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**Systematic Life-Cycle Analysis and Performance of
Enhanced Trackbed Support**

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DISCLAIMER

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TECHNICAL SUMMARY

NURail Project No. NURail2012-UKY-R04

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Systematic Life-Cycle Analysis and Performance of Enhanced Trackbed Support

Summary

Over the past 30 years, the use of hot-mix asphalt (HMA) underlayment in railroad track structures has steadily increased. While the benefits of HMA underlayment has been well documented in special trackworks applications – particularly in areas with poor subgrade and heavy tonnages – little documentation is recorded regarding the benefits of HMA relative to traditional all-granular structures when used on mainline open track.

This report compares the relative performance of HMA underlayment versus traditional granular track structures on the Panhandle Subdivision, located along the BNSF Railway's Transcon line. A total of 23 sections of double main track – one main predominately using HMA underlayment with concrete ties and the other main consisting of a traditional all-granular track structure with wood ties – were analyzed using the Surface Quality Index (SQI), which is a track quality measurement developed by BNSF to determine the extent of geometric defects in track over a period of time.

Introduction

Background and Problem Statement

Over the past 30 years railroads have increasingly utilized HMA as an alternative to traditional granular track structures to enhance track support. Originally used for special track works, such as railway/highway crossings and turnouts/crossovers, it is now allowed for special circumstances at bridge approaches, tunnels and WILDS on Class I railroads as well as many short lines throughout the country. HMA has proven particularly successful in areas with weak subgrade and in areas where suitable sources of granular material are not available.

While HMA's benefits regarding special track works is well documented, at this time no thorough analysis has been conducted regarding the performance of HMA underlayment on main-line track relative to traditional all-granular track structures. Analyses were conducted on

BNSF Railway track located along its Panhandle Subdivision through portions of Kansas, Oklahoma and Texas. The Panhandle is part of BNSF's Transcon corridor from Chicago to Southern California and is a critical east-west shipping route. Most of the Panhandle Subdivision is double main track and utilized both HMA underlayment and traditional all-granular sections of track. In many sections one main track utilizes HMA underlayment while the main directly beside it will utilize a traditional all-granular structure. In other sections, both mains utilize the same track structure. The HMA sections were placed during the double-track projects in the mid-1990s and mid-2000s.

Approach and Methodology

This report analyses the relative performance of HMA underlayment with concrete ties and all-granular track structures with wood ties using the Surface Quality Index (SQI), a designation developed by BNSF. SQI is based solely on track geometry and does not include other factors that affect performance, such as soil type, drainage, materials and most notably the amount of maintenance performed. BNSF obtains SQI figures using a geometry car which tests several times per year over various sections of track on its system.

Findings

The analyses in this paper include a comparison of 23 sections of double-main track ranging from 2.7 to 29.0 miles in length along the Panhandle Subdivision. In each section, one main utilizes a traditional all-granular structure with wood ties and the other is composed of HMA underlayment with concrete ties. Using SQI data provided by BNSF, the percentages of "deficient" versus "acceptable" track are calculated to determine the relative performance of each track structure. Statistical analyses are used to determine whether the differences are significant or due to random variations.

Conclusions and Recommendations

The performance data contained in this report provides preliminary evidence of the benefits of utilizing HMA underlayment in mainline track, but further study is recommended. Analyses of SQI data suggest little differences in the performance of the two track structures on the lower tonnage track, while the heavier tonnage track appears to benefit greatly from the use of HMA. The effect of maintenance activities is unclear. Little information could be located regarding the amount of "spot" maintenance on the Panhandle Subdivision. And records for system maintenance were not sufficiently specific to determine exactly where track surfacing was performed. Improvements in obtaining data for these areas could assist in thoroughly evaluating the performance of the two track structures.

. Publications

Several papers and presentations addressing the objectives of the project are included as attachments to this report. These include:

Appendix A: Luke Saladin's MS Report

Appendix B: Luke Saladin's MS Presentation

Appendix C: Briefing report prepared for BNSF

Appendix D: Power Point Presentation briefing for BNSF

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Appendix A: Luke Saladin's MS Report

BNSF RAILWAY

Relative Performance of Track Structures on BNSF Panhandle Subdivision



HMA underlayment with concrete ties vs. traditional granular track structure with wood ties

Report submitted for requirements of CE 768 and MSCE degree at the University of Kentucky

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6/29/2012

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II. Abstract

Over the past 30 years, hot-mix asphalt underlayment in railroad track structures has steadily increased. While the benefits of HMA underlayment has been well documented in special track works – particularly in areas with poor subgrade and heavy tonnages – little documentation has taken place regarding the benefits of HMA relative to traditional granular structures when used on mainline track. This paper seeks to compare the relative performance of HMA underlayment versus traditional granular track structures on the Panhandle subdivision, which located along the BNSF Transcon line. A total of 23 sections of double main track – one main utilizing HMA underlayment and the other a traditional granular track structure – were analyzed using the Surface Quality Index (SQI), which is a track quality measurement developed by BNSF to determine the extent of geometric defects in its track. Based on SQI data, the study found that HMA performed significantly better in eight of the 23 sections, while traditional granular track structures performed better in only four. The other 11 sections showed no significant difference.

III. Executive Summary

Increasingly over the past 30 years railroads have utilized hot-mix asphalt (HMA) as an alternative to traditional granular track structures (Rose et al. 2011). Originally used for special track work such as crossings, HMA underlayment is now utilized on mainline track by Class I railroads as well as many shortlines throughout the country. HMA has proven particularly successful in areas with weak subgrade and in areas where a suitable source of granular material is not available.

While HMA's benefits regarding special track works is well documented, to this point no thorough analysis has been conducted regarding the performance of HMA underlayment on mainline track relative to traditional all-granular track structures. BNSF railways provided funding to perform such an analysis on track located along its Panhandle subdivision through Kansas, Oklahoma and Texas. The Panhandle is part of BNSF's Transcon corridor from Chicago, Ill. to Long Beach, Calif. and is a critical east-west shipping route. Most of the Panhandle subdivision is double main track and utilizes both HMA and traditional granular underlayment. In many sections of the Panhandle one main will utilize be HMA underlayment while the main directly beside it will utilize a traditional granular structure. In other sections both mains utilize the same track structure. The HMA sections were placed during the double tracking projects in the mid-1990s and mid-2000s.

This report identified and evaluated 23 sections of varying lengths along the Panhandle subdivision in which track utilizing HMA underlayment was side-by-side to a traditional granular track structure located on the adjacent main. At BNSF's request, the performance of each track structure was evaluated using the Surface Quality Index, a metric developed by BNSF

researchers. Defects based on three geometric parameters – surface, alignment and crosslevel – are used in calculating SQI. These parameters are collected regularly by geometry test cars that travel the BNSF network.

Sections of track with an SQI above 25.0 are deemed to be in need of maintenance by BNSF officials. This report calculated the percent of track in need of maintenance (i.e. $SQI > 25.0$) within each of the identified 23 sections to determine which track structure performed better in each sections. Based on SQI, it was determined that HMA underlayment outperformed traditional granular track structures in 15 of the 23 sections. The significance of these results was tested using statistical analysis, in part because many of the differences in the amount of deficient track appeared small. The statistical analysis found that HMA underlayment significantly outperformed traditional granular track structures in eight of the 23 sections, while granular significantly outperformed HMA in 4 of the 23 sections. The other 11 sections were found to have no significant difference.

The results of this report provide preliminary evidence pointing to the benefits of utilizing HMA underlayment in mainline track, but further study is recommended. cursory analysis suggests little difference in the performance of the two track structure on the lower tonnage track, while the heavier tonnage track appeared to benefit greatly from the use of HMA. Also unclear is the effect of maintenance. Little information could be located regarding the amount of “spot” maintenance on the Panhandle sub and records for system maintenance were not specific enough to determine exactly where track surfacing was performed. Improvements in these areas could assist in thoroughly evaluating the performance of the two track structures.

1. Introduction

1.1 HMA History

Over the last 30 years the use of hot-mix asphalt (HMA) as a trackbed underlayment has increased in popularity due to a number of benefits (Rose et al. 2011) The use of HMA underlayment, though, has typically been limited to instances where traditional granular track structures have proven inadequate, most notably when soft soil subgrade is present. Research has shown that HMA underlayment can increase track modulus, provide an impervious separation layer between the ballast and subgrade, prevent surface water from entering and weakening the subgrade soils, prevent subgrade mud pumping problems and improve track geometry (Li 2002). To date, though, no study has been performed comparing the general performance of the traditional granular trackbeds with those utilizing HMA underlayment along major stretches of heavy-tonnage mainline track.

1.2 THE BNSF Transcon

The BNSF Transcon line is a primarily east-west corridor used to transport freight cross-country between Chicago and west coast ports. The Panhandle subdivision between Amarillo, Texas and Wellington, Kansas stretches more than 300 miles and along the Transcon and, when originally constructed, consisted of a traditional granular trackbed with wood ties. Over the last 20 years, to comply with demand, BNSF has gradually constructed a second main through most of the Panhandle subdivision.

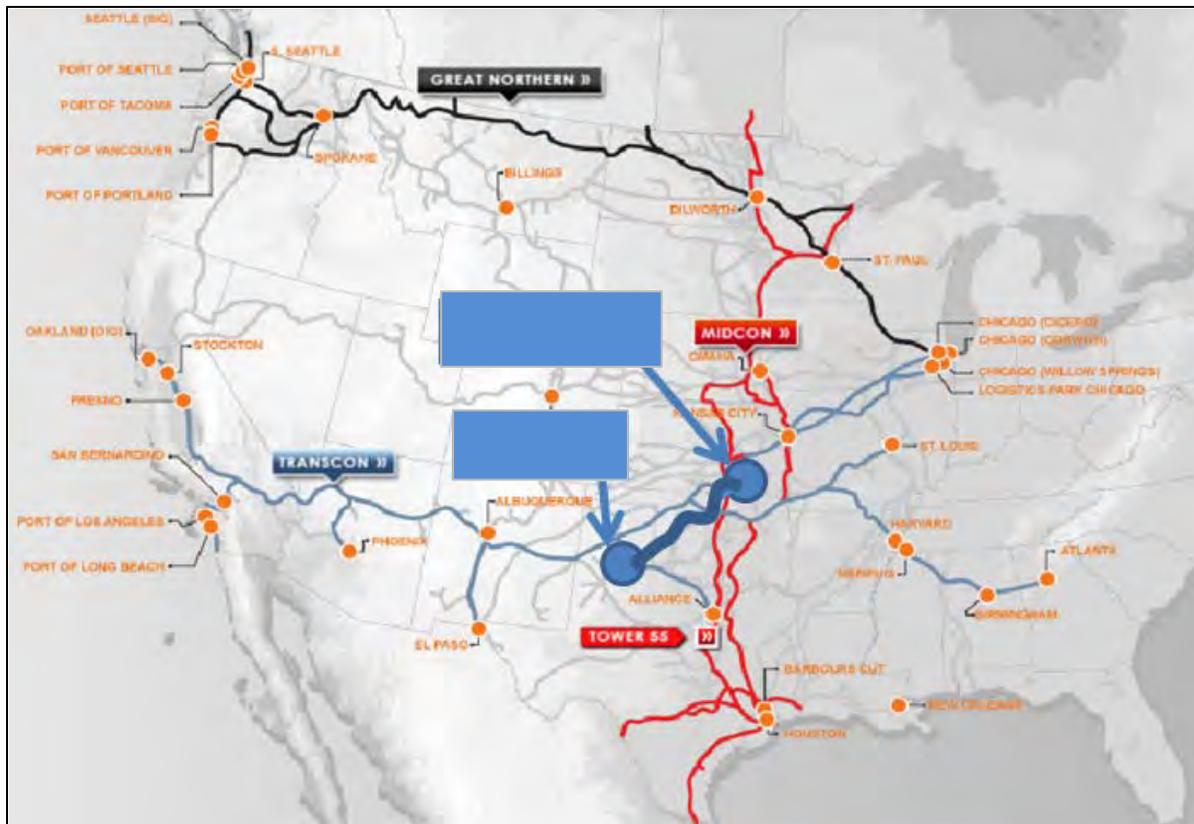


Figure 1-1: The BNSF Transcon

The Panhandle subdivision offers a unique opportunity to evaluate the performance of HMA underlayment with concrete ties relative to traditional granular trackbeds with wood ties. Currently along the Panhandle, HMA underlayment sections are parallel to traditional granular track structures through much of the corridor, offering a unique opportunity to compare the differences in performance while limiting variables (e.g. soil types, drainage, temperature) that often complicate the analysis of two track structures examined in different locations.

of each track structure. Statistical analysis will be used to determine whether the differences are significant or due to random variations.



Figure 1-3: Track utilizing HMA underlayment and concrete ties (left) beside traditional granular track structure with wood ties (right)

2. Background

2.1 Transcon History

The Transcon line provides a major shipping route between Chicago, the major central hub for railroads in the United States, and major west coast ports, most notably in Long Beach, Calif. Much of the Transcon, including the Panhandle, is a direct route with few branch lines. This means that traffic, for the most part, is consistent along long stretches of track throughout the Transcon Corridor. BNSF officials in the late 1980s decided there was enough traffic through the Panhandle section of the Transcon to warrant expanding from a single to double mainline.

BNSF had used HMA underlayment since the 1980s to combat problems of poor subgrade support and soil saturation. In the case of the Panhandle, though, the decision to use HMA was strictly economical. The region contains little aggregate that could serve as subballast in traditional granular trackbeds. Shipments of such aggregate – both immediately and during future maintenance and replacement – would have proven expensive throughout the Panhandle subdivision. For these reasons design consultants recommended using HMA as a less expensive alternative to traditional underlayment.

The first sections of new mainline track utilizing HMA underlayment were laid in 1994. Subsequent additions were made in 1995, 1996 and 2003-2007. Today, the Panhandle is comprised almost entirely of double main track. As a result of the two mains, in many sections a traditional granular track structure runs alongside a track utilizing HMA underlayment. This situation offers a unique opportunity to compare under similar conditions the relative performance of HMA with concrete ties and granular trackbeds with wood ties.

2.2 Track Structures on the Transcon

2.2.1 *HMA Trackbeds*

Since it was first introduced to the rail industry just over 30 years ago, an increasing number of railroads have implemented track utilizing a hot-mix asphalt (HMA) underlayment. This is particularly true in areas where soft or weak subgrade produces a track modulus that is below acceptable levels, or where an impervious separation layer is needed in order to prevent surface water from entering and weakening the subgrade soils. When utilized properly, HMA underlayment has been shown to lengthen surface cycles in problem areas by 10 to 20 times (Li et al. 2001).

A typical HMA track structure includes a 4- to 8-inch HMA layer as a subballast layer below and an 8- to 12-inch ballast layer on top (See Figure 2-1). The first sections of HMA installed along the Panhandle were constructed west of Codman between MP 485.6 and MP 289.9 (see Figure 1-2). Beginning in 2005, the standard HMA track design was 4" to 8" of HMA – laid in two lifts – over select subgrade. In many instances quality subgrade soil was not available along the route so select quality soil had to be relocated from the surrounding areas. Generally the top two feet of subgrade was made up of this relocated “select” subgrade.

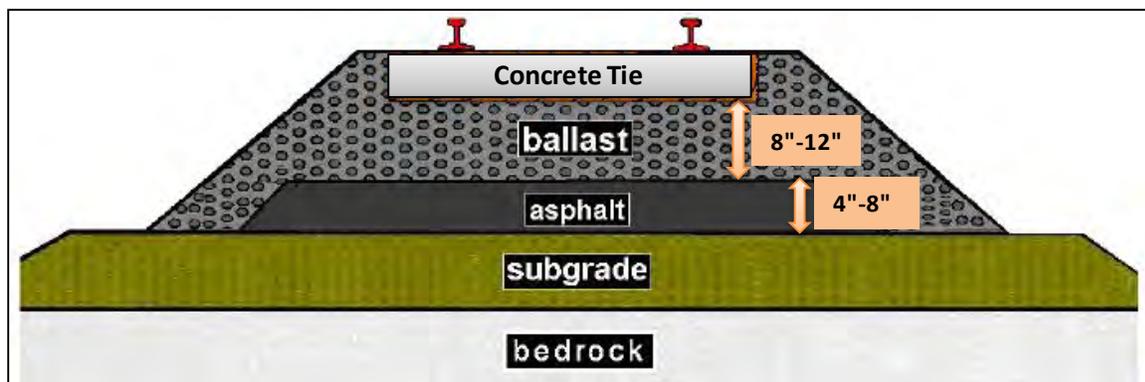


Figure 2-1: Idealized HMA cross section with concrete tie

The HMA underlayment on the Transcon throughout the Panhandle corridor is somewhat unique relative to other installations across the country in that it uses concrete ties – rather than wood – almost exclusively. The lone exception is a small stretch from MP 361.00 to 361.35 near Quinlin where HMA underlayment is utilized with wood ties. Those sections were not included in this report.

2.2.2 Granular Trackbeds

Traditional granular trackbeds make up a bulk of the track along the Panhandle subdivision. A typical granular structure includes about 12 inches of ballast and five inches of subballast spread over the subgrade soil (see Figure 2-2). The subballast utilizes medium-grade

aggregate, while the ballast consists of coarse-grade aggregate. While some granular structures using concrete ties do exist in the panhandle, this report will only consider granular track structures utilizing wood ties.

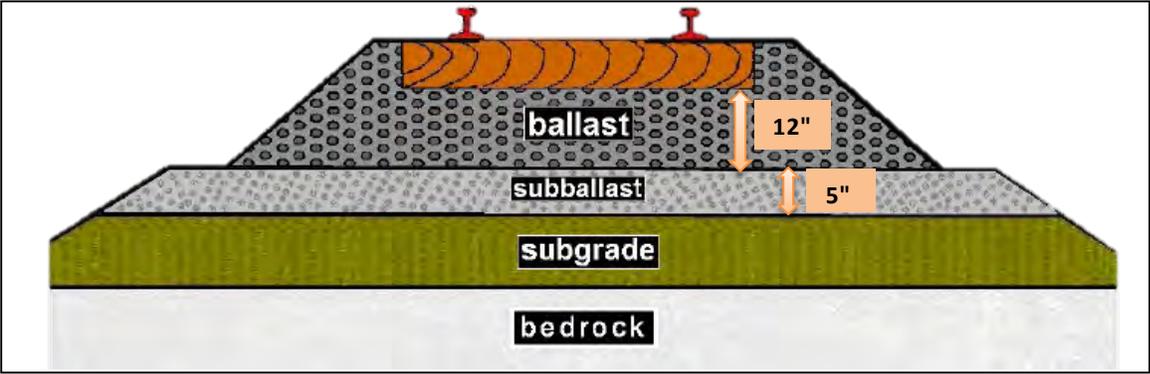


Figure 2-2: Idealized traditional granular track structure

2.2.3 Other Trackbeds

Several other track structures can be found along the portion of the Transcon, but none were evaluated in the 23 sections under consideration in this study. In many instances sidings were upgraded to mainline track in order to utilize the available rail and wood ties. These materials used in these upgraded sidings, though, were often deficient relative to the existing mains that utilized granular trackbeds with wood ties, and thus were not included as part of this study.



Figure 2-3: Traditional granular track structure with wood ties (left) alongside upgraded siding (right)

2.3 Geometry

2.3.1 BNSF Geometry Car

In addition to on-site inspections by employees, BNSF utilizes several track maintenance vehicles to monitor the geometry of its rail system. Specifically, railroads such as BNSF have come to rely heavily on geometry car fleets to provide precise measurements of track geometry over large geographic regions. Geometry cars will typically inspect several hundred miles of mainline track per day using state-of-the-art laser measurement systems. Because the technology provides track supervisors with large amounts of computerized data over a large geographic area, geometry cars have become one of the most important tools in maintenance planning. The sheer speed at which geometry cars operate allow for the same stretch of track

to be evaluated several times throughout the year. This is extremely useful in identifying trends with regard to track geometry deterioration and maintenance cycles.



Figure 2-4: BNSF geometry car

The measurements obtained by the geometry car include rail gage (the distance between the left and right rail measured 5/8 inch below the railhead), cant (the angle of the rail), and twist (the distance between two crosslevel measurements 12 feet apart). Three types of track measurements – surface, alignment and crosslevel – are primarily used in the calculation of SQI used in this report.



Figure 2-5: View of the computer system inside the BNSF geometry car

2.3.2 *Surface Quality Index (SQI)*

BNSF developed a designation known as Surface Quality Index (SQI) in order to determine whether a section of track requires maintenance. The recommendation is calculated from several track measurement parameters all of which are measured routinely by the BNSF geometry car fleet. These parameters are based solely on track geometry and do not include other factors that may affect maintenance. BNSF uses SQI to assist in the planning of system-wide maintenance by identifying track territories with the largest concentration of recommended surfacing area which are placed close together (BNSF).

The railroad track geometric parameters used in the calculation of SQI are:

- Left Surface
- Right Surface
- Left Alignment
- Right Alignment
- Cross Level

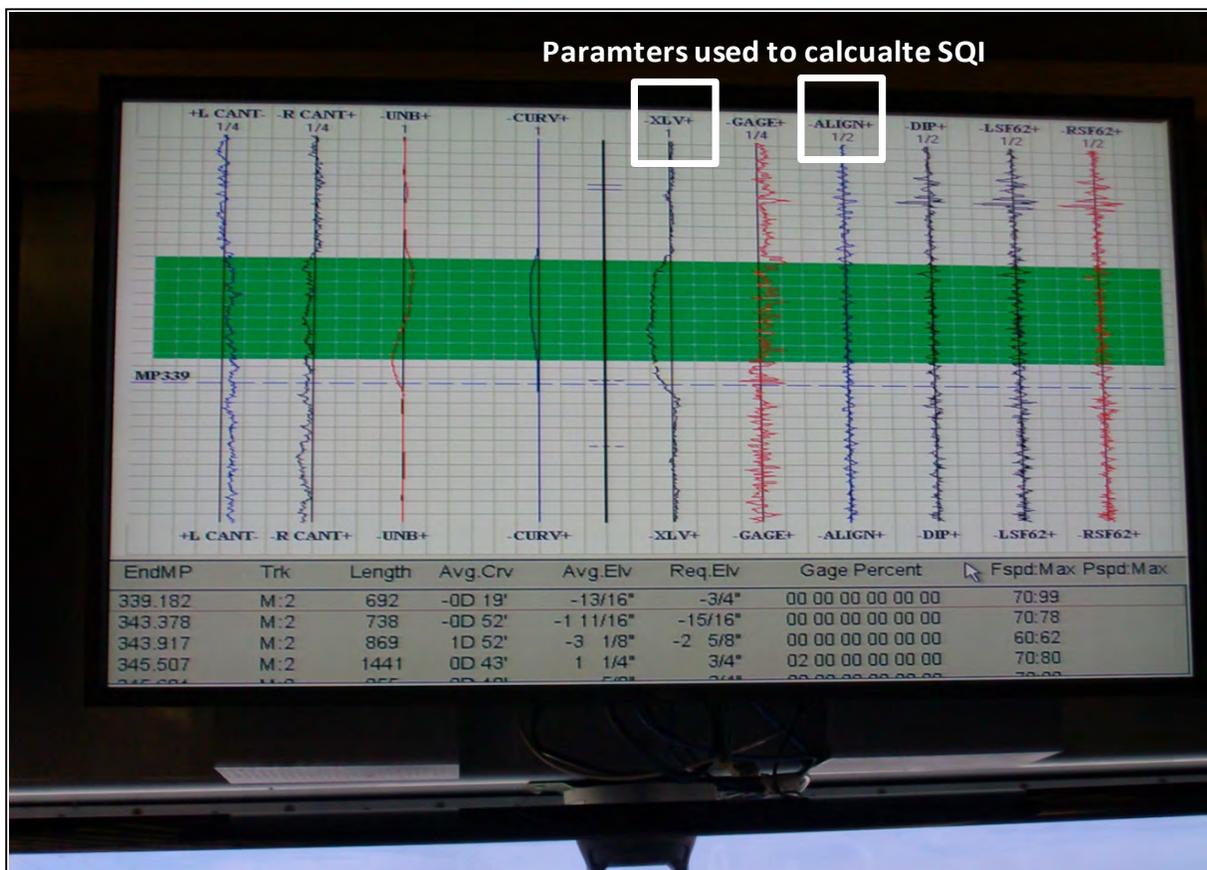


Figure 2-6: Readout in BNSF geometry car showing crosslevel (XLV) and alignment (ALIGN), two of the three parameters used to calculate SQI

2.3.2.1 Surface

Track surface describes the evenness or uniformity of track in short distances measured along the tread of the rails. When calculating SQI, surface is defined as the mid-chord offset of

a 62-foot chord. Under load the track structure gradually deteriorates due to dynamic and mechanical wear effects of passing trains. Improper drainage, unstable roadbed, inadequate tamping and deferred maintenance can create surfaced irregularities. On Class 1 track, the Federal Railroad Administration limits the surface deviation to 3 inches when based on a 62-inch chord (FRA 2011). When calculating SQI, both the left and right surface measurements are used.

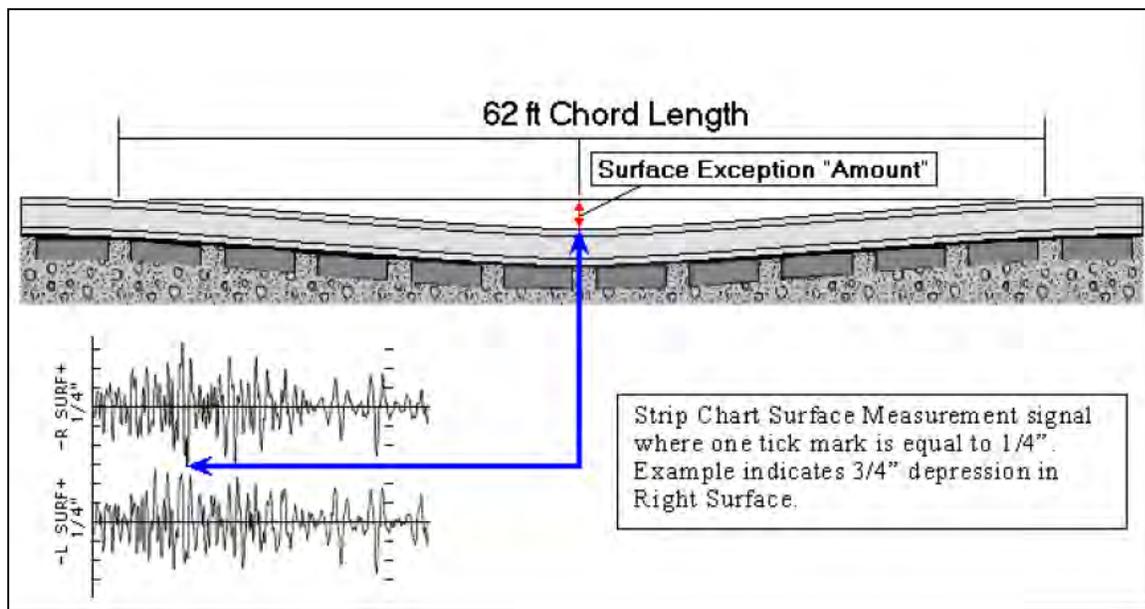


Figure 2-7: Surface measurement as recorded by BNSF geometry car (BNSF 2011b)

2.3.2.2 Alignment

Alignment is the variation in curvature of each rail of the track over a short distance as seen from the plan view. On tangent track, the intended curvature is zero, thus the alignment is measured as the deviation from zero. In a curve, the alignment is measured as the deviation from the uniform alignment over a specified distance. Alignment is also measured using a 62-inch chord. For Class 1 track the FRA limits alignment deviation to 5 inches for both tangent and curved track (FRA 2011).

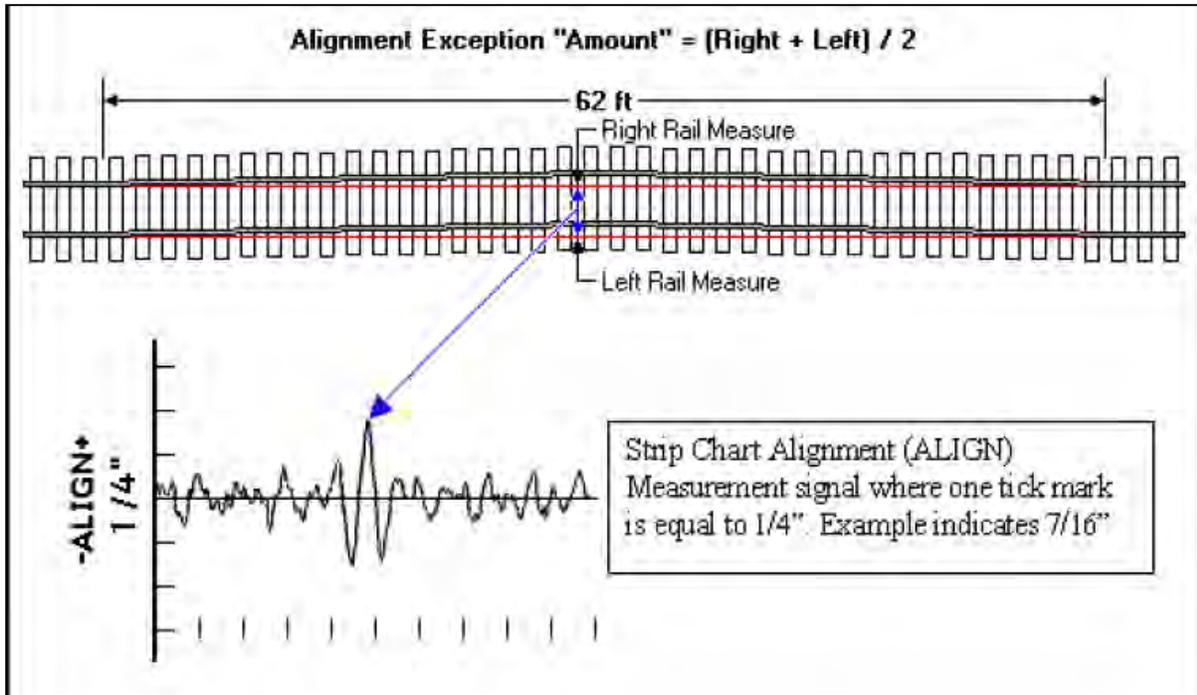


Figure 2-8: Alignment as recorded by BNSF geometry car (BNSF 2011b)

2.3.2.3 Cross Level

Crosslevel is the low spot on the rail. It measures the difference in elevation between the top surfaces of the rails at a single point in a tangent track segment. On tangent track both rails should be the same height, a term known as zero crosslevel.

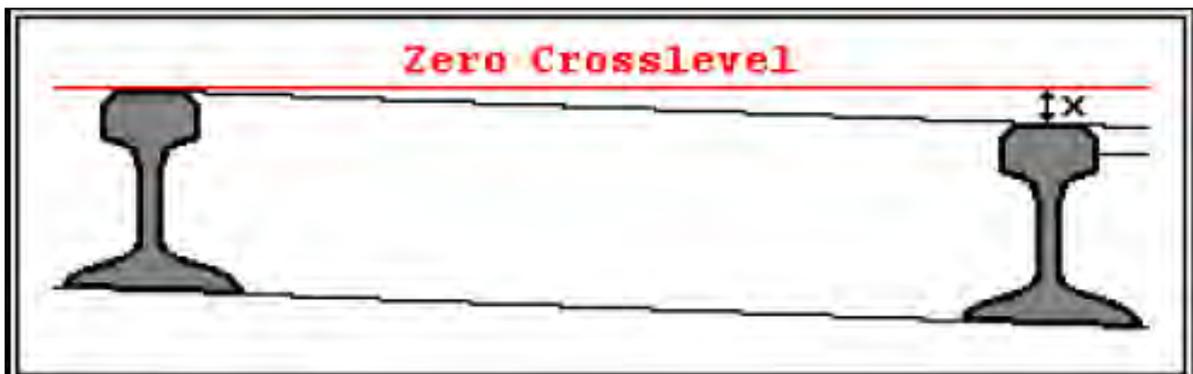


Figure 2-9: Crosslevel (BNSF 2011b)

2.3.3 Steps to Calculating SQI (BNSF 2011a)

1. Compute the roughness for each of the five parameters of used in the SQI calculation using the following equation:

$$\text{Roughness} = \sqrt{\frac{\sum_{N+150}^{N-150} \text{Parm}^2}{300} - \frac{(\sum_{N+150}^{N-150} \text{Parm})(\sum_{N+150}^{N-150} \text{Parm})}{300^2}} \quad \text{Eq. 1}$$

RS = Roughness of Left Surface Paramter

LS = Roughness of Right Surface Paramter

RA = Roughness of Left Alignment

LA = Roughness of Left Alignment

XL = Roughness of Crosslevel

2. Compute the total roughness by applying weight constants to each parameter using the following equation:

$$TR = (RS * Sw) + (LS * Sw) + (RA * Aw) + (LA * Aw) + (XL * Xw) \quad \text{Eq. 2}$$

Sw = Surface Paramter Weight Constant = 1.4

Aw = Alignment Paramter Weight Constnat = 1.2

Xw = Crosslevel Paramter Weight Constant = 3.452

3. Compute the Adjusted Roughness (AR)

$$\text{If } (TR - \text{Limit}) \geq 0.0 \rightarrow AR = TR - \text{Limit} \quad \text{Eq. 3}$$

Otherwise

$$AR = 0.0$$

Limit = Constant value based on maximum track speed (i. e. Class)

$$Class1 = 1.3$$

$$Class2 = 1.2$$

$$Class3 = 1.1$$

$$Class4 = 1.0$$

$$Class5 = 0.9$$

4. Compute Roughness Area (RA), which is the sum of the Adjusted Roughness values over a 500-foot moving window. This number is also known as the Surface Quality Index (SQI).

$$RA = SQI = \sum_{N+250}^{N-250} Parm \quad Eq. 4$$

BNSF recommends surfacing for any portion of track where the SQI exceeds 25.0. After an initial 500-foot section is shown to be in need of surfacing, the SQI is checked every 100 feet to determine if the SQI is still above the 25.0 threshold. If it is, an additional 100 feet is added to the initial 500-foot section to determine the total length of surfacing required. Maintenance priority is given to those track sections with the highest SQI. If two recommended surfacing

sections are within 500 feet of each other they are chained together as a single recommended surfacing area.

3. Methodology

3.1 Panhandle Sub-Sections

A total of 23 sections of track were chosen for this analysis. The sections were chosen based on several criteria, most obviously the presence of HMA and granular track structures side by side in order that the relative performance of the two track sections could be evaluated. Each section has a continuous length of HMA on one main and granular on the other. Also of importance was that the sections were spread throughout the Panhandle to capture the broad range of soil and moisture conditions. Efforts were also made to make the sections as long as possible in order to increase the amount of data per section.

3.2 Geometry Car Tests

BNSF provided in Excel format a foot-by-foot account of the route taken by geometry cars on the Panhandle over the last several years. This information was vital in order to determine the number of complete geometry car tests over each of the 23 identified sections. In this study, a “complete geometry car test” refers to a test over a given section – designated by mile posts – that occurs completely on one main. Geometry car schedules normally include a single uninterrupted test of several hundred miles on a single main on a unique date. In some instance, though, the geometry car may relocate to a parallel main or siding in order to travel around impediments, such as maintenance crews or out-of-service track. When this occurs it makes the evaluation of a single main incomplete since data for a portion of the section is missing.

Using the foot-by-foot geometry car route information provided by BNSF, the number of complete geometry car tests for each of the 23 sections was identified. Table 3-1 shows a summary of the tests for each of the sections. It was desired that each section have a similar number of geometry car tests in order to compare similar sample sizes. As Table 3-1 illustrates, the lone exception is Section No. 1, which has only seven tests on Main 1 compared with 19 on Main 2. Only geometry car tests between 2007 and 2011 were utilized for this analysis. The reason for this is explained further in the “Methodologies” section of this report.

(Note: Section No. 1 is technically located outside of the limits of the Panhandle subdivision. It was included in this report, though, because it is similar in character to the track located on the Panhandle and offered another section for analysis)

Table 3-1: Summary of 23 sections analyzed in this report

Section No.	From MP	To MP	Common Lengths (Miles)	Total Number of Complete Geometry Car Test Between Mile Posts (2007-2011)	
				Main 1	Main 2
1	222.00	225.75	3.75	7	19
2	243.55	257.90	14.35	22	22
3	259.55	265.10	5.55	23	24
4	265.90	271.90	6.00	22	22
5	275.65	279.65	4.00	22	25
6	281.20	284.55	3.35	22	25
7	287.80	299.50	11.70	21	17
8	301.80	305.50	3.70	20	19
9	308.50	312.20	3.70	21	20
10	358.35	365.85	7.50	22	22
11	367.33	370.90	3.57	20	21
12	373.78	380.25	6.47	22	22
13	383.10	391.40	8.30	22	19
14	394.26	413.30	19.04	22	19
15	414.75	419.20	4.45	23	21
16	421.50	426.80	5.30	23	22
17	429.10	435.80	6.70	23	22
18	438.20	445.80	7.60	20	22
19	446.50	449.20	2.70	20	22
20	457.75	470.10	12.35	22	22
21	471.90	477.15	5.25	23	20

22	485.55	489.86	4.31	23	22
23	492.05	495.90	3.85	22	22
Total			153.49	487	491
Average			6.67	21.2	21.3

3.3 SQI Data

In addition to the geometry car routes, BNSF also provided SQI data obtained from geometry car tests on the Panhandle subdivision dating back to 2000. This data was also presented in Microsoft Excel format. The data included all instances where SQI measurements indicated track was in need of maintenance (i.e. SQI > 25.0). Included in the data was the date of the measurement, the length of the SQI section and the beginning mile post of the SQI section. Other data was also included but was not utilized in this report. BNSF did not provide the SQI values for non-deficient sections of track (i.e. SQI < 25.0).

Sections of HMA underlayment on the Panhandle were installed at various times from 1996 to 2007. For all sections analyzed in this study, HMA sections were installed prior to 2007. This was intentional in order to ensure consistent track structure during the time period in which the two mains were compared. Thus, only geometry car tests results from 2007 and 2011 were used.

Using data provided by BNSF, the total number of unique geometry car tests for each section was determined. For each unique test on each section, the corresponding SQI events for those sections were totaled and divided by the section length to give the percent deficient track for that geometry car test, as shown in Eq. 5.

$$\text{Percent deficient track} = \frac{\sum SQI \text{ lengths}}{\text{Length of the section}} * 100 \quad \text{Eq. 5}$$

Once the percent deficient track was determined for each geometry car test, those figures were summed and divided by the total number of geometry car tests for that section in order to determine the average percent deficient track for each section, as seen in Eq. 6.

$$\begin{aligned} & \text{Average percent deficient track} \\ &= \frac{\sum \% \text{ Deficient Track}}{\text{Number of Complete Geometry Car Runs}} * 100 \quad \text{Eq. 6} \end{aligned}$$

The average percent deficient track calculated using Eq. 6 provided by the benchmark by which the HMA and granular track structures were evaluated in each section. The process was repeated on each section for each main (a total of 46 calculations) to determine the relative performance of each track section given the conditions of that particular section.

