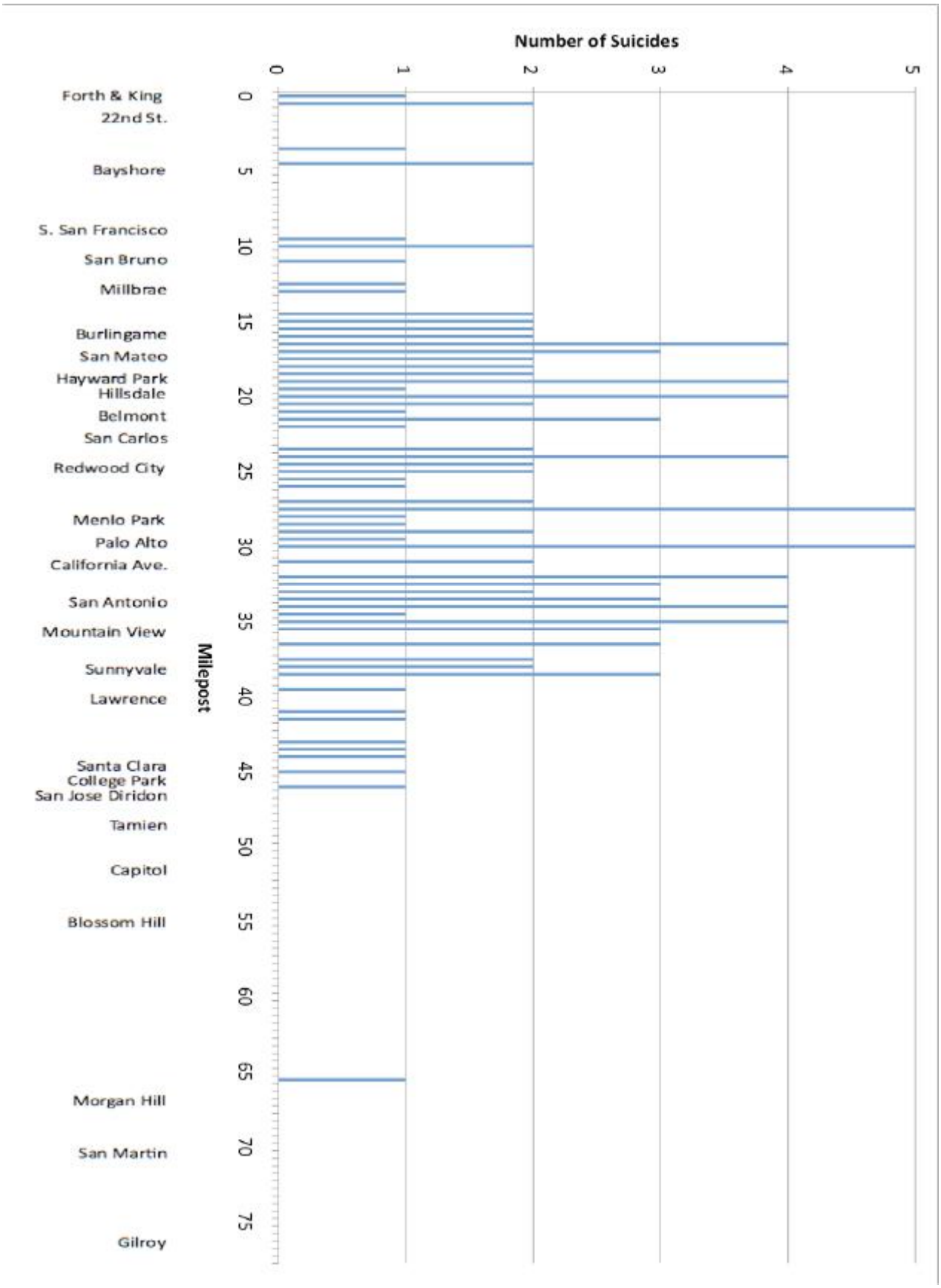

Figure 12. Number of Suicides by Milepost (1992–2009)

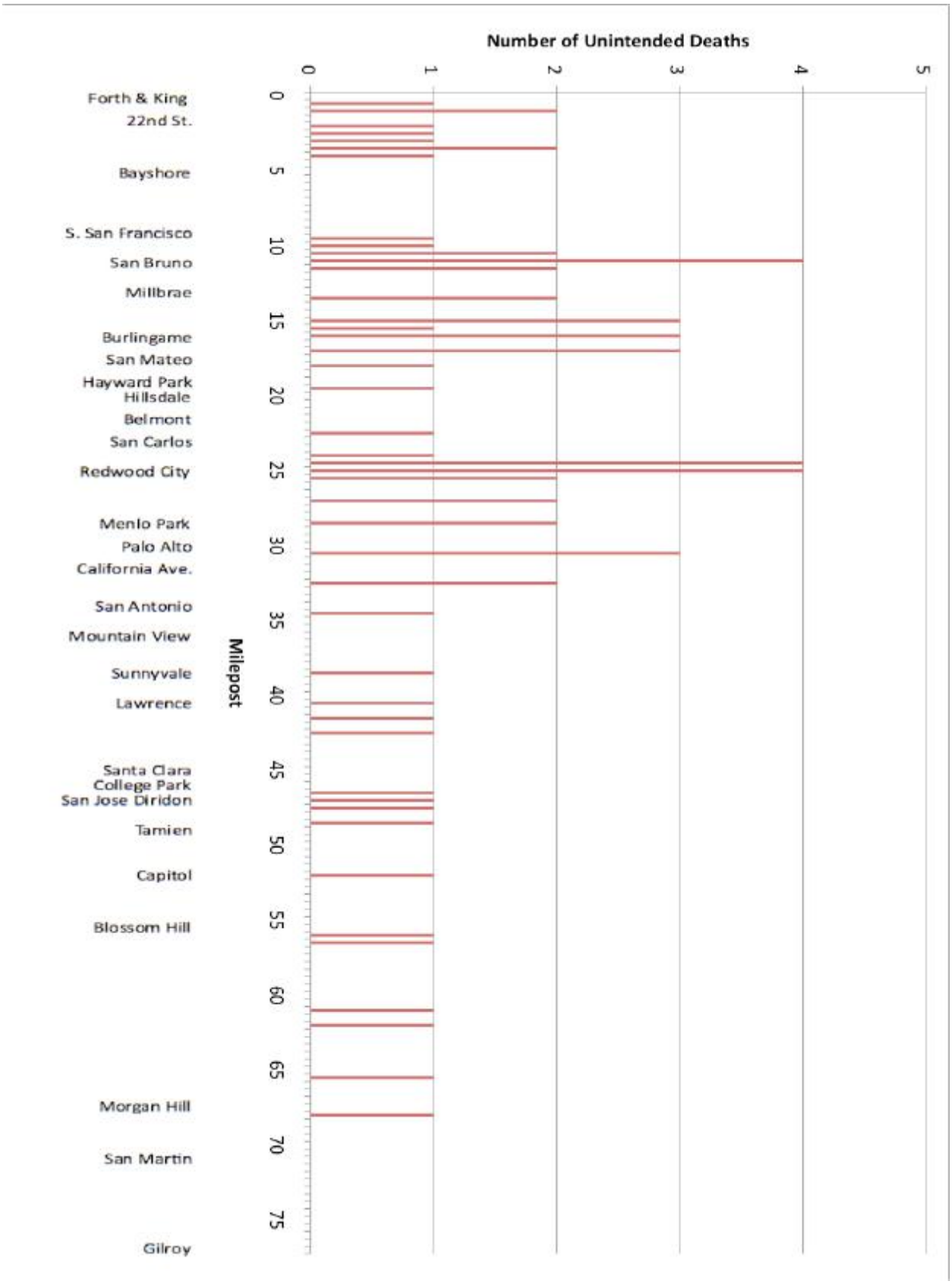

Figure 13. Number of Unintended Deaths by Milepost (1992–2009)

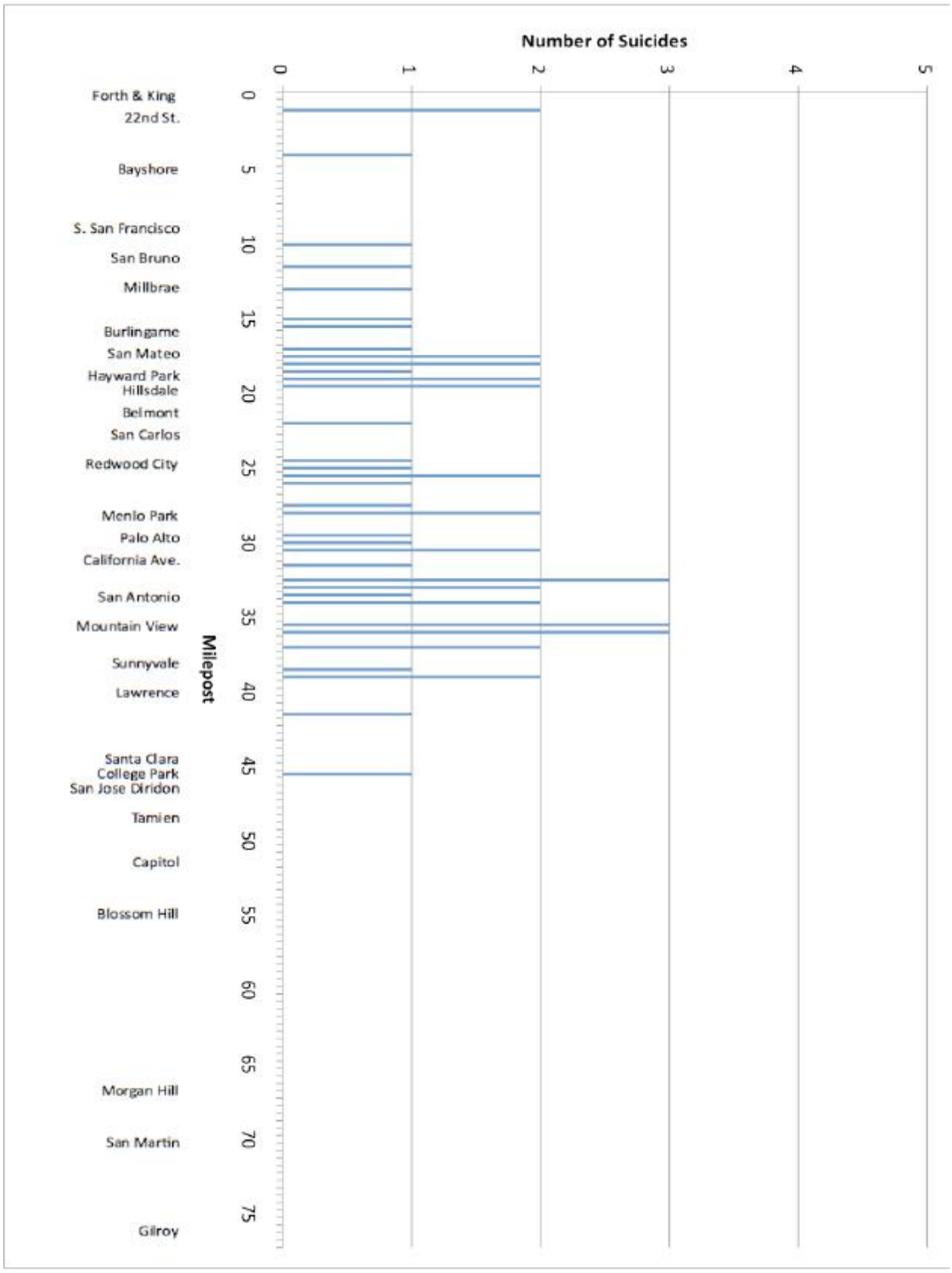

Figure 14. Number of Suicides by Milepost (2004–2009)

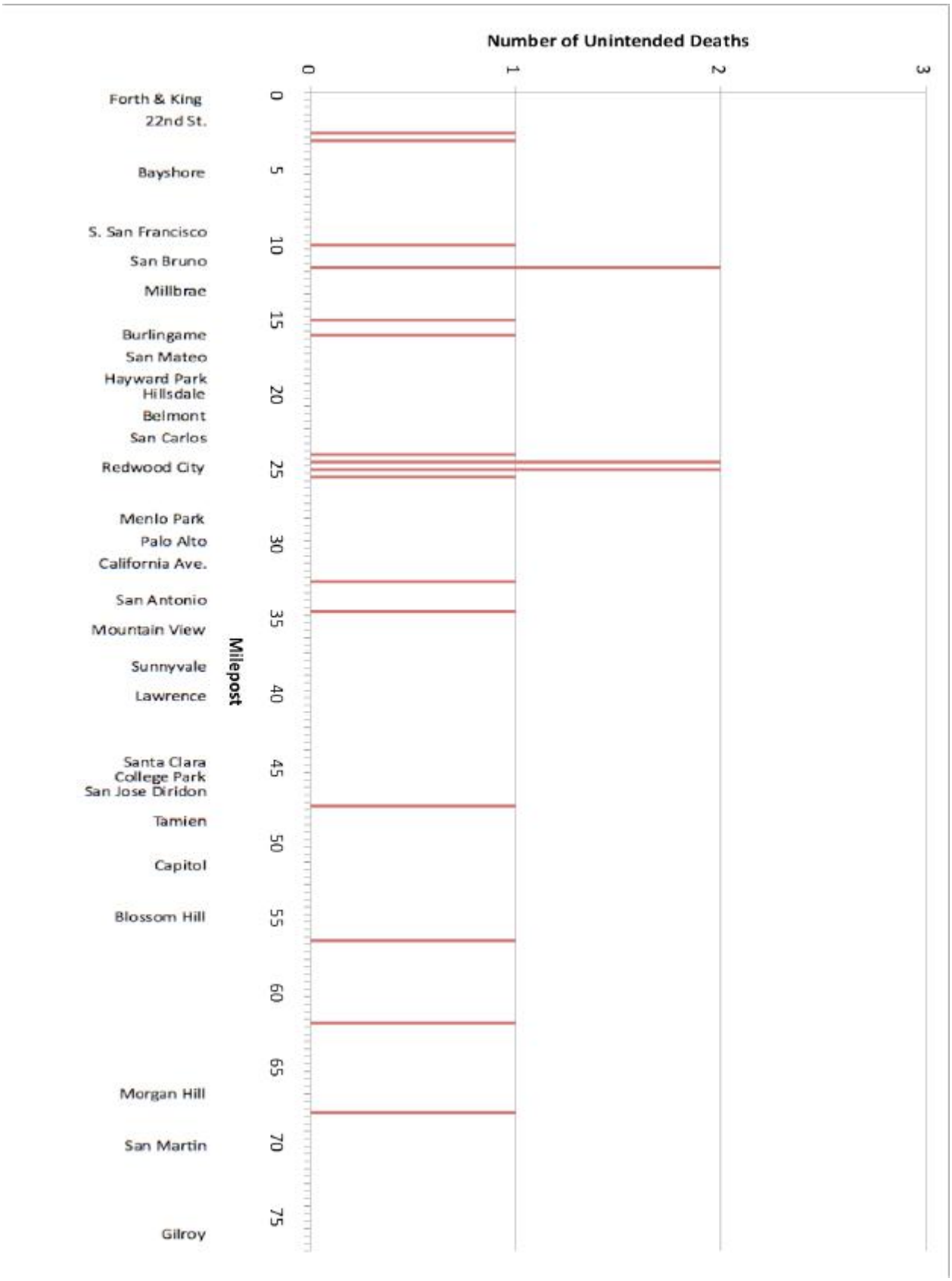

Figure 15. Number of Unintended Deaths by Milepost (2004–2009)