4. Analysis

4.1 Section Summaries

A summary of the average percent deficient track for Section 4 is illustrated in Figure 4-1. As previously stated, each section contains one main featuring HMA underlayment and another featuring a traditional granular track structure. These are illustrated on the chart using blue and red data points, respectively. Each point on the graph represents a complete geometry car test. Complete geometry car tests normally did not occur on both main 1 and main 2 on the same date, which is why the points on the HMA and granular sections do not line up with each other. The colored lines between the points are thus included to illustrate the estimated deficient track over time for comparative purposes. Also included in the figure is the

average percent deficient track for both Main 1 (HMA) and Main 2 (granular), which is used as the benchmark to compare relative performance of the two track structures. The averages are illustrated using a dotted line. In this section the HMA main, with 1.63% of the track deficient, outperforms the granular track, which was 4.09% deficient.

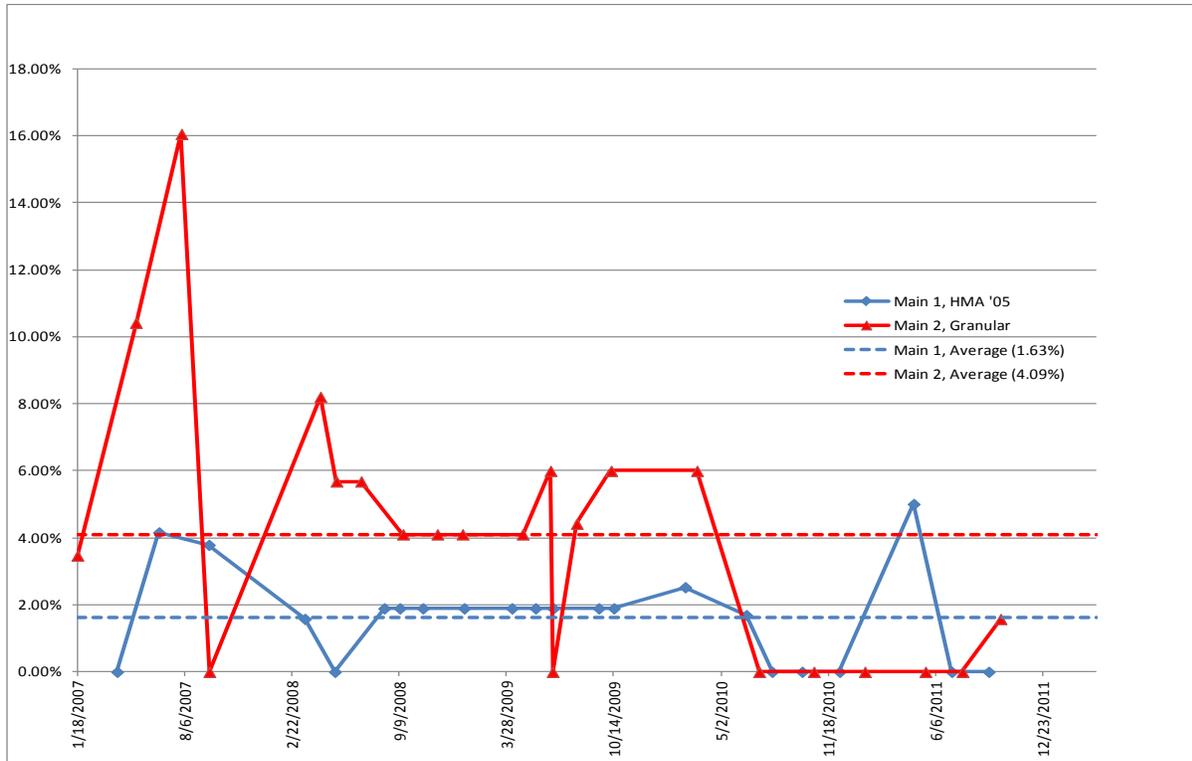


Figure 4-1: Summary of track above SQI threshold in Section 4

4.2 Results

Charts similar to Figure 4-1 were produced for the other 22 sections and are listed in Section Summaries at the end of this report. A summary of the results from each section is listed in Table 4-1. Based strictly on average percent deficient track, HMA underlayment was shown to outperform granular track structure in 15 of the 23 sections. In all but one of the eight sections where the granular track structure outperformed the HMA underlayment, the granular section was located on Main 2. The lone exception was Section 10, where the granular

Main 1 was shown to be 1.41 % deficient, while the HMA track structure on Main 2 was found to be 1.65% deficient.

Table 4-1: Comparison of deficient track in 23 sections

Section	Main 1		Main 2		Better Performing Section
	Structure	Avg. % Deficient	Structure	Avg. % Deficient	
1	HMA	3.41	Granular	4.60	HMA
2	HMA	2.29	Granular	2.11	Granular
3	HMA	3.59	Granular	0.23	Granular
4	HMA	1.60	Granular	4.09	HMA
5	HMA	1.38	Granular	1.47	HMA
6	HMA	2.62	Granular	4.97	HMA
7	HMA	3.80	Granular	2.97	Granular
8	HMA	6.35	Granular	6.36	HMA
9	HMA	0.49	Granular	4.10	HMA
10	Granular	1.41	HMA	1.65	Granular
11	HMA	6.95	Granular	4.24	Granular
12	HMA	1.85	Granular	3.83	HMA
13	HMA	2.75	Granular	3.43	HMA
14	HMA	1.70	Granular	4.21	HMA
15	HMA	2.70	Granular	0.66	Granular

16	Granular	20.36	HMA	2.32	HMA
17	Granular	0.39	HMA	0.01	HMA
18	Granular	3.17	HMA	0.60	HMA
19	Granular	4.08	HMA	0.51	HMA
20	HMA	4.77	Granular	4.28	Granular
21	HMA	5.68	Granular	0.86	Granular
22	HMA	1.71	Granular	4.71	HMA
23	Granular	27.78	HMA	1.73	HMA

In total 6 of the 23 sections on Main 1 were granular. That means when granular track was present on Main 1, it only outperformed the HMA track structure 16.7% of the time (1 of 6). Those results were in contrast to Main 2, where 17 of the 23 sections utilized a granular track structure. When a granular track structure was present on Main 2, it outperformed the HMA track structure 41.2% of the time (7 of 17).

Tables 4-2 and 4-3 summarize the performance of each track structure on Main 1 and Main 2 respectively. The chart includes two different methods for calculating the average percent deficient track: by length and section. The length method applies a weighted average based on each section's contribution to the overall length of each track type.

Avg. percent deficient track by length

$$= \sum_n \text{Avg percent deficient track for section} \\ * \left(\frac{\text{Length of Section}}{\text{Total Length of Track Type}} \right) \quad \text{Eq.7}$$

n = Number of sections

The method of calculating average percent deficient track by section simply takes the total average percent deficient track for each section and divides that number by the total amount of sections, without regard for the length of the section. This is illustrated in Equation 8.

$$\text{Avg. percent deficient track by section} = \frac{\sum \text{Avg. percent deficient track}}{\text{Number of sections}} \quad \text{Eq.8}$$

Table 4-2: Summary of Main 1

Granular	
No. of sections	6
Total miles	33.65
Total miles of SQI events	2.63
Avg. % deficient track by length	7.82%
Avg. % deficient by section	9.53%
HMA	
No. of sections	17
Total miles	119.84

Total miles of SQI events	3.60
Avg. % deficient track by length	3.00
Avg. % deficient track by section	3.16

Table 4-3: Summary of Main 2

Granular	
No. of sections	17
Total miles	119.84
Total miles of SQI events	3.986
Avg. % deficient track by length	3.33%
Avg. % deficient by section	3.36%
HMA	
No. of sections	6
Total miles	33.65
Total miles of SQI events	0.373
Avg. % deficient track by length	1.11
Avg. % deficient track by section	1.14

As illustrated in Tables 4-2 and 4-3, both track types performed better on Main 2 than Main 1. This is to be expected as Main 1 carries much higher tonnages than Main 2. The

differences, though, are much more significant regarding granular track structures than those utilizing HMA underlayment. The average percent deficient granular track when accounting for track length was 7.82% on Main 1, while Main 2 saw that same figure reduced to 3.36%. The average percent deficient track by section yielded similar results.

Sections of track utilizing HMA also showed improvements in Main 2 compared to Main 1, though they were much more modest. The average percent deficient track by length for HMA underlayment improved from 3.00% on Main 1 to 1.11% on Main 2. It is important to note that Main 2 contains a relatively small number of HMA sections (6) compared to granular (17). The opposite is true for Main 1, which contains only 7 granular sections compared with 17 sections of HMA.

4.3 Reliability of Result

In order to determine if the average deficient track for Main 1 and Main 2 was statistically significant different, a two-sample independent T-test was performed. The T-tests compares the differences between means of the two groups, in this case the average percent deficient track with HMA underlayment against the average percent deficient track with a granular trackbed. An independent – rather than dependent – T-test was used in this case because the samples were taken from two different populations and the elements in those populations were not paired (i.e. there was not always an equal number of geometry car tests nor did the tests occur on the same day on both mains).

For this analysis, unequal variance was assumed for data on both Main 1 and Main 2. The null hypothesis H_0 is that there is no difference in the average percent deficient track between Main 1 and Main 2 (i.e. the means are equal). The alternative hypothesis, H_s , is that

there is a difference between the average percent deficient track on Main 1 and Main 2. As with most scientific statistical analysis, this study is based on a 95 % confidence level. A corresponding alpha value – also known as a significance level – of 0.05 was used in this study.

After determining the hypothesis and setting the confidence the t statistic was determined. The t statistic is measure of the accuracy of the hypothesized value. In general, a hypothesized value is reasonable if the t-statistic is close to zero, not large enough when t statistic is large and positive, and too large when the t-statistic is large and negative. Equations 9 and 10 show the calculations for the t-statistic in a two-sample independent T-test.

$$t = \frac{M_{Main\ 1} - M_{Main\ 2}}{\sqrt{\frac{S_{Main\ 1}^2}{n_{Main\ 1}} + \frac{S_{Main\ 2}^2}{n_{Main\ 2}}}} \quad Eq. 9$$

$$S^2 = \frac{\sum(x - M)}{n - 1} \quad Eq. 10$$

$$M = Mean$$

x = Percent deficient track from individual geometry car runs

n = number of gometry car runs on given main

Using the results of the t-statistic and along with the degrees of freedom, the probability, P, can be calculated using a table of critical t values. Degrees of freedom are equal to the total sum of the geometry car tests for both Main 1 and Main 2 minus 2:

$$df = n_{Main\ 1} + N_{Main\ 2} - 2 \quad Eq. 11$$

df = degrees of freedom

Excel automatically generates a report that includes the above information. The program also calculates a two-tailed P value. A two-tailed P value is used because we are interested in values occurring above and below the mean. A summary of the report generated for Section 2 (MP 243.55 – MP 257.90) is listed in Table 4-4.

Table 4-4: T-test results for section No. 2

	Main 1	Main 2
Mean	0.0229172	0.021149
Variance	0.00074236	0.000566
Observations	22	22
Hypothesized Mean Difference	0	
df	41	
t statistic	0.22934009	
P (two-tail)	0.81974485	

The null hypothesis – in this case our assertion that there is no difference between the average percent deficient track on each of the two mains – is rejected when the P value is less than the significance level of 0.05. Since the P value for Section 2 of 0.81974485 is not less than 0.05, we do not reject the null hypothesis that there is no difference between the average percent deficient track on the two mains. The difference in deficient track on the two mains is thus not significant.

A similar T-test analysis was performed on each of the other 22 sections in this study.

The results of the Analysis are summarized in Table 4-5.

Table 4-5: Summary of T-tests for 23 sections

Section	P-value	Result
1	0.5083	No significant difference
2	0.8197	No significant difference
3	0.0006	Granular significantly better
4	0.0119	HMA significantly better
5	0.9407	No significant difference
6	0.1428	No significant difference
7	0.3553	No significant difference
8	0.9938	No significant difference
9	0.0002	HMA significantly better
10	0.5512	No significant difference
11	0.0099	Granular significantly better
12	0.0751	No significant difference
13	0.4767	No significant difference
14	0.0000	HMA significantly better
15	0.0002	Granular significantly better
16	0.0000	HMA significantly better
17	0.0658	No significant difference

18	0.0003	HMA significantly better
19	0.0001	HMA significantly better
20	0.6832	No significant difference
21	0.0004	Granular significantly better
22	0.0457	HMA significantly better
23	0.0000	HMA significantly better

According to the results of the T-tests, there were 8 sections – 4, 9, 14, 16, 18, 19, 22 and 23 – in which track with HMA underlayment significantly outperformed the granular trackbed beside it. There were 4 sections – 3, 12, 15 and 21 – in which granular main performed significantly better than the main with HMA underlayment. As noted earlier in this report, granular truck structures appeared to perform better when it was located on Main 2 than on Main 1. All four sections in which granular track structures outperformed HMA were located on Main 2. Perhaps the most notable results of the T-tests, though, is the fact that in 11 of the 23 sections there was no significant difference between the performances of the two track structures. This somewhat tempers the earlier analysis in which HMA underlayment was shown to outperform granular track structures in 15 of the 23 sections under review.

5. Conclusion

The evaluation comparing the performance of HMA underlayment and traditional granular track structures along the BNSF Panhandle subdivision using SQI data offers evidence pointing to HMA as a superior track structure. Of the 23 sections evaluated in this study ranging from 2.7 to 19.0 miles in length, HMA underlayment outperformed traditional granular

track structures in 15 of the sections using the SQI benchmark figure of average percent deficient track. As a percentage of total length evaluated by the geometry car test on Main 1, 7.82% of the granular sections with wood ties were deficient, against only 3.0 % of the sections utilizing HMA underlayment with concrete ties. On Main 2, 3.33% of the granular sections with wood ties were deficient versus only 1.11% of the sections with an HMA and concrete tie track structure.

The assertion of HMA superiority, though, is tempered somewhat due to statistical analysis. Using a standard T-test, HMA underlayment was shown to significantly outperform granular sections in only 8 of the 23 sections. In four of the other sections granular track significantly outperformed the HMA sections and in the other 11 of the sections no statistically significant difference was found. Also worth noting is the performance of HMA sections on Main 1 and granular sections on Main 2 were relatively consistent, with an average deficiency of 3.0 % and 3.33 % respectively. This occurred even though annual tonnages on Main 1 range between 28% and 53% more than Main 2. While this study represents only a snapshot, it offers preliminary evidence that HMA may offer superior performance on higher-tonnage lines.

6. Limitations

Several factors limited the analysis contained in this report, some of which may be addressed in future research. Those factors include limitations of the amount of SQI data provided, the availability of track maintenance data, and the availability of GIS data. Resolving any of these issues could greatly enhance the quality and depth of research regarding this topic.

6.1 Limited SQI Data

BNSF normally provides calculated SQI data in those instances where it exceeds 25.0 (i.e. when the track was considered deficient). Had all SQI data been made available, the relative changes in the track condition over time could have been more thoroughly analyzed in order to gain a more complete understanding of each track structure's performance. The amount of effort and data required to perform this analysis made obtaining and transferring the data difficult.

6.2 Limited Maintenance Data

The lack of maintenance data also left a gap in the analysis contained in this report. The performance of either track structure may have been hindered or helped by the amount of spot maintenance performed on them. While BNSF has electronic records of their program maintenance, there seemed to be some confusion in deciphering the work codes. Currently, BNSF roadmasters do not normally keep organized logs of spot maintenance performed by their crews, which could also affect the performance of the track.

6.3 No GIS Data

GIS data was not available for this study. GIS data – including shape files and map of track and known mileposts – would have simplified the analysis contained in this report and offered the chance to perform other analysis that is not efficient to do using other techniques. This includes an analysis of the soil conditions against each track structure type as well as the determination of locations where SQI events are most frequent.

7. Recommendations

7.1 Effect of Tonnages

Evidence obtained in this analysis points to HMA track structures outperforming traditional granular structures on higher tonnage lines. HMA track structures were shown to be much more effective on Main 1 of the Panhandle, which carries 28% to 53% more MGT than Main 2. Future research is needed to determine at what point tonnages warrant the use of HMA underlayment over traditional granular track structures from an economic standpoint.

7.2 Maintenance Records

Detailed accounts of maintenance performed on the track by both local and program maintenance crews are imperative to a complete analysis of the performance of HMA underlayment versus traditional granular track structures. It is recommended that records be maintained detailing the daily work undertaken by crews so that it may be analyzed.

8. References

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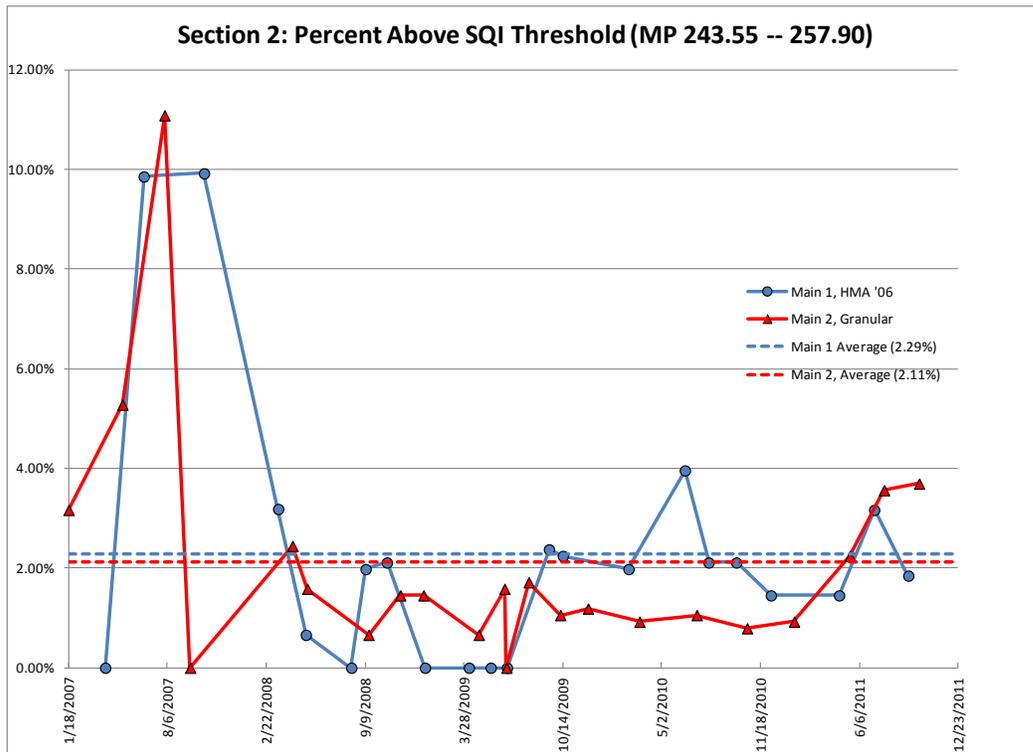
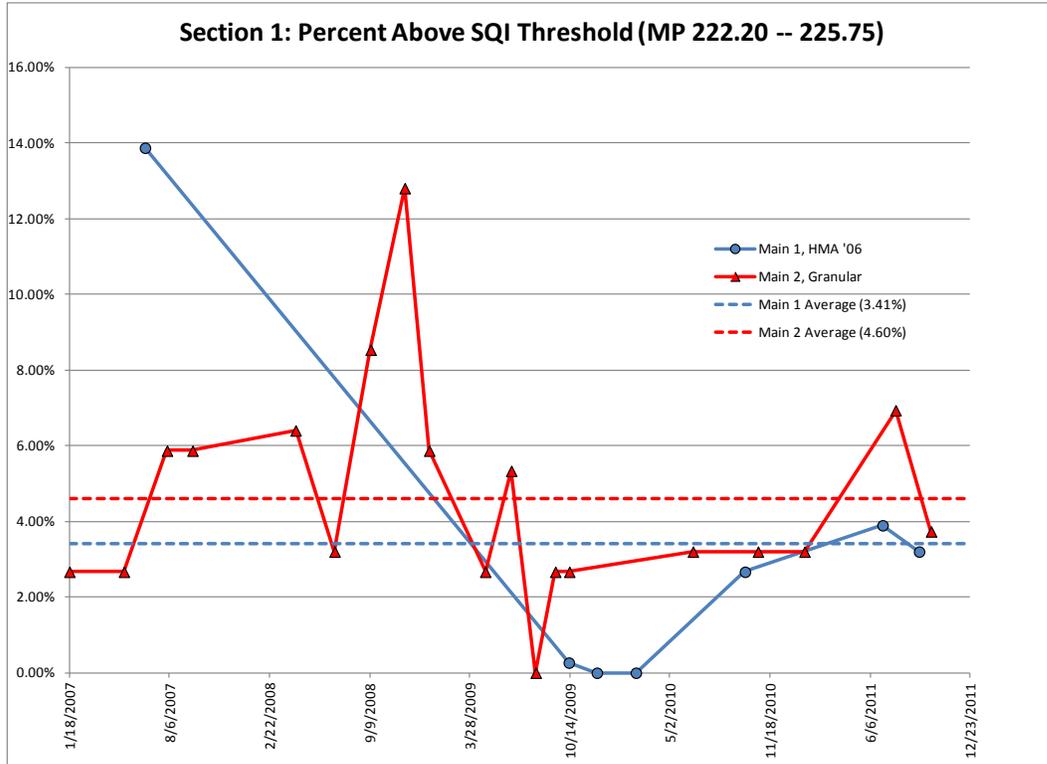
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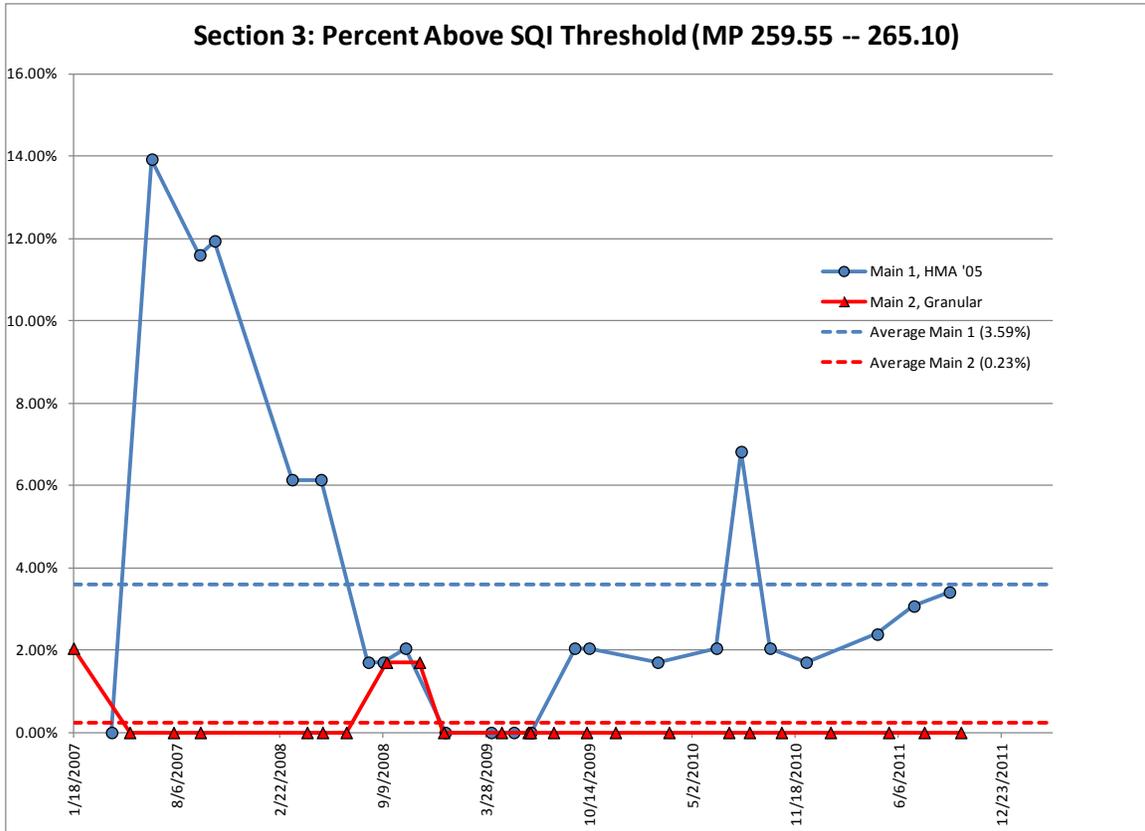
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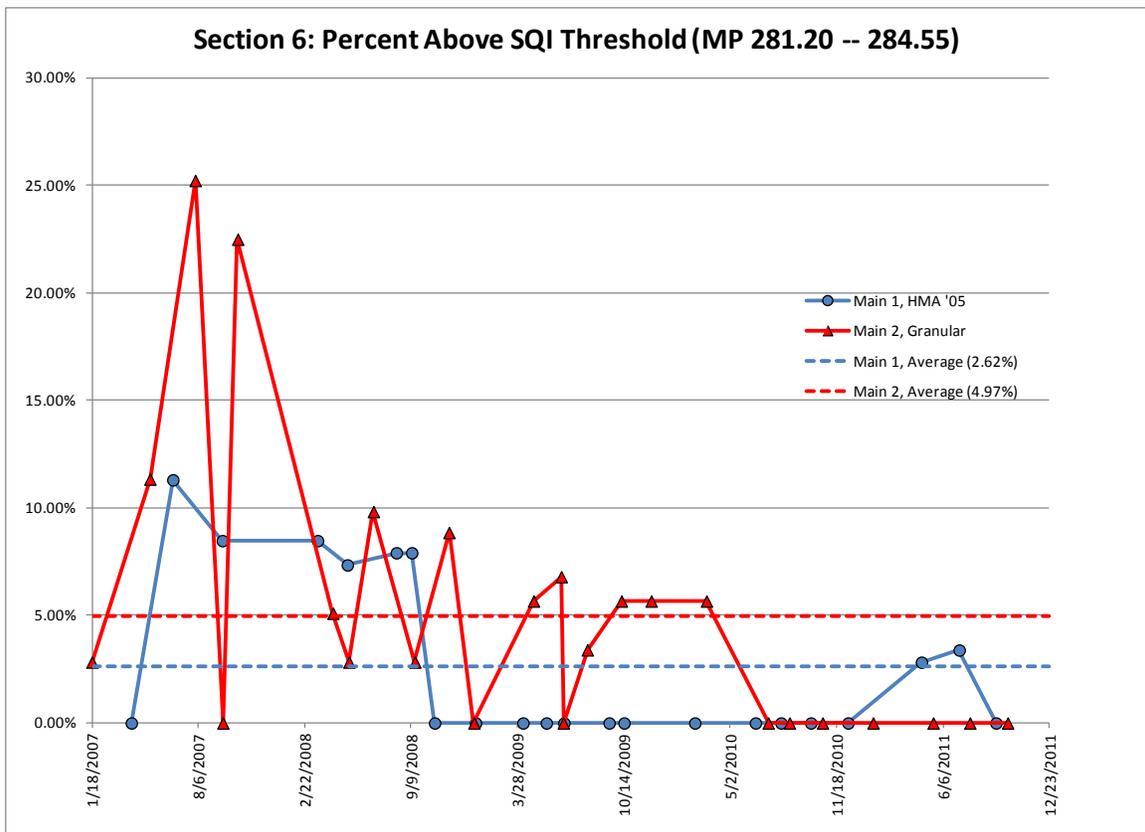
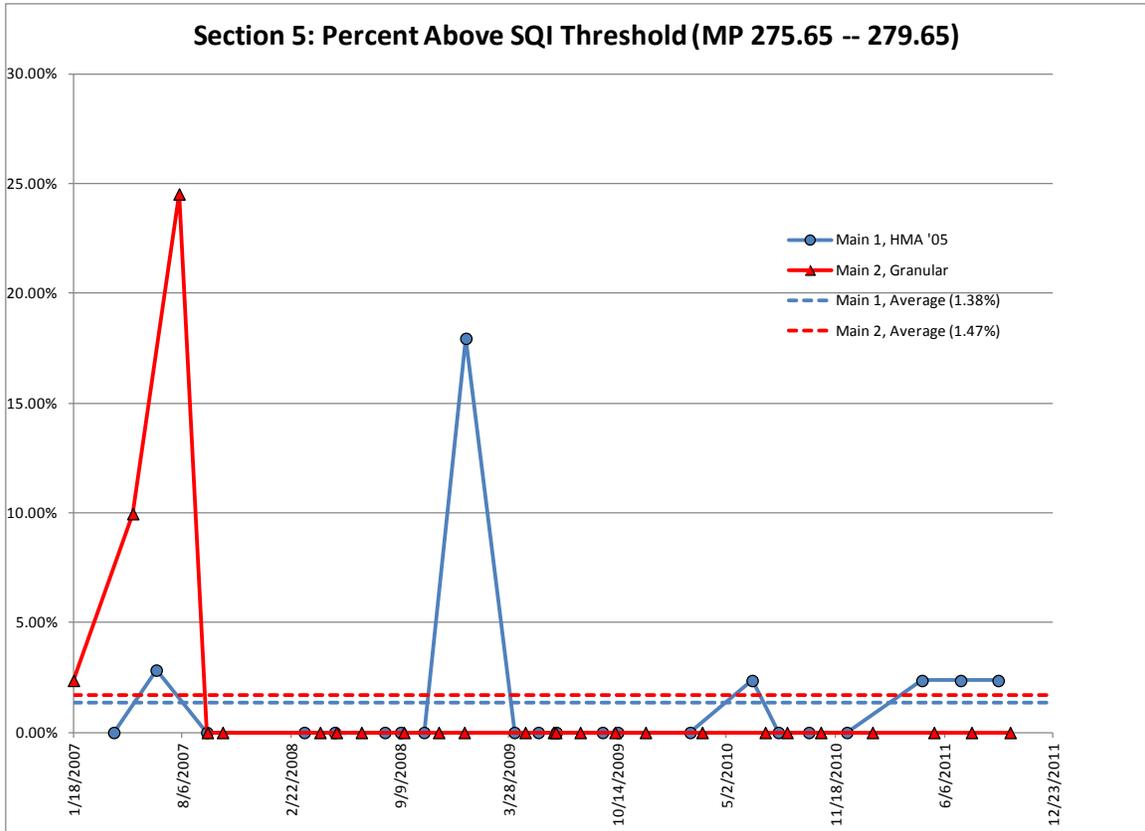
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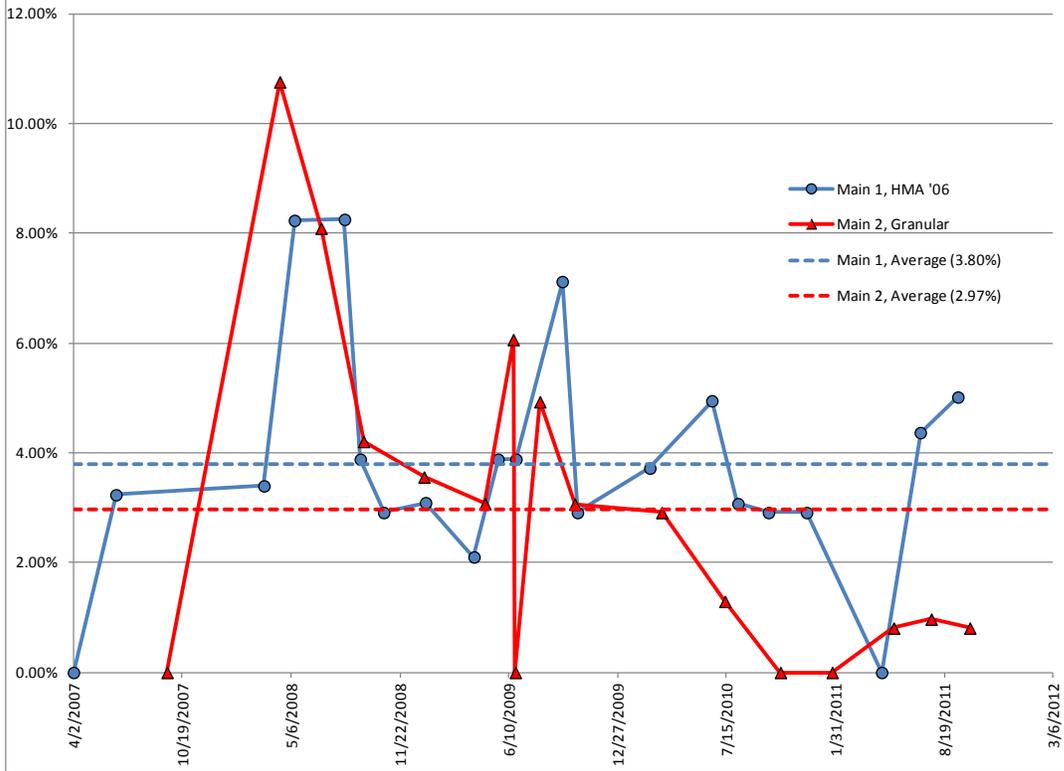
Section Summaries



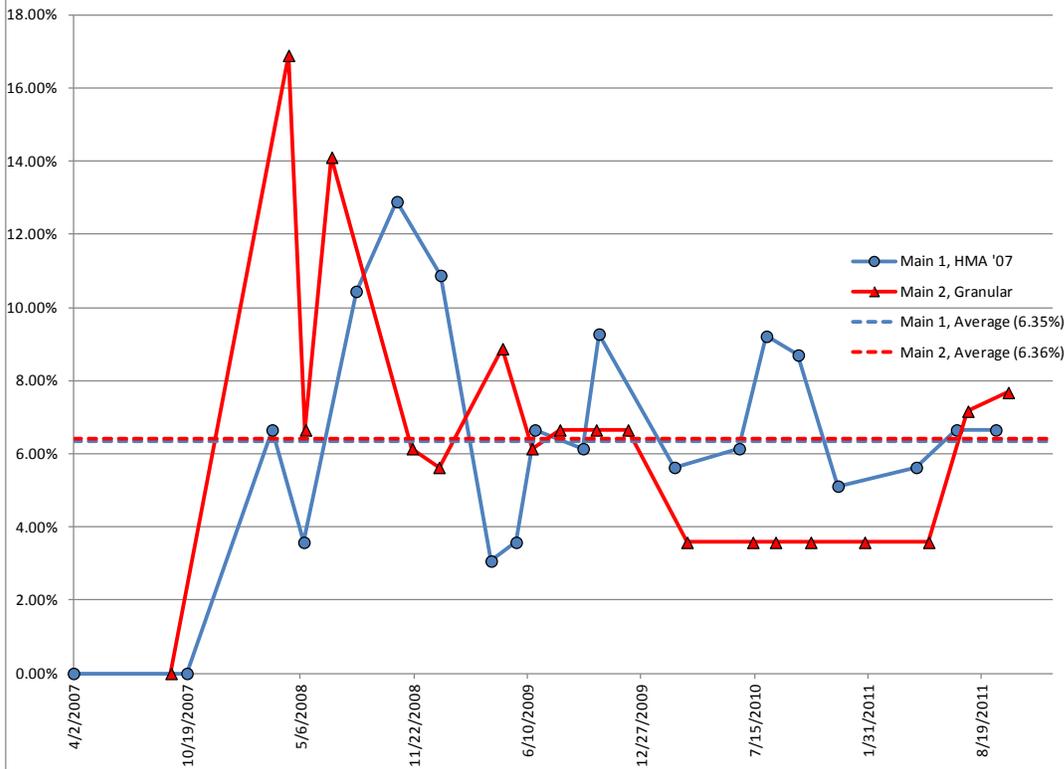




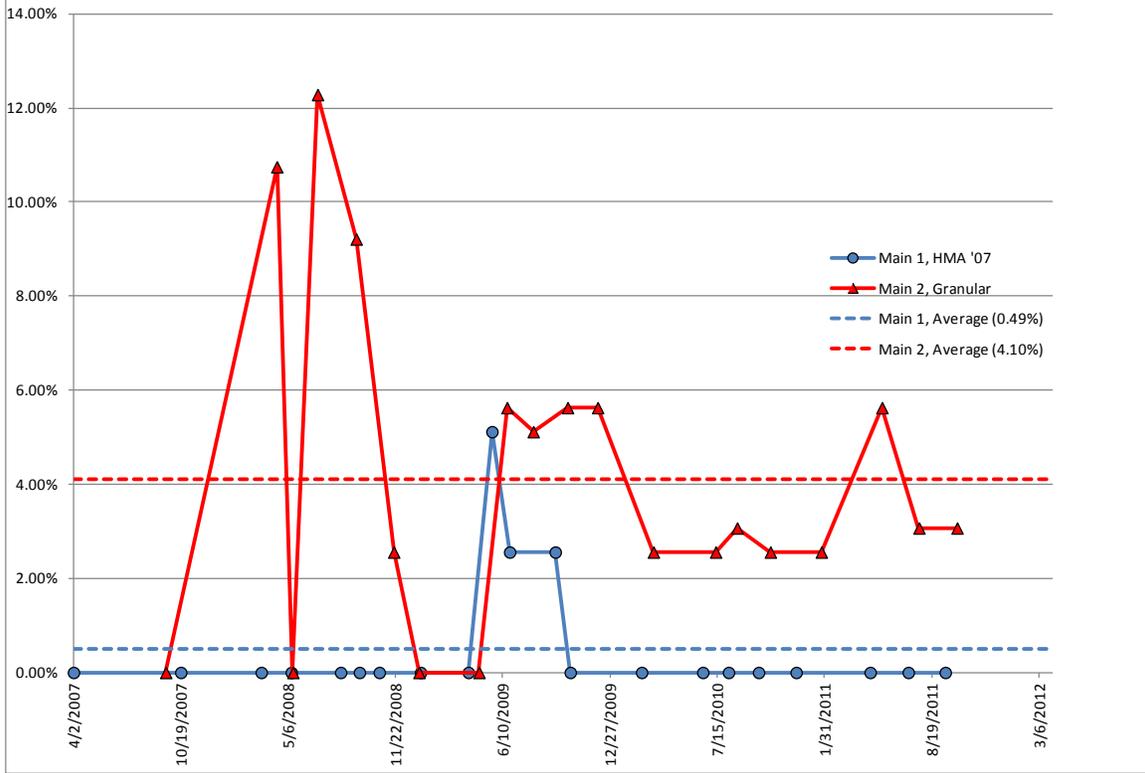
Section 7: Percent Above SQI Threshold (MP 287.80 -- 299.50)



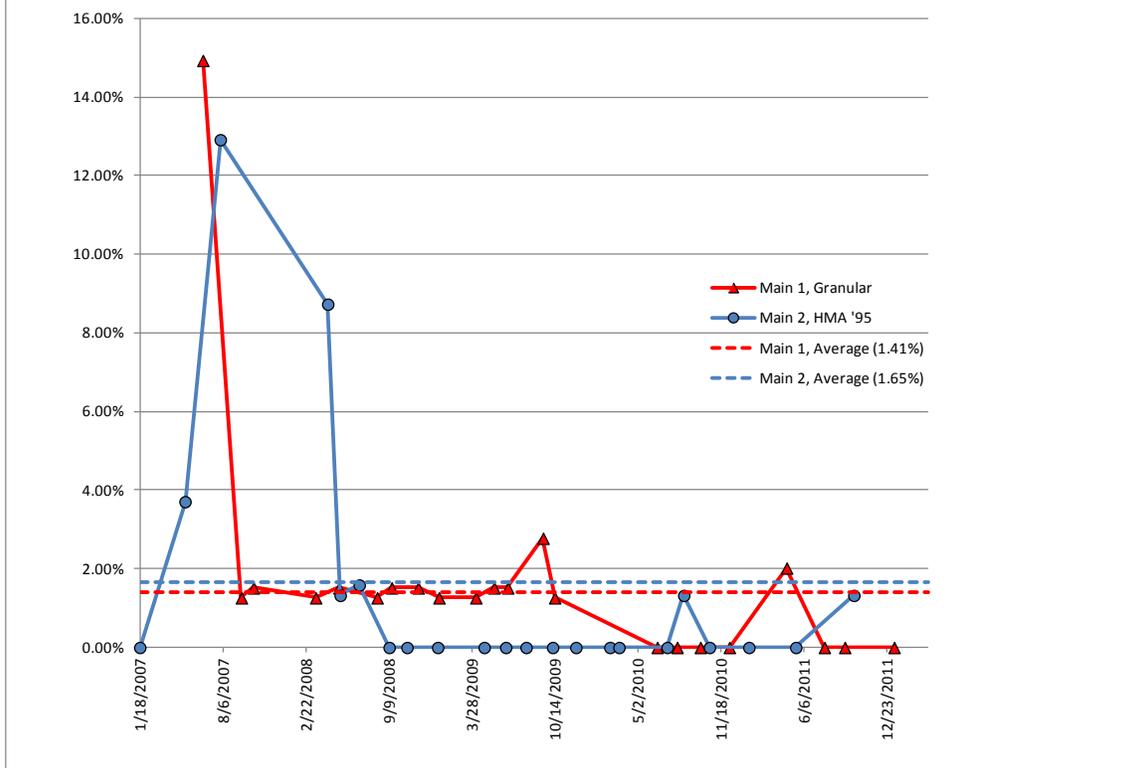
Section 8: Percent Above SQI Threshold (MP 301.80 -- 305.50)



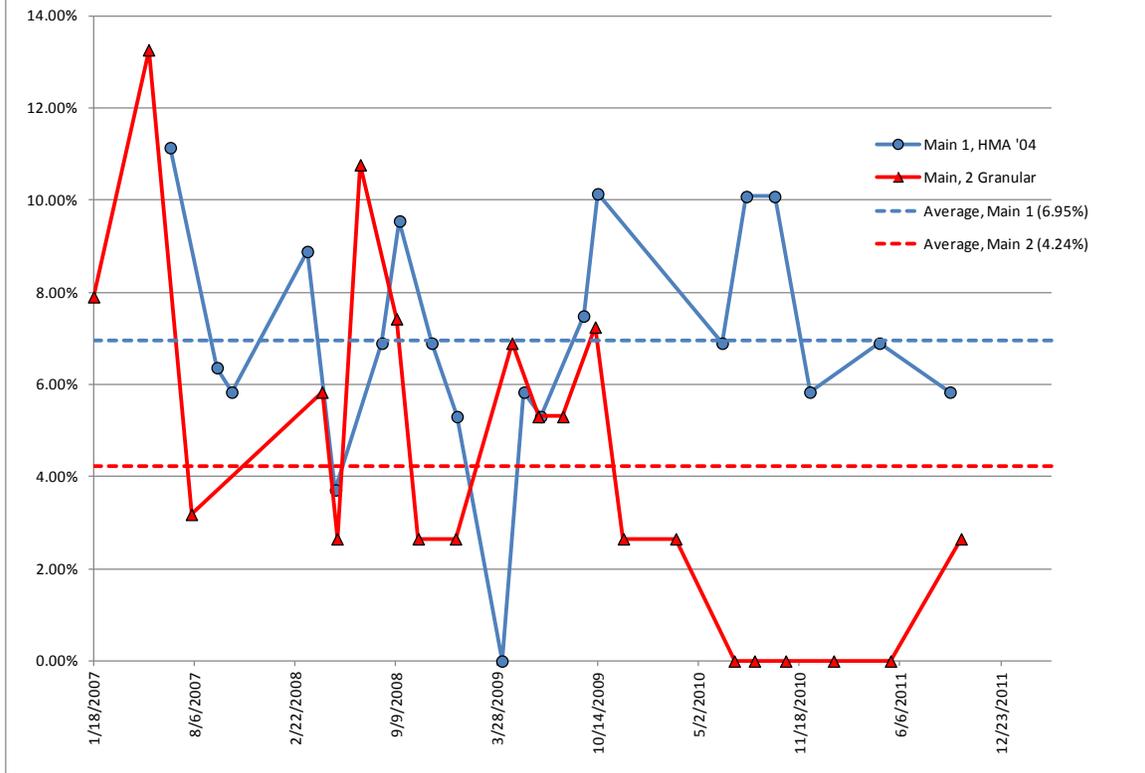
Section 9: Percent Above SQI Threshold (MP 308.50 -- 312.50)



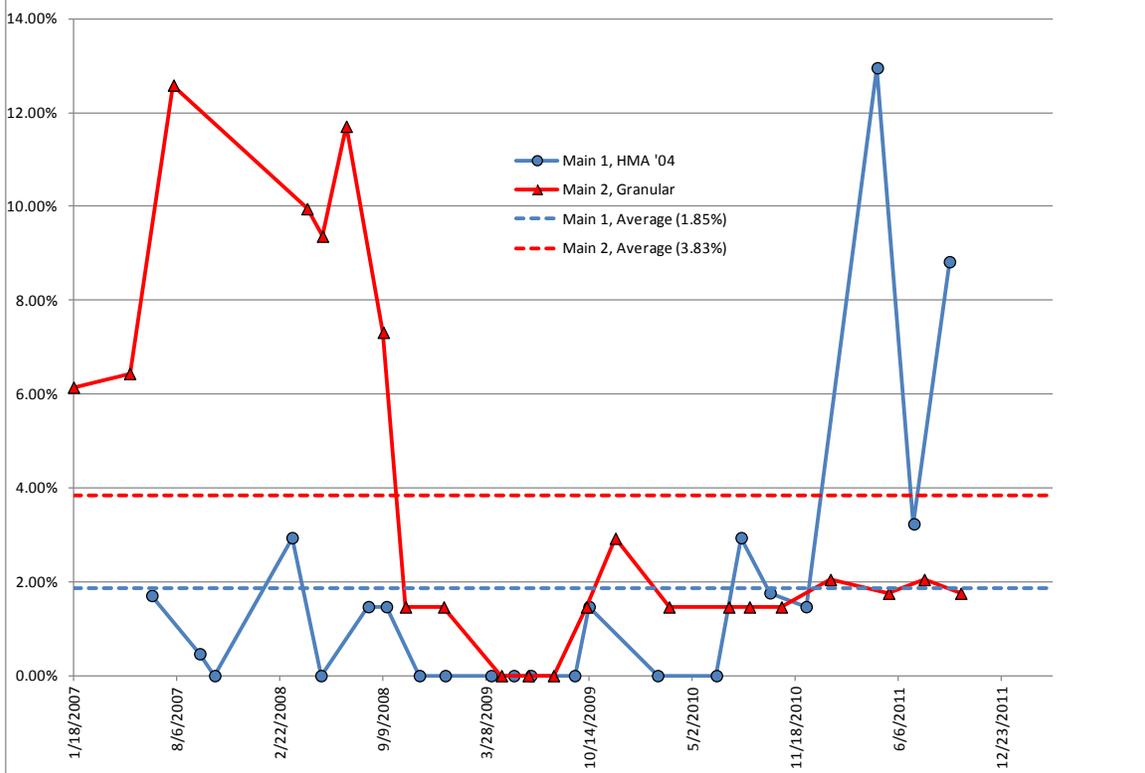
Section 10: Percent Above SQI Threshold (MP 358.35 -- 365.85)



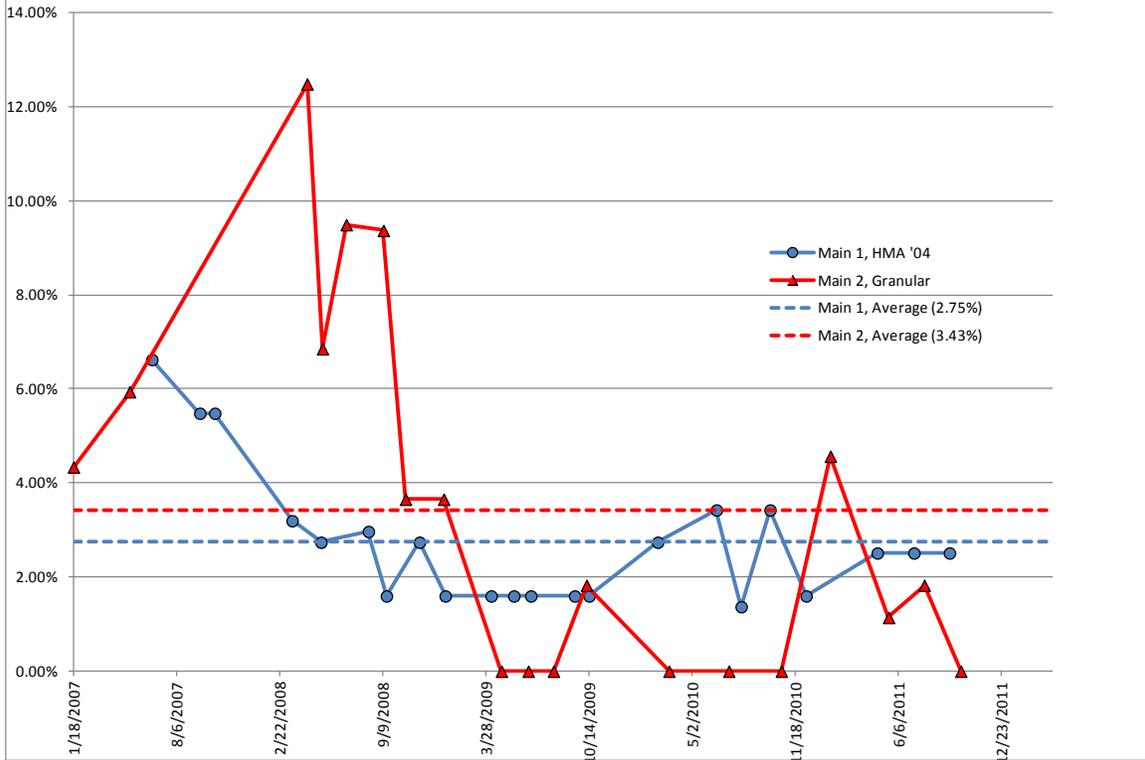
Section 11: Percent Above SQI Threshold (MP 367.33 -- 370.90)



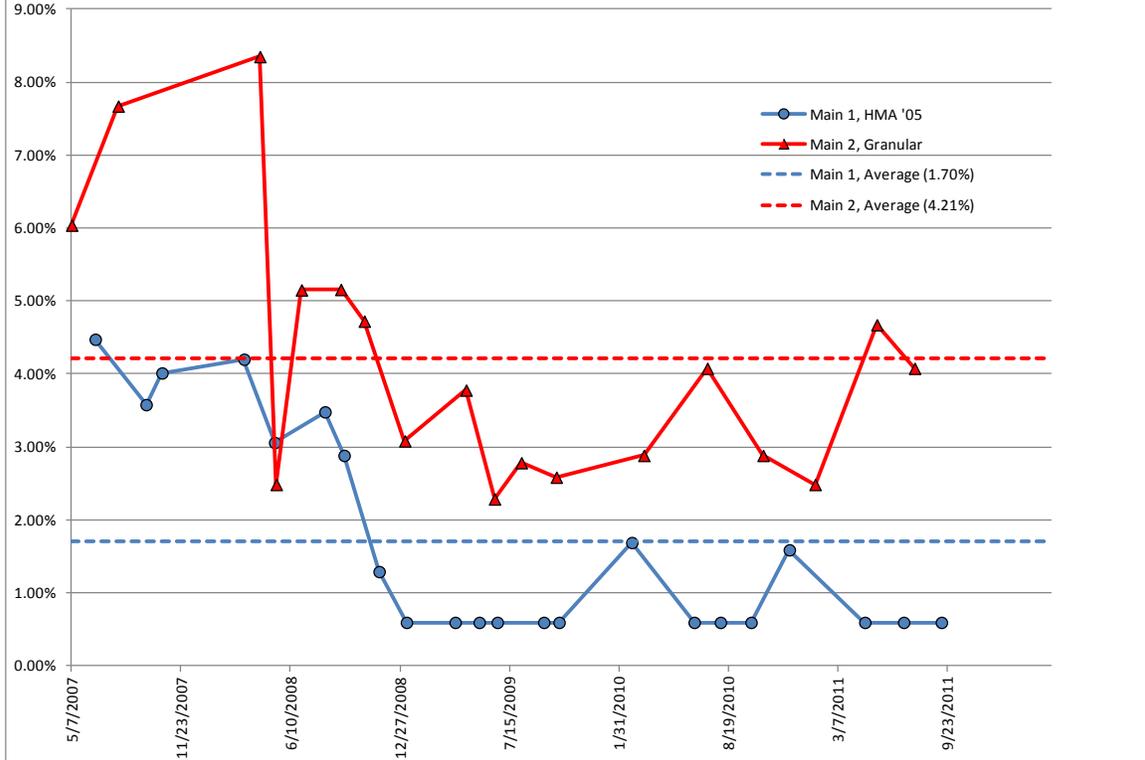
Section 12: Percent Above SQI Threshold (MP 373.78 -- 380.25)



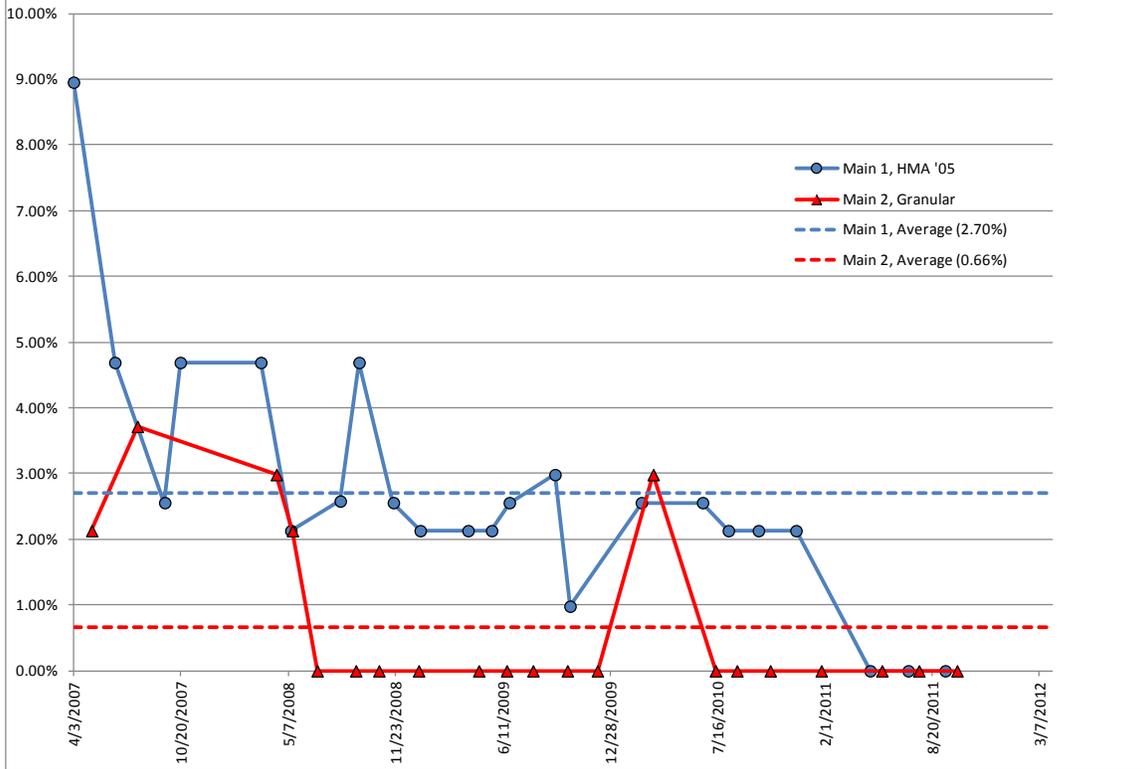
Section 13: Percent Above SQI Threshold (MP 383.10 -- 391.40)



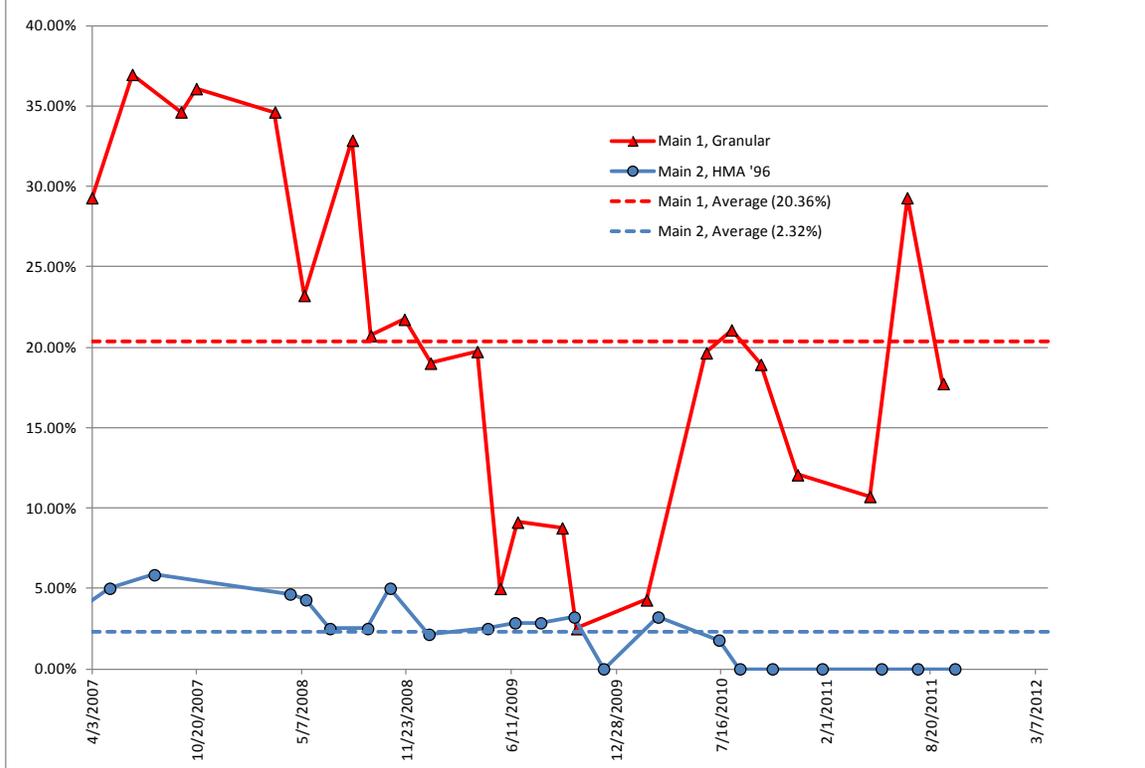
Section 14: Percent Above SQI Threshold (MP 394.26 -- 413.30)



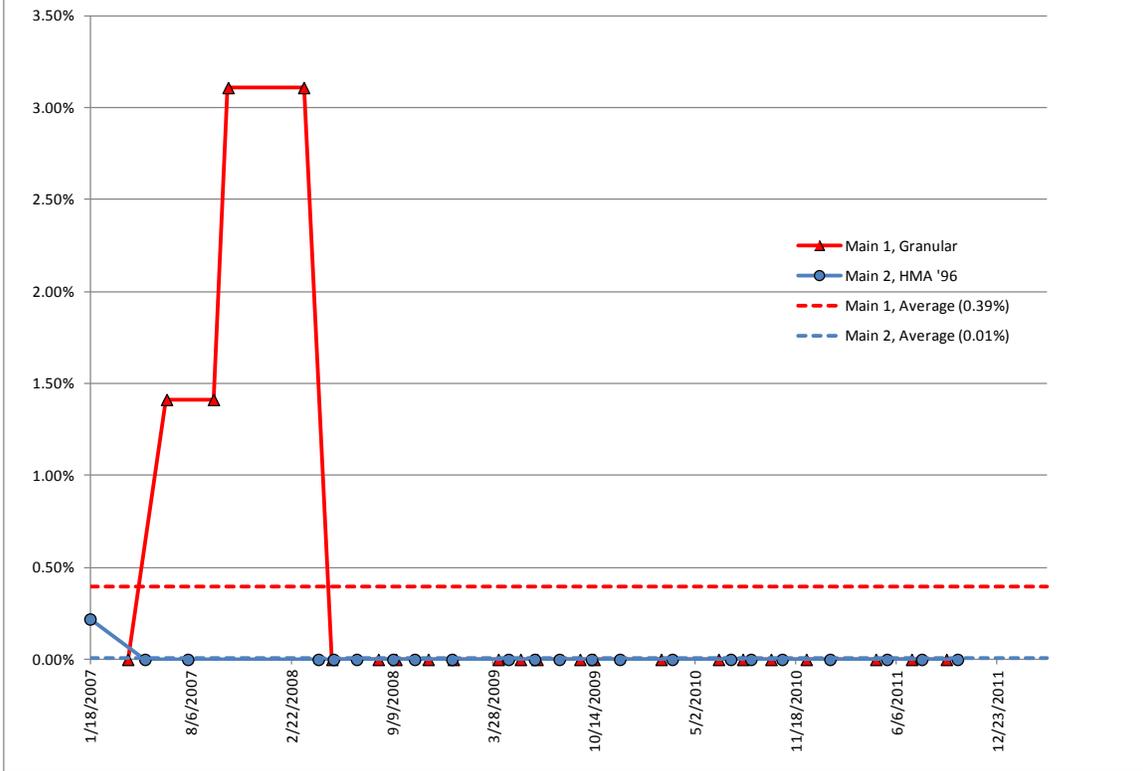
Section 15: Percent Above SQI Threshold (MP 414.75 -- 419.20)



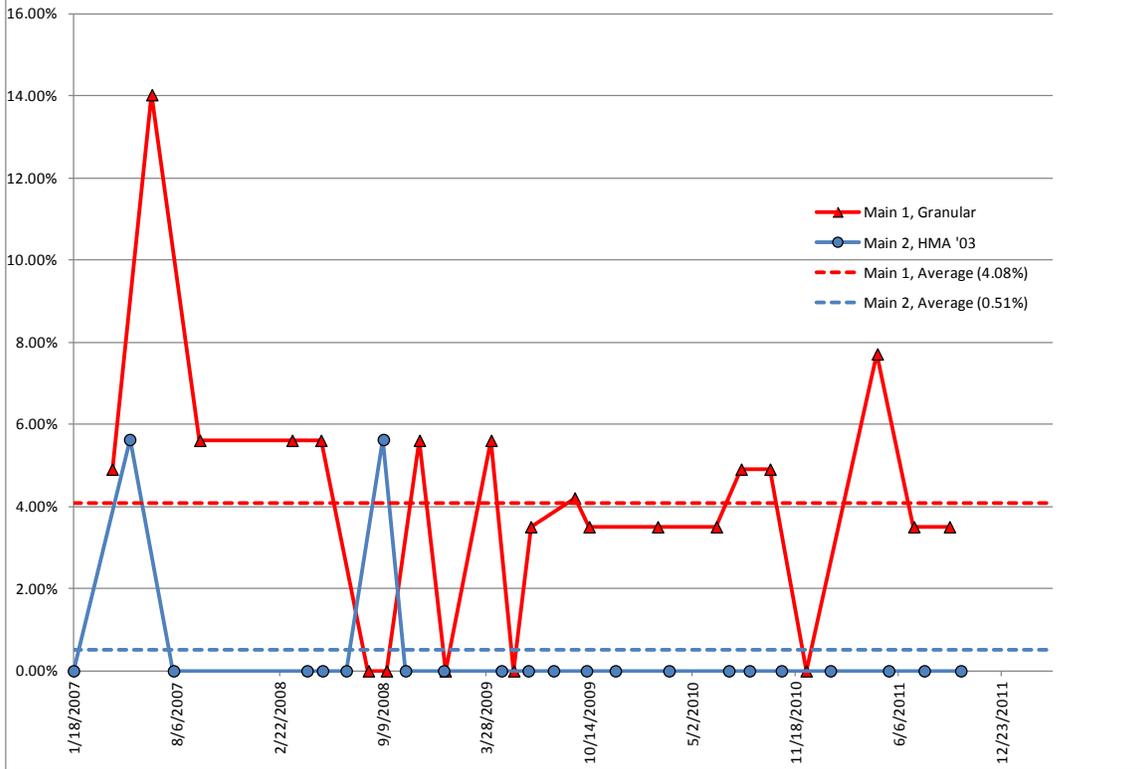
Section 16: Percent Above SQI Threshold (MP 421.50 -- 426.80)



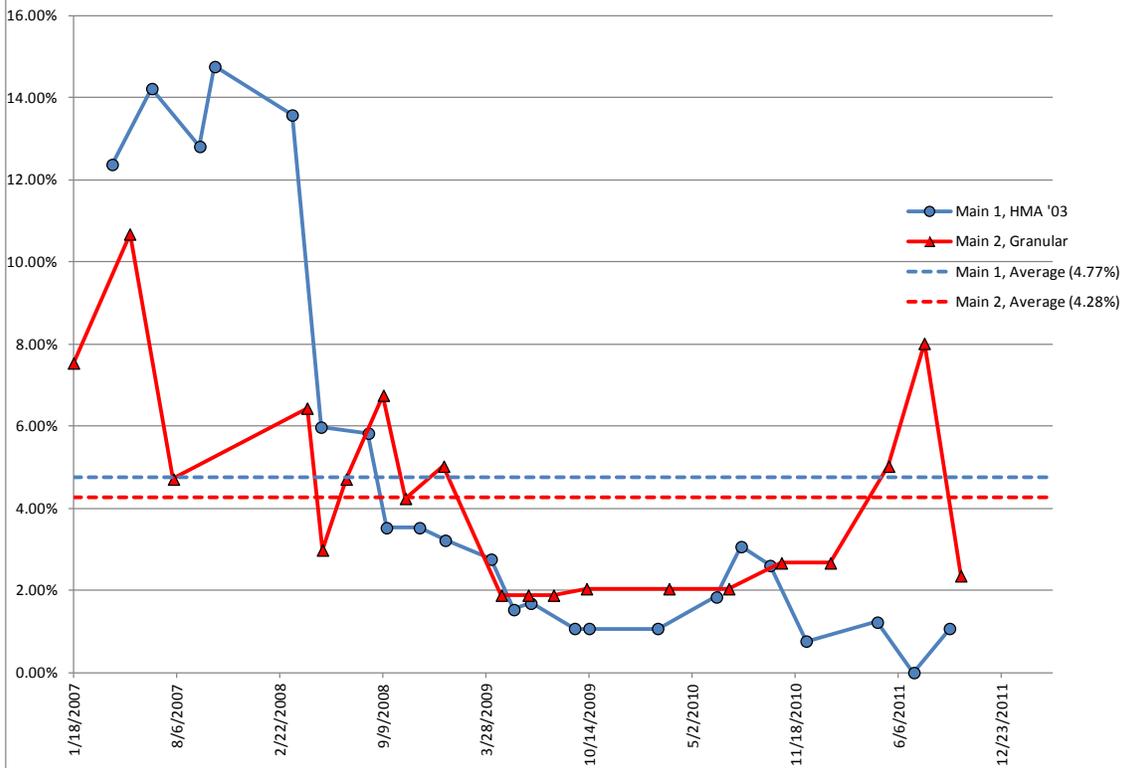
Section 17: Percent Above SQI Threshold (MP 429.10 -- 435.80)



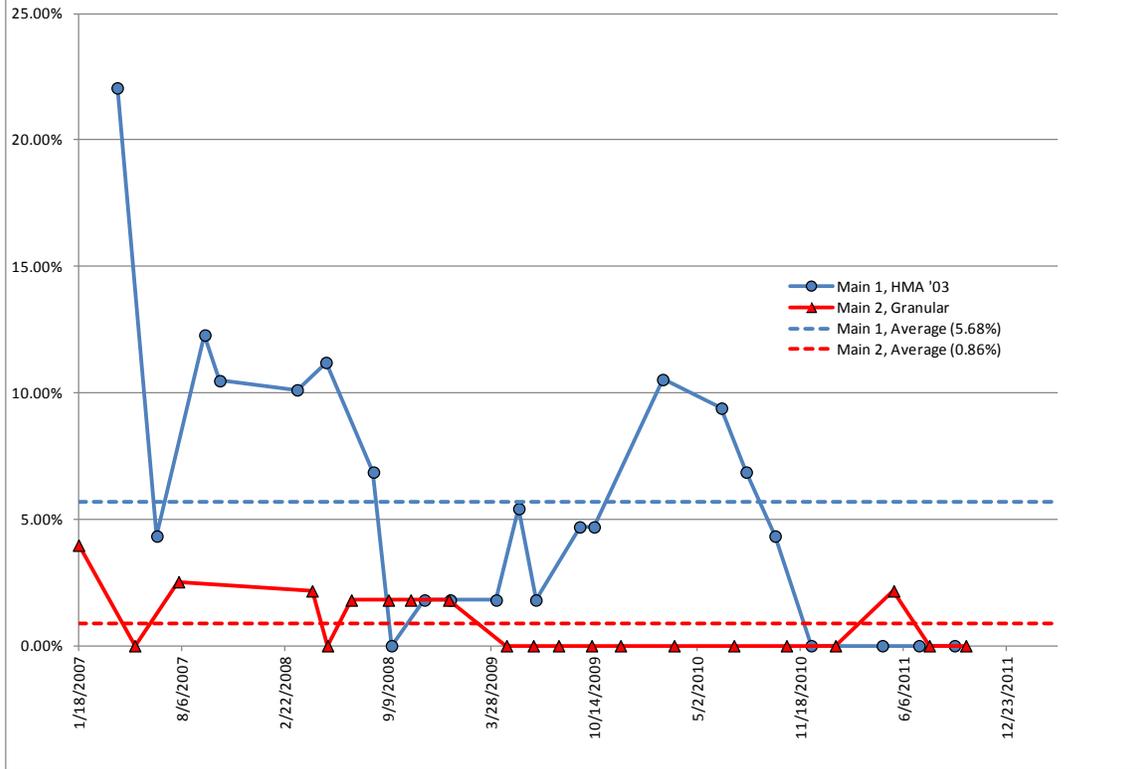
Section 19: Percent Above SQI Threshold (MP 446.50 -- 449.20)



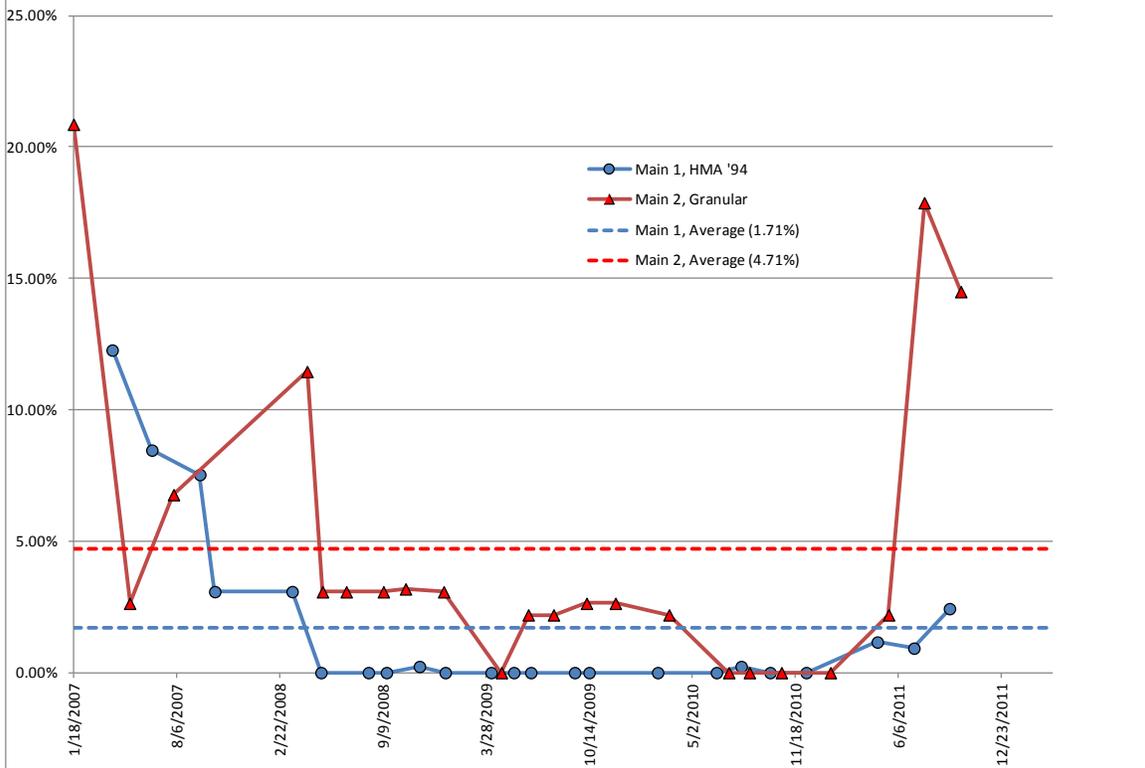
Section 20: Percent Above SQI Threshold (MP 457.75 -- 470.10)



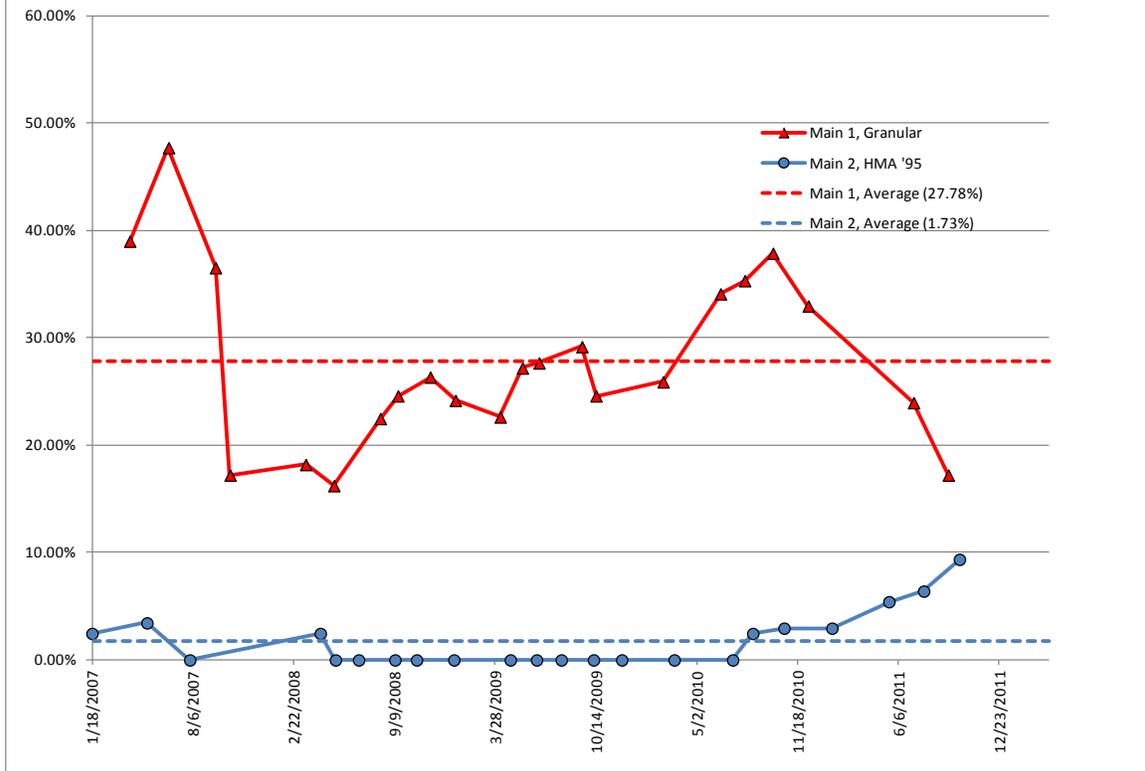
Section 21: Percent Above SQI Threshold (MP 471.90 -- 477.15)



Section 22: Percent Above SQI Threshold (MP 485.55 -- 489.86)



Section 23: Percent above SQI Threshold (MP 492.05 -- 495.90)