PROXIMITY TO STATIONS

An analysis was performed to determine the proximity to stations where suicides and unintended deaths occurred. The location of suicides and unintended deaths occurring at stations were identified using the maps provided by Caltrain.[49] Only deaths occurring within the station platform, according to the milepost associated with the event, were allocated to the station. The suicides and unintended deaths occurring away from the stations were classified according to 0.1-mile increments from the ends of the station platform up to a distance of 0.5 miles from the stations. A distance of 0.0 miles from the station indicates that the death occurred at the station platform.

The choice of the distance of 0.5 miles is somewhat arbitrary. Choosing only a short distance from the station might have excluded a visible pattern. People who commit suicides may look for an access point to the tracks and commit suicide away from that point to avoid interference. According to the literature, they may also move away from the station to encounter trains traveling at higher speeds. The most convenient access points are the stations and road crossings. The analysis for road crossings is contained in the next section. Choosing a longer distance than 0.5 miles would increase the number of times that a suicide would be included in both the stations and road-crossings analyses.

Two basic types of analyses were performed. The first analysis consisted of comparing the concentrations of suicides and unintended deaths found within each 0.1-mile increment from the station. The second analysis comprised the calculation of the cumulative number of suicides at 0.1-mile increments.

The results of the first analysis of the suicides and unintended deaths are presented in Tables 6 as well as in Figures 16 and 17. Twenty percent (25 suicides) of all the suicides (123 total suicides) occurred at the stations. This corresponds roughly with the 26.2 percent of suicides that Abbott et al. found to have occurred at station platforms.[50] It should be noted that the sections of the tracks that have the largest concentration of suicides are the station platforms. Each station platform is approximately 0.1 mile in length. When comparing 0.1-mile increments away from the station, the suicide rate at the stations exceeds any other 0.1-mile increment of section that was analyzed.

It is significant that 80 percent of the suicides occurred away from the stations, which confirms that the station could be a convenient access point but not the primary choice for committing suicide. This finding supports Abbott et al.'s reasoning that the majority of rail suicides happen away from station platforms because they are much more likely to be fatal.[51]

Table 6 also includes the ratio of suicides to unintended deaths at incremental distances from the station. The overall ratio of suicides (123 total suicides) versus unintended deaths (70 total unintended deaths) is approximately 1.8. The ratio of suicides to unintended deaths at the stations is 1.6, which is about the same as the overall ratio. The ratios of suicides to unintended deaths at increments from the station are, with the exception of the 0.3 to 0.4-mile increment, substantially greater than the average ratio. This result underscores the finding discussed in the foregoing paragraph. It should be noted that the number of unintended deaths in the 0.3 to 0.4-mile increment is about twice as high as in other increments. The reason for this may be that deaths that occurred at crossings were included in the station-based analysis. Finding the cause of this aberrant number was not considered germane to this study.

The number of suicides and unintended deaths that occurred at specific stations are shown in Figures 18 and 19 respectively. In general, the same patterns exist as were identified for the deaths according to milepost. There are relatively more deaths in the northern section and a relatively more uniform pattern for suicides versus unintended deaths.

Table 6. Unintended Deaths and Suicides at Stations and Locations at Incremental Distances from Stations

Incremental Distance from Station (miles)	Total Deaths (Suicide + Unintended)	Suicides		Unintended		
	Number of total deaths	Number of suicides	% of suicides	Number of unintended	% of unintended deaths	Ratio of suicides to unintended
0.0	41	25	20%	16	23%	1.6
0.0 – 0.1	13	10	8%	3	4%	3.3
0.1 – 0.2	19	13	11%	6	9%	2.2
0.2 – 0.3	20	16	13%	4	6%	4.0
0.3 – 0.4	23	12	10%	11	16%	1.1
0.4 – 0.5	12	9	7%	3	4%	3.0

The cumulative number of total deaths, suicides, unintended deaths, as well as the percent of the total deaths (193 total deaths), suicides (123 suicides), and unintended deaths (70 unintended) are shown in Table 7. It can be seen that approximately two thirds of total deaths, suicides, and unintended deaths occur within 0.5 miles from station platforms. This result may be significant when considering prevention and mitigation of deaths, because the efforts can be concentrated around the stations. The cumulative percentages (as a percent of the total deaths) are shown in Figure 20. The shape of the curves indicates a relatively uniform increase in both suicides and unintended deaths away from the station.

Table 7. Cumulative Number of Unintended Deaths and Suicides at Stations and Locations at Incremental Distances from Stations

Distance from Station (miles)	Total Deaths (Suicide + Unintended)		Suicides			Unintended		
	Cumulative number of deaths	% of total	Cumulative number of deaths	% of suicides	% of total	Cumulative number of deaths	% of unintended	% of total
0.0	41	21%	25	20%	13%	16	23%	8%
0.1	54	28%	35	28%	18%	19	27%	10%
0.2	73	38%	48	39%	25%	25	36%	13%
0.3	93	48%	64	52%	33%	29	41%	15%
0.4	116	60%	76	62%	39%	40	57%	21%
0.5	128	66%	85	69%	44%	43	61%	22%

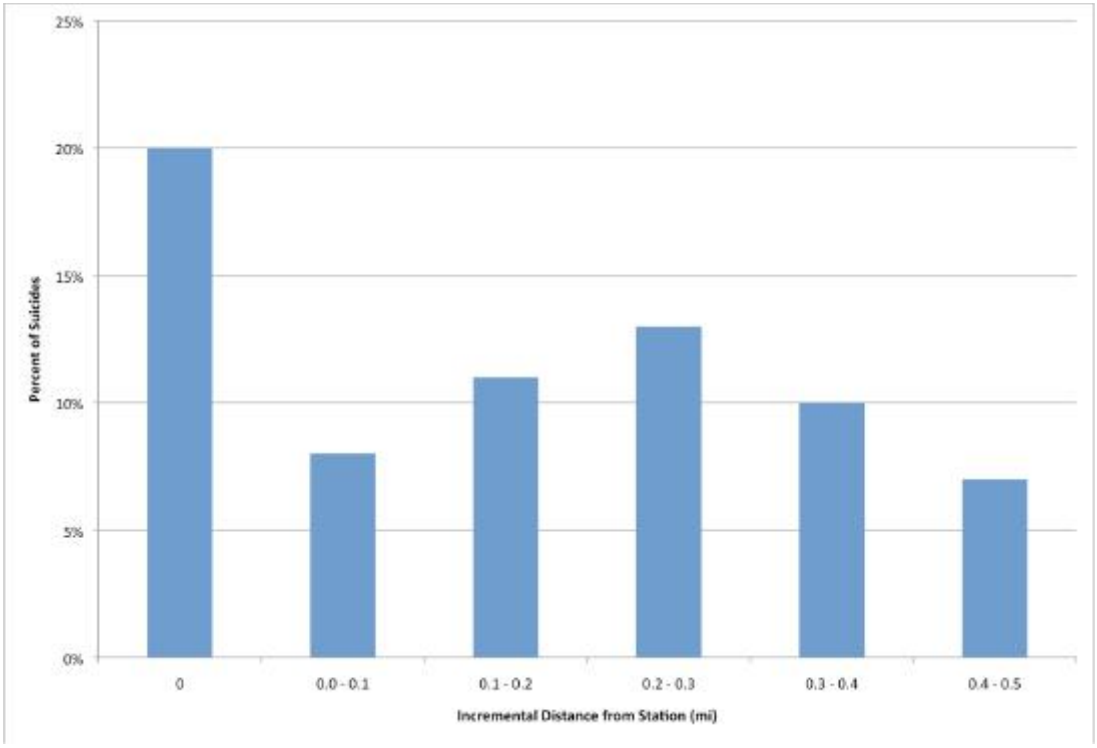

Figure 16. Percent of Suicides at Stations and Incremental Distances from Stations

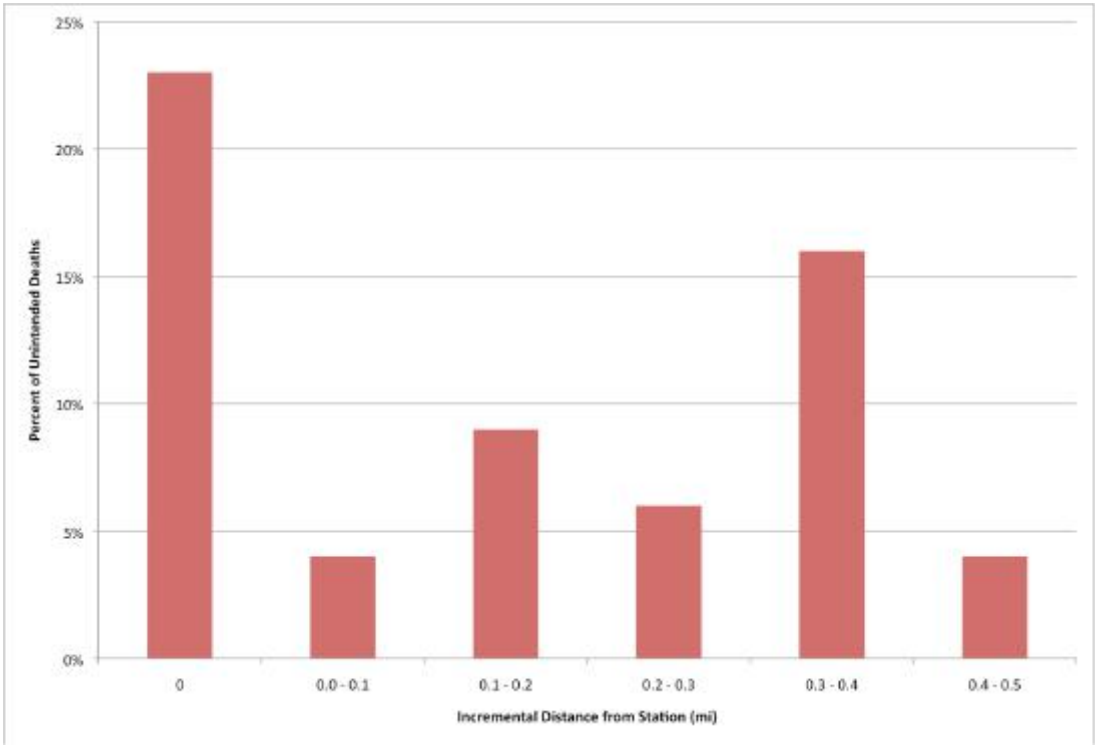

Figure 17. Percent of Unintended Deaths at Stations and Incremental Distances from Stations