Statistical Analysis

t-Test: Two-Sample Assuming Unequal Variances

MP 222.2_225.75

	Variable 1	Variable 2
Mean	0.034149	0.04605
Variance	0.002049	0.000807
Observations	8	19
Hypothesized Mean Difference	0	
Df	9	
t Stat	-0.68878	
P(T<=t) one-tail	0.254164	
t Critical one-tail	1.833113	
P(T<=t) two-tail	0.508329	
t Critical two-tail	2.262157	

t-Test: Two-Sample Assuming Unequal Variances

MP 243.55-257.90

	Variable 1	Variable 2
Mean	0.0229172	0.021149
Variance	0.00074236	0.000566
Observations	22	22
Hypothesized Mean Difference	0	
Df	41	
t Stat	0.22934009	
P(T<=t) one-tail	0.40987242	
t Critical one-tail	1.682878	
P(T<=t) two-tail	0.81974485	
t Critical two-tail	2.01954095	

t-Test: Two-Sample Assuming Unequal Variances

MP 259.55_265.10

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.035878	0.002275
Variance	0.001621	3.81E-05
Observations	23	24
Hypothesized Mean Difference	0	
Df	23	
t Stat	3.958206	
P(T<=t) one-tail	0.000312	
t Critical one-tail	1.713872	
P(T<=t) two-tail	0.000624	
t Critical two-tail	2.068658	

t-Test: Two-Sample Assuming Unequal Variances

MP 265.90_271.90

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.016272	0.04087
Variance	0.000202	0.001619
Observations	22	22
Hypothesized Mean Difference	0	
df	26	
t Stat	-2.70367	
P(T<=t) one-tail	0.005964	
t Critical one-tail	1.705618	
P(T<=t) two-tail	0.011928	
t Critical two-tail	2.055529	

t-Test: Two-Sample Assuming Unequal Variances

MP 275.65_279.65

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.013756	0.014749
Variance	0.001482	0.002718
Observations	22	25
Hypothesized Mean Difference	0	
df	44	
t Stat	-0.07483	
P(T<=t) one-tail	0.470344	
t Critical one-tail	1.68023	
P(T<=t) two-tail	0.940689	
t Critical two-tail	2.015368	

t-Test: Two-Sample Assuming Unequal Variances

MP 281.20_284.55

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.026212	0.049701
Variance	0.001521	0.004439
Observations	22	25
Hypothesized Mean Difference	0	
df	39	
t Stat	-1.49553	
P(T<=t) one-tail	0.071412	
t Critical one-tail	1.684875	
P(T<=t) two-tail	0.142825	
t Critical two-tail	2.022691	

t-Test: Two-Sample Assuming Unequal Variances

MP 287.80_299.50

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.038047	0.029743
Variance	0.000451	0.000961
Observations	21	17
Hypothesized Mean Difference	0	
df	27	
t Stat	0.940418	
P(T<=t) one-tail	0.177671	
t Critical one-tail	1.703288	
P(T<=t) two-tail	0.355341	
t Critical two-tail	2.05183	

t-Test: Two-Sample Assuming Unequal Variances

MP 301.80_305.50

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.063462	0.063553
Variance	0.001116	0.001485
Observations	20	19
Hypothesized Mean Difference	0	
df	36	
t Stat	-0.00787	
P(T<=t) one-tail	0.496882	
t Critical one-tail	1.688298	
P(T<=t) two-tail	0.993765	
t Critical two-tail	2.028094	

t-Test: Two-Sample Assuming Unequal Variances

MP 308.50_312.20

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.004875	0.04095
Variance	0.000172	0.001211
Observations	21	20
Hypothesized Mean Difference	0	
df	24	
t Stat	-4.3521	
P(T<=t) one-tail	0.000108	
t Critical one-tail	1.710882	
P(T<=t) two-tail	0.000216	
t Critical two-tail	2.063899	

t-Test: Two-Sample Assuming Unequal Variances

MP 358.35_365.85

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.014721	0.010221
Variance	0.001095	6.6E-05
Observations	21	21
Hypothesized Mean Difference	0	
df	22	
t Stat	0.605226	
P(T<=t) one-tail	0.275611	
t Critical one-tail	1.717144	
P(T<=t) two-tail	0.551222	
t Critical two-tail	2.073873	

t-Test: Two-Sample Assuming Unequal Variances

MP 367.33_370.90

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.069491	0.042406
Variance	0.000672	0.001373
Observations	20	21
Hypothesized Mean Difference	0	
df	36	
t Stat	2.722376	
P(T<=t) one-tail	0.004964	
t Critical one-tail	1.688298	
P(T<=t) two-tail	0.009928	
t Critical two-tail	2.028094	

t-Test: Two-Sample Assuming Unequal Variances

MP 373.78_380.25

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.018507	0.038321
Variance	0.001014	0.001573
Observations	22	22
Hypothesized Mean Difference	0	
df	40	
t Stat	-1.82717	
P(T<=t) one-tail	0.037571	
t Critical one-tail	1.683851	
P(T<=t) two-tail	0.075142	
t Critical two-tail	2.021075	

t-Test: Two-Sample Assuming Unequal Variances

MP 383.10_391.40

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.027519	0.034293
Variance	0.000209	0.001483
Observations	22	19
Hypothesized Mean Difference	0	
df	22	
t Stat	-0.72402	
P(T<=t) one-tail	0.238342	
t Critical one-tail	1.717144	
P(T<=t) two-tail	0.476684	
t Critical two-tail	2.073873	

t-Test: Two-Sample Assuming Unequal Variances

MP 394.26_413.30

	<i>Variable 1</i>	<i>Variable</i> <i>2</i>
Mean	0.017017955	0.042089
Variance	0.000209892	0.000302
Observations	22	19
Hypothesized Mean Difference	0	
df	35	
t Stat	-4.97117744	
P(T<=t) one-tail	8.75078E-06	
t Critical one-tail	1.68957244	
P(T<=t) two-tail	1.75016E-05	
t Critical two-tail	2.030107915	

t-Test: Two-Sample Assuming Unequal Variances

MP 414.75_419.20

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.026959	0.006646
Variance	0.000374	0.000157
Observations	23	21
Hypothesized Mean Difference	0	
df	38	
t Stat	4.166967	
P(T<=t) one-tail	8.58E-05	
t Critical one-tail	1.685954	
P(T<=t) two-tail	0.000172	
t Critical two-tail	2.024394	

t-Test: Two-Sample Assuming Unequal Variances

MP 421.50_426.80

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.203556	0.023166
Variance	0.01139	0.000365
Observations	23	22
Hypothesized Mean Difference	0	
df	23	
t Stat	7.973609	
P(T<=t) one-tail	2.27E-08	
t Critical one-tail	1.713872	
P(T<=t) two-tail	4.54E-08	
t Critical two-tail	2.068658	

t-Test: Two-Sample Assuming Unequal Variances

MP 429.10_435.80

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.003933	9.99E-05
Variance	8.99E-05	2.19E-07
Observations	23	22
Hypothesized Mean Difference	0	
df	22	
t Stat	1.936451	
P(T<=t) one-tail	0.032881	
t Critical one-tail	1.717144	
P(T<=t) two-tail	0.065763	
t Critical two-tail	2.073873	

t-Test: Two-Sample Assuming Unequal Variances

MP 438.20_445.80

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.031661	0.006004
Variance	0.000639	7.96E-05
Observations	20	22
Hypothesized Mean Difference	0	
df	23	
t Stat	4.302302	
P(T<=t) one-tail	0.000133	
t Critical one-tail	1.713872	
P(T<=t) two-tail	0.000265	
t Critical two-tail	2.068658	

t-Test: Two-Sample Assuming Unequal Variances

MP 446.50_449.20

	<i>Variable 1</i>	<i>Variable 2</i>
Mean	0.040812	0.00512
Variance	0.001006	0.000275
Observations	22	22
Hypothesized Mean Difference	0	
df	32	
t Stat	4.678314	
P(T<=t) one-tail	2.52E-05	
t Critical one-tail	1.693889	
P(T<=t) two-tail	5.05E-05	
t Critical two-tail	2.036933	

t-Test: Two-Sample Assuming Unequal Variances

MP 457.75_470.10

	<i>Variable 1</i>	<i>Variable 2</i>
Mean	0.047652	0.042797
Variance	0.002469	0.000635
Observations	23	20
Hypothesized Mean Difference	0	
df	34	
t Stat	0.411573	
P(T<=t) one-tail	0.341618	
t Critical one-tail	1.690924	
P(T<=t) two-tail	0.683235	
t Critical two-tail	2.032244	

t-Test: Two-Sample Assuming Unequal Variances

MP 471.90_477.15

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.056758	0.008606
Variance	0.002966	0.000146
Observations	23	21
Hypothesized Mean Difference	0	
df	24	
t Stat	4.130716	
P(T<=t) one-tail	0.000189	
t Critical one-tail	1.710882	
P(T<=t) two-tail	0.000378	
t Critical two-tail	2.063899	

t-Test: Two-Sample Assuming Unequal Variances

MP 485.55_489.86

	<i>Variable</i> <i>1</i>	<i>Variable</i> <i>2</i>
Mean	0.017148	0.047126
Variance	0.001086	0.003536
Observations	23	22
Hypothesized Mean Difference	0	
df	32	
t Stat	-2.07906	
P(T<=t) one-tail	0.022855	
t Critical one-tail	1.693889	
P(T<=t) two-tail	0.045709	
t Critical two-tail	2.036933	

t-Test: Two-Sample Assuming Unequal Variances

MP 492.05_495.90

	<i>Variable</i>	<i>Variable</i>
	<i>1</i>	<i>2</i>
Mean	0.277789	0.017262
Variance	0.006593	0.000669
Observations	22	22
Hypothesized Mean Difference	0	
df	25	
t Stat	14.34008	
P(T<=t) one-tail	7.21E-14	
t Critical one-tail	1.708141	
P(T<=t) two-tail	1.44E-13	
t Critical two-tail	2.059539	

Appendix B: Luke Saladin's MS Presentation

Appendix C: Briefing report prepared for BNSF

BNSF Transcon Corridor – Panhandle Sub-Division
Trackbed Performance Comparison Study
August, 2012

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IV. Summary Statistics

Main 1 - Year 2007 thru Year 2011		
Segment	Length (mi)	Average Percent Trackbed Length Where SQI Threshold Was Exceeded
MP 239.00 to MP 299.00	60.00	
Concrete w/HMA	44.45	2.6%
Existing Wood	6.71	4.1%
Upgraded Siding	8.84	6.6%
MP 337.00 to MP 419.21	78.15	
Concrete w/HMA	45.46	2.4%
Existing Wood	26.55	4.0%
Upgraded Siding	6.14	7.5%
MP 419.21 to MP 489.86	69.45	
Concrete w/HMA	31.03	3.9%
Existing Wood	33.87	6.1%
Upgraded Siding	4.55	2.3%
MP 489.86 to MP 550.00	60.14	
Concrete w/HMA	0.00	0.0%
Existing Wood	58.16	5.8%
Upgraded Siding	1.98	50.0%
	Length (mi)	

Total =	267.74	Weighted Average of Percent Trackbed Length Where SQI Threshold Was Exceeded
Concrete w/HMA	120.94	2.9%
Existing Wood	125.29	5.4%
Upgraded Siding	21.51	9.9%

Main 2 - Year 2007 thru Year 2011		
Segment	Length (mi)	Percent Trackbed Length Where SQI Threshold Was Exceeded
MP 550.00 to MP 497.36	52.64	
Concrete w/HMA	0.00	0.0%
Existing Wood	52.64	4.3%
Upgraded Siding	0.00	0.0%
MP 497.36 to MP 367.33	124.09	
Concrete w/HMA	28.05	1.1%
Existing Wood	81.03	3.8%
Upgraded Siding	15.01	5.4%
MP 367.33 to MP 337.00	27.42	
Concrete w/HMA	10.00	2.4%
Existing Wood	11.39	3.1%
Upgraded Siding	6.03	4.5%
MP 299.00 to MP 279.64	19.36	
Concrete w/HMA	2.00	2.0%

Existing Wood	14.56	3.1%
Upgraded Siding	2.80	3.0%
MP 279.64 to MP 240.89	38.75	
Concrete w/HMA	0.00	0.0%
Existing Wood	38.75	2.6%
Upgraded Siding	0.00	0.0%
	Length (mi)	Weighted Average of Percent Trackbed Length Where SQI Threshold Was Exceeded
Total =	262.26	
Concrete w/HMA	40.05	1.5%
Existing Wood	198.37	3.6%
Upgraded Siding	23.84	4.9%

V. Introduction

In the Fall of 2011, BNSF Research ... Department... contracted with the University of Kentucky to conduct a study comparing the performance of three trackbed types along the BNSF Transcon Corridor – Panhandle Sub-Division. Performance of trackbed types refers to their surface quality over time. The study corridor extends from Wellington, Kansas to Amarillo, Texas for a distance of about 330 miles (Figure 1). The Panhandle Subdivision capacity has expanded from a mostly single-track facility with sidings to primarily double-track from the early 1990s thru 2007. The three trackbed types compared in this study are referred to as:

- Type A: Concrete Ties with an HMA separation layer (aka “Concrete w/HMA”),
- Type B: Existing Wood Ties with Granular Ballast (aka “Existing Wood”), and
- Type C: Former Sidings, Wood Ties with Granular Ballast, Converted/Expanded for Use as Mainline (aka “Upgraded Siding”)

BNSF Transcon Corridor - Panhandle Subdivision Approximately 330 Miles



Figure 1. Project Study Location

VI. Methodology

The performance measure recommended by BNSF staff to compare the performance of trackbed types was the Surface Quality Index (SQI), which is a composite index calculated from several track geometry parameters collected during geometry car runs. Several geometry car runs are made on both trackbed mains (Main 1 and Main 2) each year. When the index exceeds a predefined threshold, the beginning location and the length of track where the SQI threshold is exceeded are recorded (among other variables).

Historical SQI data was provided by BNSF to the University of Kentucky. Since some of the double-track mainline was not completed until Year 2006, historical data from Year 2007 thru Year 2011 were used in this study. Sections of trackbed that were not completed until 2007 were avoided (e.g. MP 299 thru MP 314). The remaining single-main section from about MP 314 to MP 337 was also avoided.

(Except for possibly MP 288 thru MP 299)

Geometry car runs were required to have been continuous runs over a given section of mainline.

1. Measures of Effectiveness (MOEs) Utilized for Compiling Trackbed Surface Quality Index

Two basic alternatives for compiling and summarizing SQI data were utilized in this study:

1. Percent Length of Trackbed Where SQI Threshold Was Exceeded
 - a. Based on the Summation of Overall Length of Trackbed Type Within a Given Segment¹
 - b. Based on Lengths of Individual Trackbed Type Sub-Segments
 - c. Based on a Moving One-Mile Window at 0.25-Mile Increments
2. Frequency That SQI Threshold Was Exceeded
 - a. Based on Percent Length Of Trackbed Type Grouped By Number (Frequency) Of Geometry Car Runs Where SQI Threshold Was Exceeded

¹ Multiple trackbed type sub-segments (concrete ties w/ HMA, existing wood ties w/ ballast, and upgraded sidings) can exist within a given segment.

1.1 MOE #1 - Percent Length Of Trackbed Where SQI Threshold Was Exceeded:
Based on Total Length Of Trackbed Type Within A Specified Corridor Segment

Main 1 (north-side track) and Main 2 (south-side track) were divided into “corridor segments” of lengths that vary from 60-miles to 82 miles on Main 1 and from 19-miles to 130-miles on Main 2. Corridor segment boundaries were established based on:

- maximizing the number of continuous geometry car runs over a given length of track, and
- boundaries where the double-track mainline became single-track.

Tables follow.

Main 1 – Segment 1			
MP 239.00 to MP 299.00			
<ul style="list-style-type: none"> • 60-miles • 19 Geometry Car Runs From 2007 thru 2011 			
Trackbed Type	Length (mi)	Overall Average (Median) Percent Length That Exceeded SQI Threshold	Standard Deviation (n = 19)
Concrete w/HMA	44.45	2.6% (2.5%)	1.4%
Existing Wood	6.71	4.1% (3.1%)	4.8%
Upgraded Siding	8.84	6.6% (6.4%)	2.9%
<i>Total</i>	<i>60.00</i>		
<i>Other</i>	<i>0.00</i>	-	

Main 1 – Segment 2			
MP 337.00 to MP 419.21			
<ul style="list-style-type: none"> • 82.21-miles (80.35-miles actual length due to “short-miles”) • 20 Geometry Car Runs From 2007 thru 2011 			
Trackbed Type	Length (mi)	Overall Average (Median) Percent Length That Exceeded SQI Threshold	Standard Deviation (n = 20)
Concrete w/HMA	45.46	2.4% (2.4%)	1.1%
Existing Wood	26.55	4.0% (3.5%)	2.6%
Upgraded Siding	6.14	7.5% (6.0%)	5.4%
<i>Total</i>	<i>78.15</i>		
<i>Other</i>	<i>2.20</i>	-	

Main 1 – Segment 3			
MP 419.21 to MP 489.86			
<ul style="list-style-type: none"> • 70.65-miles • 21 Geometry Car Runs From 2007 thru 2011 			
Trackbed Type	Length (mi)	Overall Average (Median) Percent Length That Exceeded SQI Threshold	Standard Deviation (n = 21)
Concrete w/HMA	31.03	3.9% (2.4%)	3.6%
Existing Wood	33.87	6.1% (5.4%)	3.0%
Upgraded Siding	4.55	2.3% (2.1%)	3.4%

<i>Total</i>	<i>69.45</i>		
<i>Other</i>	<i>1.20</i>	-	

Main 1 – Segment 4			
MP 489.86 to MP 550.00			
<ul style="list-style-type: none"> • 60.14-miles • 17 Geometry Car Runs From 2007 thru 2011 			
Trackbed Type	Length (mi)	Overall Average (Median) Percent Length That Exceeded SQI Threshold	Standard Deviation (n = 17)
Concrete w/HMA	0.00	-	-
Existing Wood	58.16	5.8% (4.8%)	2.8%
Upgraded Siding	1.98	50.1% (47.8%)	11.8%
<i>Total</i>	<i>60.14</i>		
<i>Other</i>	<i>0.00</i>	-	

Main 2

Main 2 – Segment 1			
MP 240.89 to MP 279.64			
<ul style="list-style-type: none"> • 38.75-miles • 20 Geometry Car Runs From 2007 thru 2011 			
Trackbed Type	Length (mi)	Overall Average (Median) Percent Length That Exceeded SQI Threshold	Standard Deviation (n = 20)
Concrete w/HMA	0.00	-	-
Existing Wood	38.75	2.6% (2.2%)	3.0%
Upgraded Siding	0.00	-	-
<i>Total</i>	<i>38.75</i>		
<i>Other</i>	<i>0.00</i>	-	

Main 2 – Segment 2			
MP 279.64 to MP 299.00			
<ul style="list-style-type: none"> • 19.36-miles • 19 Geometry Car Runs From 2007 thru 2011 			
Trackbed Type	Length (mi)	Overall Average (Median) Percent Length That Exceeded SQI Threshold	Standard Deviation (n = 19)

Concrete w/HMA	2.00	2.0% (0.00%)	7.6%
Existing Wood	14.56	3.1% (3.0%)	3.2%
Upgraded Siding	2.80	3.0% (3.4%)	3.0%
<i>Total</i>	<i>19.36</i>		
<i>Other</i>	<i>0.00</i>	-	

Main 2 – Segment 3			
MP 337.00 to MP 367.33			
<ul style="list-style-type: none"> • 30.33-miles (29.55-miles actual length due to “short-mile”) • 19 Geometry Car Runs From 2007 thru 2011 			
Trackbed Type	Length (mi)	Overall Average (Median) Percent Length That Exceeded SQI Threshold	Standard Deviation (n = 19)
Concrete w/HMA	10.00	2.4% (0.1%)	3.9%
Existing Wood	11.99	3.1% (2.1%)	2.6%
Upgraded Siding	6.03	4.5% (1.8%)	5.8%
<i>Total</i>	<i>27.42</i>		
<i>Other</i>	<i>2.13</i>	-	

Main 2 – Segment 4			
MP 367.33 to MP 497.36			
<ul style="list-style-type: none"> • 130.03-miles (128.95-miles actual length due to “short-mile”) • 18 Geometry Car Runs From 2007 thru 2011 			
Trackbed Type	Length (mi)	Overall Average (Median) Percent Length That Exceeded SQI Threshold	Standard Deviation (n = 18)
Concrete w/HMA	28.05	1.1% (1.1%)	0.6%
Existing Wood	81.03	3.8% (3.5%)	2.0%
Upgraded Siding	15.01	5.4% (5.1%)	2.1%
<i>Total</i>	<i>124.09</i>		
<i>Other</i>	<i>4.86</i>	-	

Main 2 – Segment 5			
MP 497.36 to MP 550.00			
<ul style="list-style-type: none"> • 52.64-miles 			

• 20 Geometry Car Runs From 2007 thru 2011			
Trackbed Type	Length (mi)	Overall Average (Median) Percent Length That Exceeded SQI Threshold	Standard Deviation (n = 20)
Concrete w/HMA	0.00	-	-
Existing Wood	52.64	4.3% (3.2%)	2.1%
Upgraded Siding	0.00	-	-
<i>Total</i>	<i>52.64</i>		
<i>Other</i>	<i>0.00</i>	-	

1.2 MOE #2 - Percent Length Of Trackbed Where SQI Threshold Was Exceeded: Based on Individual Trackbed Type Sub-Segment Lengths

Traveling along the Transcon Corridor on Main 1 or Main 2 between Kansas and Texas, there are generally three trackbed types² that are being evaluated:

- Type A: Concrete Ties with an HMA separation layer (aka “Concrete w/HMA”),
- Type B: Existing Wood Ties with Granular Ballast (aka “Existing Wood”), and
- Type C: Former Sidings, Wood Ties with Granular Ballast, Converted/Expanded for Use as Mainline (aka “Upgraded Siding”)

The following tables summarize how the trackbed type changes along Main 1 and Main 2.

² Type X trackbed type represents all other types besides Type A, B, or C

Main 1 Sub-Segments: MP238 to MP550				
Trackbed Type	Begin MP	End MP	Length (mi)	"Short-Mile"
B	238.00	240.91	2.91	
C	240.91	243.55	2.64	
A	243.55	257.90	14.35	
C	257.90	259.55	1.65	
A	259.55	265.10	5.55	
C	265.10	265.90	0.80	
A	265.90	271.90	6.00	
C	271.90	275.65	3.75	
A	275.65	279.65	4.00	
B	279.65	281.20	1.55	
A	281.20	284.55	3.35	
B	284.55	287.80	3.25	
A	287.80	299.00	11.20	
MP 299 to MP 337 - do not assess				
X	337.00	339.20	2.20	
B	339.20	346.89	7.69	
A	346.89	350.78	3.28	*
B	350.78	367.20	16.25	*
A	367.20	370.90	3.70	
C	370.90	373.79	1.81	*
A	373.79	380.23	6.44	
C	380.23	383.11	2.88	
A	383.11	391.65	8.54	
B	391.65	394.26	2.61	
A	394.26	413.31	19.05	

Main 1 Sub-Segments: MP238 to MP550				
Trackbed Type	Begin MP	End MP	Length (mi)	"Short-Mile"
C	413.31	414.76	1.45	
A	414.76	419.21	4.45	
B	419.21	445.80	26.59	
X	445.80	446.50	0.70	
B	446.50	450.80	4.30	
X	450.80	451.30	0.50	
B	451.30	452.40	1.10	
A	452.40	455.00	2.60	
C	455.00	457.75	2.75	
A	457.75	470.11	12.36	
C	470.11	471.91	1.80	
A	471.91	483.68	11.77	
B	483.68	485.56	1.88	
A	485.56	489.86	4.30	
C	489.86	491.84	1.98	
B	491.84	550.00	58.16	
		TOTAL=	272.14	
	Conc w/HMA	Type A=	120.94	44.4%
	Existing Wood	Type B=	126.29	46.4%
	Upgraded Wood Siding	Type C=	21.51	7.9%
	Other	Type X=	3.40	1.2%

Main 2 Sub-Segments: MP238 to MP550

Trackbed Type	Begin MP	End MP	Length (mi)	Short
B	238.00	238.50	0.50	
X	238.50	240.89	2.39	
B	240.89	279.64	38.75	
C	279.64	281.19	1.55	
B	281.19	284.54	3.35	
C	284.54	285.79	1.25	
A	285.79	287.79	2.00	
B	287.79	299.00	11.21	
MP 299 to MP 337 - do not assess				
B	337.00	339.20	2.20	
X	339.20	340.98	1.78	
B	340.98	350.77	9.19017	*
C	350.77	352.75	1.80083	*
A	352.75	355.60	2.85	
C	355.60	358.35	2.75	
A	358.35	360.99	2.64	
X	360.99	361.34	0.35	
A	361.34	365.85	4.51	
C	365.85	367.33	1.48	
B	367.33	391.39	22.98	*
A	391.39	392.59	1.20	
C	392.59	394.25	1.66	
B	394.25	419.19	24.94	
C	419.19	421.49	2.30	
A	421.49	426.79	5.30	

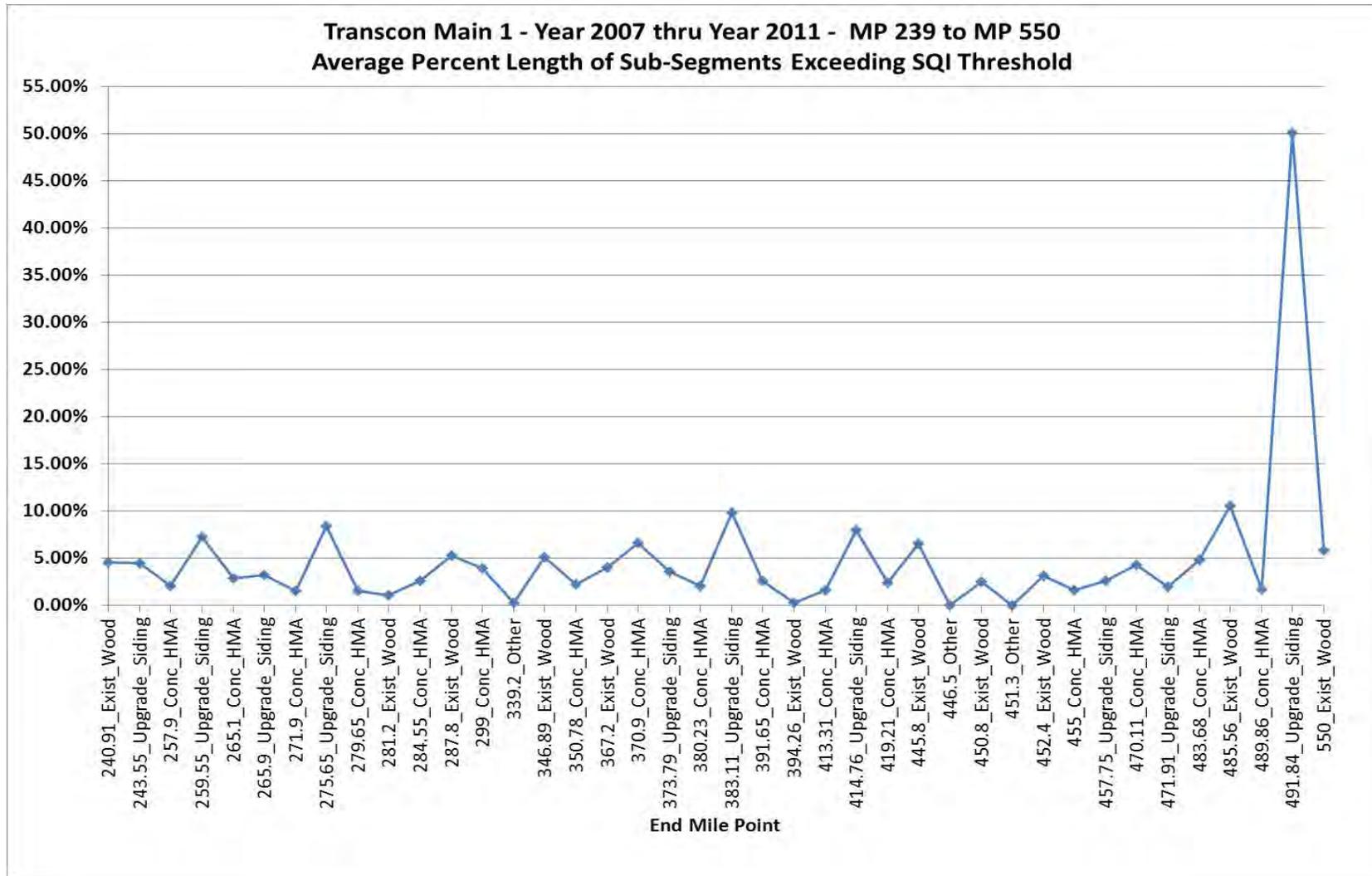
Main 2 Sub-Segments: MP238 to MP550

Trackbed Type	Begin MP	End MP	Length (mi)	Short
C	426.79	429.09	2.30	
A	429.09	435.79	6.70	
C	435.79	438.19	2.40	
A	438.19	449.19	11.00	
C	449.19	452.19	3.00	
X	452.19	453.49	1.30	
B	453.49	454.24	0.75	
X	454.24	454.49	0.25	
B	454.49	464.70	10.21	
X	464.70	464.99	0.29	
B	464.99	477.14	12.15	
X	477.14	479.29	2.15	
B	479.29	480.12	0.83	
X	480.12	480.99	0.87	
B	480.99	483.66	2.67	
C	483.66	485.54	1.88	
B	485.54	492.04	6.50	
A	492.04	495.89	3.85	
C	495.89	497.36	1.47	
B	497.36	550.00	52.64	
		TOTAL=	272.14	
	Conc w/HMA	A=	40.05	14.7%
	Existing Wood	B=	198.87	73.1%
	Upgraded Wood Siding	C=	23.84	8.8%

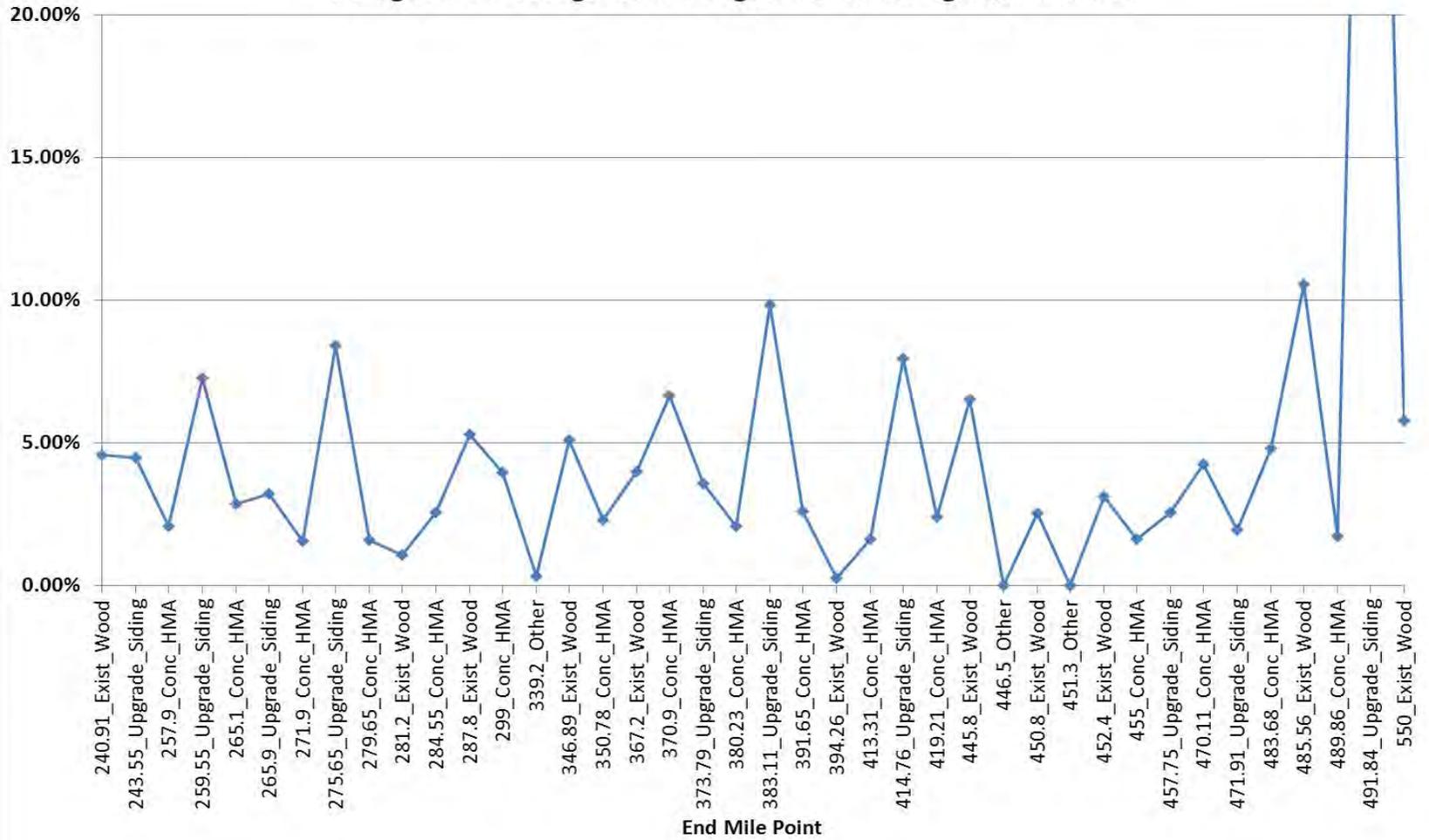
Main 2 Sub-Segments: MP238 to MP550

Trackbed Type	Begin MP	End MP	Length (mi)	Short
	Other	X=	9.38	3.4%

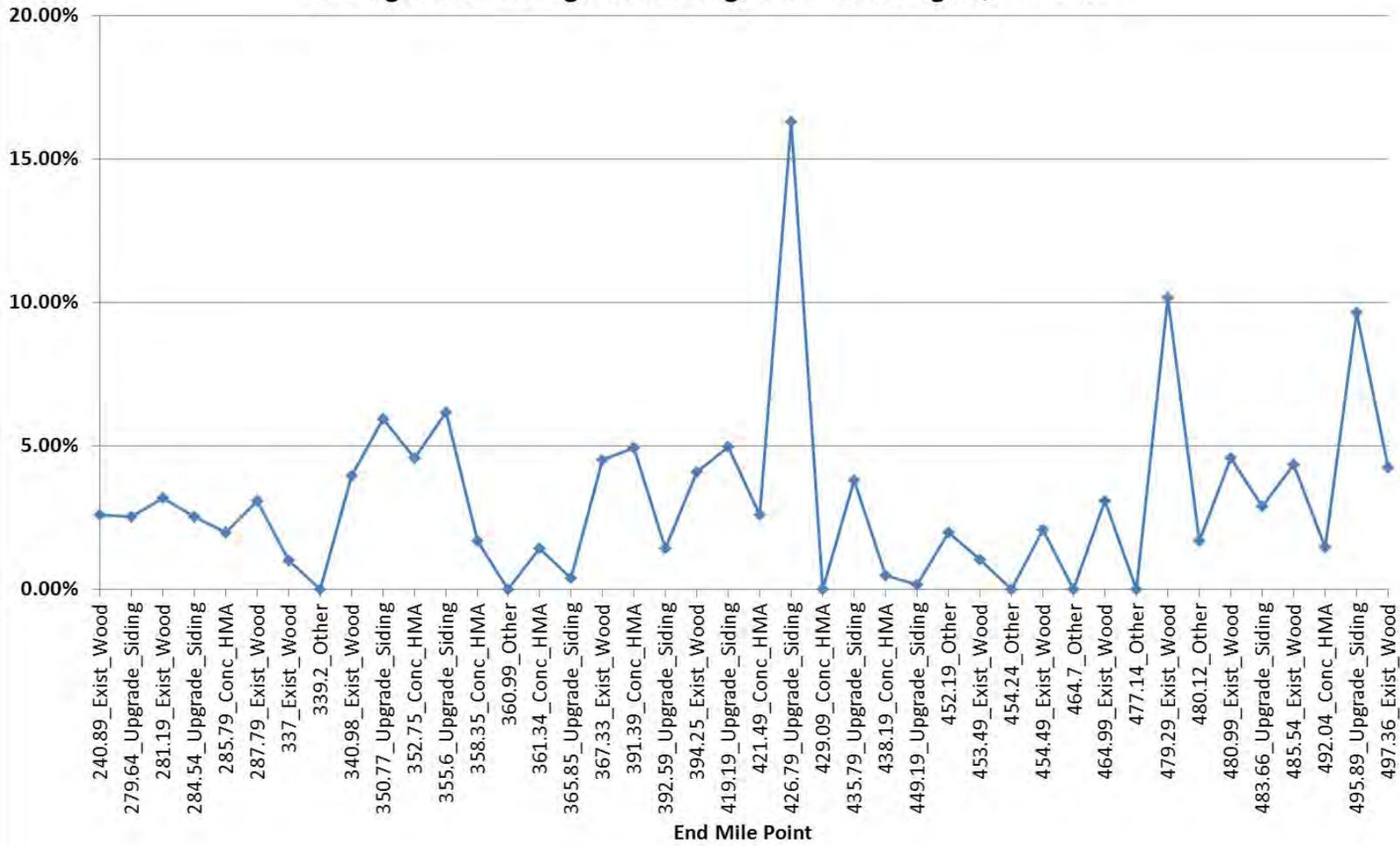
The following figures summarize for each trackbed type sub-segment the average percent length that exceeded the SQI threshold for geometry car runs from 2007 thru 2011.



Transcon Main 1 - Year 2007 thru Year 2011 - MP 239 to MP 550
Average Percent Length of Sub-Segments Exceeding SQI Threshold



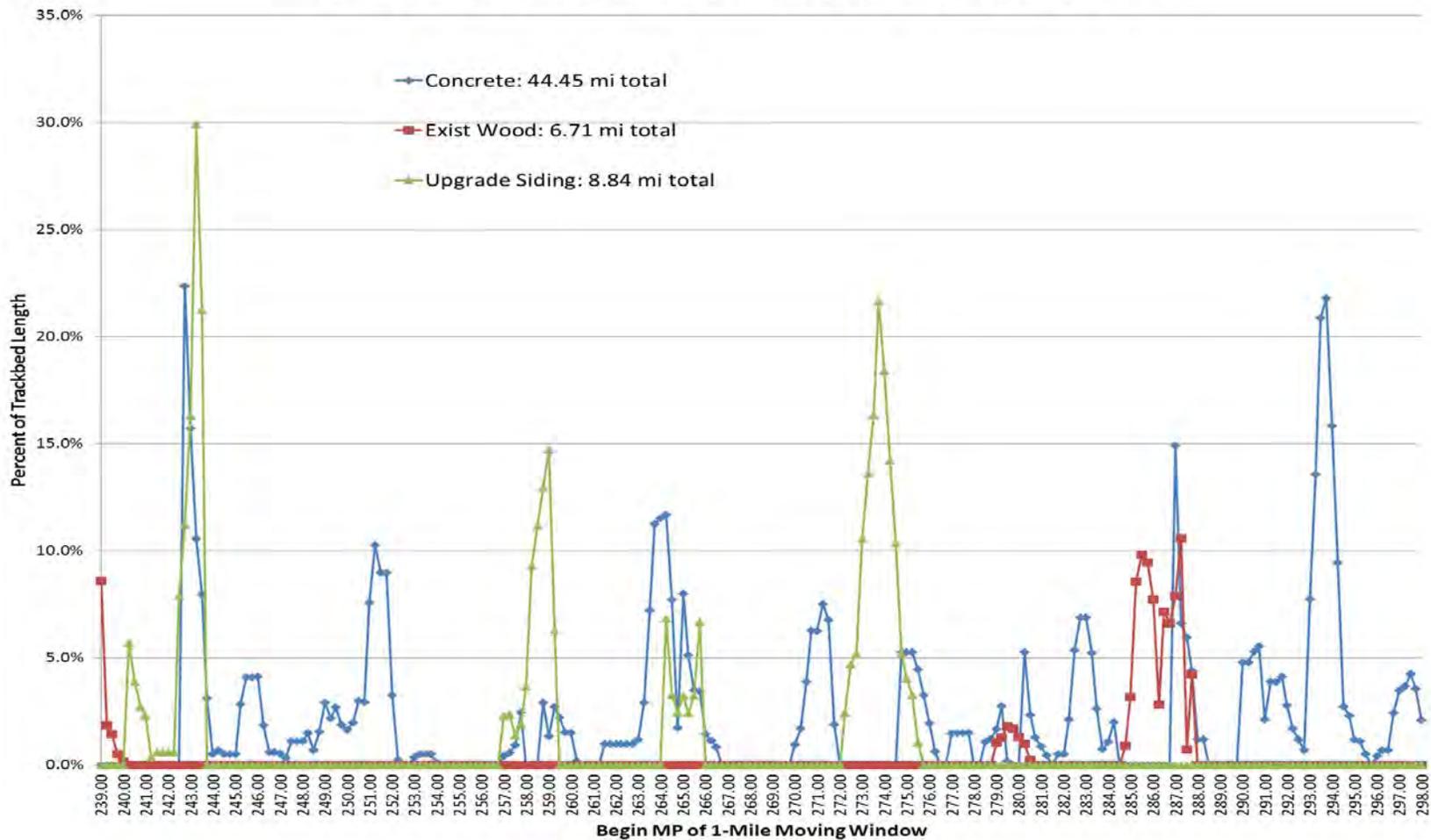
Transcon Main 2 - Year 2007 thru Year 2011 - MP 240.89 to MP 550
Average Percent Length of Sub-Segments Exceeding SQI Threshold



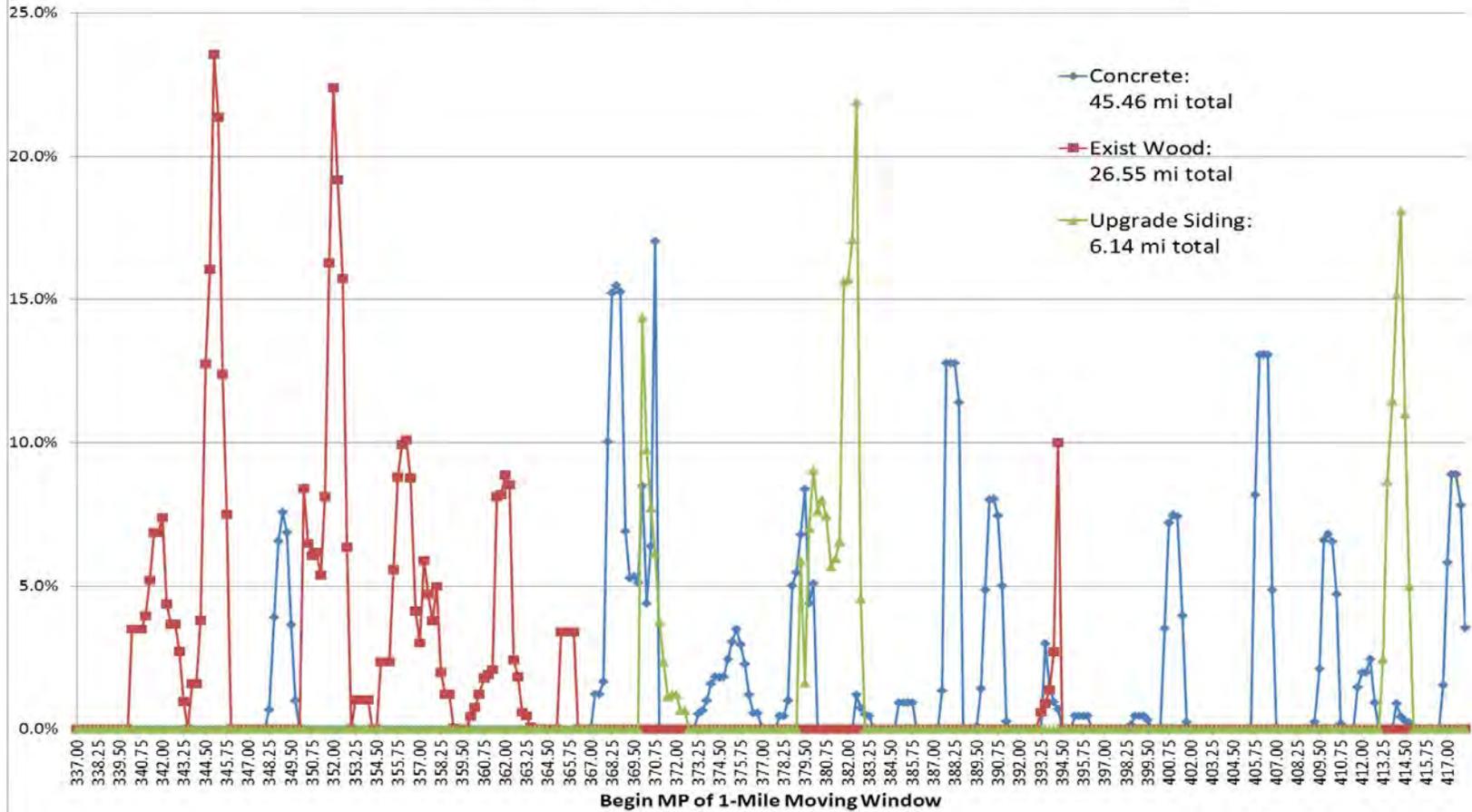
1.3 Percent Length of Trackbed Where SQI Threshold Was Exceeded: Moving One-Mile Window Along the Transcon Corridor

A third method of calculating the percent length of trackbed that exceeded the SQI threshold is to consider a one-mile “moving-window” along the entire corridor that moves along the track at quarter-mile increments. With this method, one-mile “hot spots” of trackbed can be identified where the SQI threshold is being exceeded.

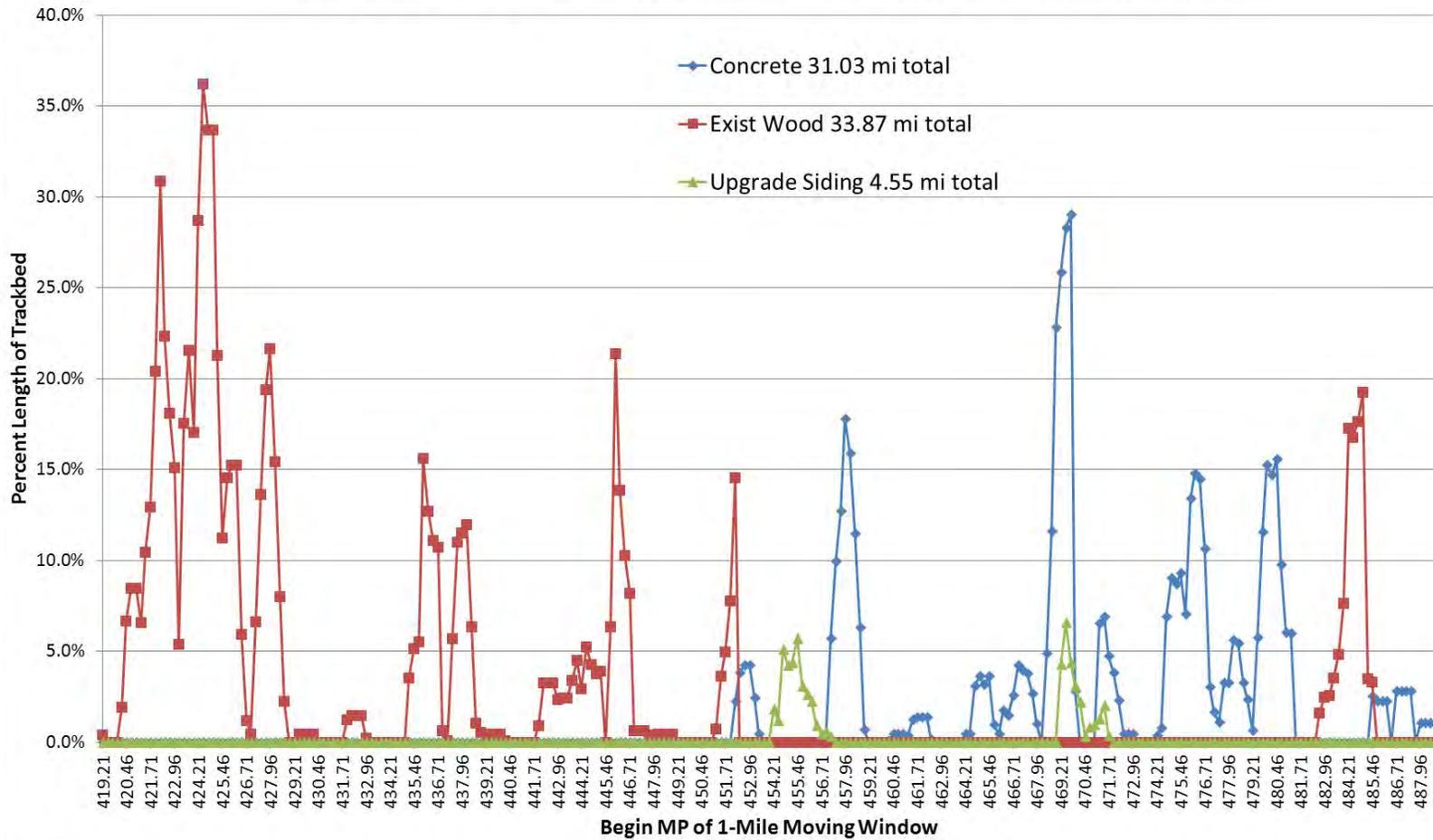
**Average Percent Exceeding SQI Threshold
Moving 1-Mile Window at 0.25-Mile Increment
Main 1, MP 239 to MP 299, Year 2007 to Year 2011, n= 19 Geom Car Runs**



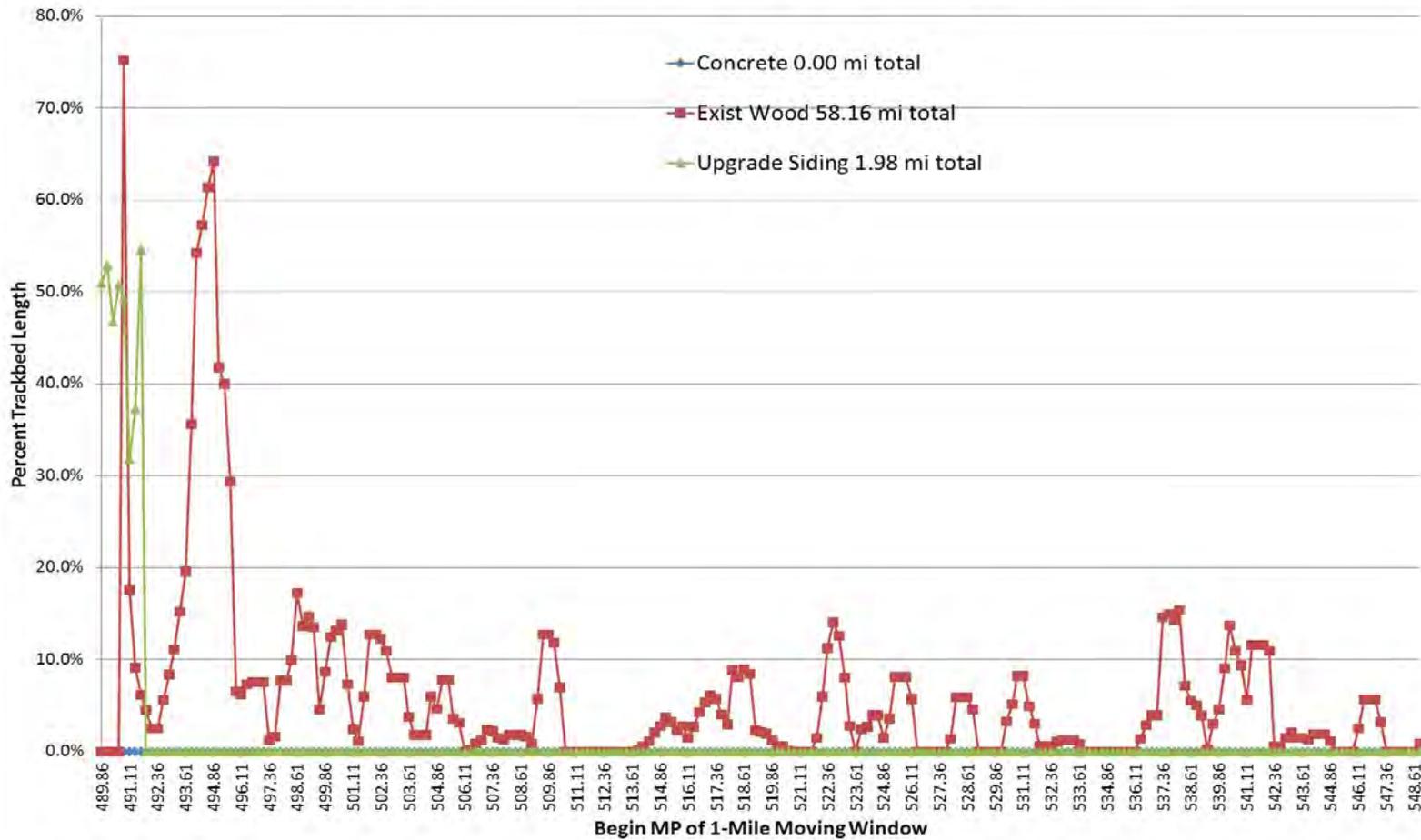
**Average Percent Trackbed Length Exceeding SQI Threshold
Moving 1-Mile Window at 0.25-Mile Increment
Main 1, MP 337 to MP 419.21, Year 2007 to Year 2011, n= 20 Geom Car Runs**



**Average Percent Trackbed Length Exceeding SQI Threshold
Moving 1-Mile Window at 0.25-Mile Increment
Main 1, MP 419.21 to MP 489.86, Year 2007 to Year 2011, n= 21 Geom Car Runs**

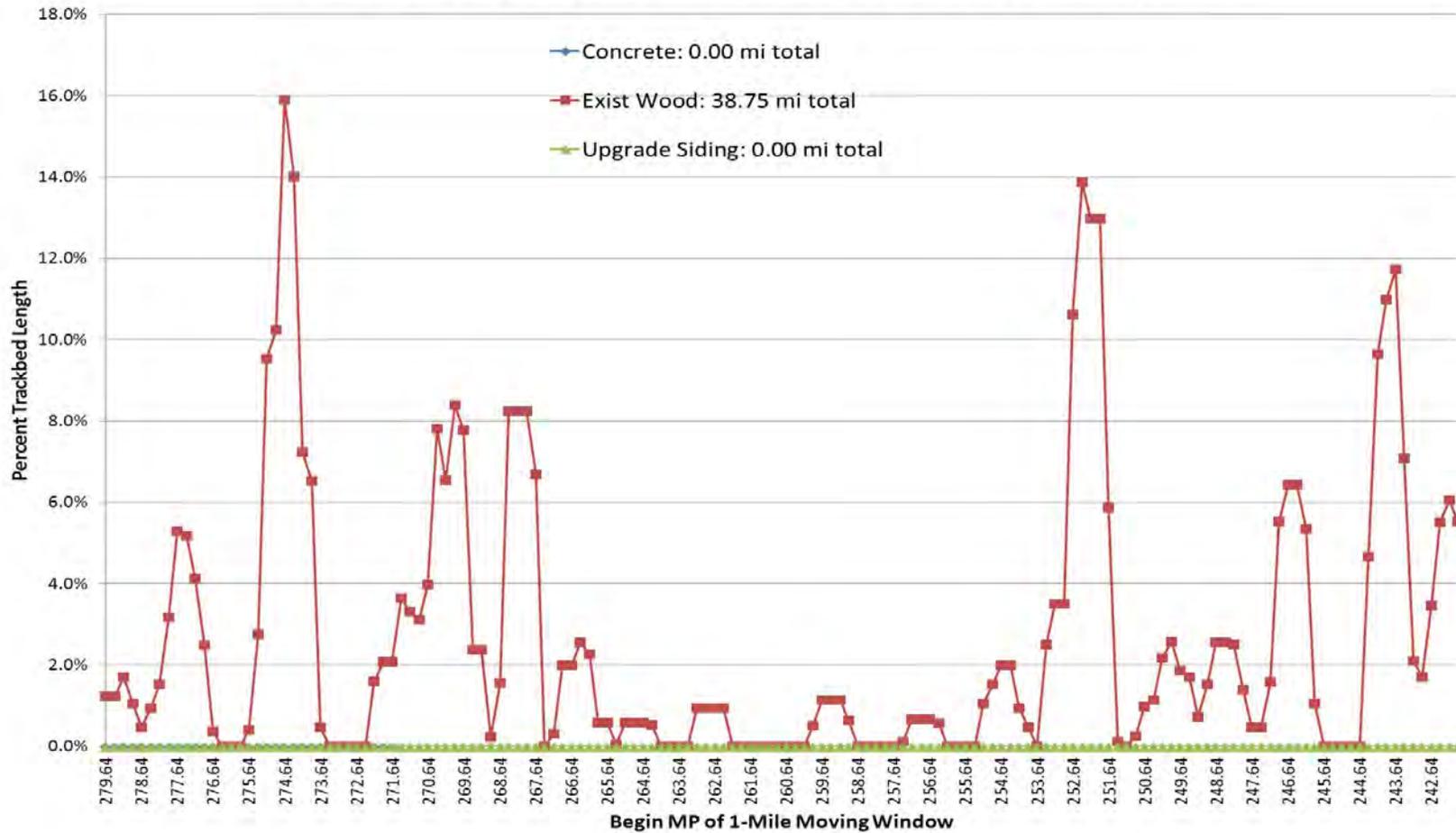


**Average Percent Trackbed Length Exceeding SQI Threshold
Moving 1-Mile Window at 0.25-Mile Increment
Main 1, MP 489.86 to MP 550.00, Year 2007 to Year 2011, n= 17 Geom Car Runs**

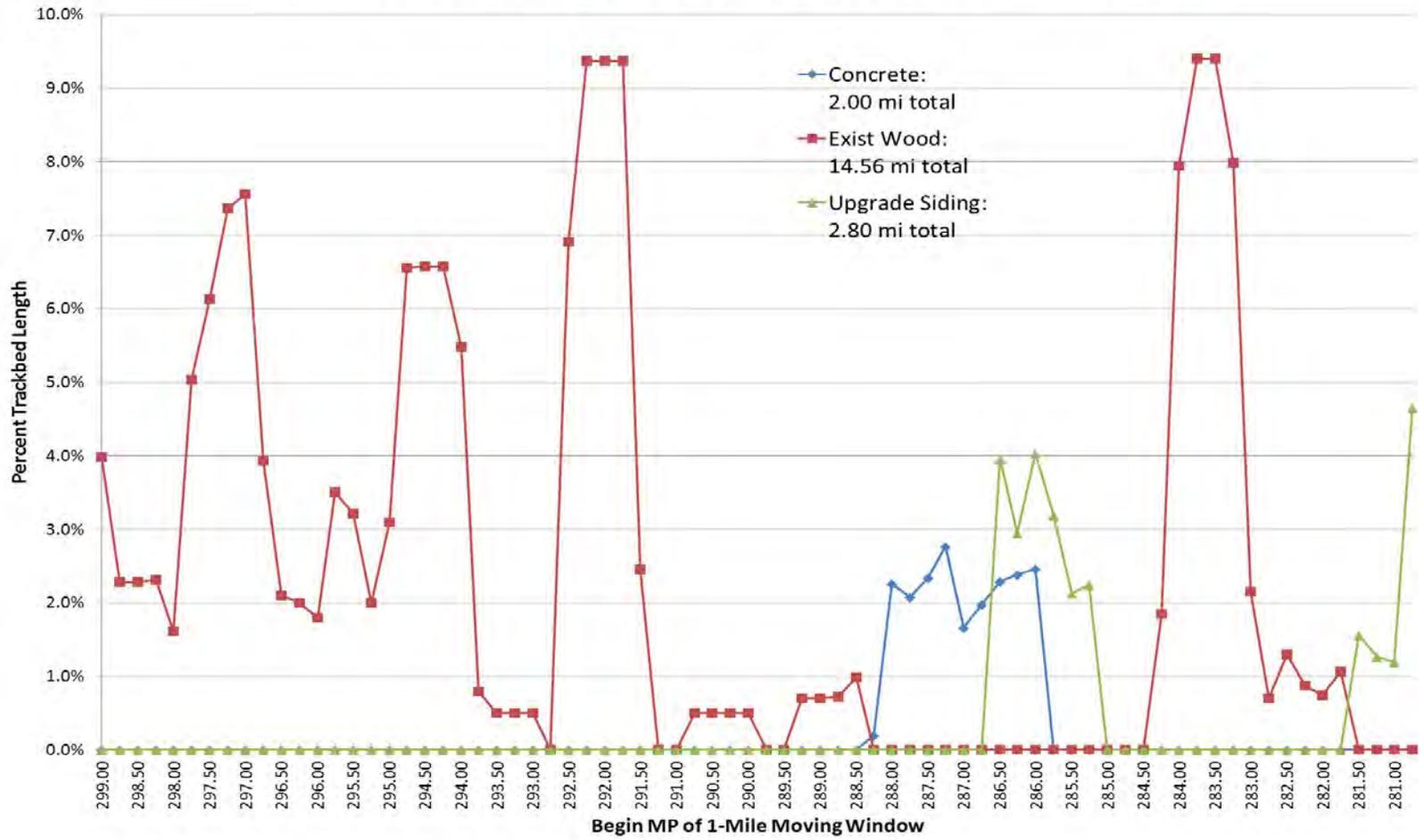


Main 2 Moving Window

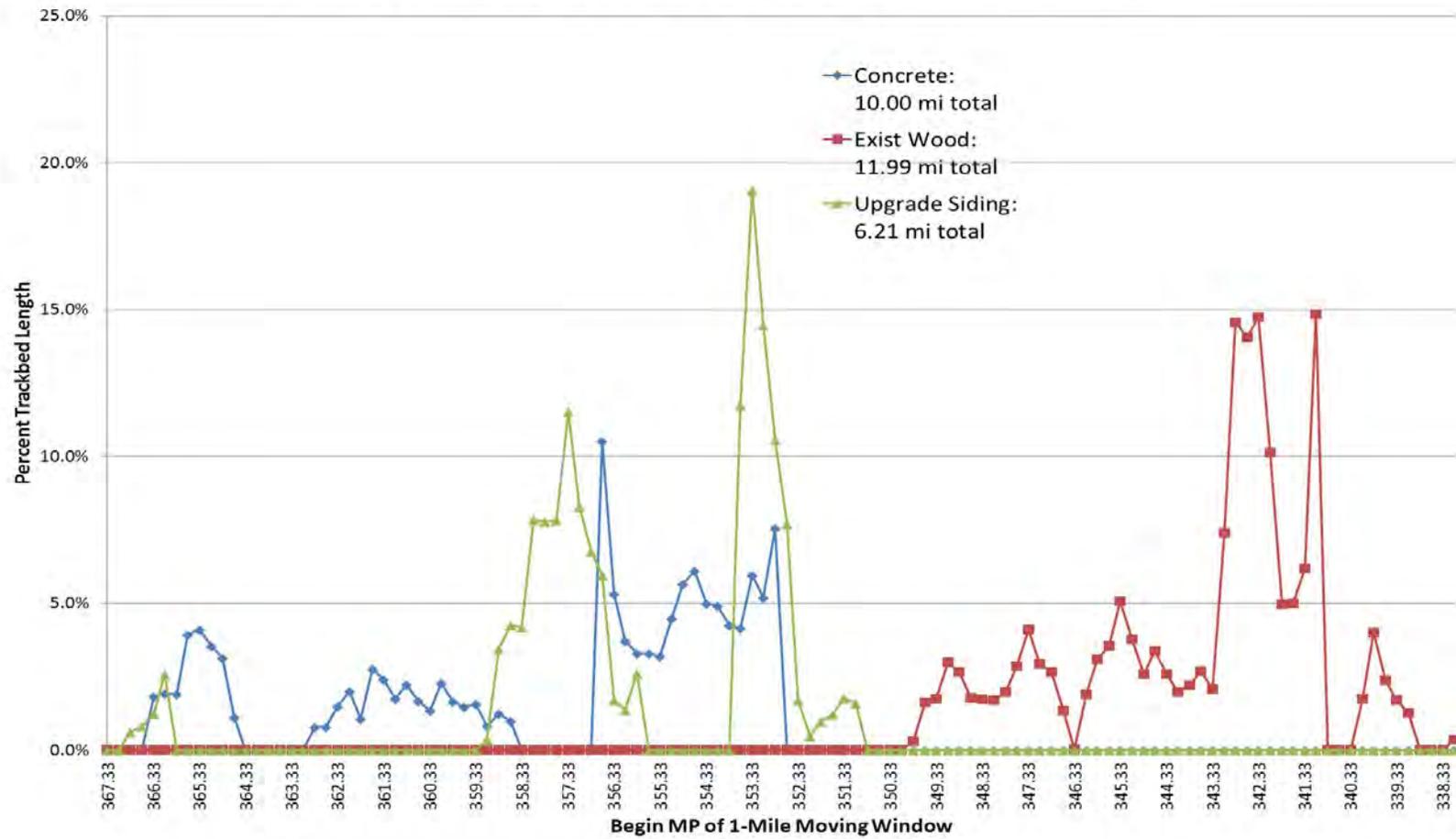
Average Percent Trackbed Length Exceeding SQI Threshold
Moving 1-Mile Window at 0.25-Mile Increment
Main 2, MP 279.64 to MP 240.89, Year 2007 to Year 2011, n= 20 Geom Car Runs



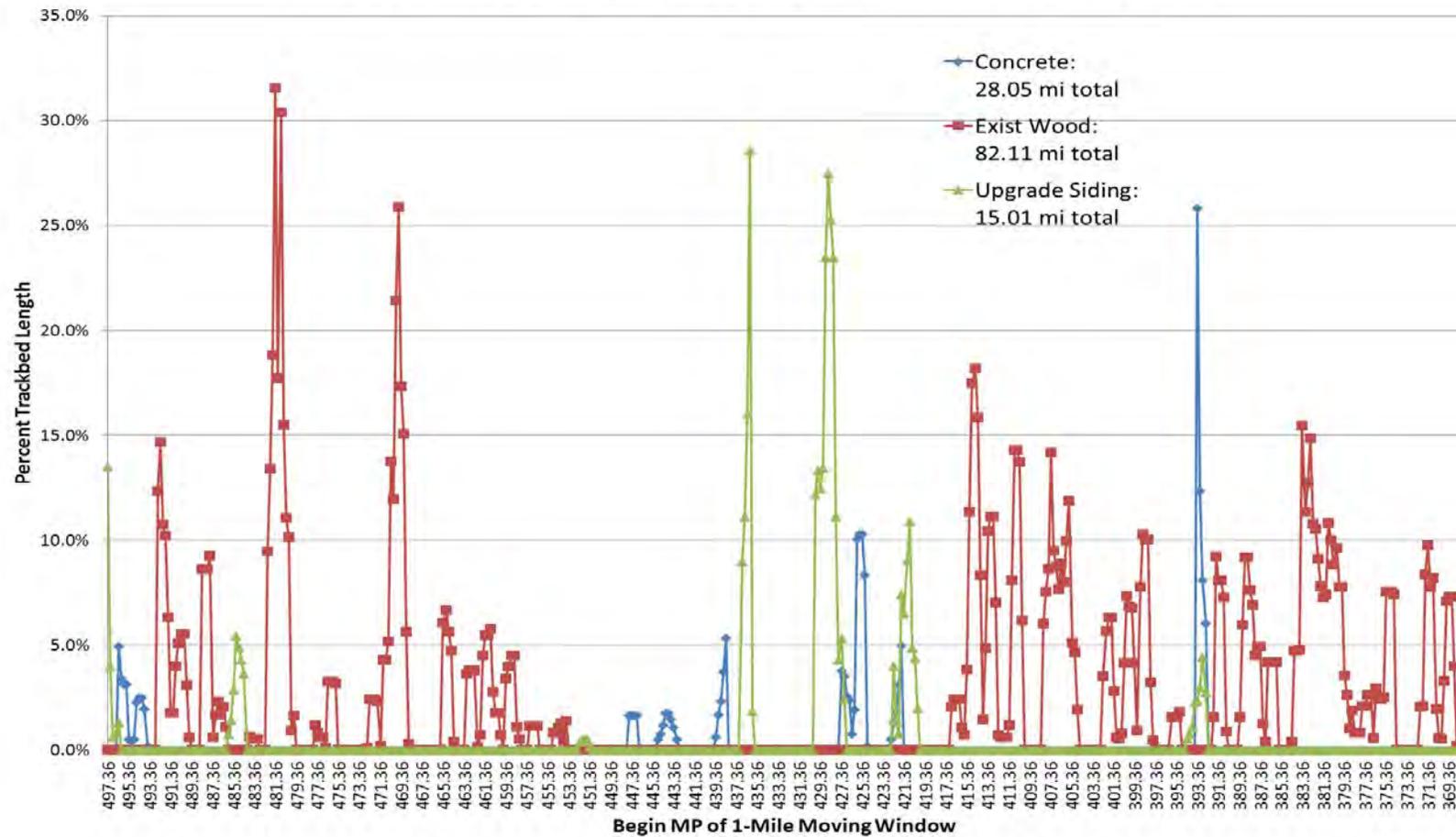
**Average Percent Trackbed Length Exceeding SQI Threshold
 Moving 1-Mile Window at 0.25-Mile Increment
 Main 2, MP 299.00 to MP 279.64, Year 2007 to Year 2011, n= 19 Geom Car Runs**



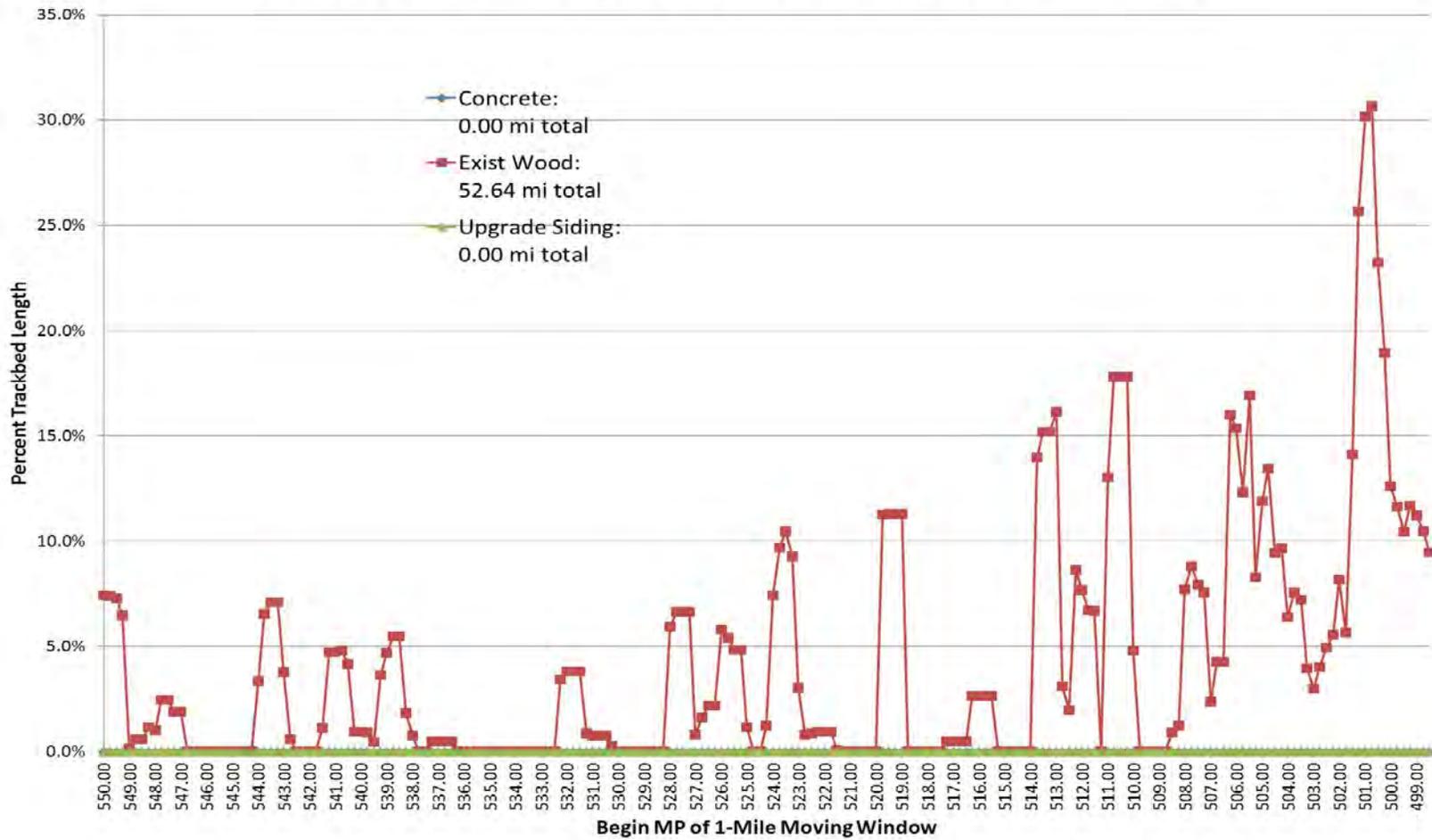
**Average Percent Trackbed Length Exceeding SQI Threshold
Moving 1-Mile Window at 0.25-Mile Increment
Main 2, MP 367.33 to MP 337.00, Year 2007 to Year 2011, n= 19 Geom Car Runs**



**Average Percent Trackbed Length Exceeding SQI Threshold
Moving 1-Mile Window at 0.25-Mile Increment
Main 2, MP 497.36 to MP 367.33, Year 2007 to Year 2011, n= 18 Geom Car Runs**



**Average Percent Trackbed Length Exceeding SQI Threshold
 Moving 1-Mile Window at 0.25-Mile Increment
 Main 2, MP 550.00 to MP 497.36, Year 2007 to Year 2011, n= 20 Geom Car Runs**



1.4 Frequency That SQI Threshold Was Exceeded:

Percent Length Of Trackbed Type Grouped By Number Of Geometry Car Runs Where SQI Threshold Was Exceeded

The frequency of the number of geometry car runs where the SQI threshold was exceeded for the three trackbed types along the Transcon corridor is another useful descriptive statistic. The following table summarizes the performance of four segments on Main 1 by looking at the percent length of trackbed type grouped by the frequency of geometry car runs that exceeded the SQI threshold. The frequency of geometry car runs that exceeded the SQI threshold is organized into five groups:

- 0-to-1 run
- 2-to-4 runs
- 5-to-9 runs
- 10-to-14 runs
- Greater than 14 runs

For example, over the segment that extends from MP 239 to MP 299 (60-mi), there were a total of 19 geometry car runs made between 2007 and 2011. Of the total length of Concrete w/ HMA trackbed type within this segment (44.45-mi):

- 91.6% of that length exceeded the SQI threshold only 0-to-1 run out of the total 19 runs made;
- 6.0% of the 44.45-mi of Concrete w/HMA exceeded the SQI threshold 2-to-4 runs out of the total 19 runs made;
- 1.7% of the 44.45-mi of Concrete w/HMA exceeded the SQI threshold 5-to-9 runs out of the total 19 runs made;
- 0.7% of the 44.45-mi of Concrete w/HMA exceeded the SQI threshold 10-to-14 runs out of the total 19 runs made; and
- 0% of the 44.45-mi of Concrete w/HMA exceeded the SQI threshold >14 runs out of the total 19 runs made;

Within the segment extending from MP 239 to MP 299, the trackbed types of Existing Wood w/ Ballast (6.71-mi) and Upgraded Siding (8.84-mi) had greater percentages of their lengths, compared to Concrete w/HMA, exceeding the SQI threshold a greater number of runs out of the total 19 geometry car runs made between 2007 and 2011.

The same descriptive statistics are summarized in Table X for three additional segments along Main 1:

- MP 337 to MP 419.21

- MP 419.21 to MP 489.86
- MP 489.86 to MP 550.00

At the bottom of the following tables, each trackbed type along the entire distance of Main 1 is summarized with a weighted average of the percent length of trackbed type grouped by the frequency of geometry car runs that exceeded the SQI threshold. The Concrete w/HMA trackbed type (120.94-mi) on Main 1 seems to perform better than the other two trackbed types, having a higher weighted average percentage (89.0%) of its length exceeding the SQI threshold on only 0-to-1 runs out of a total of 19 geometry car runs.

Main 1 - Year 2007 thru Year 2011						
		Percent of Total Length of Trackbed Type By Number of Geometry Car Runs That Exceeded SQI Threshold				
Segment	Length (mi)	0 to 1 Runs	2 to 4 Runs	5 to 9 Runs	10 to 14 Runs	>14 Runs
MP 239.00 to MP 299.00 (19 Geometry Car Runs)	60.00					
Concrete w/HMA	44.45	91.6%	6.0%	1.7%	0.7%	0.0%
Existing Wood	6.71	88.4%	5.8%	5.7%	0.1%	0.0%
Upgraded Siding	8.84	76.9%	15.6%	5.7%	1.8%	0.0%
MP 337.00 to MP 419.21 (20 Geometry Car Runs)	78.15					
Concrete w/HMA	45.46	89.9%	7.8%	1.4%	0.5%	0.4%
Existing Wood	26.55	87.4%	6.9%	4.0%	0.6%	1.1%
Upgraded Siding	6.14	70.5%	19.4%	7.8%	1.5%	0.8%
MP 419.21 to MP 489.86 (21 Geometry Car Runs)	69.45					

Main 1 - Year 2007 thru Year 2011						
		Percent of Total Length of Trackbed Type By Number of Geometry Car Runs That Exceeded SQI Threshold				
Segment	Length (mi)	0 to 1 Runs	2 to 4 Runs	5 to 9 Runs	10 to 14 Runs	>14 Runs
Concrete w/HMA	31.03	83.8%	10.0%	5.0%	1.2%	0.0%
Existing Wood	33.87	83.2%	5.8%	6.7%	2.6%	1.7%
Upgraded Siding	4.55	88.8%	9.9%	1.3%	0.0%	0.0%
MP 489.86 to MP 550.00 (17 Geometry Car Runs)	60.14					
Concrete w/HMA	0.00	0.0%	0.0%	0.0%	0.0%	0.0%
Existing Wood	58.16	84.9%	8.1%	3.9%	1.8%	1.3%
Upgraded Siding	1.98	24.2%	16.7%	16.2%	5.6%	37.3%
	Miles					
Total =	267.74	Weighted Average				
Concrete w/HMA	120.94	89.0%	7.7%	2.4%	0.8%	0.2%
Existing Wood	125.29	85.2%	7.1%	4.8%	1.7%	1.3%
Upgraded Siding	21.51	72.7%	15.6%	6.3%	1.7%	3.7%

Main 2 - Year 2007 thru Year 2011						
		Percent of Total Length of Trackbed Type By Number of Geometry Car Runs That Exceeded SQI Threshold				
Segment	Length (mi)	0 to 1 Runs	2 to 4 Runs	5 to 9 Runs	10 to 14 Runs	>14 Runs
MP 550.00 to MP 497.36 (20 Geometry Car Runs)	52.64					
Concrete w/HMA	0.00	0.0%	0.0%	0.0%	0.0%	0.0%
Existing Wood	52.64	87.3%	5.8%	4.1%	2.2%	0.6%
Upgraded Siding	0.00	0.0%	0.0%	0.0%	0.0%	0.0%
MP 497.36 to MP 367.33 (18 Geometry Car Runs)	124.09					

Main 2 - Year 2007 thru Year 2011						
		Percent of Total Length of Trackbed Type By Number of Geometry Car Runs That Exceeded SQI Threshold				
Segment	Length (mi)	0 to 1 Runs	2 to 4 Runs	5 to 9 Runs	10 to 14 Runs	>14 Runs
Concrete w/HMA	28.05	96.1%	3.0%	0.5%	0.4%	0.0%
Existing Wood	81.03	87.7%	7.0%	3.5%	1.8%	0.0%
Upgraded Siding	15.01	83.5%	7.9%	6.3%	2.3%	0.0%
MP 367.33 to MP 337.00 (19 Geometry Car Runs)	27.42					
Concrete w/HMA	10.00	90.4%	9.6%	0.0%	0.0%	0.0%
Existing Wood	11.39	91.9%	5.0%	2.6%	0.5%	0.0%
Upgraded Siding	6.03	80.8%	14.6%	4.3%	0.3%	0.0%
MP 299.00 to MP 279.64 (19 Geometry Car Runs)	19.36					
Concrete w/HMA	2.00	95.0%	5.0%	0.0%	0.0%	0.0%
Existing Wood	14.56	90.9%	5.5%	2.8%	0.8%	0.0%
Upgraded Siding	2.80	85.7%	11.8%	2.5%	0.0%	0.0%

Main 2 - Year 2007 thru Year 2011						
		Percent of Total Length of Trackbed Type By Number of Geometry Car Runs That Exceeded SQI Threshold				
Segment	Length (mi)	0 to 1 Runs	2 to 4 Runs	5 to 9 Runs	10 to 14 Runs	>14 Runs
MP 279.64 to MP 240.89 (20 Geometry Car Runs)	38.75					
Concrete w/HMA	0.00	0.0%	0.0%	0.0%	0.0%	0.0%
Existing Wood	38.75	89.8%	7.2%	2.0%	0.9%	0.1%
Upgraded Siding	0.00	0.0%	0.0%	0.0%	0.0%	0.0%
	Miles					
Total =	262.26	Weighted Average				
Concrete w/HMA	40.05	94.6%	4.7%	0.4%	0.3%	0.0%
Existing Wood	198.37	88.5%	6.5%	3.3%	1.6%	0.2%
Upgraded Siding	23.84	83.1%	10.1%	5.3%	1.5%	0.0%

Another way of looking at the geometry car run frequency data is to consider each 52.8-ft length of trackbed as being a series of discrete “points” along the total length of the track corridor. The percent of geometry car runs that exceeded the SQI threshold for each discrete point can then be compiled. This method reveals particular locations where the frequency of exceeding the SQI threshold might have been more of an issue than at other locations.