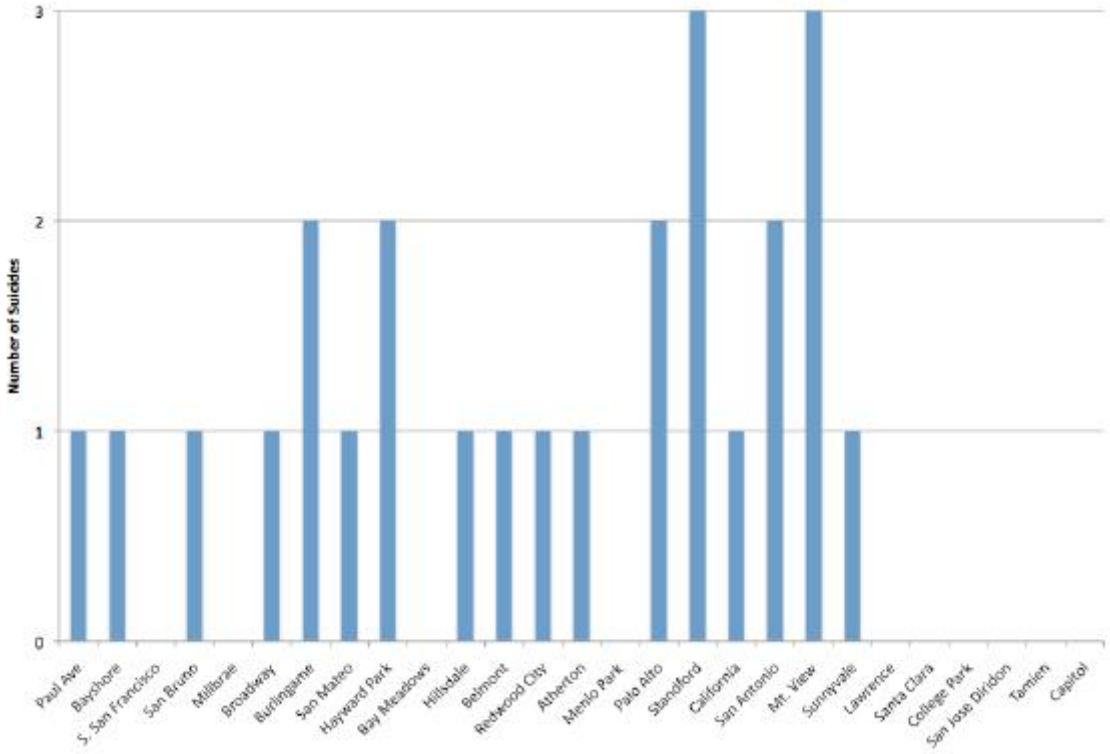

Figure 18. Number of Suicides at Station Platforms

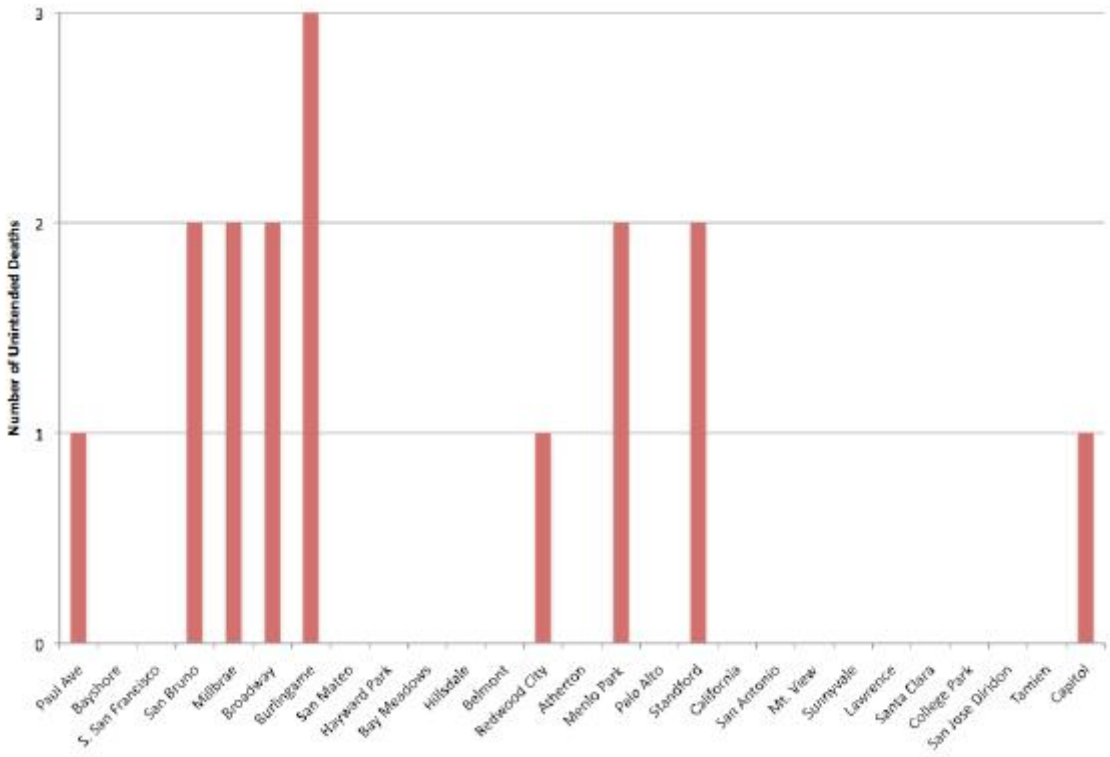

Figure 19. Number of Unintended Deaths at Station Platforms

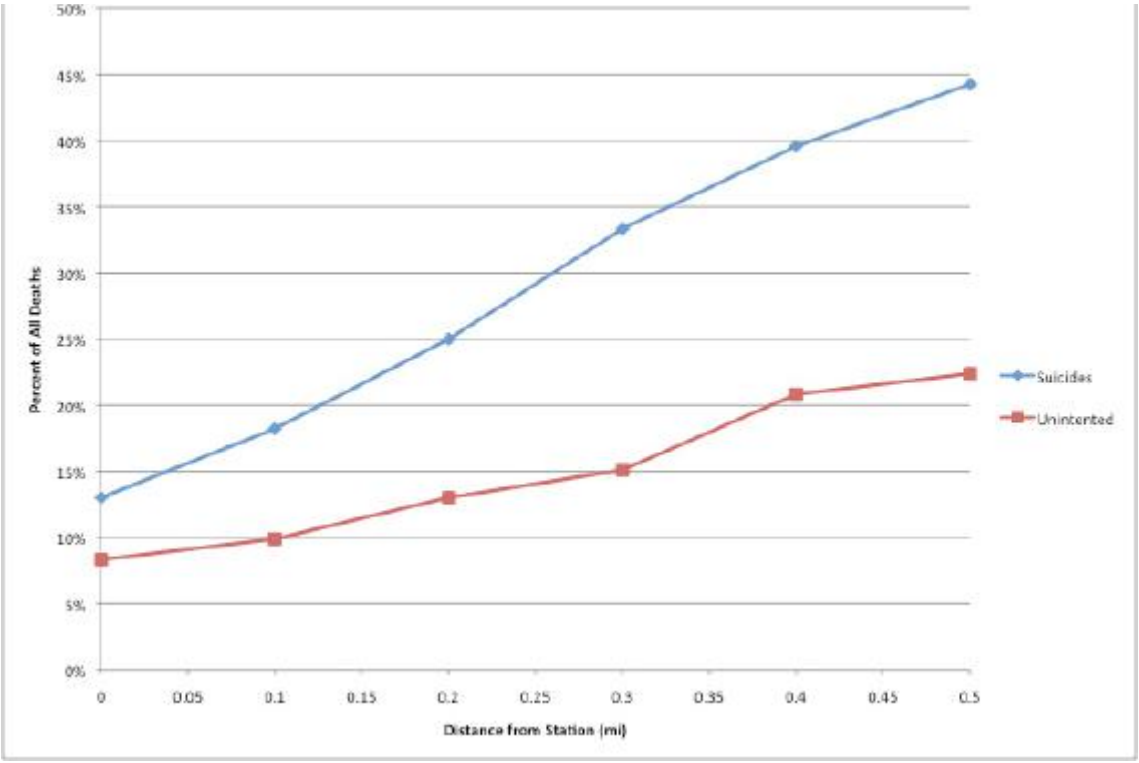

Figure 20. Cumulative Percent of Unintended Deaths and Suicides at Stations and at Incremental Distances from Stations (percent based on total of 193 deaths)

PROXIMITY TO ROAD CROSSINGS

An analysis, similar to the analysis carried out for the deaths relative to station platforms, was carried out for the proximity of the deaths to road crossings. All suicides and unintended deaths occurring at road crossings were identified. Deaths were classified according to the distances away from the road crossings. A distance of zero meant that the death occurred within the paved area of the road. The results are shown in Table 8. Smaller increments were used closer to the road crossings (as compared to the increments used for the stations) because a suicidal person would not have to leave the crossing or go very far to encounter a train traveling at high speed.

The percentage of suicides at road crossings is less than the percentage of suicides at even a small distance away from the road crossing. This may indicate that the crossing may be a convenient access point and that the persons who wish to commit suicide may walk only a small distance away from the crossing. Since there are probably fewer bystanders present at road crossings, as compared to stations, the suicidal person may be less likely to deem it necessary to venture far away from the road. It is also possible that a suicidal person could be inside a vehicle stopped at or near the road crossing. Further investigation to confirm these conclusions was outside the scope of this study.

As stated in the previous section, the ratio of suicides to unintended deaths for the entire data sample (193 deaths) is 1.8. From Table 8 it can be seen that the ratios of suicides to unintended deaths show an uneven pattern. No distinct conclusion was made regarding this result.

Table 8. Road Crossings: Unintended Deaths, Suicides at Road Crossings and Locations at Incremental Distances from Road Crossings

Incremental Distance from Road Crossing (miles)	Total Deaths (Suicide + Unintended)	Suicides		Unintended		
	Number of deaths	Number of deaths	% of all suicides	Number of deaths	% of all unintended deaths	Ratio of suicides to unintended
0.0	15	10	8%	5	7%	2.0
0.0 – 0.025	21	7	6%	14	20%	0.5
0.025 – 0.05	25	15	12%	10	14%	1.5
0.05 – 0.1	34	21	17%	13	19%	1.6
0.0 – 0.1	80	43	35%	37	53%	1.2
0.1 – 0.2	18	15	12%	3	4%	5.0
0.2 – 0.3	6	4	3%	2	3%	2.0

The cumulative numbers of total deaths, suicides and unintended deaths are presented in Table 9. In the case of suicides, 59 percent occurred within 0.3 miles of a road crossing, compared with 52 percent for stations (see Table 7). It may be concluded that these patterns are similar. By comparison, 67 percent of unintended deaths occur within 0.3 miles of a road crossing versus 41 percent for stations. This result is not surprising, given that a significant proportion of these deaths may be the result of drivers making poor judgments when crossing the railroad track, or people walking on the right of way, or other factors associated with the road crossings.

The cumulative percentages (as a percent of the total 193 deaths) are also shown in Figure 21. It can be seen that there is a significant leveling-off of suicides and unintended deaths after a distance of 0.1 miles away from the stations. This supports the conclusion that the persons wanting to commit suicide may not feel the need to go far to encounter a train traveling at high speed to ensure a fatal outcome.

Table 9. Road Crossings: Unintended Deaths and Suicides at Road Crossings and Locations at Incremental Distances from Road Crossings (Cumulative Values)

Distance from Road Crossing (miles)	Total Deaths (Suicide + Unintended)		Suicides			Unintended		
	Cumulative number of deaths	% of total	Cumulative number of deaths	% of suicides	% of total	Cumulative number of deaths	% of unintended	% of total
0.0	15	8%	10	8%	5%	5	7%	3%
0.025	36	19%	17	14%	9%	19	27%	10%
0.05	61	32%	32	26%	17%	29	41%	15%
0.1	95	49%	53	43%	27%	42	60%	22%
0.2	113	59%	68	55%	35%	45	64%	23%
0.3	119	62%	72	59%	37%	47	67%	24%

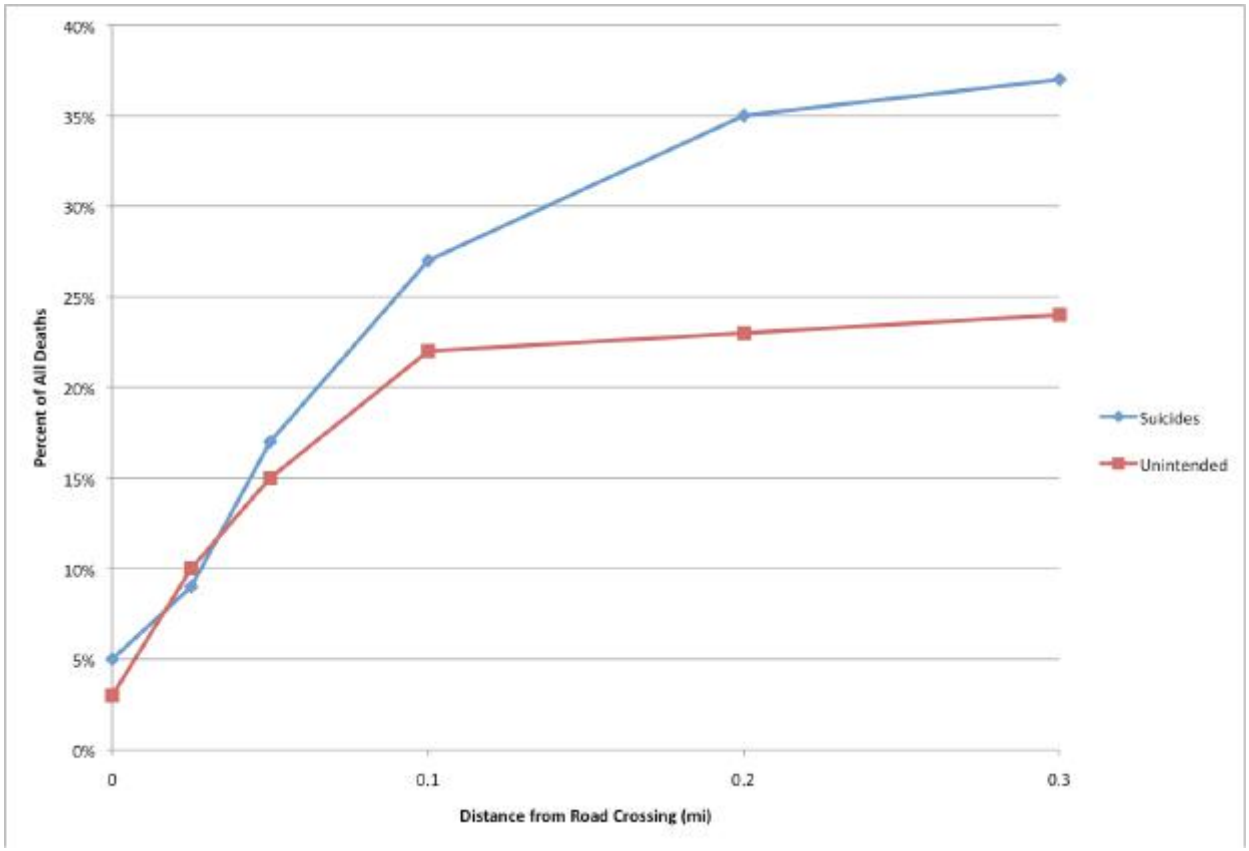

Figure 21. Cumulative Percent of Unintended Deaths and Suicides at Road Crossings and at Incremental Distances from Road Crossings

PROXIMITY TO STATIONS AND ROAD CROSSINGS

The fact that the data for suicides and unintended deaths relative to stations and road crossings could overlap was noted in a previous section. The data from the previous two sections were combined to determine the extent to which the suicides and unintended deaths were concentrated around stations and road crossings and also to form some idea of the magnitude of the overlap of the data.

The cumulative percentages of suicides and unintended deaths as a function of the distance from the nearest station or road crossing are shown in Table 10. The data indicate that 100 percent of deaths occur within 0.3 miles from a road crossing or station. The fact that the percentages as shown are greater than 100 percent is the result of having some stations and road crossings within 0.3 of a mile of each other. A death would then be allocated to both the station and the road crossing, leading to some double counting. Since the percentages are not much greater than 100 percent, it could be concluded that the overlap is not great and that the conclusions made in the foregoing sections should not be greatly affected by this overlap.

Table 10. Unintended Deaths and Suicides at Stations and Road Crossings and at Incremental Distances from Stations and Road Crossings

Incremental Distance from Station or Road Crossing (miles)	Total Deaths (Suicide + Unintended)	Suicides			Unintended		
	Number	Cumulative number of suicides	% of Suicides	% of Total deaths	Cumulative number of unintended deaths	% of Unintended deaths	% of Total deaths
0.0	56	35	28%	18%	21	30%	11%
0.1	149	88	72%	46%	61	88%	32%
0.2	186	116	94%	60%	70	100%	36%
0.3	212	136	111%	71%	76	109%	39%

GENDER

All suicides and unintended deaths were classified according to gender for the deaths for which data were available. Males chose rail suicides 3.5 times more than females, as can be seen in Table 11. The results confirm Abbot et al.'s finding that males choose rail as the method of suicide more often than females.[52]

Table 11. Suicides and Unintended Deaths by Gender

	Male	Female	Male to Female Ratio
Suicides	60	17	3.5
Unintended	23	13	1.8

SUMMARY OF CONCLUSIONS

A summary of the major conclusions regarding possible patterns follows:

1. **Year of Occurrence**: There did not appear to be a trend over time. There may be a slight upward trend for suicides if the data from the last few years were compared to the data for the first few years, but this may be due to a concurrent increase in population or service by Caltrain. A similar comparison for unintended deaths showed the opposite result, i.e. there were fewer deaths during the last few years. This may be the result of having mitigated the circumstances that caused the unintended deaths.

2. **Month of the Year:** No distinct pattern was identified for suicides or for unintended deaths related to the month of the year except for a low frequency of suicides in September.

3. **Day of the Week**: Most suicides occurred during the workweek, especially on Mondays and Fridays. Fewer trains are running during the weekend, therefore there are fewer opportunities for deaths involving trains. The literature indicated that suicides are more likely to occur on Mondays because the stress of "new beginnings" may be too much for people to handle. The results of this study do not directly support this finding.

4. **Day of the Month**: The data showed some indication of a cluster of suicides at the beginning of the month. This would support the finding in the literature that most suicides occur during the first week of the month. A pattern could not be detected for unintended deaths.

5. **Time of Day**: The data appear to indicate that the peak periods of suicides correlate fairly well with the peak periods of train operations.

6. **Milepost**: The data showed three sets of patterns.

   - The largest concentration of suicides was between the Burlingame and Sunnyvale stations, approximately a 25-mile stretch of track, with a fairly uniform distribution of suicides. In contrast there was only one suicide south of the Diridon Station. There were lower concentrations of suicides north of the Burlingame Station and the pattern was also less uniform than the Sunnyvale to Burlingame section. The Burlingame to Sunnyvale section is characterized by older neighborhoods and an opinion was offered that the cause of the higher incidence of suicides in this area could be that the railroad is a more integral part of the community. The area to the north of the Burlingame station has relatively more industrial development and the tracks are in tunnel in the area close to San Francisco. The almost total absence of suicides south of the Diridon Station could be attributed to lower development density and much lower train frequency to the south of the Diridon Station.

   - In contrast to the suicides north of the Diridon Station, the unintended deaths showed more clustering, which may indicate that there may be circumstances that caused

these deaths, but they could also have been spurious accidents. It should be noted that it was not the objective of this study to determine causes or circumstances of unintended deaths. Moreover, eliminating causes of accidents can sometimes not be feasible from economic and other viewpoints.

- The contrast between the relatively uniform distribution of the suicides in the Sunnyvale to Burlingame section and the unintended deaths in the same section indicated that there were not specific areas that were much more attractive for suicides than others, based on the data analyses. It is also noteworthy that the maximum number of suicides that occurred on a 0.5-mile section of track during the last six-year period was three, which leads to the conclusion that suicides on the tracks were relatively rare events and that it is unlikely that the suicides were caused by factors specifically associated with the railroad or that there was a significant source of suicides, such as a hospital nearby.

7. **Proximity to Stations**: Only 20 percent of all the suicides occurred at the stations. This corresponds with the 26.2 percent of suicides that was found in the literature. The station may be a convenient point of access but not the preferred place to commit suicide. The data also showed that approximately two thirds of the suicides occurred within 0.5 of a mile from a station. This holds true for unintended deaths as well. This result may be significant when considering prevention and mitigation of deaths because the efforts can be concentrated in close proximity to the stations.

8. **Proximity to Road Crossings**: Forty-three percent of suicides occurred within 0.1 mile from a road crossing and almost two-thirds within 0.3 of a mile. This may be an indication that a person committing suicide uses the road as access to the tracks and then walks a relatively small distance away from the road, possibly to avoid interference.

9. **Proximity to Stations and Road Crossings:** An analysis, wherein the proximities of suicides and unintended deaths to either stations or road crossings were combined, showed that most suicides and unintended deaths occurred within 0.3 of a mile from either a station or a road crossing.

10. **Gender**: The data revealed that males chose rail suicides 3.5 times more often than females. This result confirms the findings in the literature that males choose rail as a method of suicides more often than females.

It may be concluded that the data did show some patterns for suicides with respect to time and location. Some of the patterns can be explained while the reasons for some are not immediately obvious. However, the patterns in the latter category did not indicate a particularly attractive location or possible source for suicides. In the immediate past, there were the tragic suicides associated with the students from Henry M. Gunn High School within a very short period of time. However, given the relatively long periods of time for which the data were analyzed in this study, these events did not stand out at the level of aggregation used in the analyses.

RECOMMENDATIONS

It is recommended that Caltrain continue to monitor suicides to detect patterns and attempt to mitigate the circumstances where the suicides could be prevented, if such prevention methods would be feasible from economic and other viewpoints. Other commuter rail system operators may find the analyses conducted in this study helpful as a basis for detecting patterns in suicides.

APPENDIX A: FATALITY LOG

A list of all deaths, from August 1992 to December 2009, were provided by Caltrain. The data were rearranged to facilitate analysis.

Data and abbreviations used in chart:

Mile Post: Miles from a mile post, starting at San Francisco's 4th and King Street Station, heading south on Caltrain tracks, in tenths of a mile. Letters S and N refer to southbound or northbound tracks.

Nature: Nature of death—unintended (U), suicide (S), homocide (H) or pending (P)

Caltrain/Union Pacific: Name of train service
CT=Caltrain; UP=Union Pacific; SP=Southern Pacific; ACE=Altamont Commuter Express; AMTRAK=United States national rail service

Moon Phase: Percent of illumination of moon

Date	Time	Day	Location	Mile Post	Nature (Suicide or Unintended)	Caltrain/ Union Pacific	Comments	Sex	Age	Race	Day/ Night	Moon Phase
5/22/98		Friday	San Francisco	0.7 S	U			M			Day	
12/21/92	.	Monday	San Francisco	1.00 S	S							
6/15/06	3:15 p.m	Thursday	San Francisco	1.20 S	S	CT		M			Day	
8/2/94		Tuesday	San Francisco	1.20 S	U							
6/15/01		Friday	San Francisco	1.40 S	U			F			Day	
3/23/08	4:29 p.m.	Sunday	San Francisco	1.50 N	S	CT	Tresspasser struck in tunnel				Day	
1/8/03		Wednesday	San Francisco	2.40 N	U			M			Night	
1/24/07	6:20 p.m.	Wednesday	San Francisco	2.60 S	U	CT					Night	37%
7/26/04		Monday	San Francisco	3.20 S	U			M			Day	
1/3/03		Friday	San Francisco	3.70 N	U			F			Night	
1/24/94		Monday	San Francisco	3.70 N	U							
5/27/06	1:30 p.m.	Saturday	San Francisco	4.10 N	S	CT		M			Day	
12/20/93		Monday	San Francisco	4.10 N	U							
3/19/99		Friday	San Francisco	5.20 S	S			M			Day	
2/17/96		Saturday	Brisbane	5.40 N	S			F			Day	
8/11/94		Thursday	South San Francisco	9.70 S	U							
10/28/04		Thursday	South San Francisco	10.20 N	S			M			Day	
5/29/05		Sunday	San Bruno	10.30 S	U			M			Night	
1/17/03		Friday	San Bruno	10.70 S	S			M			Night	
11/3/97		Monday	San Bruno	11.0 S	S						Day	
2/25/96		Sunday	San Bruno	11.0 N	U						Day	
9/12/95		Tuesday	San Bruno	11.0 S	U						Night	
12/31/01		Monday	San Bruno	11.10 N	U			F			Night	
10/16/00		Monday	San Bruno	11.10 S	U						Day	
3/4/00		Saturday	San Bruno	11.10 S	U			F&M			Night	

Date	Time	Day	Location	Mile Post	Nature (Suicide or unintended)	Caltrain/ Union Pacific	Comments	Sex	Age	Race	Day/ Night	Moon Phase
6/30/08	1:15 p.m.	Monday	San Bruno	11.60 N	S	CT		F			Day	
4/19/08	5:34 p.m.	Saturday	San Bruno	11.60 S	U	CT	On skateboard with headphones	M	15		Day	
7/24/05		Sunday	San Bruno	11.60 S	U			M			Day	
11/4/05		Friday	Millbrae	13.30 S	S			M			Night	
11/15/00		Wednesday	Millbrae	13.70 S	U			M			Night	
2/17/95		Friday	Millbrae	13.70 S	U						Day	
10/1/96		Tuesday	Millbrae	13.90 N	S						Day	
8/12/95		Saturday	Burlingame	15.10 N	U	SP					Night	
3/30/02		Saturday	Burlingame	15.20 S	S			M			Night	
8/23/95		Wednesday	Burlingame	15.20 N	U						Day	
4/18/06	2:40 p.m.	Tuesday	Burlingame	15.30 S	U	CT		M			Day	
3/12/04		Friday	Burlingame	15.40 S	S			M			Day	
10/5/95		Thursday	Burlingame	15.60 N	H						Night	
11/18/06	12:30 a.m.	Saturday	Burlingame	15.60 S	S	CT		M			Night	
4/10/95		Monday	Burlingame	15.60 N	U						Night	
10/24/00		Tuesday	Burlingame	15.70 N	S			M			Night	
9/19/08	6:00 p.m.	Friday	Burlingame	16.20 N	U	CT		F			Day	
5/8/01		Tuesday	Burlingame	16.30 N	S			M			Night	
8/15/92		Saturday	Burlingame	16.30 S	S							
5/11/98		Monday	Burlingame	16.30 S	U						Night	
10/22/99		Friday	Burlingame	16.40 S	U			F			Day	
4/16/01		Monday	Burlingame	16.60 N	S			M			Day	
5/25/00		Thursday	San Mateo	16.90 N	S			M			Day	
9/21/09	4:40 p.m.	Monday	San Mateo	17.10 N	S	CT	At grade crossing	M	49	W	Day	
9/2/93		Thursday	San Mateo	17.20 N	U							

Date	Time	Day	Location	Mile Post	Nature (Suicide or Unintended)	Caltrain/ Union Pacific	Comments	Sex	Age	Race	Day/ Night	Moon Phase
12/29/97		Monday	San Mateo	17.20 S	U						Night	
5/16/98		Saturday	San Mateo	17.40 N	S						Night	
8/14/93		Saturday	San Mateo	17.40 S	U							
3/4/98		Wednesday	San Mateo	17.45 N	S						Day	
10/22/01		Monday	San Mateo	17.50 S	S			M			Day	
12/16/09	6:53 p.m.	Wednesday	San Mateo	17.60 N	P	CT	Transient was laying on tracks at station	M	61		Night	
11/30/07	4:50 p.m.	Friday	San Mateo	17.60 N	S	CT					Night	57%
8/3/05		Wednesday	San Mateo	17.70 S	S			M			Night	
8/28/01		Tuesday	San Mateo	18.00 S	S			M			Day	
1/28/00		Friday	San Mateo	18.10 S	U			M			Day	
10/30/08	5:23 a.m.	Thursday	San Mateo	18.30 N	S	CT					Night	
9/6/07	11:40 a.m.	Thursday	San Mateo	18.30 N	S	CT					Day	22%
1/28/08	3:10 p.m.	Monday	San Mateo	19.00 S	S	CT		F	43		Day	
10/9/95		Monday	San Mateo	19.00 S	S						Night	
8/6/07	5:35 a.m.	Monday	San Mateo	19.30 S	S	CT					Day	40%
12/5/08	7:12 a.m.	Friday	San Mateo	19.40 S	S	CT		M			Day	
7/26/95		Wednesday	San Mateo	19.60 S	S						Night	
8/21/09	10:45 p.m.	Friday	Palo Alto	19.70 N	S	CT		F	13	W	Night	
5/14/09	6:38 a.m.	Thursday	San Mateo	19.70 S	S	CT			M		Day	
7/12/00		Wednesday	San Mateo	19.90 N	S				M		Day	
3/2/00		Thursday	San Mateo	19.90 S	U				M		Day	
5/25/93		Tuesday	San Mateo	20.30 S	S							
10/20/97		Monday	San Mateo	20.70 N	S						Night	
7/7/00		Friday	San Mateo	20.70 S	S				M		Day	
5/20/95		Saturday	San Mateo	20.90 S	S						Day	