The following figures summarize this analysis for the three trackbed types – Concrete w/HMA, Existing Wood, and Upgraded Siding – for the segment extending from MP 239 to MP 299 on Main 1.

Main 1 - MP 239 to MP 299

Figure XX – Concrete w/HMA

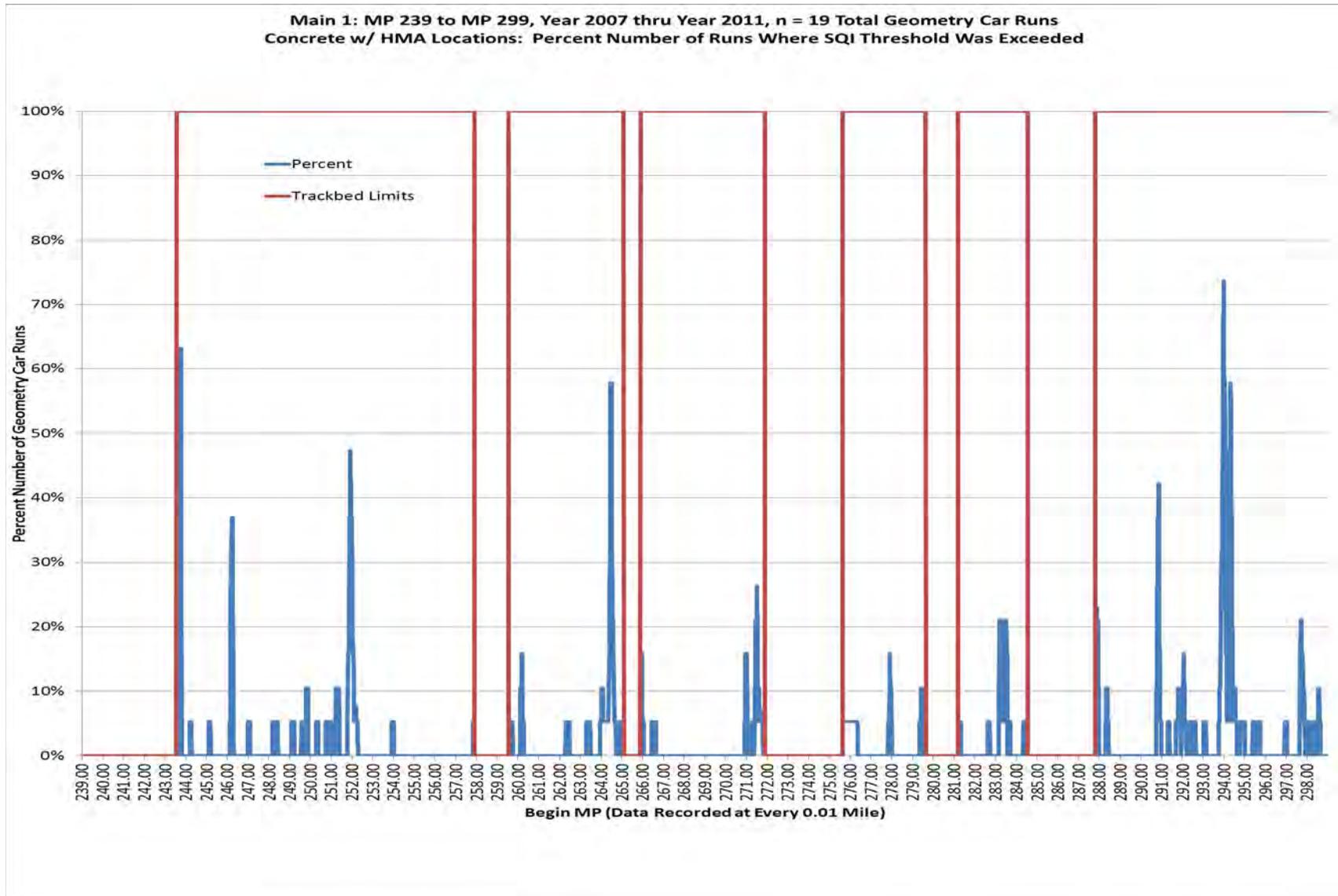


Figure XX – Existing Wood

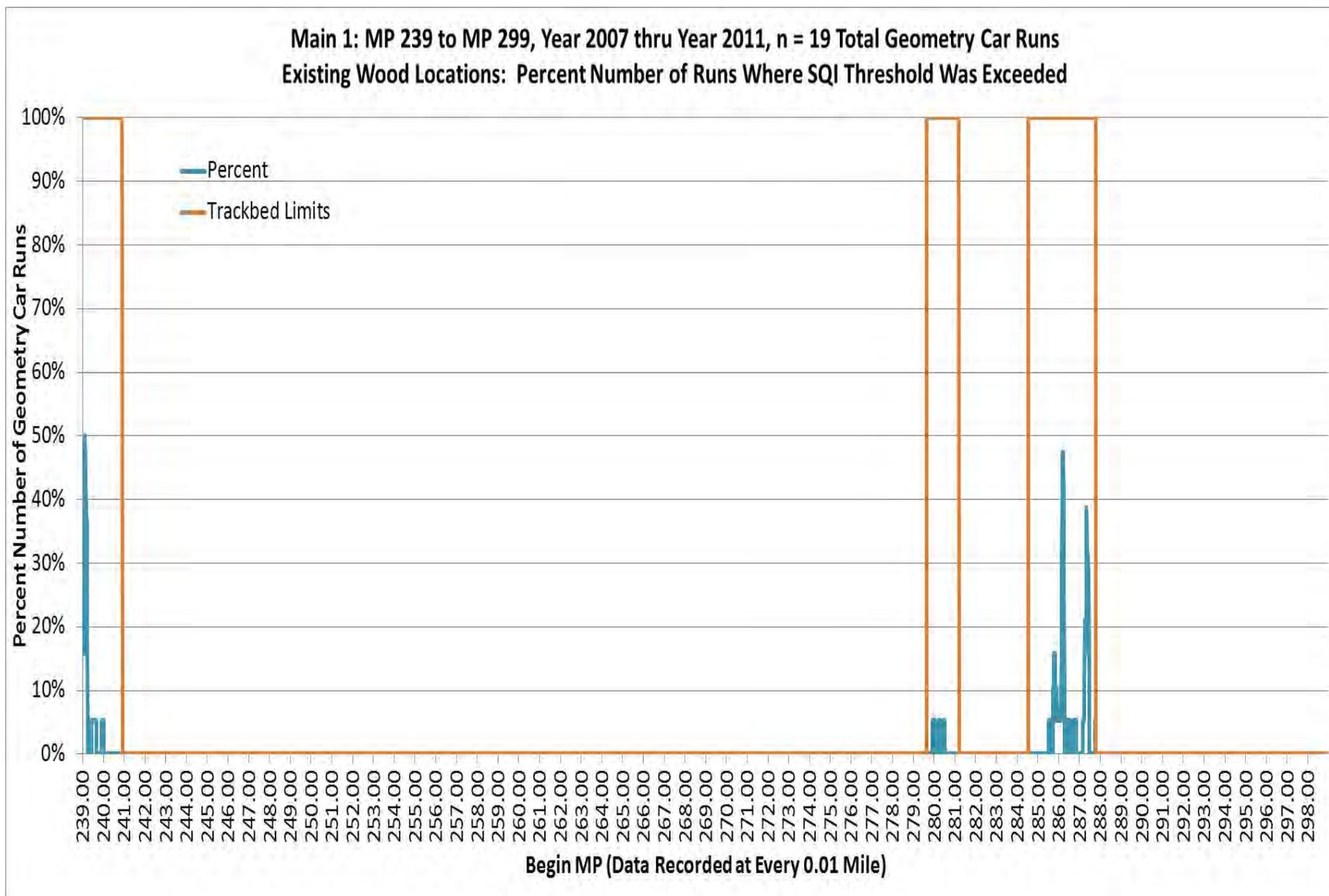
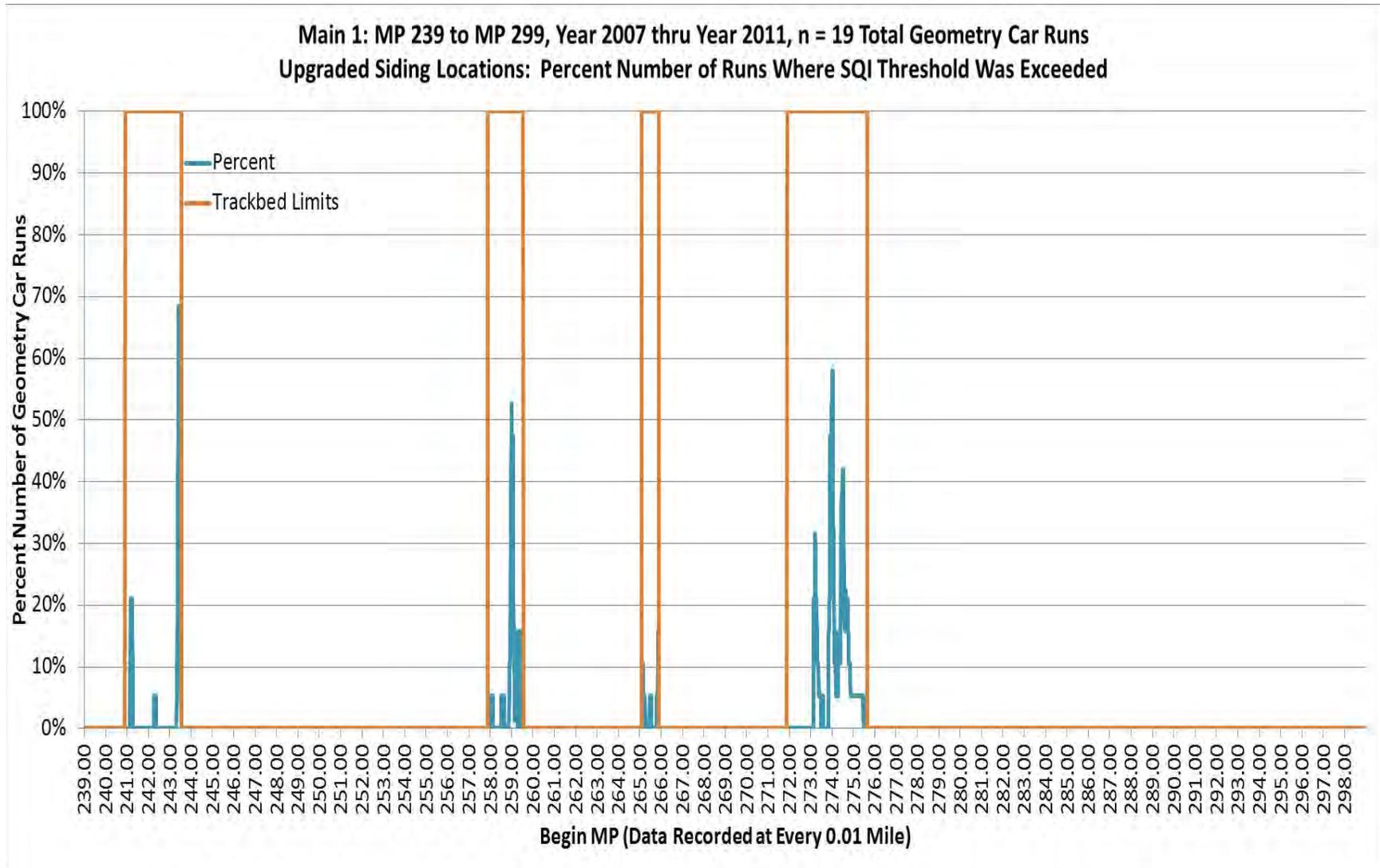


Figure XX – Upgraded Siding



Main 1 - MP 337 to MP 419.21

Figure XX – Concrete w/HMA

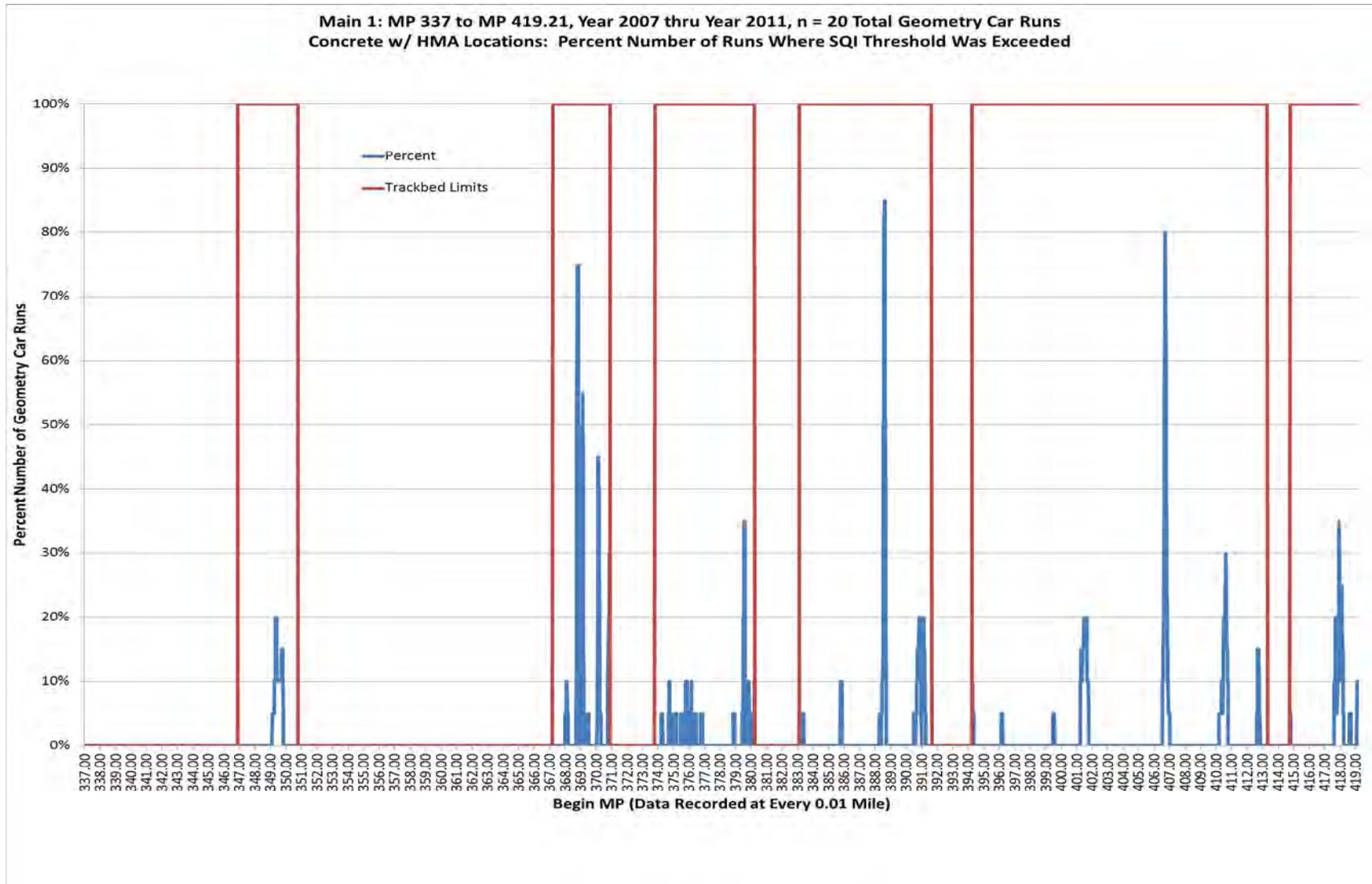


Figure XX – Existing Wood

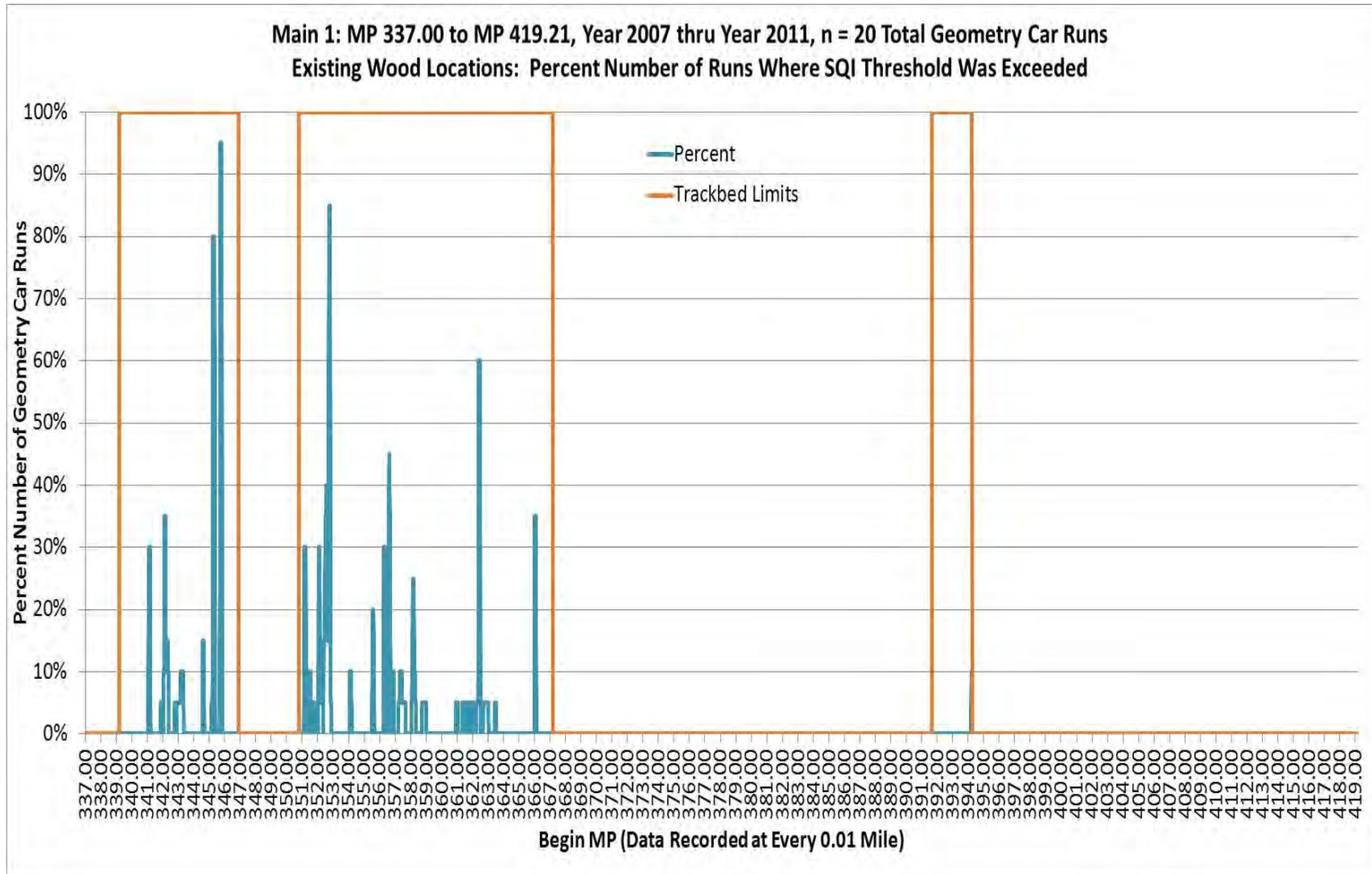
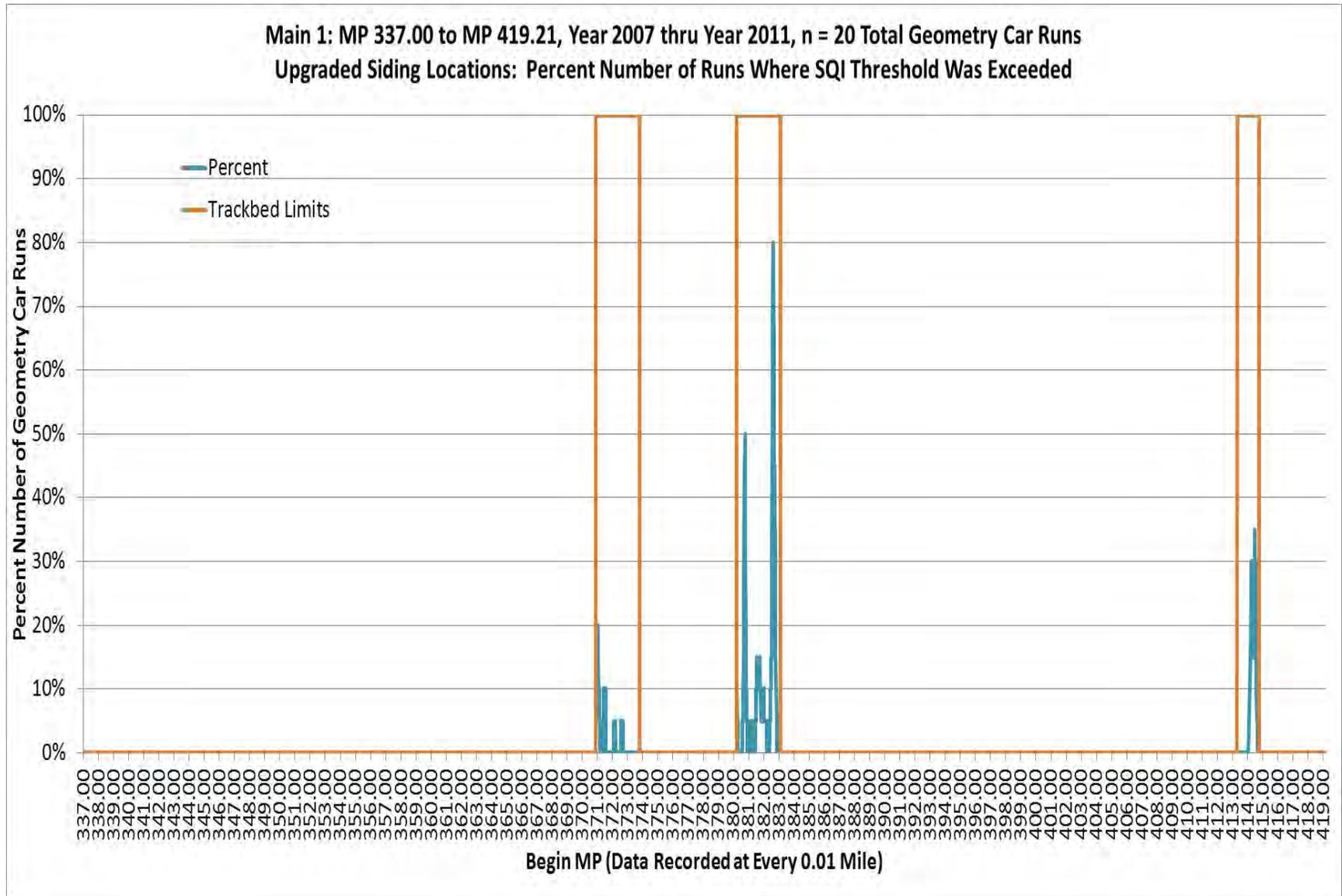


Figure XX – Upgraded Siding



Main 1 - MP 419.21 to MP 489.86

Figure XX. Concrete w/HMA

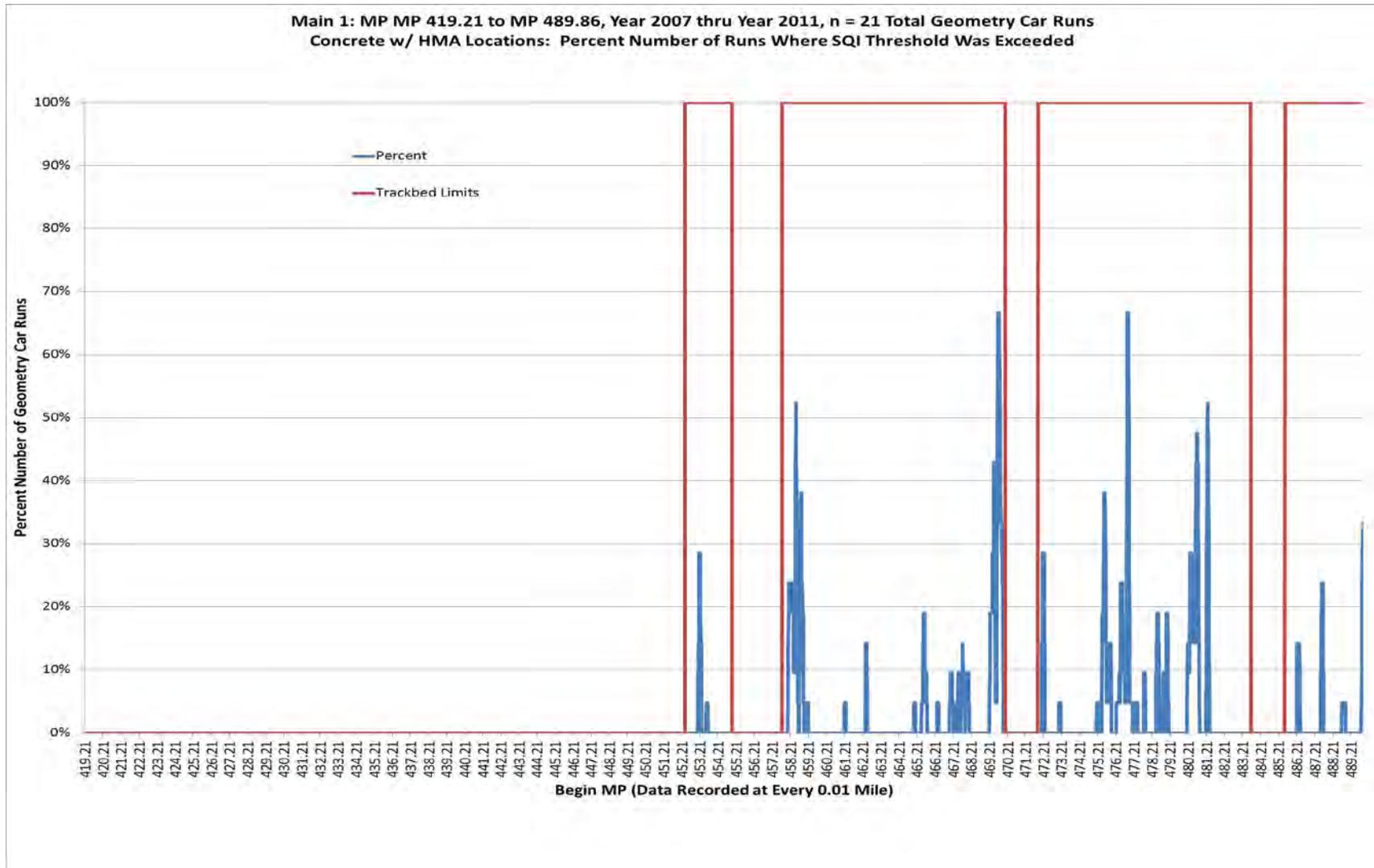


Figure XX. Existing Wood

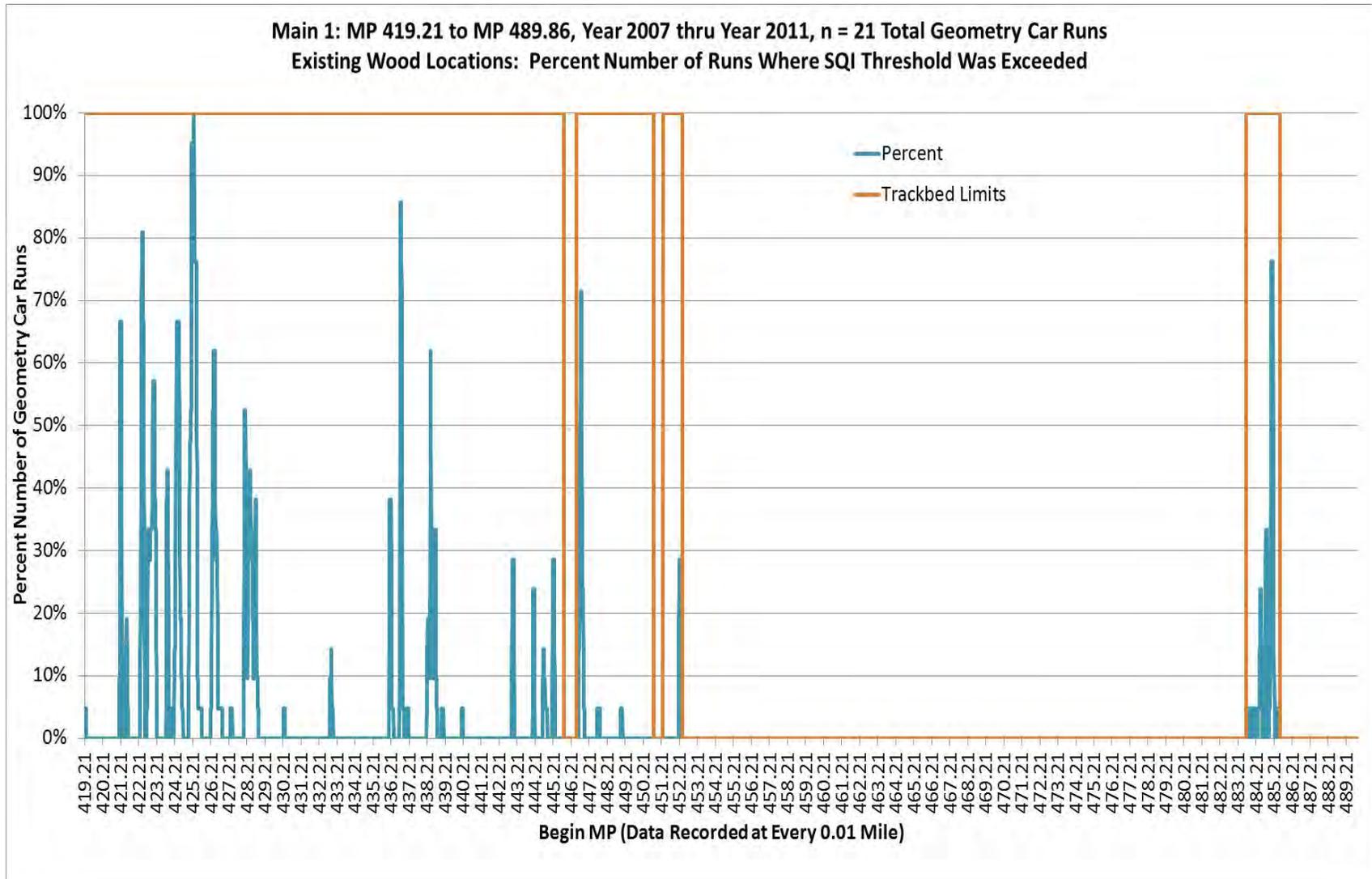
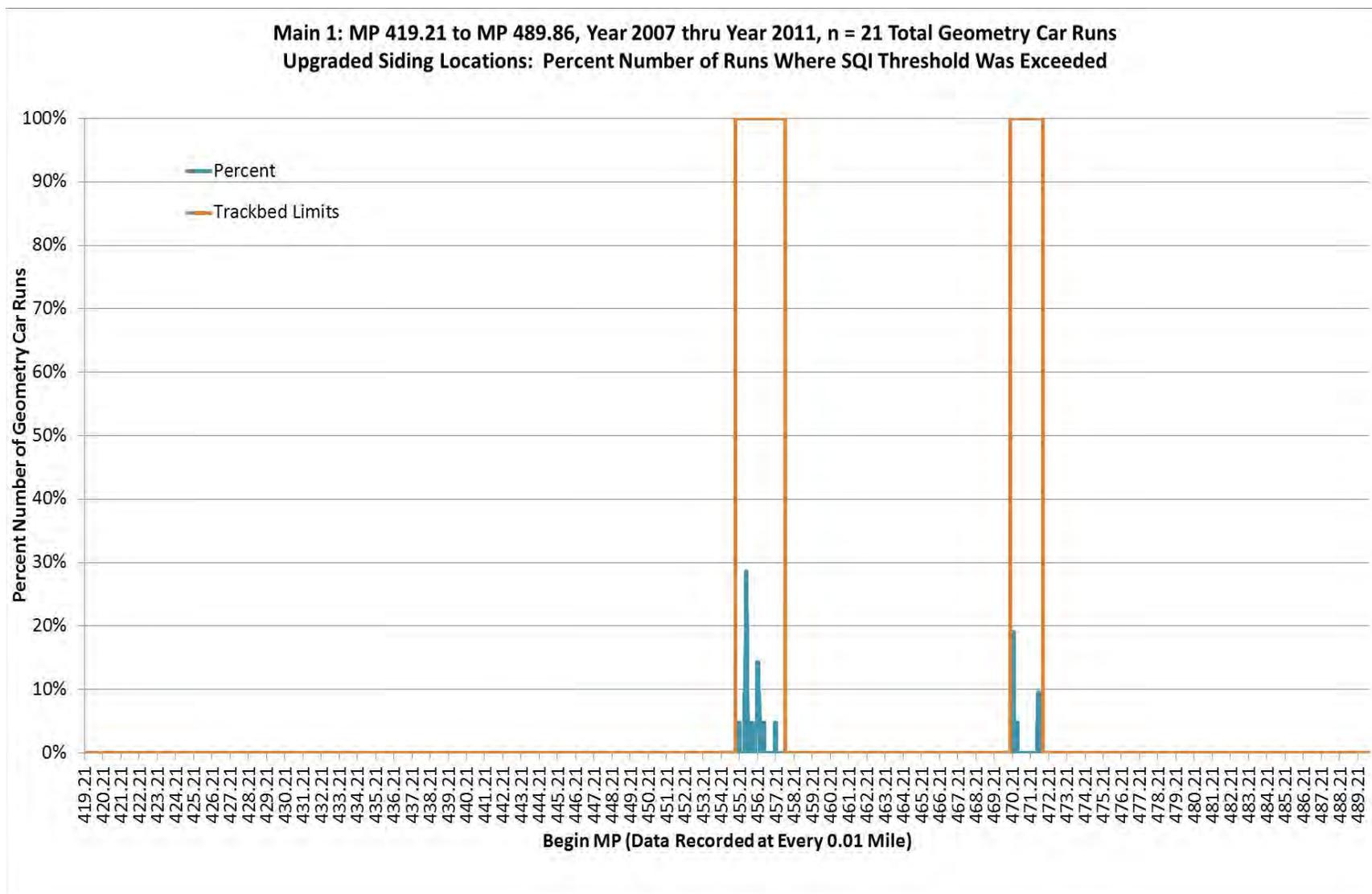