Date	Time	Day	Location	Mile Post	Nature (Suicide or Unintended)	Caltrain/ Union Pacific	Comments	Sex	Age	Race	Day/ Night	Moon Phase
1/30/02		Wednesday	Belmont	21.00 S	S			M			Day	
3/6/93		Saturday	Belmont	21.40 S	S							
11/15/97		Saturday	Belmont	21.50 S	S						Day	
7/25/98		Saturday	Belmont	21.90 S	S			M			Day	
3/25/93		Thursday	Belmont	22.10 S	S							
10/4/92		Sunday	Belmont	22.40 N	S							
1/6/07	6:50 p.m.	Saturday	Belmont	22.50 N	S	CT					Night	89%
2/8/95		Wednesday	San Carlos	22.60 S	U						Day	
4/5/94		Tuesday	San Carlos	22.80 S	S							
1/8/03		Wednesday	Redwood City	24.40 S	S			M			Day	
4/6/95		Thursday	Redwood City	24.50 S	S	SP					Night	
4/6/06	11:58 p.m.	Thursday	Redwood City	24.50 N	U	CT		M			Day	
2/26/03		Wednesday	Redwood City	24.60 S	S			M			Night	
1/7/08	7:25 p.m.	Monday	Redwood City	24.70 S	S	CT		M	17		Night	
10/22/02		Tuesday	Redwood City	24.80 S	S			M			Day	
8/16/95		Wednesday	Redwood City	24.80 N	U	SP					Night	
6/4/93		Friday	Redwood City	24.80 N	U							
9/15/09	4:50 p.m.	Tuesday	Redwood City	24.80 S	U	CT	At grade crossing	M	57	W	Day	
11/3/06	11:00 p.m.	Friday	Redwood City	24.80 S	U	CT					Night	
5/11/99		Tuesday	Redwood City	24.90 S	S			F			Night	
1/29/01		Monday	Redwood City	25.20 N	U			M				
1/26/98		Monday	Redwood City	25.20 N	U							
2/1/06	7:43 a.m.	Wednesday	Redwood City	25.20 S	U	CT		F				
6/13/04		Sunday	Redwood City	25.30 S	S			M				
10/9/98		Friday	Redwood City	25.40 N	S			M				

Date	Time	Day	Location	Mile Post	Nature (Suicide or Unintended)	Caltrain/ Union Pacific	Comments	Sex	Age	Race	Day/ Night	Moon Phase
10/11/06	5:57 p.m.	Wednesday	Redwood City	25.40 S	U	CT		M			Day	
7/8/09	5:52 p.m.	Wednesday	Redwood City	25.70 N	S	CT		M			Day	
10/16/05		Sunday	Redwood City	25.70 N	S			M			Day	
7/16/96		Tuesday	Redwood City	25.80 S	U						Day	
11/6/09	5:45 p.m.	Friday	Redwood City	25.90 N	P	CT	3/10 mile south of Redwood City station	M	60		Night	
9/6/06	5:30 p.m.	Wednesday	Redwood City	26.00 N	U	CT		M			Day	
10/28/04		Thursday	Redwood City	26.20 N	S			M			Night	
1/12/97		Sunday	Redwood City	27.00 N	S						Day	
8/4/95		Friday	Redwood City	27.20 N	H						Night	
2/14/96		Wednesday	Redwood City	27.40 S	U	SP					Night	
1/16/95		Monday	Atherton	27.50 N	U						Night	
4/27/08	7:05 p.m.	Sunday	Atherton	27.60 S	S	CT		F			Day	
7/7/99		Wednesday	Atherton	27.80 S	S			F			Day	
1/13/03		Monday	Menlo Park	28.40 N	N			F			Day	
10/16/96		Wednesday	Menlo Park	28.40 N	S			F			Night	
1/18/05		Tuesday	Menlo Park	28.40 S	S			M			Day	
11/29/01		Thursday	Menlo Park	28.40 S	S			F			Night	
4/7/08	8:38 p.m.	Monday	Menlo Park	28.50 N	S	CT		M	66		Day	
1/3/02		Thursday	Menlo Park	28.80 S	U			M			Day	
6/13/01		Wednesday	Menlo Park	28.80 S	U			F			Day	
2/23/99		Tuesday	Menlo Park	29.00 N	U						Night	
10/28/01		Sunday	Menlo Park	29.20 S	S			M			Night	
7/5/07	6:15 p.m.	Thursday	Palo Alto	29.80 S	S	CT					Day	71%
6/29/00		Thursday	Menlo Park	30.00 S	S			M			Night	

Date	Time	Day	Location	Mile Post	Nature (Suicide or Unintended)	Caltrain/ Union Pacific	Comments	Sex	Age	Race	Day/ Night	Moon Phase
12/12/04		Sunday	Palo Alto	30.20 S	S			M			Night	
2/19/99		Friday	Palo Alto	30.60 S	U			M			Night	
11/6/04		Saturday	Palo Alto	30.80 N	S			M			Night	
10/7/02		Monday	Palo Alto	30.80 N	S			M				
11/14/03		Friday	Palo Alto	30.80 S	S			M			Night	
2/6/96		Tuesday	Palo Alto	30.80 N	U						Night	
6/17/08	8:05 p.m.	Tuesday	Palo Alto	30.90 N	S	CT					Day	
12/2/94		Friday	Palo Alto	30.90 N	U							
3/3/95		Friday	Palo Alto	31.00 S	S						Day	
11/23/92		Monday	Palo Alto	31.80 S	S							
7/9/05		Saturday	Palo Alto	32.00 N	S			M			Day	
10/13/03		Monday	Palo Alto	32.70 S	U			F			Night	
4/5/96		Friday	Palo Alto	32.90 S	S						Night	
6/2/09	9:57 p.m.	Tuesday	Palo Alto	33.00 N	S	CT		F	17	W	Night	
5/5/09	8:20 p.m.	Tuesday	Palo Alto	33.00 N	S	CT		M	17	W	Day	
3/3/06	8:28 a.m.	Friday	Palo Alto	33.00 S	S	CT		M			Day	
6/28/07	4:50 p.m.	Thursday	Palo Alto	33.00 N	U	CT	Car struck while stuck on tracks				Day	97%
7/22/06	9:10 a.m.	Saturday	Palo Alto	33.20 S	S	CT		M			Day	
10/19/09	10:50 p.m.	Monday	Palo Alto	33.30 S	P	CT		M	16		Night	
12/9/05		Friday	Palo Alto	33.50 S	S			M			Night	
1/4/94		Tuesday	Palo Alto	33.50 S	S							
5/1/01		Tuesday	Palo Alto	33.60 S	S			M			Night	
5/4/09	11:30 a.m.	Monday	Palo Alto	33.80 S	S	CT		F		W	Day	

Date	Time	Day	Location	Mile Post	Nature (Suicide or Unintended)	Caltrain/ Union Pacific	Comments	Sex	Age	Race	Day/ Night	Moon Phase
12/23/09	5:11 p.m.	Wednesday	San Antonio	34.10 S	P	CT	Adult male stepped off platform in front of train	M			Night	
6/6/08	4:20 p.m.	Friday	Mountain View	34.10 N	S	CT					Day	
8/10/09	6:33 p.m.	Monday	Mountain View	34.10 S	S	CT	At station	F	42		Day	
11/25/95		Saturday	Mountain View	34.20 S	S						Night	
5/20/03		Tuesday	Mountain View	34.60 S	S			M			Night	
3/13/97		Thursday	Mountain View	34.70 N	S						Day	
10/5/06	6:44 p.m.	Thursday	Mountain View	34.70 N	U	CT		F			Day	
6/6/95		Tuesday	Mountain View	34.80 N	S						Day	
2/24/95		Friday	Mountain View	34.80 N	S						Night	
8/7/98		Friday	Mountain View	35.10 N	S						Day	
12/31/08	6:12 p.m.	Wednesday	Mountain View	35.60 S	S	CT					Night	
4/19/95		Wednesday	Mountain View	35.80 S	S						Day	
10/13/08	5:55 p.m.	Monday	Mountain View	36.00 S	S	CT		F			Day	
2/18/04		Wednesday	Mountain View	36.00 S	S			F			Day	
4/6/06	7:15 p.m.	Thursday	Mountain View	36.10 N	S	CT		M			Day	
11/7/08	5:09 p.m.	Friday	Mountain View	36.50 N	S	CT		M			Night	
2/13/07	7:50 p.m.	Tuesday	Mountain View	36.50 S	S	CT					Day	18%
11/25/01		Sunday	Sunnyvale	37.10 S	S			M			Night	
12/24/05		Saturday	Mountain View	37.30 S	S			M			Night	
11/11/06	8:18 p.m.	Saturday	Mountain View	37.50 N	S	CT		M			Night	
4/4/01		Wednesday	Sunnyvale	38.50 N	S			M			Day	
7/25/94		Monday	Sunnyvale	38.50 N	S							
5/30/05		Monday	Sunnyvale	38.60 S	S			M			Night	
2/26/93		Friday	Sunnyvale	38.80 S	S							

Date	Time	Day	Location	Mile Post	Nature (Suicide or Unintended)	Caltrain/ Union Pacific	Comments	Sex	Age	Race	Day/ Night	Moon Phase
10/11/00		Wednesday	Sunnyvale	39.00 N	U						Night	
3/17/93		Wednesday	Sunnyvale	39.30 S	S	SP						
3/8/06	9:22 p.m.	Wednesday	Sunnyvale	39.40 N	S	CT		M			Night	
5/25/09	9:16 a.m.	Monday	Sunnyvale	39.50 N	S	CT		M			Day	
3/20/95		Monday	Sunnyvale	40.50 S	S						Day	
9/22/92		Tuesday	Sunnyvale	40.60 S	U							
12/22/06	1:20 a.m.	Friday	Santa Clara	41.70 S	S	CT		M			Night	
7/29/95		Saturday	Santa Clara	42.00 N	U						Day	
3/22/93		Monday	Santa Clara	42.50 N	S	SP						
3/6/00		Monday	Santa Clara	42.80 N	U			M			Day	
6/26/00		Monday	Santa Clara	44.00 S	S			F			Day	
8/14/98		Friday	Santa Clara	44.20 N	S						Day	
2/29/00		Tuesday	Santa Clara	44.70	S			M			Night	
7/3/04		Saturday	San José	45.60 S	S			M				
11/6/09	3:39 p.m.	Friday	San José	46.40 N	P	ACE	Identified by law enforcement as transient	F	52		Day	
2/22/99		Monday	San José	46.70 N	U			F			Day	
7/29/94		Friday	San José	46.90 ?	S	AMTRAK						
4/2/94		Saturday	San José	47.20 ?	U	SP						
6/5/09	4:04 p.m.	Friday	San José	48.00 S	U	CT		M	38	W	Day	
1/9/00		Sunday	San José	48.60 N	U			M			Night	
7/25/00		Tuesday	San José	52.50 S	U						Day	
11/20/97		Thursday	San José	56.20 N	U						Day	
7/23/09	6:40 p.m.	Thursday	San José	57.00 S	U	CT		M			Day	
5/14/01		Monday	San José	61.50 S	U			M			Day	
11/6/08	6:35 a.m.	Thursday	San José	62.20 S	U	CT		F			Night	

Date	Time	Day	Location	Mile Post	Nature (Suicide or Unintended)	Caltrain/ Union Pacific	Comments	Sex	Age	Race	Day/ Night	Moon Phase
6/19/96		Wednesday	San José	65.60 N	U						Day	
8/7/03		Thursday	Morgan Hill	66.50 S	S			M			Night	
1/23/06	6:50 p.m.	Monday	Morgan Hill	68.10 S	U	CT		F			Night	

APPENDIX B: LISTING OF STATIONS

A list of all Caltrain stations was provided by Caltrain. The data include the mileposts and specific information about the crossings and conditions of the station.

7.2 STATION PEDESTRIAN AND EMERGENCY CROSSINGS

LEGEND

CITY/JURISDICTION = Refers to the city in which the station is located
NO. of TRKS = The number of crossing tracks
PANEL SURFACE = Crossig panel surface material
BOARD = Boarding type
S GATE = Oneway Swing Gate

AC = Hot mix asphaltic concrete crossing surface
C = Concrete panel crossing surface
R = Rubber panel crossing surface

AWS = Advance Warning Signs
YEAR = Year Last Reconstructed

CB = Center Boarding
NCB = Narrow center boarding
OB = Outside Boarding
*** = UP Track**

Condition based on 1-5, 1 = Very Good, 5 = Very Poor

Data as of: March 23, 2005
Revised: June 1, 2005

	STATION NAME	ID	MP	CITY	BOARD	NO. of TRKS	NO. of XING	PANEL SURFACE	MILEPOST / XING CONDITION 1		2		3		4		5		YEAR	APPR COND.	STRIPING	AWS	CENTER FENCE	PED GATES	S GATE	TRACK CENTER	XING WIDTH	NOTES
1	SAN FRANCISCO	SFK	0.2	SF	CB	4	2	AC	0.31		0.36								2003				NO	NO				Terminal crossings
2	22nd STREET	TWE	1.8	SF	OB	2	-	-															YES	NO				
3	PAUL AVENUE	PAU	4.1	SF	OB	2	-	-							-				-				NO	NO				
4	BAYSHORE	BAY	5.2	BSBN	OB	4	2	C	5.16	1	5.30	1							2004	1	NO	NO	YES	NO		15'-18'-15'	10'	2 Emergency crossings (concrete) both end of platforms
5	SOUTH SF	SSF	9.3	SSF	NCB	6	4	2AC / 2R	9.30	3	9.16	3	9.18	3	9.19	4			2000	3	NO	NO	NO	NO		13'	6'	Lead track west of main line xings.
6	SAN BRUNO	SBR	11.6	SBRN	OB	2	2	C	11.54		11.66								2003				YES	NW,NE,SW,SE	4			
7	MILLBRAE	MIL	13.6	MLBR	OB	3	OP-1	-	13.60										-				YES	NO				
8	BROADWAY	BWY	15.2	BURL	NCB	2	3	R	15.24	3	15.26	3	15.29	3					2000	3	YES	YES	NO	NO		13'	12'	Striping: painted platform, AWS: Signs & stencil in AC.
9	BURLINGAME	BUR	16.3	BURL	NCB	2	3	R	16.22	3	16.24	3	16.25	3					1975	4	YES	YES	NO	NO		-	-	Striping: platform painted (yellow), AWS: stencil in platform. 2 ML tracks, 1 storage (abandoned)
10	SAN MATEO	SMT	17.7	SMTO	OB	2	UP-1	-	17.74	1									-	1	NO	YES	YES	(1st St) SW,SE	2	30'	10'	Passengers use 1st Street crossing. AWS pertains to xing. End of platform xings with "EXIT" only on swing gate
11	HAYWARD PARK	HPK	19.1	SMTO	OB	2	2	C	18.98	1	19.11	1							2000	1	NO	YES	YES	NW,NE,SW,SE	4	30'	10'	End of platform xings with "EXIT" only swing gate
12	BAY MEADOWS	BMD	20.0	SMTO	OB	2	1	R	20.03	2									1980	2	NO	NO	NO	NO		18'	6'	
13	HILLSDALE	HIL	20.3	SMTO	NCB	2	5	C	20.29		20.31		20.33		20.36				2001				NO	NW,NE,SW,SE	4			
14	BELMONT	BEL	21.9	BLMT	CB	2	UP-1	-	21.95										-				NO	NO				Stop Signs
15	SAN CARLOS	SCS	23.2	SCAR	OB	2	UP-1	-	23.24										-				YES	NO				
16	REDWOOD CITY	RWC	25.4	RDWC	OB	2	1	C	25.47	1									2000	1	YES	YES	YES	NW,NE,SW,SE	4	18'	10'	Xing @ N end shares w/ Broadway sidewalk xing, both have xing arms
17	ATHERTON	ATH	27.8	ATN	NCB	2	5	R	27.78	2	27.80	2	27.82	2	27.84	2	27.86	2	2003	3	NO	NO	NO	NO		18'	12'	Xing dist. apart (from North): 65', 85', 122', 105'
18	MENLO PARK	MPK	28.9	MLPK	OB	2	2	C	28.92										2004	1	YES	YES	YES	NW,NE,SW,SE	4	18'	15-10'	North xing shares with Oak Grove Street sidewalk
19	PALO ALTO	PAL	30.1	PA	OB	2	1	C	30.02										2004	2	YES	NO	NO	NE, NW	2	18'		Xing will be improved for ADA. Gates will be provided.
20	STANFORD	STF	30.6	PA	OB	2	1	R	30.68										2003	3	YES	NO	NO	NO		15'	12'	
21	CALIFORNIA AVE	CAL	31.8	PA	NCB	2	3	R	31.71	2	31.74	2	31.77	2					2003	3	YES	NO	NO	NO		14'	10'	
22	SAN ANTONIO	SAT	34.1	MTVW	OB	2	-	-											-				YES	NO				
23	MOUNTAIN VIEW	MVW	36.1	MTVW	OB	2	2	C	36.02	1	36.15	1							2000	1	YES	NO	YES	NW,NE,SW,SE	4	18'	10'	
24	SUNNYVALE	SUN	38.8	SUNV	OB	2	2	C	38.68	1	38.80	1							2004	1	YES	NO	YES	NW,NE,SW,SE	4	18'	10'	
25	LAWRENCE	LAW	40.8	SUNV	OB	2	UP-1	C	40.87	1									2004	1	NO	NO	YES	NO		15-18'	20'	Emergency xings @ both ends, private AC xing at North end, gated at each end and at center fencing
26	SANTA CLARA	SCL	44.9	SCIC	NCB	2	3	C	44.92	3	44.95	4	44.98	3					1999	1	YES	NO	NO	NO				
27	COLLEGE PARK	CPK	46.3	SJS	NCB	2	1	R	46.33										1980's	3	YES	NO	NO	NO				AC Xing in front of shelter
28	SAN JOSE DIRIDON	SJD	47.5	SJS	CB	2	2	1C / 1AC	47.43	1	47.58	1							2004	1	NO	NO	NO	NO		15'	18'	Terminal xings for maintenance / emergency
29	TAMIEN	TAM	49.2	SJS	CB	2	-	-											-				NO	NO				
30	LICK HI-RAIL ACCESS		51.6	SJS		3	1	AC											2004	1	NO	NO	NO	N/A		15'/18'	30'	Hi-rail access crossing on setout track and MT-2
31	CAPITOL *	CAP	52.4	SJS																								
32	BLOSSOM HILL *	BHL	55.7	SJS																								
33	MORGAN HILL *	MHL	67.5	MGHL																				NO	2			
34	SAN MARTIN*	SMR	71.2	SMAR																								
35	GILROY *	GIL	77.4	GLRY	OB	-	1	AC											1993	3	NO	NO	NO			VARIES	20'	Yard Crossing

STATION PRIVATE PEDESTRIAN AND EMERGENCY CROSSINGS SUMMARY

CROSSING TYPE	NUMBER OF CROSSINGS
HMAC SURFACE	6
CONCRETE PANEL	24
RUBBER PANEL	19
TOTAL:	49

TOTAL NUMBER OF STATION PEDESTRIAN XING GATES: 30
Total no. of pedestrian swing gates at stations: 34
Total no. of pedestrian swing gates not at stations: 10

* 4 at Common, 4 at 16th st, 2 at Santa Paula

APPENDIX C: LISTING OF CROSSINGS

A list of at-grade road crossings of the Caltrain tracks was provided, from milepost 0.00 to milepost 48.22. An approximate list of at-grade road crossings not listed on the worksheets, south of milepost 48.22, was provided by Caltrain staff.

7.1 VEHICULAR AND PUBLIC PEDESTRIAN GRADE CROSSINGS

Legend

LOCATION = Roadway Name
DOT# = Department of Transportation Number
PANEL XING SURFACE = Crossig Panel Surface Material
WARNING DEVICES: **NE**= Northeast, **SW** = Southwest
#9 = flashing lights with gates
#9A = cantilevered flashing lights with gates
CWD = Constant Warning Device

PED GATE = Pedestrian gate
MOD 9 = Stand alone pedestrian gates
ARM = Auxiay arm attached to the existing gates
STR: ✔ = Striping exists
ADT* = Average Daily Traffic
*To be updated as city data is acquired
YRR = Year Last Reconstructed

SUR = Surface
APR = Approach
STR = Striping
AWS = Advance Warning Signs
SWK = Sidewalk
QNE = View for Northeast Quadrant
QSW = View for Southwest Quadrant

CONDITION RATING

1	Excellent
2	Good
3	Satisfactory
4	Unsatisfactory
5	Near Failure
0	None

Data as of: March 2005
Revised: June 1, 2005

	MP	LOCATION	DOT #	105E - PUC #	CITY	PANEL XING SURFACE	LENGTH (ft.) MT-1	LENGTH (ft.) MT-2	STR	WARNING DEVICES TYPE CONTROL	WARNING DEVICES TYPE NE	WARNING DEVICES TYPE SW	PED GATE ARM	PED GATE MOD 9	ADT*	YRR	CONDITION RATING SUR	APR	STR	AWS	SWK	QNE	QSW	NOTES
1	0.79	Common	922712X	0.80	SF	Conc	100.0	100.0		CWD	9A&9	2x9	2	2	LITE	2003	1	4	-	-	-	2	2	Approach, striping, advance warning signs not constructed yet, s/w to be constructed 4 quads. Not open
2	1.08	16th Street	754749Y	1.08	SF	Conc	160.0	160.0	✔	CWD	9A&9	2x9	2	2	HEAVY	2003	1	3	-	-	-	4	4	Partial striping. Crossing under reconstruction
3	10.27	Linden Avenue	754866U	10.20	SSF	Conc	70.0	70.0		CWD	9A	9			1,700	2004	1	2	3	4	2	3	2	Sidewalk location west of track… partial SE. Extra lights facing Dollar. 29' from CL MT2 to SW#9 should move to MT2
4	10.62	Scott Street	754867B	10.60	SBRN	AC	51.2	50.5	✔	CWD	9	9			5,000	1975	2	2	4		3	2	2	Gates remain down excessively long time for Northbound
5	11.08	San Bruno Avenue	754869P	11.00	SBRN	Rubber	76.9	77.1	✔	CWD	9	9	2		20,000	2001	3	3	4	4	4	4	3	Striping East. Islands both sides (small West)
6	11.13	San Mateo Avenue	754870J	11.10	SBRN	Conc	151.8	155.2	✔	CWD	9	9			10,000	2001	2	2	3	4	4	-	-	Extra lights NE. Bollards to discourage drivers from going around gates
7	11.39	Angus Avenue	754871R	11.40	SBRN	AC	47.2	44.7	✔	CWD	9	9			1,400	2001	3	3	3	4	3	4	3	
8	12.77	Center Street	754873E	12.80	SBRN	Conc	50.0	50.0	✔	CWD	9	9		2	4,000	2003	1	1	4	3	3	1	1	West Advance warning sign need to be corrected.
9	13.04	Santa Paula Ped. Crossing	754874L	13.10	MLBR	Conc	15.0	15.0		CWD	9	9				2003	1	1	4			3	1	
10	15.17	Broadway	754879V	15.20	BURL	Conc	96.0	96.0	✔	CWD	9A	9A			10,000	2000	2	3	3	3	4	3	3	Small island west side, none east
11	15.62	Morrell Ped. Crossing	754885Y	15.60-D	BURL	RUBBER	10.0	10.0			STOP sign	STOP sign				1999	2	2	3	4	3	1	1	Ped Xing stop signs w/ Pvt. Sign. MT1 to Carolan 66', MT2 to California 105'
12	15.95	Oak Grove Avenue	754886F	15.90	BURL	Conc	66.0	66.0	✔	CWD	9	9	2	2	8,000	2000	2	2	4	4	3	3	3	Advance Warning signs West only, MT1 to Carolan 72' ±, MT2 to California 90' ±.
13	16.28	North Lane	754887M	16.20	BURL	AC	55.0	55.0		CWD	9	9	2	2	MOD	1970	4	4		4	3	3		AWS Northeast only, no island, set out tracks to be removed with station improvements
14	16.34	South Lane	754890V	16.30	BURL	AC	55.2	55.3		CWD	9	9		2	LITE	1970	3	4		4		-	4	AWS not to MUTCD. No island. NW only defined sidewalk
15	16.44	Howard Avenue	754891C	16.40	BURL	Conc	78.0	78.0	✔	CWD	9	9		2	7,000	2000	1	1	4	4	4	3	4	No islands. NW and SE ped gates stand alone. Slight curb at #9's SW & NE
16	16.56	Bayswater Avenue	754892J	16.50	BURL	AC	77.2	72.5		CWD	9	9		2	12,000	1970	4	3	5	4	4	2	2	Need STOP bar East. SA Modified #9's. "Dead" siding rail in place.
17	16.69	Peninsula Avenue	754893R	16.60	BURL	Conc	77.7	77.4	✔	CWD	9	9	2	2	MOD	1999	2	2	5		4	3	4	Ped gate SW side does nothing, Sidewalk on the inside.
18	16.94	Villa Terrace	754894X	16.90	BURL	AC	58.5	59.1	✔	CWD	9	9	2	2	1,028	1970	4	4	4	4	3	4	3	Stand alone (SA) modified #9s
19	17.09	Bellevue Avenue	754895E	17.10	BURL	AC	63.9	62.4	✔	CWD	9	9	2	2	1,860	1970	1	1	4	4	3	3	3	37' Curb to curb, 22' Striped traveled way
20	17.80	1st Avenue	754900Y	17.70	SMTO	Conc	70.0	70.0	✔	CWD	9	9	2	2	4,000	2000	1	2	2	4	3	4	4	No left flasher SE Quad @ S. Railroad Ave and 1st Ave
21	17.87	2nd Avenue	754901F	17.80	SMTO	Conc	70.0	70.0	✔	CWD	9	9	2	2	6,000	2000	1	2	3	4	3	4	4	No left light SE Quad @ S. Railroad Ave & 2nd Ave
22	17.94	3rd Avenue	754902M	17.90	SMTO	Conc	80.0	80.0	✔	CWD	9A	9	2	2	14,000	2000	1	1	4	4	3	4	4	Advance warning sign West only. Ped gates: NW, SE - SA; NE - w'9A; SW - w/9. No left flasher SE on RR Ave @ 3rd Ave
23	18.00	4th Avenue	754903U	18.00	SMTO	Conc	70.0	70.0	✔	CWD	9	9A			12,000	2000	1	1	4	3	3	2	2	46' Traveled way on S. Railroad Ave. SE Quad no left turn light (SA) NW Quad no left turn light (SA)
24	18.06	5th Avenue	754904B	18.10	SMTO	Conc	70.0	70.0	✔	CWD	9	9			6,000	2000	1	1	3	3	3	3	3	40' Traveled way, no left turn independent light @ NE Quad
25	18.29	9th Avenue	754905H	18.30	SMTO	Conc	70.0	70.0	✔	CWD	9	9			10,000	2000	1	1	3	3	3	4	3	54' curb to curb traveled way, 45' to Railroad Ave from MT2, 40' to S. Railroad Ave from MT1
26	19.65	25th Avenue	754910E	19.70	SMTO	Conc	83.9	84.0	✔	CWD	9A	9A			12,000	2000	2	2	3	4	4	2	2	
27	24.86	Whipple Avenue	754935A	24.80	RDWC	Conc	120.0	120.0	✔	CWD	9	9			27,000	2000	1	1	2	2	2	2	2	No ped gates, Center island both approaches
28	25.17	Brewster Avenue	754936G	25.20	RDWC	Conc	80.0	80.0	✔	CWD	9A	9A			6,000	2000	1	2	2	1	2	1	1	No ped gates
29	25.34	Broadway	754937N	25.40	RDWC	Conc	79.5	79.2	✔	CWD	9A	9A			10,000	2000	1	1	1	1	1	1	1	Ped gates SW and SE only
30	25.78	Maple Street	754940W	25.70	RDWC	Conc	70.0	70.0	✔	CWD	9	9			2,000	2000	1	1	1	1	1	2	3	No ped gates
31	25.85	Main Street	754941D	25.80	RDWC	Conc	170.0	170.0	✔	CWD	9	9			9,000	1999	1	2	3	2	3	1	1	No ped gates
32	26.02	Chestnut Street	754942K	26.00	RDWC	Conc	70.0	70.0	✔	CWD	9	9			6,000	2000	1	2	2	2	1	1	1	No ped gates. Raised median island on street approaches.
33	27.75	Fair Oaks Lane	754986K	27.70	ATN	AC	48.2	50.3	✔	CWD	9	9			4,000	1996	3	1	2	2	1	1	3	Sidewalk SW only, No ped gates
34	28.05	Watkins Avenue	754987S	28.00	ATN	AC	36.6	37.0	✔	CWD	9	9			2,000	1995	1	2	2	2		1	1	No sidewalk, no ped. Gates
35	28.37	Encinal Avenue	754988Y	28.40	ATN	Conc	60.0	60.0	✔	CWD	9	9			5,000	1999	1	1	2	1	1	1	1	
36	28.58	Glenwood Avenue	754989F	28.60	MLPK	Conc	60.0	60.0	✔	CWD	9	9			7,000	1999	1	1	1	1	1	1	1	
37	28.78	Oak Grove Avenue	754990A	28.80	MLPK	Conc	80.2	80.1	✔	CWD	9	9			13,000	1999	1	1	2	1	1	1	1	This crossing north of Menlo Park Station
38	28.98	Ravenswood Avenue	754991G	29.00	MLPK	Conc	96.0	96.5	✔	CWD	9	9A			27,000	1999	1	1	1	1	1	2	1	Menlo Park Station is at North Median island center gates
39	29.76	Alma Street	754992N	29.80	PA	Conc	74.0	74.0	✔	CWD	9	9			21,000	2005	4	3	2	2	3	1	1	Sidewalk only on NE. Bike lanes. Median islands.
40	31.01	Churchill Avenue	754998E	31.00	PA	Rubber	62.9	62.9	✔	CWD	9	9A	2	2	10,100	1992	3	2	3	3	3	4	4	SA Ped Gate @ NW. Trees, fences, etc. all quadrants
41	33.00	W Meadow Drive	755010S	33.00	PA	Rubber	74.7	75.3	✔	CWD	9	9A	2	2	9,000	1992	3	2	3	4	3	3	3	SA Traffic Signals @ Intersection, View traffic east to west poor view
42	33.33	Charlston Avenue	755011Y	33.40	PA	Rubber	78.3	78.2	✔	CWD	9	9A	2	2	28,000	1992	3	2	2	3	3	3	3	Signalized Intersection
43	34.74	Rengstorff Avenue	755013M	34.70	MTVW	AC	100.7	98.0	✔	CWD	9	9			20,000	1980	3	2	1	1	1	1	2	5' Median islands both approaches.
44	35.94	Castro Street	755015B	35.90	MTVW	Conc	111.0	110.0	✔	CWD	9	9	1	1	38,000	2000	1	1	1	1	1	1	2	Median island on both approaches. Eastbound gate on island
45	37.96	Mary Avenue	755037B	37.90	SUNV	Conc	140.1	140.0	✔	CWD	9A	9			45,000	2000	1	1	2	2	3	1	1	5' wide median island with gates for both approaches
46	38.93	Sunnyvale Avenue	755042X	38.90	SUNV	Conc	80.0	80.1	✔	CWD	9	9			21,000	2000	1	1	1	2	1	1	1	
47	46.27	Stockton Avenue	755082V	45.65	SCIC	AC		115.7							4,000	1970	5	4	3	3	2	4	4	JPB & City of San Jose are currently working for closure of this crossing.
48	48.06	Auzerais Street	755097K	47.45	SJS	Conc	62.0	62.0	✔	CWD	9	9			2,210	2004	1	1	1	2	1	-	-	
49	48.22	West Virginia Street	755099Y	47.60	SJS	MT1-R, MT2-C	53.0	52.4	✔	CWD	9	9			9,000	2000	1	2	3	2	2	4	2	