Figure XX. Upgraded Siding



Main 1 - MP 489.86 to MP 550.00

Figure XX. Existing Wood

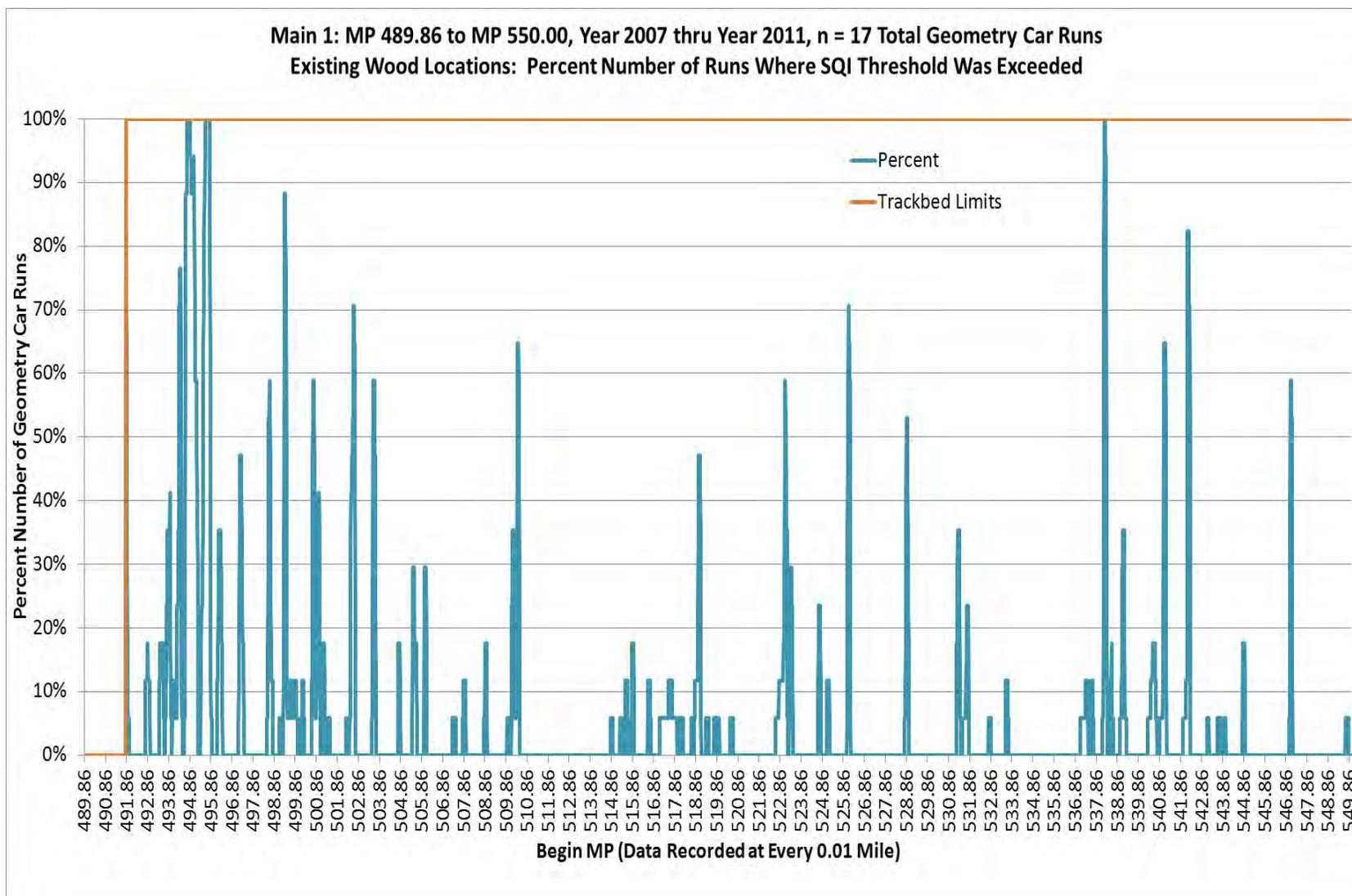
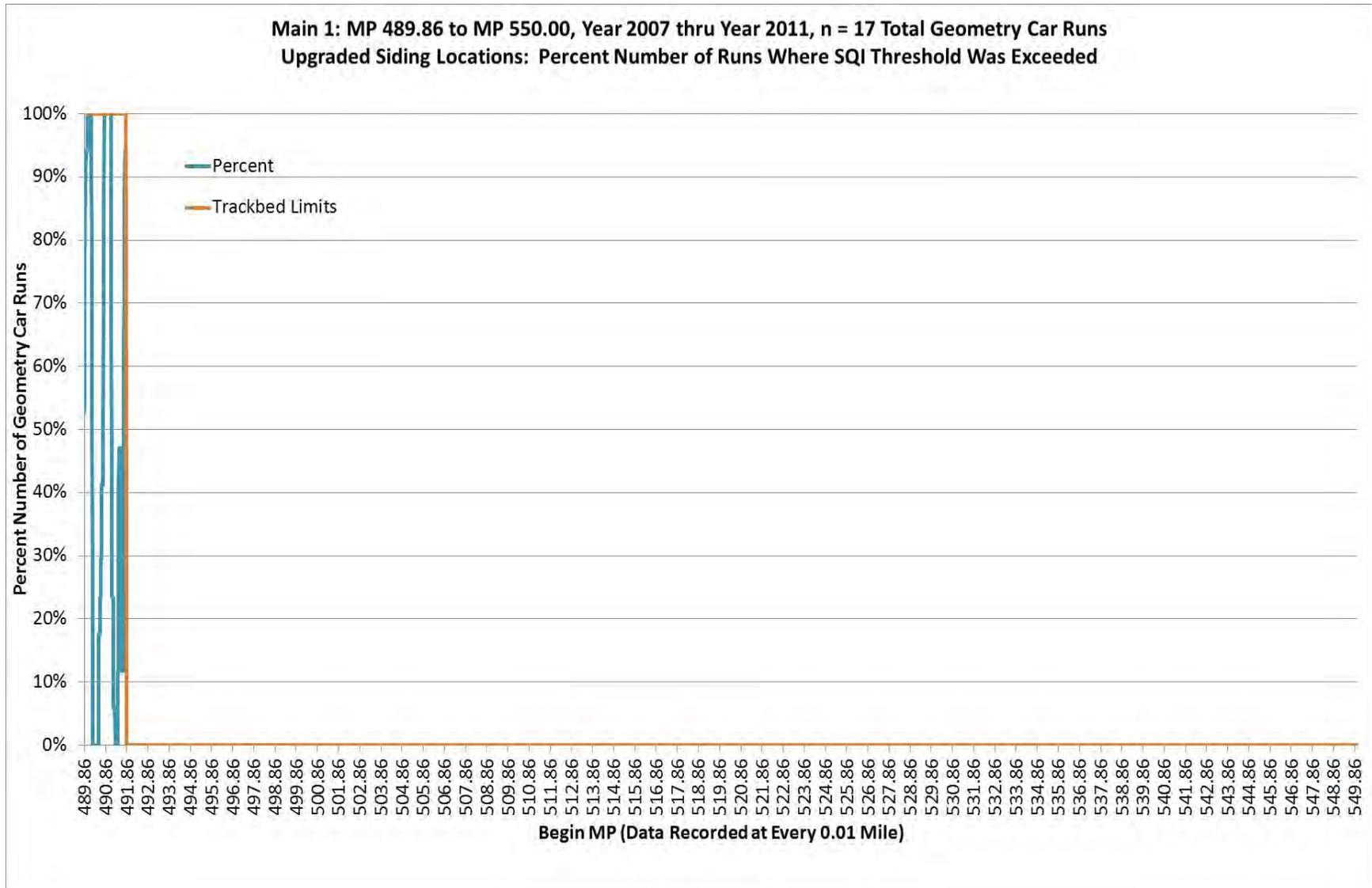
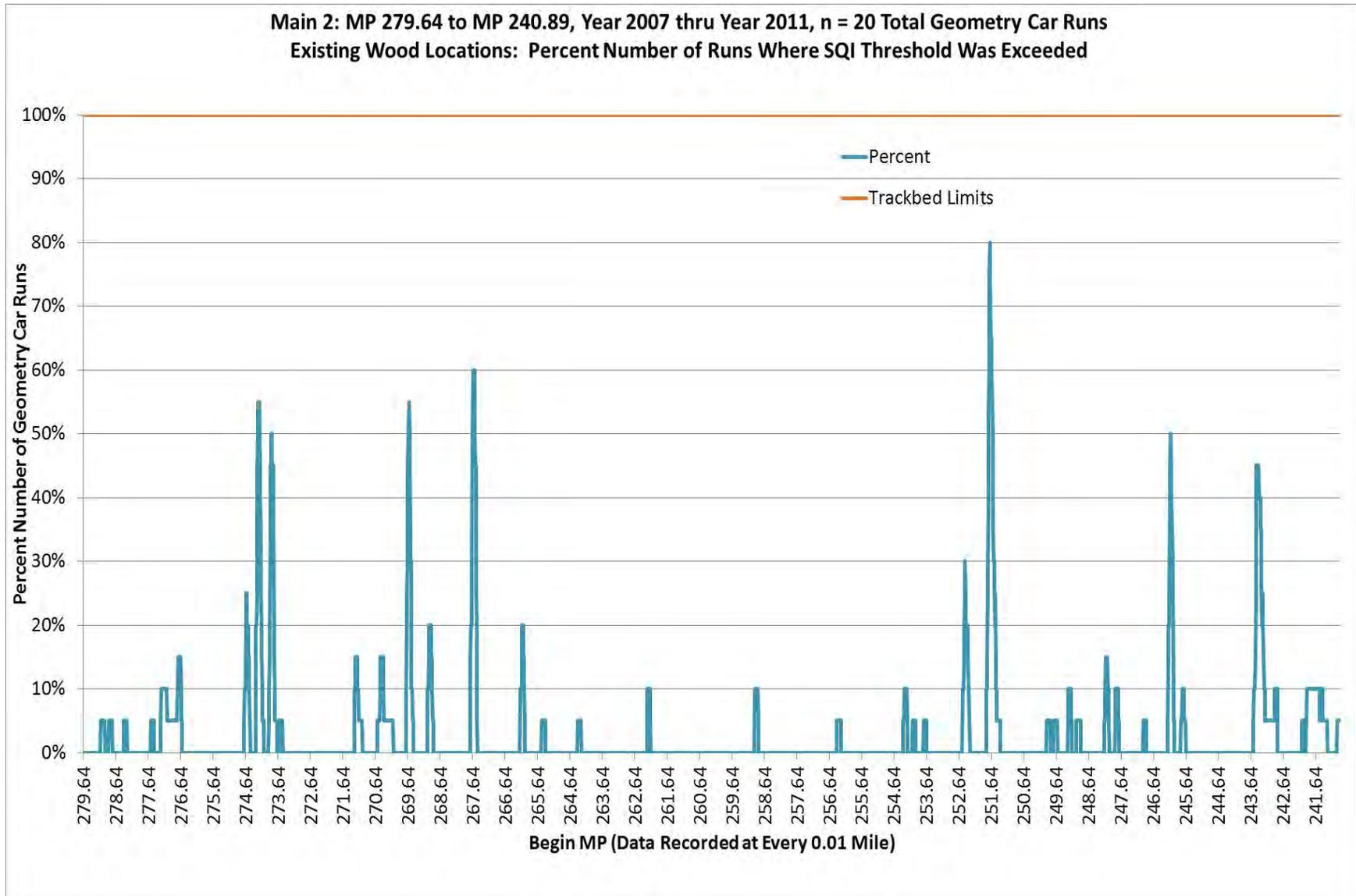


Figure XX. Upgraded Siding



Main 2 - MP 240.89 to MP 279.64

Figure XX – Existing Wood



Main 2 - MP 279.64 to MP 299.00

Figure XX – Concrete w/HMA

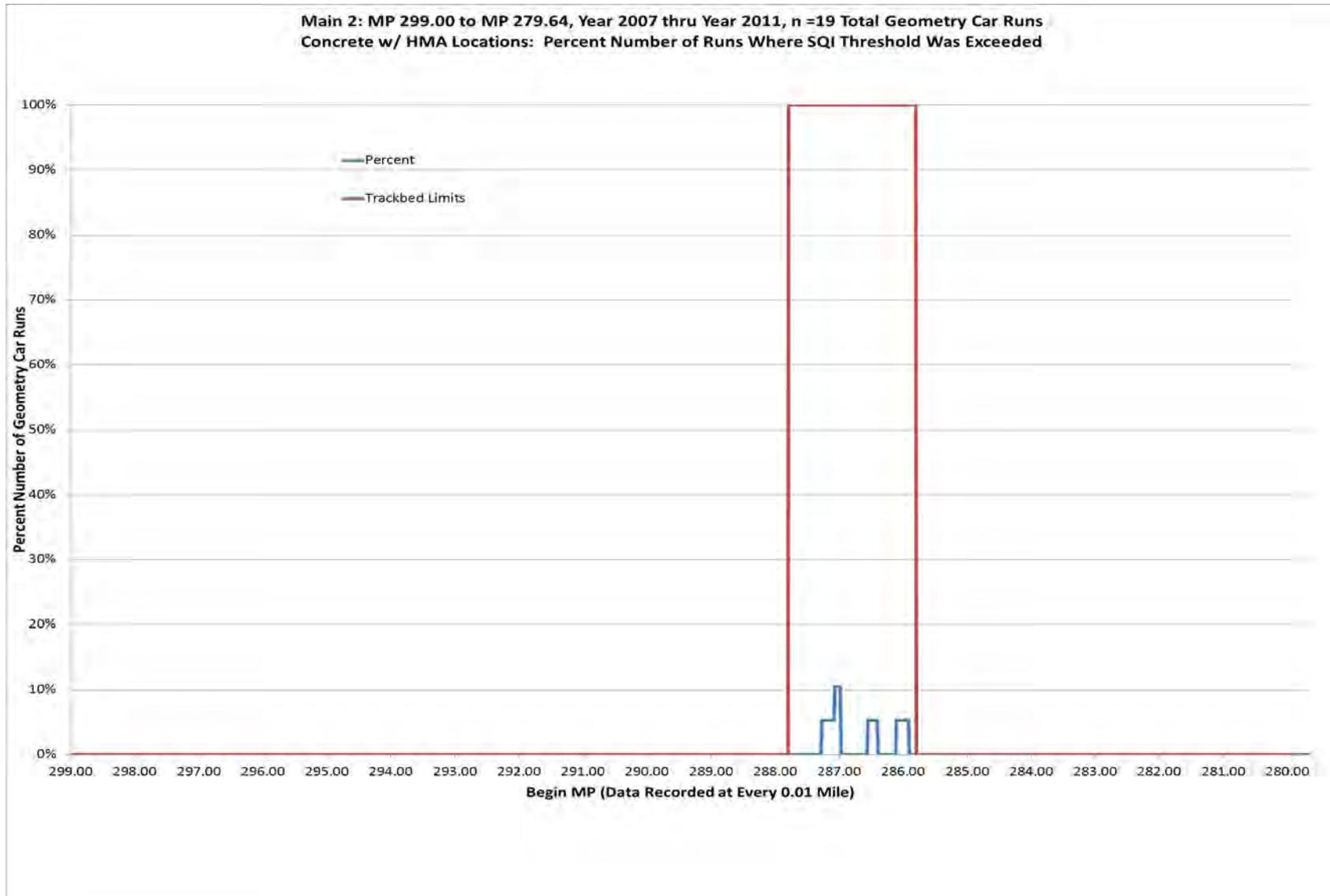


Figure XX – Existing Wood

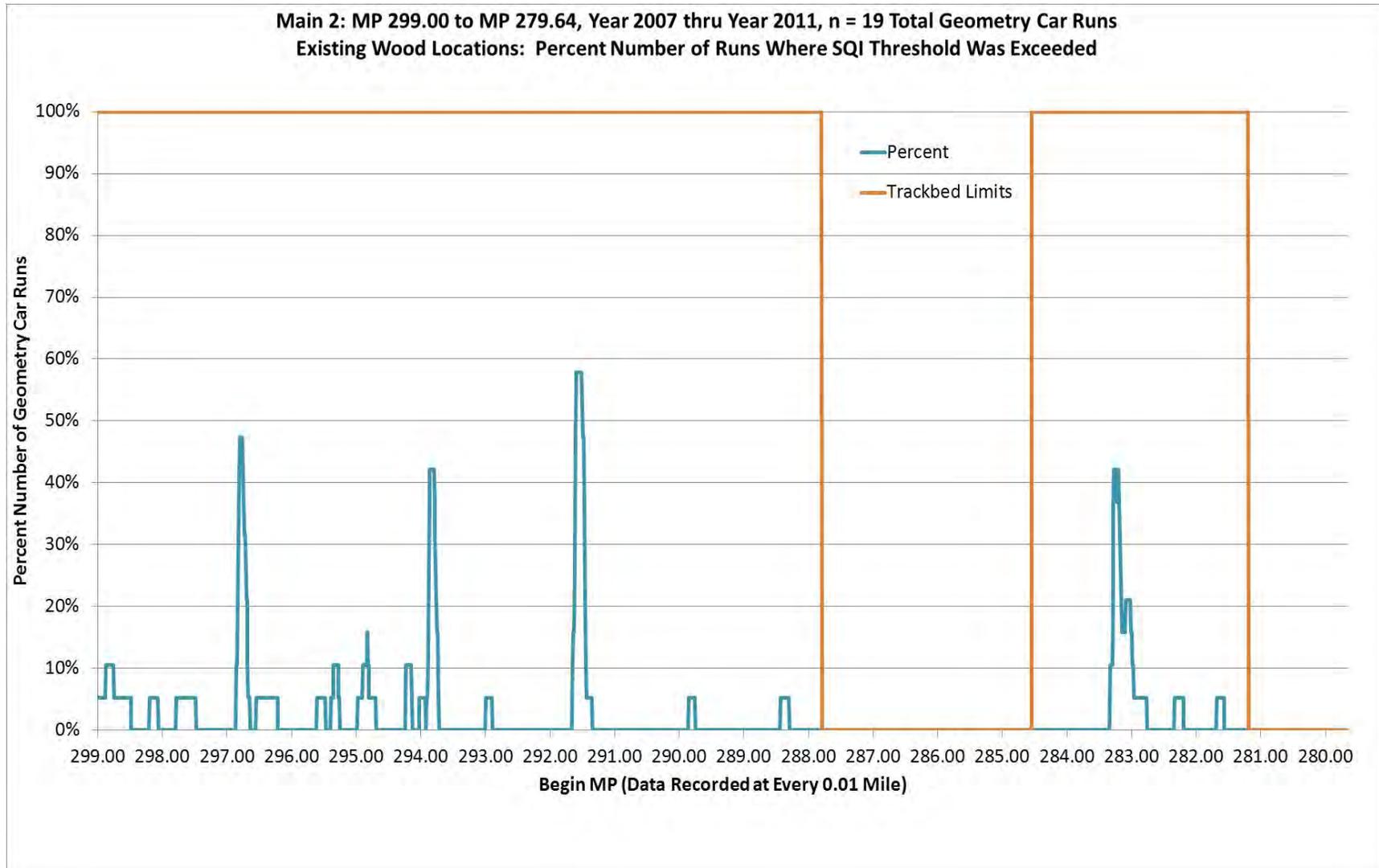
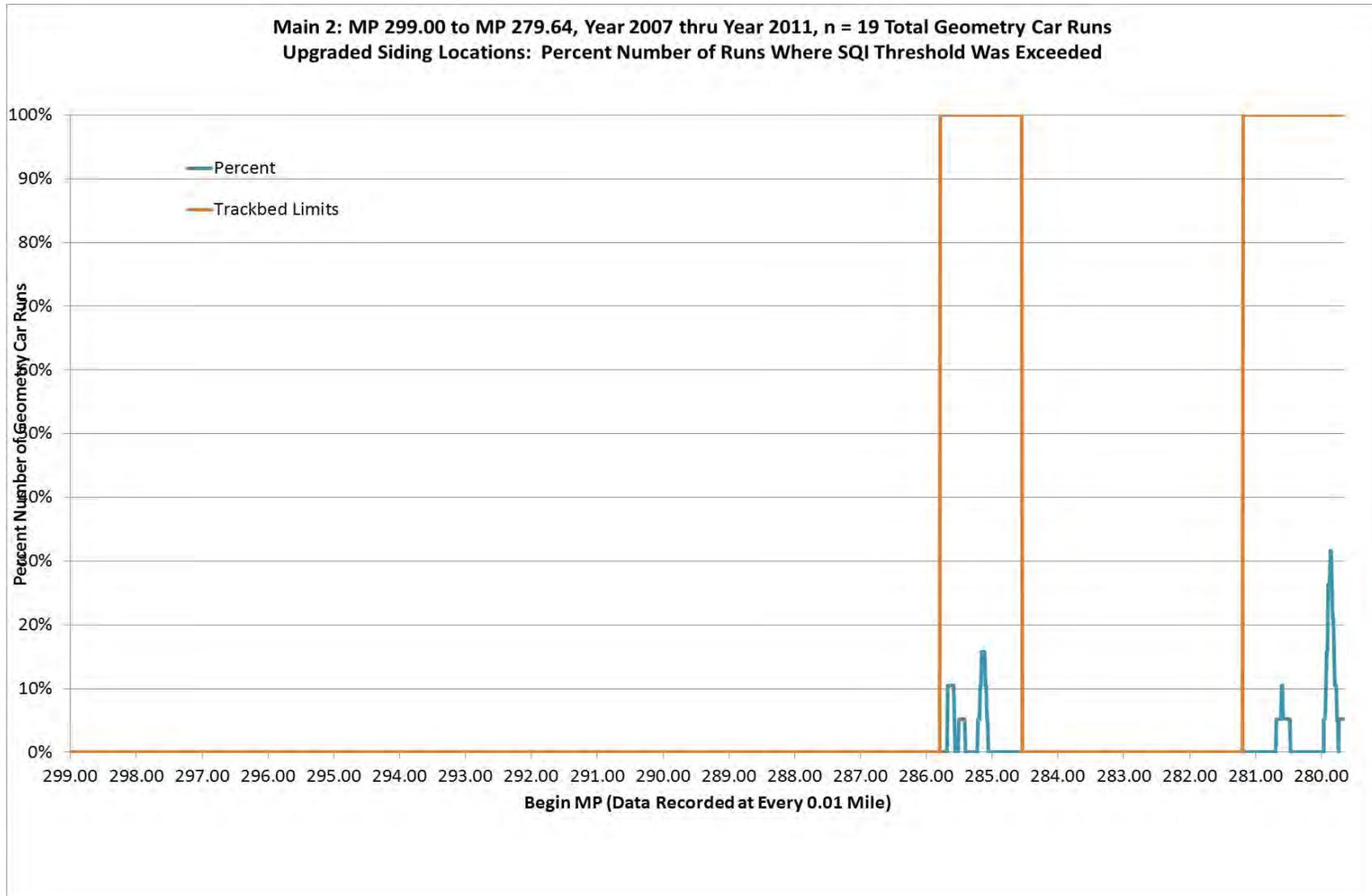


Figure XX – Upgraded Siding



Main 2 - MP 337.00 to MP 367.33

Figure XX. Concrete w/HMA

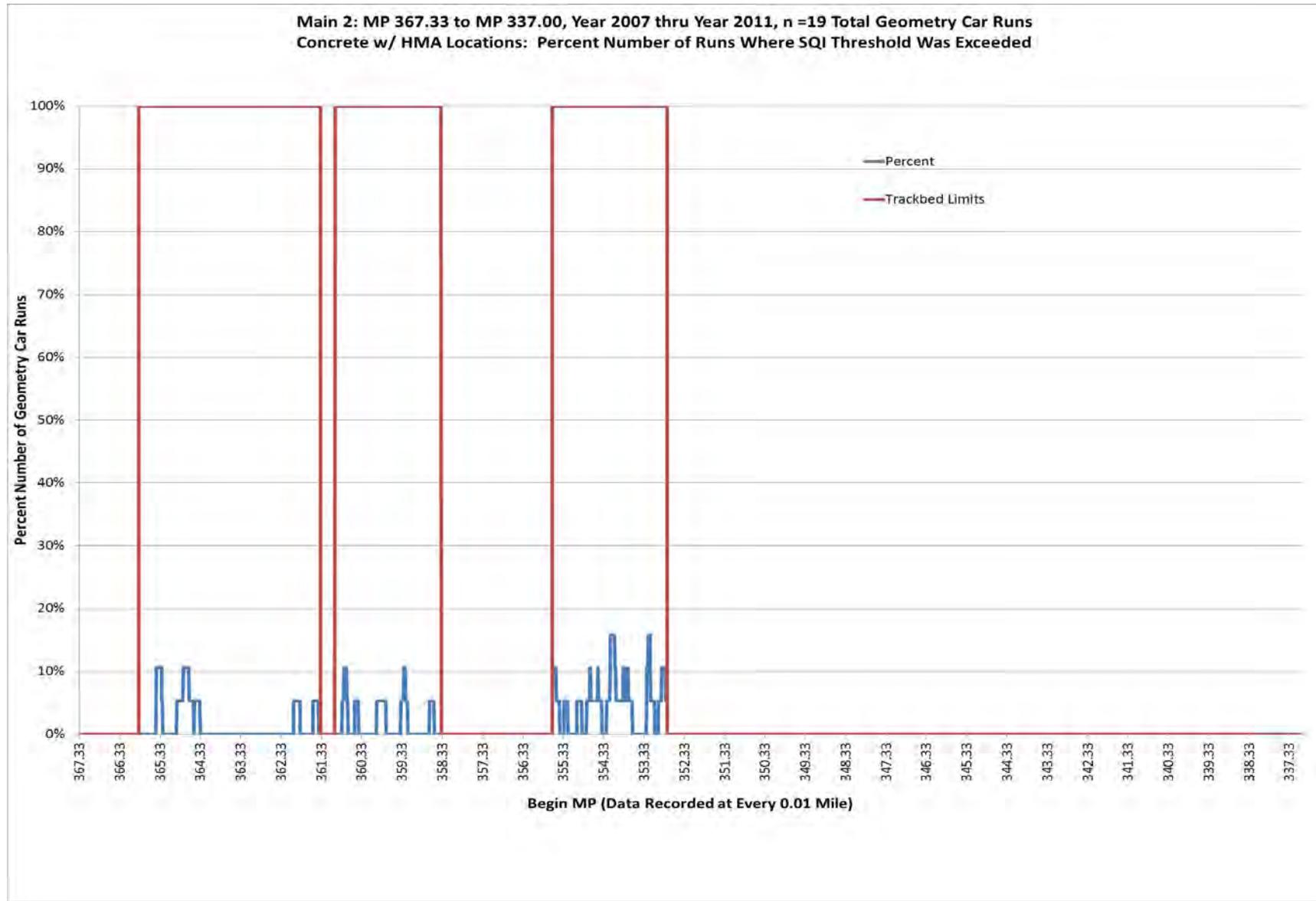


Figure XX. Existing Wood

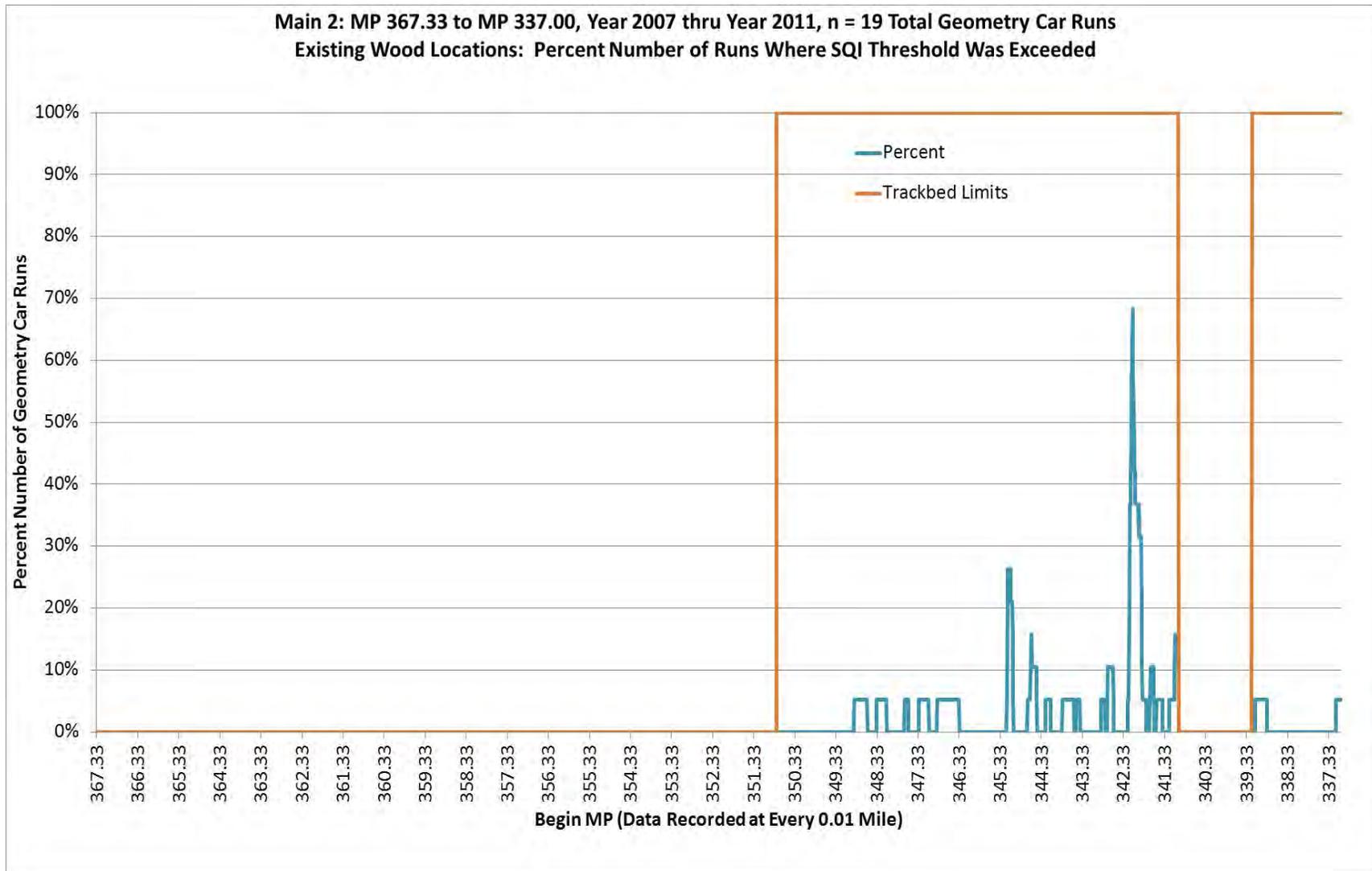
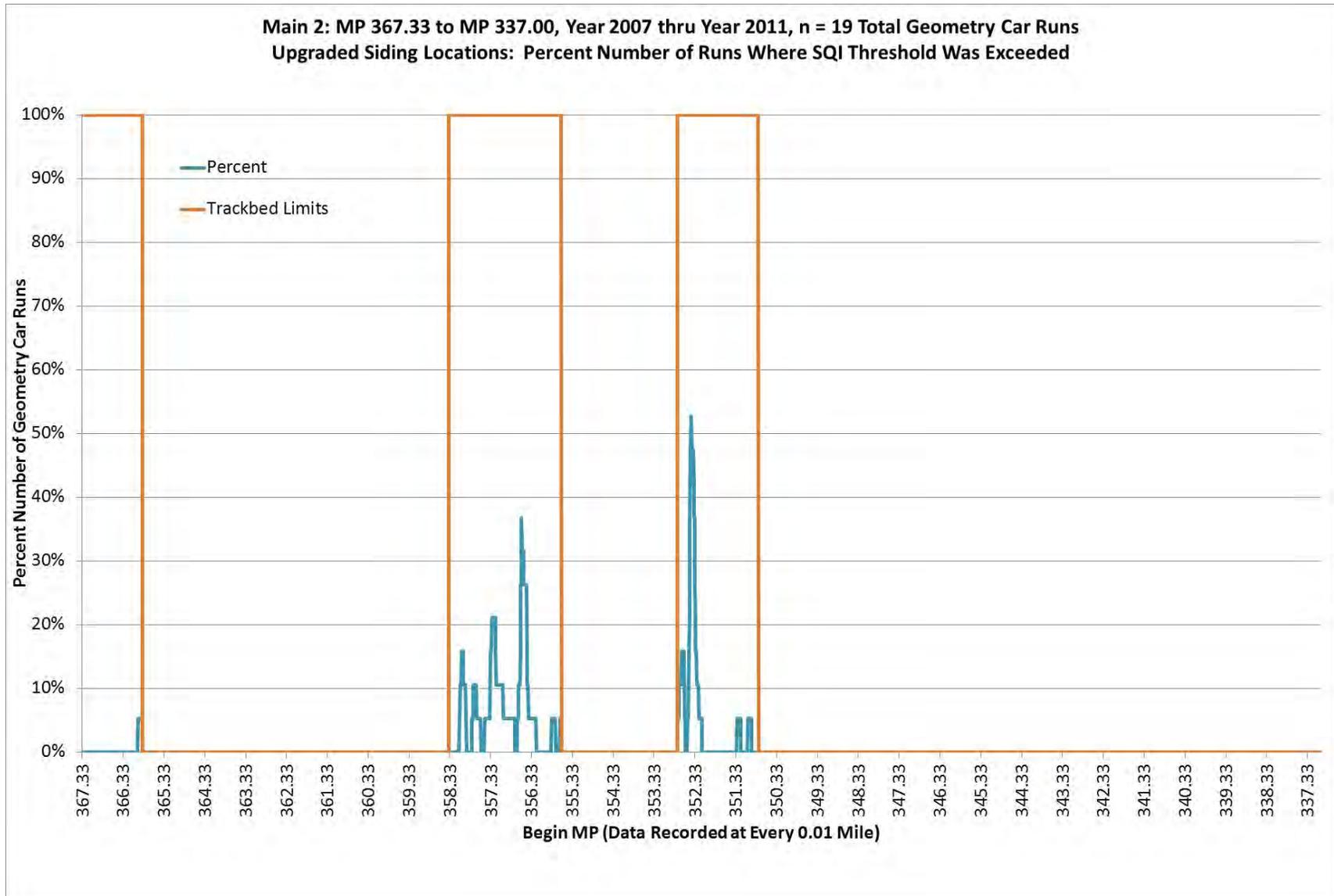


Figure XX. Upgraded Siding



Main 2 - MP 367.33 to MP 497.36

Figure XX. Concrete w/HMA

**Main 2: MP 497.36 to MP 367.33 , Year 2007 thru Year 2011, n =18 Total Geometry Car Runs
Concrete w/ HMA Locations: Percent Number of Runs Where SQI Threshold Was Exceeded**

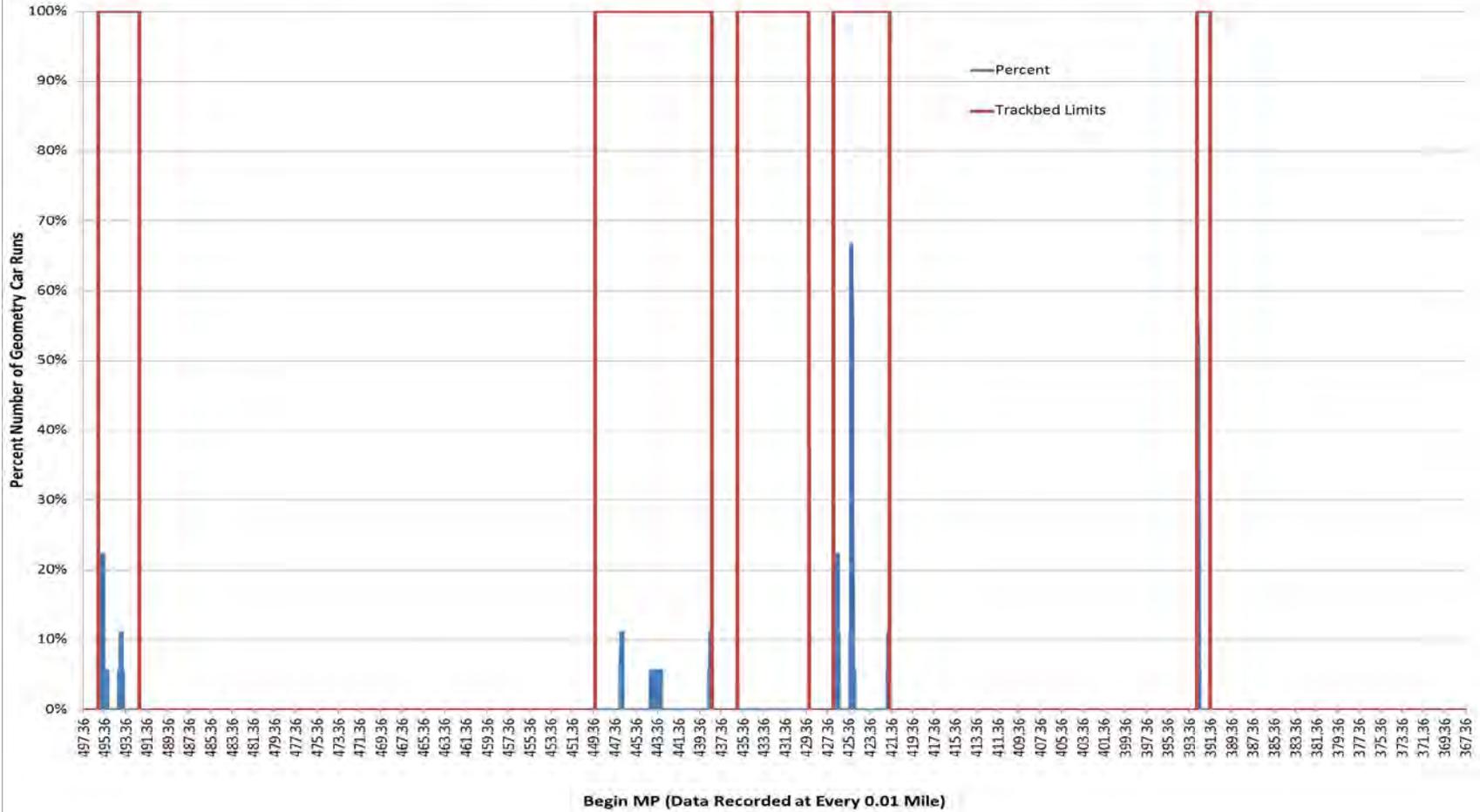


Figure XX. Existing Wood

Main 2: MP 497.36 to MP 367.33, Year 2007 thru Year 2011, n = 18 Total Geometry Car Runs
Existing Wood Locations: Percent Number of Runs Where SQI Threshold Was Exceeded