VEHICULAR AND PUBLIC PEDESTRIAN GRADE CROSSINGS SUMMARY

CROSSING TYPE	NUMBER OF CROSSINGS	TOTAL LENGTH
HMAC SURFACE	11	1,291 ft.
CONCRETE PANEL	33	5,475 ft.
RUBBER PANEL	5	597 ft.
TOTAL:	49	7,363 ft.

TOTAL NUMBER OF CROSSINGS WITH PEDESTRIAN GATES: 21

TYPE	TOTAL NUMBER	
# 9	151	EA
# 9A	17	EA
# 9 Mod.	36	EA
Aux. Arm	30	EA

53.51 Skyway Ave.
54.01 Branham Lane
54.91 Chynoweth Ave.
59.66 Blanchard Rd.
60.31 Emada Ave.
60.76 Bailey Ave.
61.11 Farm road
61.41 Laguna Ave.
61.80 Richmond Ave.
62.20 Private crossing
62.70 Palm Ave.
64.10 Live Oak Ave.
65.17 Tilton Ave.
66.70 Private crossing
67.30 Main St.
67.70 Dunne Ave.
66.90 Tennant Ave.
71.30 San Martin Ave.
72.70 Church Ave.
73.00 Private crossing
73.60 Masten Ave.
73.90 Rucker Ave.
74.70 Buena Vista Ave.
75.10 Cohansey Ave.
75.30 Private crossing
75.40 Las Animas Ave.
76.20 Leavesly Ave.
76.29 Pedestrian crossing
76.80 I.O.O.F. St.
77.00 Lewis St.
77.15 Martin St.
77.30 6th St.
77.40 7th St.

APPENDIX D: CALTRAIN SCHEDULE

The Caltrain northbound and southbound weekday service schedule of trains was obtained from the Caltrain website, http://www.caltrain.com/schedule.html, accessed February 2010.

Northbound - Weekday Service

Morning to Early Afternoon - Page 1 of 2

GILROY / SAN JOSE to SAN FRANCISCO - Northbound — WEEKDAY SERVICE

See Page 2 For Early Afternoon and Evening Times

	Train #	101	103	305	207	309	211	313	215	217	319	221	323	225	227	329	231	233	135	237	139	143	147	151	
Zone 6	Gilroy	AM								6:07		6:30			7:05						AM		PM		Zone 6
	San Martin									6:16		6:39			7:14										
	Morgan Hill									6:22		6:45			7:20										
Zone 5	Blossom Hill									6:35		6:58			7:33										Zone 5
	Capitol									6:41		7:04			7:39										
	Tamien	-	4:58		5:50	5:56				6:49	6:56	7:12			7:47	7:56		8:33		9:33					
	San Jose Diridon	4:30	5:05	5:45	5:57	6:03	6:22	6:45	6:50	6:57	7:03	7:20	7:45	7:50	7:55	8:03	8:22	8:40	9:10	9:40	10:10	11:10	12:10	1:10	
	College Park	-	-	-	-	-	-	-	-	-	-	-	-	-	7:58	-	-	-	-	-	-	-	-	-	
Zone 4	Santa Clara	4:35	5:10	-	6:02	-	6:27	-	-	7:02	-	7:25	-	-	8:02	-	8:27	8:45	9:15	9:45	10:15	11:15	12:15	1:15	Zone 4
	Lawrence	4:40	5:15	-	6:12	-	-	-	-	7:12	-	7:30	-	-	8:12	-	-	8:50	9:20	9:50	10:20	11:20	12:20	1:20	
	Sunnyvale	4:44	5:19	-	6:18	6:13	-	-	7:00	7:18	7:13	-	-	8:00	8:18	8:13	-	8:54	9:24	9:54	10:24	11:24	12:24	1:24	
	Mountain View	4:49	5:24	5:57	6:23	-	6:37	6:57	7:05	7:23	-	7:37	7:57	8:05	8:23	-	8:37	8:59	9:29	9:59	10:29	11:29	12:29	1:29	
	San Antonio	4:53	5:28	-	6:27	-	-	-	-	7:27	-	-	-	-	8:27	-	-	9:03	9:33	10:03	10:33	11:33	12:33	1:33	
	California Avenue	4:57	5:32	-	6:31	-	-	-	7:11	7:31	-	-	-	8:11	8:31	-	-	9:07	9:37	10:07	10:37	11:37	12:37	1:37	
Zone 3	Palo Alto	5:01	5:36	6:05	6:36	6:23	-	7:05	7:16	7:36	7:23	-	8:05	8:16	8:36	8:23	-	9:11	9:41	10:11	10:41	11:41	12:41	1:41	Zone 3
	Menlo Park	5:04	5:39	-	6:39	-	6:45	-	-	7:39	-	7:45	-	-	8:39	-	8:45	9:14	9:44	10:14	10:44	11:44	12:44	1:44	
	Redwood City	5:09	5:44	-	6:45	6:30	6:51	-	-	7:45	7:30	7:51	-	-	8:45	8:30	8:51	9:19	9:49	10:19	10:49	11:49	12:49	1:49	
	San Carlos	5:13	5:48	-	-	-	6:55	-	7:24	-	-	7:55	-	8:24	-	-	8:55	9:23	9:53	10:23	10:53	11:53	12:53	1:53	
	Belmont	5:16	5:51	-	-	-	6:58	-	-	-	-	7:58	-	-	-	-	8:58	9:26	9:56	10:26	10:56	11:56	12:56	1:56	
	Hillsdale	5:19	5:54	6:16	6:51	-	7:02	7:16	7:28	7:51	-	8:02	8:16	8:28	8:51	-	9:02	9:29	9:59	10:29	10:59	11:59	12:59	1:59	
	Hayward Park	5:22	5:57	-	-	-	7:05	-	-	-	-	8:05	-	-	-	-	9:05	-	10:02	-	11:02	12:02	1:02	2:02	
	San Mateo	5:25	6:00	-	-	6:39	7:08	-	7:32	-	7:39	8:08	-	8:32	-	8:39	9:08	9:33	10:05	10:33	11:05	12:05	1:05	2:05	
Zone 2	Burlingame	5:28	6:03	-	-	-	7:11	-	7:35	-	-	8:11	-	8:35	-	-	9:11	9:36	10:08	10:36	11:08	12:08	1:08	2:08	Zone 2
	Millbrae	5:33	6:08	6:24	6:59	6:45	7:17	7:24	-	7:59	7:45	8:17	8:24	-	8:59	8:45	9:17	9:41	10:13	10:41	11:13	12:13	1:13	2:13	
	San Bruno	5:37	6:12	-	-	-	7:21	-	7:42	-	-	8:21	-	8:42	-	-	9:21	9:45	10:17	10:45	11:17	12:17	1:17	2:17	
	So. San Francisco	5:41	6:16	-	7:05	-	7:25	-	-	8:05	-	8:25	-	-	9:05	-	9:25	-	10:21	-	11:21	12:21	1:21	2:21	
	Bayshore	5:47	6:22	-	-	-	7:33+	-	-	-	-	8:33+	-	-	-	-	9:31	-	10:27	-	11:27	12:27	1:27	2:27	
	22nd Street	5:52	6:27	-	-	-	7:40+	-	-	-	-	8:40+	-	-	-	-	9:37	-	10:32	-	11:32	12:32	1:32	2:32	
Zone 1	San Francisco	6:01	6:36	6:42	7:19	7:02	7:48	7:42	7:57	8:19	8:02	8:48	8:42	8:57	9:19	9:02	9:45	10:02	10:41	11:02	11:41	12:41	1:41	2:41	Zone 1

Local Limited Baby Bullet 6:45 ▶ 6:51, 7:12 ▶ 7:18 Timed Transfers - Train bypasses station. + Train may leave up to 5 minutes early.

GILROY / SAN JOSE to SAN FRANCISCO - Northbound — WEEKDAY SERVICE

See Page 1 For Morning and Early Afternoon Times

155	257	NORTHBOUND	159	261	263	365	267	369	271	373	275	277	379	281	383	285	287	189	191	193	195	*197
PM		Gilroy																				PM
		San Martin																				
		Morgan Hill																				
		Blossom Hill																				
		Capitol																				
	2:33	Tamien		3:37	3:58		4:32		4:58			5:32		5:58		6:24				8:23	9:23	
2:10	2:40	San Jose Diridon	3:05	3:44	4:05	4:25	4:39	4:45	5:05	5:25	5:31	5:39	5:45	6:05	6:25	6:31	6:45	6:50	7:30	8:30	9:30	10:30
-	-	College Park	3:08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:15	2:45	Santa Clara	3:12	3:49	4:10	-	4:44	-	5:10	-	-	5:44	-	6:10	-	-	-	6:55	7:35	8:35	9:35	10:35
2:20	2:50	Lawrence	3:17	3:54	-	-	4:52	-	-	-	5:39	5:52	-	-	-	6:39	6:53	7:00	7:40	8:40	9:40	10:40
2:24	2:54	Sunnyvale	3:21	3:58	-	-	4:58	-	-	-	-	5:58	-	-	-	-	-	7:04	7:44	8:44	9:44	10:44
2:29	2:59	Mountain View	3:26	4:03	-	4:37	5:03	4:58	-	5:37	5:46	6:03	5:58	-	6:37	6:46	7:00	7:09	7:49	8:49	9:49	10:49
2:33	3:03	San Antonio	3:30	4:07	-	-	5:07	-	-	-	-	6:07	-	-	-	-	-	7:13	7:53	8:53	9:53	10:53
2:37	3:07	California Avenue	3:34	4:11	-	-	5:11	-	-	-	-	6:11	-	-	-	-	7:06	7:17	7:57	8:57	9:57	10:57
2:41	3:11	Palo Alto	3:38	4:16	4:24	-	5:16	5:06	5:24	-	5:54	6:16	6:06	6:24	-	6:54	7:10	7:21	8:01	9:01	10:01	11:01
2:44	3:14	Menlo Park	3:41	4:19	-	4:46	5:19	-	-	5:46	5:57	6:19	-	-	6:46	6:57	7:13	7:24	8:04	9:04	10:04	11:04
2:49	3:19	Redwood City	3:46	4:25	4:31	4:52	5:25	-	5:31	5:52	-	6:25	-	6:31	6:52	-	7:19	7:29	8:09	9:09	10:09	11:09
2:53	3:23	San Carlos	3:50	4:29	4:35	-	5:29	-	5:35	-	6:04	6:29	-	6:35	-	7:04	7:23	7:33	8:13	9:13	10:13	11:13
2:56	3:26	Belmont	3:53	-	4:38	-	-	-	5:38	-	-	-	-	6:38	-	-	-	7:36	8:16	9:16	10:16	11:16
2:59	3:29	Hillsdale	3:56	-	4:42	-	-	5:17	5:42	-	6:08	-	6:17	6:42	-	7:08	7:28	7:39	8:19	9:19	10:19	11:19
3:02	-	Hayward Park	3:59	-	4:45	-	-	-	5:45	-	-	-	-	6:45	-	-	-	7:42	8:22	9:22	10:22	11:22
3:05	3:33	San Mateo	4:02	4:36	4:48	-	5:36	-	5:48	-	6:12	6:36	-	6:48	-	7:12	7:32	7:45	8:25	9:25	10:25	11:25
3:08	3:36	Burlingame	4:05	-	4:51	-	-	-	5:51	-	6:15	-	-	6:51	-	7:15	7:35	7:48	8:28	9:28	10:28	11:28
3:13	3:41	Millbrae	4:10	4:43	4:57	5:05	5:43	5:25	5:57	6:05	-	6:43	6:25	6:57	7:05	-	7:41	7:53	8:33	9:33	10:33	11:33
3:17	3:45	San Bruno	4:14	-	5:01	-	-	-	6:01	-	6:22	-	-	7:01	-	7:22	-	7:57	8:37	9:37	10:37	11:37
3:21	-	So. San Francisco	4:18	-	5:05	-	-	-	6:05	-	-	-	-	7:05	-	-	-	8:01	8:41	9:41	10:41	11:41
3:27	-	Bayshore	4:24	-	5:13+	-	-	-	6:13+	-	-	-	-	7:13+	-	-	-	8:07	8:47	9:47	10:47	11:47
3:32	-	22nd Street	4:29	4:55	5:21+	5:17	5:55	5:37	6:21+	6:17	-	6:55	6:37	7:21+	7:17	-	7:53	8:12	8:52	9:52	10:52	11:52
3:41	4:02	San Francisco	4:38	5:03	5:29	5:24	6:02	5:44	6:29	6:24	6:39	7:02	6:44	7:29	7:24	7:39	8:00	8:21	9:01	10:01	11:01	12:01

Local | Limited | Baby Bullet | 6:45 ▸ 6:51, 7:12 ▸ 7:18 Timed Transfers

- Train bypasses station. + Train may leave up to 5 minutes early.
* Train departure may be delayed up to 15 minutes after Sharks games.

Morning to Early Afternoon - Page 1 of 2

SAN FRANCISCO to SAN JOSE / GILROY - Southbound — WEEKDAY SERVICE

See Page 2 For Early Afternoon and Evening Times

Train #	102	104	206	208	210	312	314	216	218	220	322	324	226	228	230	332	134	236	138	142	146	150
Zone 1 San Francisco	4:55	5:25	6:11	6:24	6:44	6:59	7:14	7:19	7:24	7:44	7:59	8:14	8:19	8:24	8:44	8:59	9:07	9:37	10:07	11:07	12:07	1:07
22nd Street	5:00	5:30	6:16	6:29	6:49	7:04	7:19	-	7:29	7:49	8:04	8:19	-	8:29	8:49	9:04	9:12	-	10:12	11:12	12:12	1:12
Bayshore	5:05	5:35	-	6:34	-	-	-	-	7:34	-	-	-	-	8:34	-	-	9:17	-	10:17	11:17	12:17	1:17
So. San Francisco	5:11	5:41	-	6:40	-	-	-	-	7:40	-	-	-	-	8:40	-	-	9:23	-	10:23	11:23	12:23	1:23
San Bruno	5:15	5:45	-	6:44	-	-	-	7:33	7:44	-	-	-	8:33	8:44	-	-	9:27	9:51	10:27	11:27	12:27	1:27
Zone 2 Millbrae	5:19	5:49	6:29	6:48	7:01	7:17	7:32	-	7:48	8:01	8:17	8:32	-	8:48	9:01	9:17	9:31	9:55	10:31	11:31	12:31	1:31
Burlingame	5:23	5:53	6:33	6:52	-	-	-	7:38	7:52	-	-	-	8:38	8:52	-	-	9:35	9:59	10:35	11:35	12:35	1:35
San Mateo	5:26	5:56	6:36	6:55	7:07	-	-	7:42	7:55	8:07	-	-	8:42	8:55	9:07	-	9:38	10:02	10:38	11:38	12:38	1:38
Hayward Park	5:29	5:59	-	6:58	-	-	-	-	7:58	-	-	-	-	8:58	-	-	9:41	-	10:41	11:41	12:41	1:41
Hillsdale	5:32	6:02	6:40	7:01	-	-	7:40	7:46	8:01	-	-	8:40	8:46	9:01	-	-	9:44	10:06	10:44	11:44	12:44	1:44
Belmont	5:35	6:05	-	7:04	-	-	-	-	8:04	-	-	-	-	9:04	-	-	9:47	10:09	10:47	11:47	12:47	1:47
San Carlos	5:38	6:08	6:44	7:07 ▸	7:13	-	-	7:50	8:07 ▸	8:13	-	-	8:50	9:07 ▸	9:13	-	9:50	10:12	10:50	11:50	12:50	1:50
Redwood City	5:43	6:13	6:49	7:12 ▸	7:18	7:30	-	-	8:12 ▸	8:18	8:30	-	-	9:12 ▸	9:18	9:30	9:55	10:17	10:55	11:55	12:55	1:55
Zone 3 Menlo Park	5:48	6:18	6:54	-	7:23	7:35	-	7:58	-	8:23	8:35	-	8:58	-	9:23	9:35	10:00	10:22	11:00	12:00	1:00	2:00
Palo Alto	5:51	6:21	6:57	7:18	7:26	-	7:51	8:01	8:18	8:26	-	8:51	9:01	9:18	9:26	-	10:03	10:25	11:03	12:03	1:03	2:03
California Avenue	5:55	6:25	7:01	-	7:30	-	-	-	-	8:30	-	-	-	-	9:30	-	10:07	10:29	11:07	12:07	1:07	2:07
San Antonio	5:59	6:29	-	-	7:34	-	-	-	-	8:34	-	-	-	-	9:34	-	10:11	10:33	11:11	12:11	1:11	2:11
Mountain View	6:03	6:33	7:07	-	7:38	7:44	7:58	8:09	-	8:38	8:44	8:58	9:09	-	9:38	9:44	10:15	10:37	11:15	12:15	1:15	2:15
Sunnyvale	6:08	6:38	-	-	7:43	-	-	-	-	8:43	-	-	-	-	9:43	-	10:20	10:42	11:20	12:20	1:20	2:20
Zone 4 Lawrence	6:12	6:42	7:12	-	7:49+	-	-	8:16	-	8:49+	-	-	9:16	-	9:49+	-	10:24	10:46	11:24	12:24	1:24	2:24
Santa Clara	6:17	6:47	-	7:34	7:56+	-	-	-	8:34	8:56+	-	-	-	9:34	9:56+	-	10:29	10:51	11:29	12:29	1:29	2:29
College Park	-	-	-	-	7:59+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Jose Diridon	6:26	6:56	7:24	7:43	8:06	7:58	8:13	8:28	8:43	9:05	8:58	9:13	9:28	9:43	10:05	9:58	10:38	11:00	11:38	12:38	1:38	2:38
Tamien		7:03		7:50	8:13				8:50	9:12				9:50	10:12			11:07				
Zone 5 Capitol																						
Blossom Hill																						
Zone 6 Morgan Hill																						
San Martin		AM																AM		PM		
Gilroy																						

Local Limited Baby Bullet 6:45 ▸ 6:51 / 7:12 ▸ 7:18 Timed Transfers - Train bypasses station. + Train may leave up to 5 minutes early.

SAN FRANCISCO to SAN JOSE / GILROY - Southbound — WEEKDAY SERVICE

See Page 1 For Morning and Early Afternoon Times

	154	256	158	SOUTHBOUND	260	362	264	266	368	270	372	274	276	378	280	382	284	386	288	190	192	194	196	198	
Zone 1	2:07	2:37	3:07	San Francisco	3:37	4:09	4:19	4:27	4:33	4:56	5:14	5:20	5:27	5:33	5:56	6:14	6:27	6:33	6:56	7:30	8:40	9:40	10:40	12:01	Zone 1
	2:12	-	3:12	22nd Street	-	-	-	4:32	-	-	-	-	5:32	-	-	-	6:32	-	-	7:35	8:45	9:45	10:45	12:06	
	2:17	-	3:17	Bayshore	-	-	-	4:40	-	-	-	-	5:40	-	-	-	6:40	-	-	7:40	8:50	9:50	10:50	12:11	
	2:23	-	3:23	So. San Francisco	-	-	-	4:48	-	5:08	-	-	5:48	-	6:08	-	6:48	-	7:08	7:46	8:56	9:56	10:56	12:17	
	2:27	2:51	3:27	San Bruno	3:51	-	4:33	4:52	-	-	-	5:34	5:52	-	-	-	6:52	-	-	7:50	9:00	10:00	11:00	12:21	
Zone 2	2:31	2:55	3:31	Millbrae	3:55	4:25	-	4:56	4:49	5:14	5:30	-	5:56	5:49	6:14	6:30	6:56	6:49	7:14	7:54	9:04	10:04	11:04	12:25	Zone 2
	2:35	2:59	3:35	Burlingame	3:59	-	4:38	5:00	-	-	-	5:39	6:00	-	-	-	7:00	-	-	7:58	9:08	10:08	11:08	12:29	
	2:38	3:02	3:38	San Mateo	4:02	-	4:42	5:04	4:57	-	-	5:43	6:04	5:57	-	-	7:04	6:57	-	8:01	9:11	10:11	11:11	12:32	
	2:41	-	3:41	Hayward Park	-	-	-	5:07	-	-	-	-	6:07	-	-	-	7:07	-	-	8:04	9:14	10:14	11:14	12:35	
	2:44	3:06	3:44	Hillsdale	4:06	4:33	4:47	5:11	-	5:22	5:38	5:48	6:11	-	6:22	6:38	7:11	-	7:22	8:07	9:17	10:17	11:17	12:38	
	2:47	3:09	3:47	Belmont	4:09	-	-	5:14	-	-	-	-	6:14	-	-	-	7:14	-	-	8:10	9:20	10:20	11:20	12:41	
	2:50	3:12	3:50	San Carlos	4:12	-	4:51	5:18	-	-	-	5:52	6:18	-	-	-	7:18	-	-	8:13	9:23	10:23	11:23	12:44	
	2:55	3:17	3:55	Redwood City	4:17	-	-	5:22	5:06	5:28	-	-	6:22	6:06	6:28	-	7:22	7:06	7:28	8:18	9:28	10:28	11:28	12:49	
Zone 3	3:00	3:22	4:00	Menlo Park	4:22	-	-	5:28	-	5:34	-	-	6:28	-	6:34	-	7:28	-	7:34	8:23	9:33	10:33	11:33	12:54	Zone 3
	3:03	3:25	4:03	Palo Alto	4:25	4:44	5:01	-	5:12	5:38	5:49	6:02	-	6:12	6:38	6:49	-	7:12	7:38	8:26	9:36	10:36	11:36	12:57	
	3:07	3:29	4:07	California Avenue	4:29	-	5:05	-	-	5:42	-	6:06	-	-	6:42	-	-	-	7:42	8:30	9:40	10:40	11:40	1:01	
	3:11	3:33	4:11	San Antonio	4:33	-	-	-	-	5:46	-	-	-	-	6:46	-	-	-	7:46	8:34	9:44	10:44	11:44	1:05	
	3:15	3:37	4:15	Mountain View	4:37	4:51	5:11	5:36	-	5:50	5:56	6:12	6:36	-	6:50	6:56	7:36	-	7:50	8:38	9:48	10:48	11:48	1:09	
	3:20	3:42	4:20	Sunnyvale	4:42	-	5:16	-	5:21	5:55	-	6:17	-	6:21	6:55	-	-	7:21	7:55	8:43	9:53	10:53	11:53	1:14	
Zone 4	3:24	3:46	4:24	Lawrence	4:46	-	-	-	-	6:01+	-	-	6:43	-	7:01+	-	-	-	7:59	8:47	9:57	10:57	11:57	1:18	Zone 4
	3:29	3:51	4:29	Santa Clara	4:51	-	-	5:47	-	6:08+	-	-	6:48	-	7:08+	-	7:47	-	8:04	8:52	10:02	11:02	12:02	1:23	
	-	-	4:32	College Park	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	3:38	4:00	4:39	San Jose Diridon	5:00	5:06	5:27	5:55	5:32	6:16	6:11	6:28	6:56	6:32	7:16	7:11	7:55	7:32	8:12	9:01	10:11	11:11	12:11	1:32	
		4:07	4:45	Tamien	5:07				5:39	6:22			7:02	6:39	7:23			7:39	8:19		10:18	11:18			
Zone 5			4:52	Capitol						6:29			7:09												Zone 5
			4:58	Blossom Hill						6:35			7:15												
Zone 6	PM		5:11	Morgan Hill						6:48			7:28								PM		AM		Zone 6
			5:17	San Martin						6:54			7:34												
			5:30	Gilroy						7:07			7:47												

Local | Limited | Baby Bullet | 6:45 ▮ 6:51 / 7:12 ▶ 7:18 Timed Transfers | - Train bypasses station. | + Train may leave up to 5 minutes early.

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ABBREVIATIONS AND ACRONYMS

ACE	Altamont Commuter Express
BART	Bay Area Rapid Transit
Caltrans	California Department of Transportation
CDC	Centers for Disease Control
ECML	East Coast Main Line
PCJPB	Peninsula Corridor Joint Powers Board
SOVRN	Suicides and Open Verdicts on the Railway Network [project]
VTA	Valley Transit Authority

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