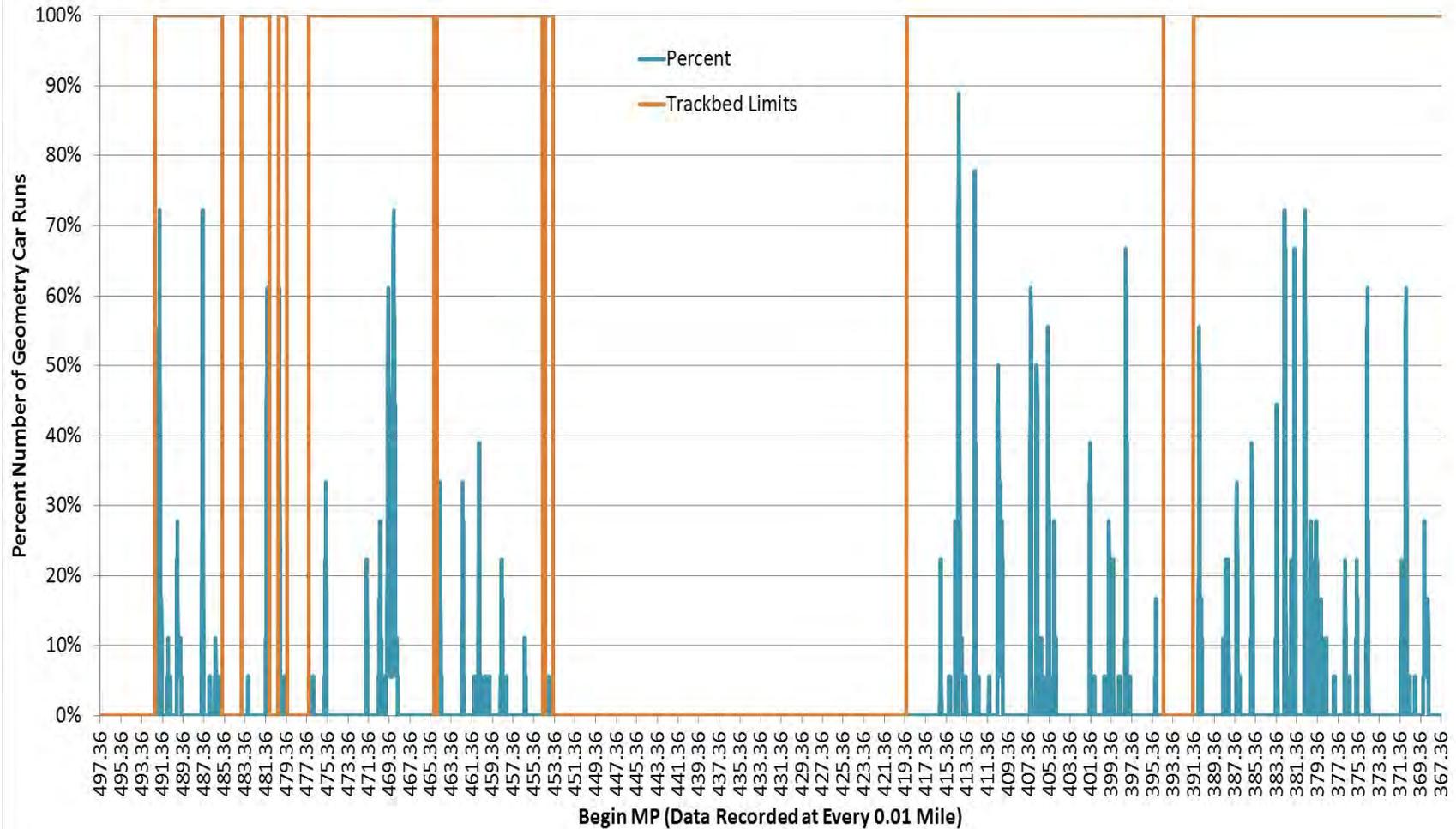
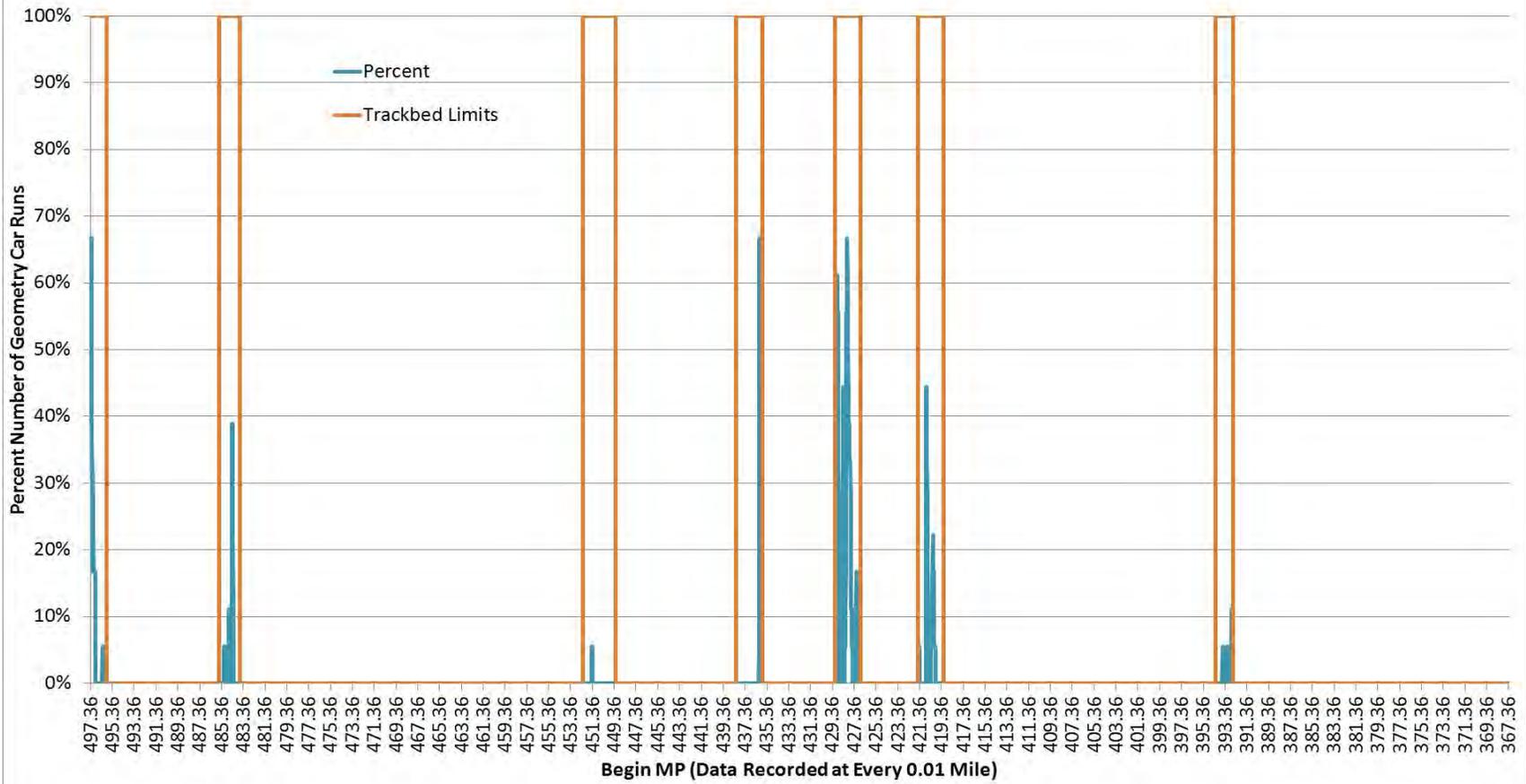


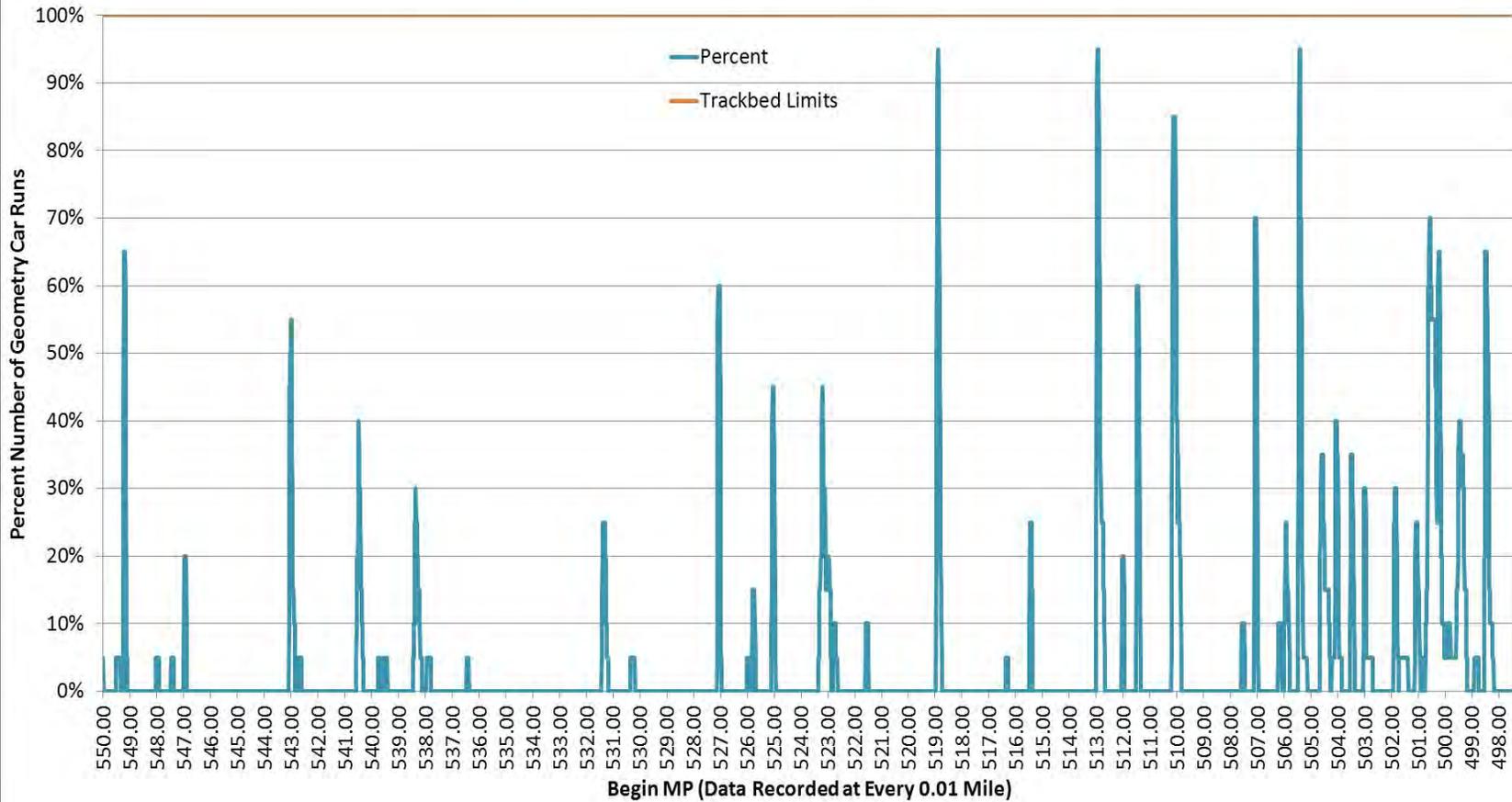
Figure XX. Upgraded Siding

**Main 2: MP 497.36 to MP 367.33, Year 2007 thru Year 2011, n = 18 Total Geometry Car Runs
 Upgraded Siding Locations: Percent Number of Runs Where SQI Threshold Was Exceeded**



Main 2 - MP 497.36 to MP 550.00

Main 2: MP 550.00 to MP 497.36, Year 2007 thru Year 2011, n = 20 Total Geometry Car Runs
Existing Wood Locations: Percent Number of Runs Where SQI Threshold Was Exceeded



VII. Appendix A - One-Mile Moving Window Results

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window									
		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrade Siding: 8.84 mi total	OtherSQI
239.00	240.00	0	5280	0	0	0.0%	8.6%	0.0%	0.0%
239.25	240.25	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
239.50	240.50	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
239.75	240.75	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
240.00	241.00	0	4804.8	475.2	0	0.0%	0.1%	0.0%	0.0%
240.25	241.25	0	3484.8	1795.2	0	0.0%	0.0%	5.7%	0.0%
240.50	241.50	0	2164.8	3115.2	0	0.0%	0.0%	3.9%	0.0%
240.75	241.75	0	844.8	4435.2	0	0.0%	0.0%	2.7%	0.0%
241.00	242.00	0	0	5280	0	0.0%	0.0%	2.3%	0.0%
241.25	242.25	0	0	5280	0	0.0%	0.0%	0.3%	0.0%
241.50	242.50	0	0	5280	0	0.0%	0.0%	0.6%	0.0%
241.75	242.75	0	0	5280	0	0.0%	0.0%	0.6%	0.0%
242.00	243.00	0	0	5280	0	0.0%	0.0%	0.6%	0.0%
242.25	243.25	0	0	5280	0	0.0%	0.0%	0.6%	0.0%
242.50	243.50	0	0	5280	0	0.0%	0.0%	7.9%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrade Siding: 8.84 mi total	OtherSQI
242.75	243.75	1056	0	4224	0	22.4%	0.0%	11.2%	0.0%
243.00	244.00	2376	0	2904	0	15.7%	0.0%	16.3%	0.0%
243.25	244.25	3696	0	1584	0	10.6%	0.0%	29.9%	0.0%
243.50	244.50	5016	0	264	0	8.0%	0.0%	21.3%	0.0%
243.75	244.75	5280	0	0	0	3.1%	0.0%	0.0%	0.0%
244.00	245.00	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
244.25	245.25	5280	0	0	0	0.7%	0.0%	0.0%	0.0%
244.50	245.50	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
244.75	245.75	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
245.00	246.00	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
245.25	246.25	5280	0	0	0	2.8%	0.0%	0.0%	0.0%
245.50	246.50	5280	0	0	0	4.1%	0.0%	0.0%	0.0%
245.75	246.75	5280	0	0	0	4.1%	0.0%	0.0%	0.0%
246.00	247.00	5280	0	0	0	4.1%	0.0%	0.0%	0.0%
246.25	247.25	5280	0	0	0	1.8%	0.0%	0.0%	0.0%
246.50	247.50	5280	0	0	0	0.6%	0.0%	0.0%	0.0%
246.75	247.75	5280	0	0	0	0.6%	0.0%	0.0%	0.0%
247.00	248.00	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
247.25	248.25	5280	0	0	0	0.3%	0.0%	0.0%	0.0%
247.50	248.50	5280	0	0	0	1.1%	0.0%	0.0%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concret e	Exist Wood	Upgrad e Siding	Othe r	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrad e Siding: 8.84 mi total	OtherSQ I
247.75	248.75	5280	0	0	0	1.1%	0.0%	0.0%	0.0%
248.00	249.00	5280	0	0	0	1.1%	0.0%	0.0%	0.0%
248.25	249.25	5280	0	0	0	1.5%	0.0%	0.0%	0.0%
248.50	249.50	5280	0	0	0	0.7%	0.0%	0.0%	0.0%
248.75	249.75	5280	0	0	0	1.5%	0.0%	0.0%	0.0%
249.00	250.00	5280	0	0	0	2.9%	0.0%	0.0%	0.0%
249.25	250.25	5280	0	0	0	2.2%	0.0%	0.0%	0.0%
249.50	250.50	5280	0	0	0	2.7%	0.0%	0.0%	0.0%
249.75	250.75	5280	0	0	0	1.9%	0.0%	0.0%	0.0%
250.00	251.00	5280	0	0	0	1.6%	0.0%	0.0%	0.0%
250.25	251.25	5280	0	0	0	2.0%	0.0%	0.0%	0.0%
250.50	251.50	5280	0	0	0	3.0%	0.0%	0.0%	0.0%
250.75	251.75	5280	0	0	0	2.9%	0.0%	0.0%	0.0%
251.00	252.00	5280	0	0	0	7.6%	0.0%	0.0%	0.0%
251.25	252.25	5280	0	0	0	10.3%	0.0%	0.0%	0.0%
251.50	252.50	5280	0	0	0	9.0%	0.0%	0.0%	0.0%
251.75	252.75	5280	0	0	0	9.0%	0.0%	0.0%	0.0%
252.00	253.00	5280	0	0	0	3.3%	0.0%	0.0%	0.0%
252.25	253.25	5280	0	0	0	0.2%	0.0%	0.0%	0.0%
252.50	253.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrade Siding: 8.84 mi total	OtherSQI
252.75	253.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
253.00	254.00	5280	0	0	0	0.4%	0.0%	0.0%	0.0%
253.25	254.25	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
253.50	254.50	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
253.75	254.75	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
254.00	255.00	5280	0	0	0	0.1%	0.0%	0.0%	0.0%
254.25	255.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
254.50	255.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
254.75	255.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
255.00	256.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
255.25	256.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
255.50	256.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
255.75	256.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
256.00	257.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
256.25	257.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
256.50	257.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
256.75	257.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
257.00	258.00	4752	0	528	0	0.4%	0.0%	2.3%	0.0%
257.25	258.25	3432	0	1848	0	0.6%	0.0%	2.4%	0.0%
257.50	258.50	2112	0	3168	0	0.9%	0.0%	1.4%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrade Siding: 8.84 mi total	OtherSQI
257.75	258.75	792	0	4488	0	2.5%	0.0%	1.9%	0.0%
258.00	259.00	0	0	5280	0	0.0%	0.0%	3.7%	0.0%
258.25	259.25	0	0	5280	0	0.0%	0.0%	9.3%	0.0%
258.50	259.50	0	0	5280	0	0.0%	0.0%	11.2%	0.0%
258.75	259.75	1056	0	4224	0	2.9%	0.0%	13.0%	0.0%
259.00	260.00	2376	0	2904	0	1.3%	0.0%	14.7%	0.0%
259.25	260.25	3696	0	1584	0	2.7%	0.0%	6.3%	0.0%
259.50	260.50	5016	0	264	0	2.2%	0.0%	0.0%	0.0%
259.75	260.75	5280	0	0	0	1.5%	0.0%	0.0%	0.0%
260.00	261.00	5280	0	0	0	1.5%	0.0%	0.0%	0.0%
260.25	261.25	5280	0	0	0	0.2%	0.0%	0.0%	0.0%
260.50	261.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
260.75	261.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
261.00	262.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
261.25	262.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
261.50	262.50	5280	0	0	0	1.0%	0.0%	0.0%	0.0%
261.75	262.75	5280	0	0	0	1.0%	0.0%	0.0%	0.0%
262.00	263.00	5280	0	0	0	1.0%	0.0%	0.0%	0.0%
262.25	263.25	5280	0	0	0	1.0%	0.0%	0.0%	0.0%
262.50	263.50	5280	0	0	0	1.0%	0.0%	0.0%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrade Siding: 8.84 mi total	OtherSQI
262.75	263.75	5280	0	0	0	1.0%	0.0%	0.0%	0.0%
263.00	264.00	5280	0	0	0	1.2%	0.0%	0.0%	0.0%
263.25	264.25	5280	0	0	0	2.9%	0.0%	0.0%	0.0%
263.50	264.50	5280	0	0	0	7.2%	0.0%	0.0%	0.0%
263.75	264.75	5280	0	0	0	11.2%	0.0%	0.0%	0.0%
264.00	265.00	5280	0	0	0	11.5%	0.0%	0.0%	0.0%
264.25	265.25	4488	0	792	0	11.7%	0.0%	6.8%	0.0%
264.50	265.50	3168	0	2112	0	7.7%	0.0%	3.3%	0.0%
264.75	265.75	1848	0	3432	0	1.7%	0.0%	2.4%	0.0%
265.00	266.00	1056	0	4224	0	8.0%	0.0%	3.2%	0.0%
265.25	266.25	1848	0	3432	0	5.1%	0.0%	2.4%	0.0%
265.50	266.50	3168	0	2112	0	3.5%	0.0%	3.2%	0.0%
265.75	266.75	4488	0	792	0	3.4%	0.0%	6.7%	0.0%
266.00	267.00	5280	0	0	0	1.4%	0.0%	0.0%	0.0%
266.25	267.25	5280	0	0	0	1.1%	0.0%	0.0%	0.0%
266.50	267.50	5280	0	0	0	0.8%	0.0%	0.0%	0.0%
266.75	267.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
267.00	268.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
267.25	268.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
267.50	268.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrad e Siding	Othe r	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrad e Siding: 8.84 mi total	OtherSQ I
267.75	268.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
268.00	269.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
268.25	269.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
268.50	269.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
268.75	269.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
269.00	270.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
269.25	270.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
269.50	270.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
269.75	270.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
270.00	271.00	5280	0	0	0	0.9%	0.0%	0.0%	0.0%
270.25	271.25	5280	0	0	0	1.7%	0.0%	0.0%	0.0%
270.50	271.50	5280	0	0	0	3.9%	0.0%	0.0%	0.0%
270.75	271.75	5280	0	0	0	6.3%	0.0%	0.0%	0.0%
271.00	272.00	4752	0	528	0	6.3%	0.0%	0.0%	0.0%
271.25	272.25	3432	0	1848	0	7.5%	0.0%	0.0%	0.0%
271.50	272.50	2112	0	3168	0	6.8%	0.0%	0.0%	0.0%
271.75	272.75	792	0	4488	0	1.9%	0.0%	0.0%	0.0%
272.00	273.00	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
272.25	273.25	0	0	5280	0	0.0%	0.0%	2.4%	0.0%
272.50	273.50	0	0	5280	0	0.0%	0.0%	4.7%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrade Siding: 8.84 mi total	OtherSQI
272.75	273.75	0	0	5280	0	0.0%	0.0%	5.2%	0.0%
273.00	274.00	0	0	5280	0	0.0%	0.0%	10.5%	0.0%
273.25	274.25	0	0	5280	0	0.0%	0.0%	13.6%	0.0%
273.50	274.50	0	0	5280	0	0.0%	0.0%	16.3%	0.0%
273.75	274.75	0	0	5280	0	0.0%	0.0%	21.7%	0.0%
274.00	275.00	0	0	5280	0	0.0%	0.0%	18.4%	0.0%
274.25	275.25	0	0	5280	0	0.0%	0.0%	14.2%	0.0%
274.50	275.50	0	0	5280	0	0.0%	0.0%	10.4%	0.0%
274.75	275.75	528	0	4752	0	5.3%	0.0%	5.2%	0.0%
275.00	276.00	1848	0	3432	0	5.3%	0.0%	4.0%	0.0%
275.25	276.25	3168	0	2112	0	5.3%	0.0%	3.3%	0.0%
275.50	276.50	4488	0	792	0	4.4%	0.0%	1.1%	0.0%
275.75	276.75	5280	0	0	0	3.3%	0.0%	0.0%	0.0%
276.00	277.00	5280	0	0	0	1.9%	0.0%	0.0%	0.0%
276.25	277.25	5280	0	0	0	0.6%	0.0%	0.0%	0.0%
276.50	277.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
276.75	277.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
277.00	278.00	5280	0	0	0	1.5%	0.0%	0.0%	0.0%
277.25	278.25	5280	0	0	0	1.5%	0.0%	0.0%	0.0%
277.50	278.50	5280	0	0	0	1.5%	0.0%	0.0%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrade Siding: 8.84 mi total	OtherSQI
277.75	278.75	5280	0	0	0	1.5%	0.0%	0.0%	0.0%
278.00	279.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
278.25	279.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
278.50	279.50	5280	0	0	0	1.1%	0.0%	0.0%	0.0%
278.75	279.75	4752	528	0	0	1.2%	0.0%	0.0%	0.0%
279.00	280.00	3432	1848	0	0	1.7%	1.1%	0.0%	0.0%
279.25	280.25	2112	3168	0	0	2.7%	1.3%	0.0%	0.0%
279.50	280.50	792	4488	0	0	0.2%	1.8%	0.0%	0.0%
279.75	280.75	0	5280	0	0	0.0%	1.7%	0.0%	0.0%
280.00	281.00	0	5280	0	0	0.0%	1.3%	0.0%	0.0%
280.25	281.25	264	5016	0	0	5.3%	1.0%	0.0%	0.0%
280.50	281.50	1584	3696	0	0	2.3%	0.2%	0.0%	0.0%
280.75	281.75	2904	2376	0	0	1.3%	0.0%	0.0%	0.0%
281.00	282.00	4224	1056	0	0	0.9%	0.0%	0.0%	0.0%
281.25	282.25	5280	0	0	0	0.4%	0.0%	0.0%	0.0%
281.50	282.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
281.75	282.75	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
282.00	283.00	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
282.25	283.25	5280	0	0	0	2.1%	0.0%	0.0%	0.0%
282.50	283.50	5280	0	0	0	5.4%	0.0%	0.0%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrad e Siding	Othe r	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrad e Siding: 8.84 mi total	OtherSQ I
282.75	283.75	5280	0	0	0	6.9%	0.0%	0.0%	0.0%
283.00	284.00	5280	0	0	0	6.9%	0.0%	0.0%	0.0%
283.25	284.25	5280	0	0	0	5.2%	0.0%	0.0%	0.0%
283.50	284.50	5280	0	0	0	2.6%	0.0%	0.0%	0.0%
283.75	284.75	4224	1056	0	0	0.7%	0.0%	0.0%	0.0%
284.00	285.00	2904	2376	0	0	1.1%	0.0%	0.0%	0.0%
284.25	285.25	1584	3696	0	0	2.0%	0.0%	0.0%	0.0%
284.50	285.50	264	5016	0	0	0.0%	0.0%	0.0%	0.0%
284.75	285.75	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
285.00	286.00	0	5280	0	0	0.0%	3.2%	0.0%	0.0%
285.25	286.25	0	5280	0	0	0.0%	8.6%	0.0%	0.0%
285.50	286.50	0	5280	0	0	0.0%	9.8%	0.0%	0.0%
285.75	286.75	0	5280	0	0	0.0%	9.4%	0.0%	0.0%
286.00	287.00	0	5280	0	0	0.0%	7.7%	0.0%	0.0%
286.25	287.25	0	5280	0	0	0.0%	2.8%	0.0%	0.0%
286.50	287.50	0	5280	0	0	0.0%	7.1%	0.0%	0.0%
286.75	287.75	0	5280	0	0	0.0%	6.6%	0.0%	0.0%
287.00	288.00	1056	4224	0	0	14.9%	7.9%	0.0%	0.0%
287.25	288.25	2376	2904	0	0	6.6%	10.6%	0.0%	0.0%
287.50	288.50	3696	1584	0	0	6.0%	0.7%	0.0%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrade Siding: 8.84 mi total	OtherSQI
287.75	288.75	5016	264	0	0	4.4%	4.2%	0.0%	0.0%
288.00	289.00	5280	0	0	0	1.2%	0.0%	0.0%	0.0%
288.25	289.25	5280	0	0	0	1.2%	0.0%	0.0%	0.0%
288.50	289.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
288.75	289.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
289.00	290.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
289.25	290.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
289.50	290.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
289.75	290.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
290.00	291.00	5280	0	0	0	4.8%	0.0%	0.0%	0.0%
290.25	291.25	5280	0	0	0	4.8%	0.0%	0.0%	0.0%
290.50	291.50	5280	0	0	0	5.3%	0.0%	0.0%	0.0%
290.75	291.75	5280	0	0	0	5.5%	0.0%	0.0%	0.0%
291.00	292.00	5280	0	0	0	2.1%	0.0%	0.0%	0.0%
291.25	292.25	5280	0	0	0	3.9%	0.0%	0.0%	0.0%
291.50	292.50	5280	0	0	0	3.9%	0.0%	0.0%	0.0%
291.75	292.75	5280	0	0	0	4.1%	0.0%	0.0%	0.0%
292.00	293.00	5280	0	0	0	2.8%	0.0%	0.0%	0.0%
292.25	293.25	5280	0	0	0	1.7%	0.0%	0.0%	0.0%
292.50	293.50	5280	0	0	0	1.2%	0.0%	0.0%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrade Siding: 8.84 mi total	OtherSQI
292.75	293.75	5280	0	0	0	0.7%	0.0%	0.0%	0.0%
293.00	294.00	5280	0	0	0	7.8%	0.0%	0.0%	0.0%
293.25	294.25	5280	0	0	0	13.6%	0.0%	0.0%	0.0%
293.50	294.50	5280	0	0	0	20.9%	0.0%	0.0%	0.0%
293.75	294.75	5280	0	0	0	21.8%	0.0%	0.0%	0.0%
294.00	295.00	5280	0	0	0	15.8%	0.0%	0.0%	0.0%
294.25	295.25	5280	0	0	0	9.4%	0.0%	0.0%	0.0%
294.50	295.50	5280	0	0	0	2.7%	0.0%	0.0%	0.0%
294.75	295.75	5280	0	0	0	2.3%	0.0%	0.0%	0.0%
295.00	296.00	5280	0	0	0	1.2%	0.0%	0.0%	0.0%
295.25	296.25	5280	0	0	0	1.1%	0.0%	0.0%	0.0%
295.50	296.50	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
295.75	296.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
296.00	297.00	5280	0	0	0	0.4%	0.0%	0.0%	0.0%
296.25	297.25	5280	0	0	0	0.7%	0.0%	0.0%	0.0%
296.50	297.50	5280	0	0	0	0.7%	0.0%	0.0%	0.0%
296.75	297.75	5280	0	0	0	2.4%	0.0%	0.0%	0.0%
297.00	298.00	5280	0	0	0	3.5%	0.0%	0.0%	0.0%
297.25	298.25	5280	0	0	0	3.7%	0.0%	0.0%	0.0%
297.50	298.50	5280	0	0	0	4.2%	0.0%	0.0%	0.0%

Main 1 - MP 239 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concret e	Exist Wood	Upgrad e Siding	Othe r	Concrete : 44.45 mi total	Exist Wood : 6.71 mi total	Upgrad e Siding: 8.84 mi total	OtherSQ I
297.75	298.75	5280	0	0	0	3.5%	0.0%	0.0%	0.0%
298.00	299.00	5280	0	0	0	2.1%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
337.00	338.00	0	0	0	5280	0.0%	0.0%	0.0%	0.0%
337.25	338.25	0	0	0	5280	0.0%	0.0%	0.0%	0.0%
337.50	338.50	0	0	0	5280	0.0%	0.0%	0.0%	0.3%
337.75	338.75	0	0	0	5280	0.0%	0.0%	0.0%	0.8%
338.00	339.00	0	0	0	5280	0.0%	0.0%	0.0%	0.8%
338.25	339.25	0	264	0	5016	0.0%	0.0%	0.0%	0.8%
338.50	339.50	0	1584	0	3696	0.0%	0.0%	0.0%	0.7%
338.75	339.75	0	2904	0	2376	0.0%	0.0%	0.0%	0.0%
339.00	340.00	0	4224	0	1056	0.0%	0.0%	0.0%	0.0%
339.25	340.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
339.50	340.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
339.75	340.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
340.00	341.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
340.25	341.25	0	5280	0	0	0.0%	3.5%	0.0%	0.0%
340.50	341.50	0	5280	0	0	0.0%	3.5%	0.0%	0.0%
340.75	341.75	0	5280	0	0	0.0%	3.5%	0.0%	0.0%
341.00	342.00	0	5280	0	0	0.0%	4.0%	0.0%	0.0%
341.25	342.25	0	5280	0	0	0.0%	5.2%	0.0%	0.0%
341.50	342.50	0	5280	0	0	0.0%	6.9%	0.0%	0.0%
341.75	342.75	0	5280	0	0	0.0%	6.9%	0.0%	0.0%
342.00	343.00	0	5280	0	0	0.0%	7.4%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
342.25	343.25	0	5280	0	0	0.0%	4.4%	0.0%	0.0%
342.50	343.50	0	5280	0	0	0.0%	3.7%	0.0%	0.0%
342.75	343.75	0	5280	0	0	0.0%	3.7%	0.0%	0.0%
343.00	344.00	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
343.25	344.25	0	5280	0	0	0.0%	1.0%	0.0%	0.0%
343.50	344.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
343.75	344.75	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
344.00	345.00	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
344.25	345.25	0	5280	0	0	0.0%	3.8%	0.0%	0.0%
344.50	345.50	0	5280	0	0	0.0%	12.8%	0.0%	0.0%
344.75	345.75	0	5280	0	0	0.0%	16.1%	0.0%	0.0%
345.00	346.00	0	5280	0	0	0.0%	23.6%	0.0%	0.0%
345.25	346.25	0	5280	0	0	0.0%	21.4%	0.0%	0.0%
345.50	346.50	0	5280	0	0	0.0%	12.4%	0.0%	0.0%
345.75	346.75	0	5280	0	0	0.0%	7.5%	0.0%	0.0%
346.00	347.00	581	4699	0	0	0.0%	0.0%	0.0%	0.0%
346.25	347.25	1901	3379	0	0	0.0%	0.0%	0.0%	0.0%
346.50	347.50	3221	2059	0	0	0.0%	0.0%	0.0%	0.0%
346.75	347.75	4541	739	0	0	0.0%	0.0%	0.0%	0.0%
347.00	348.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
347.25	348.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
347.50	348.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
347.75	348.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
348.00	349.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
348.25	349.25	5280	0	0	0	0.7%	0.0%	0.0%	0.0%
348.50	349.50	5280	0	0	0	3.9%	0.0%	0.0%	0.0%
348.75	349.75	5280	0	0	0	6.6%	0.0%	0.0%	0.0%
349.00	350.00	5280	0	0	0	7.6%	0.0%	0.0%	0.0%
349.25	350.25	5280	0	0	0	6.9%	0.0%	0.0%	0.0%
349.50	350.50	5280	0	0	0	3.7%	0.0%	0.0%	0.0%
349.75	350.75	5280	0	0	0	1.0%	0.0%	0.0%	0.0%
350.00	351.00	4118	1162	0	0	0.0%	0.0%	0.0%	0.0%
350.25	351.25	2798	2482	0	0	0.0%	8.4%	0.0%	0.0%
350.50	351.50	1478	3802	0	0	0.0%	6.5%	0.0%	0.0%
350.75	351.75	158	5122	0	0	0.0%	6.1%	0.0%	0.0%
351.00	352.00	0	5280	0	0	0.0%	6.2%	0.0%	0.0%
351.25	352.25	0	5280	0	0	0.0%	5.4%	0.0%	0.0%
351.50	352.50	0	5280	0	0	0.0%	8.1%	0.0%	0.0%
351.75	352.75	0	5280	0	0	0.0%	16.3%	0.0%	0.0%
352.00	353.00	0	5280	0	0	0.0%	22.4%	0.0%	0.0%
352.25	353.25	0	5280	0	0	0.0%	19.2%	0.0%	0.0%
352.50	353.50	0	5280	0	0	0.0%	15.7%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
352.75	353.75	0	5280	0	0	0.0%	6.4%	0.0%	0.0%
353.00	354.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
353.25	354.25	0	5280	0	0	0.0%	1.0%	0.0%	0.0%
353.50	354.50	0	5280	0	0	0.0%	1.0%	0.0%	0.0%
353.75	354.75	0	5280	0	0	0.0%	1.0%	0.0%	0.0%
354.00	355.00	0	5280	0	0	0.0%	1.0%	0.0%	0.0%
354.25	355.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
354.50	355.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
354.75	355.75	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
355.00	356.00	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
355.25	356.25	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
355.50	356.50	0	5280	0	0	0.0%	5.6%	0.0%	0.0%
355.75	356.75	0	5280	0	0	0.0%	8.8%	0.0%	0.0%
356.00	357.00	0	5280	0	0	0.0%	9.9%	0.0%	0.0%
356.25	357.25	0	5280	0	0	0.0%	10.1%	0.0%	0.0%
356.50	357.50	0	5280	0	0	0.0%	8.8%	0.0%	0.0%
356.75	357.75	0	5280	0	0	0.0%	4.1%	0.0%	0.0%
357.00	358.00	0	5280	0	0	0.0%	3.0%	0.0%	0.0%
357.25	358.25	0	5280	0	0	0.0%	5.9%	0.0%	0.0%
357.50	358.50	0	5280	0	0	0.0%	4.7%	0.0%	0.0%
357.75	358.75	0	5280	0	0	0.0%	3.8%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
358.00	359.00	0	5280	0	0	0.0%	5.0%	0.0%	0.0%
358.25	359.25	0	5280	0	0	0.0%	2.0%	0.0%	0.0%
358.50	359.50	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
358.75	359.75	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
359.00	360.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
359.25	360.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
359.50	360.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
359.75	360.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
360.00	361.00	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
360.25	361.25	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
360.50	361.50	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
360.75	361.75	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
361.00	362.00	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
361.25	362.25	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
361.50	362.50	0	5280	0	0	0.0%	8.1%	0.0%	0.0%
361.75	362.75	0	5280	0	0	0.0%	8.2%	0.0%	0.0%
362.00	363.00	0	5280	0	0	0.0%	8.9%	0.0%	0.0%
362.25	363.25	0	5280	0	0	0.0%	8.5%	0.0%	0.0%
362.50	363.50	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
362.75	363.75	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
363.00	364.00	0	5280	0	0	0.0%	0.6%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
363.25	364.25	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
363.50	364.50	0	5280	0	0	0.0%	0.1%	0.0%	0.0%
363.75	364.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
364.00	365.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
364.25	365.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
364.50	365.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
364.75	365.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
365.00	366.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
365.25	366.25	0	5280	0	0	0.0%	3.4%	0.0%	0.0%
365.50	366.50	0	5280	0	0	0.0%	3.4%	0.0%	0.0%
365.75	366.75	0	5280	0	0	0.0%	3.4%	0.0%	0.0%
366.00	367.00	0	5280	0	0	0.0%	3.4%	0.0%	0.0%
366.25	367.25	264	5016	0	0	0.0%	0.0%	0.0%	0.0%
366.50	367.50	1584	3696	0	0	0.0%	0.0%	0.0%	0.0%
366.75	367.75	2904	2376	0	0	0.0%	0.0%	0.0%	0.0%
367.00	368.00	4224	1056	0	0	0.0%	0.0%	0.0%	0.0%
367.25	368.25	5280	0	0	0	1.2%	0.0%	0.0%	0.0%
367.50	368.50	5280	0	0	0	1.2%	0.0%	0.0%	0.0%
367.75	368.75	5280	0	0	0	1.7%	0.0%	0.0%	0.0%
368.00	369.00	5280	0	0	0	10.0%	0.0%	0.0%	0.0%
368.25	369.25	5280	0	0	0	15.2%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
368.50	369.50	5280	0	0	0	15.5%	0.0%	0.0%	0.0%
368.75	369.75	5280	0	0	0	15.3%	0.0%	0.0%	0.0%
369.00	370.00	5280	0	0	0	6.9%	0.0%	0.0%	0.0%
369.25	370.25	5280	0	0	0	5.3%	0.0%	0.0%	0.0%
369.50	370.50	5280	0	0	0	5.3%	0.0%	0.0%	0.0%
369.75	370.75	5280	0	0	0	5.1%	0.0%	0.0%	0.0%
370.00	371.00	4752	0	528	0	8.5%	0.0%	14.4%	0.0%
370.25	371.25	3432	0	1848	0	4.4%	0.0%	9.8%	0.0%
370.50	371.50	2112	0	3168	0	6.4%	0.0%	7.7%	0.0%
370.75	371.75	792	0	4488	0	17.0%	0.0%	6.1%	0.0%
371.00	372.00	0	0	5280	0	0.0%	0.0%	3.8%	0.0%
371.25	372.25	0	0	5280	0	0.0%	0.0%	2.4%	0.0%
371.50	372.50	0	0	5280	0	0.0%	0.0%	1.1%	0.0%
371.75	372.75	0	0	5280	0	0.0%	0.0%	1.2%	0.0%
372.00	373.00	0	0	5280	0	0.0%	0.0%	1.2%	0.0%
372.25	373.25	0	0	5280	0	0.0%	0.0%	0.7%	0.0%
372.50	373.50	0	0	5280	0	0.0%	0.0%	0.7%	0.0%
372.75	373.75	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
373.00	374.00	1109	0	4171	0	0.0%	0.0%	0.0%	0.0%
373.25	374.25	2429	0	2851	0	0.5%	0.0%	0.0%	0.0%
373.50	374.50	3749	0	1531	0	0.7%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
373.75	374.75	5069	0	211	0	1.0%	0.0%	0.0%	0.0%
374.00	375.00	5280	0	0	0	1.6%	0.0%	0.0%	0.0%
374.25	375.25	5280	0	0	0	1.8%	0.0%	0.0%	0.0%
374.50	375.50	5280	0	0	0	1.8%	0.0%	0.0%	0.0%
374.75	375.75	5280	0	0	0	1.8%	0.0%	0.0%	0.0%
375.00	376.00	5280	0	0	0	2.5%	0.0%	0.0%	0.0%
375.25	376.25	5280	0	0	0	3.1%	0.0%	0.0%	0.0%
375.50	376.50	5280	0	0	0	3.5%	0.0%	0.0%	0.0%
375.75	376.75	5280	0	0	0	3.0%	0.0%	0.0%	0.0%
376.00	377.00	5280	0	0	0	2.3%	0.0%	0.0%	0.0%
376.25	377.25	5280	0	0	0	1.2%	0.0%	0.0%	0.0%
376.50	377.50	5280	0	0	0	0.6%	0.0%	0.0%	0.0%
376.75	377.75	5280	0	0	0	0.6%	0.0%	0.0%	0.0%
377.00	378.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
377.25	378.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
377.50	378.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
377.75	378.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
378.00	379.00	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
378.25	379.25	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
378.50	379.50	5280	0	0	0	1.0%	0.0%	0.0%	0.0%
378.75	379.75	5280	0	0	0	5.0%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
379.00	380.00	5280	0	0	0	5.5%	0.0%	0.0%	0.0%
379.25	380.25	5174	0	106	0	6.8%	0.0%	5.9%	0.0%
379.50	380.50	3854	0	1426	0	8.4%	0.0%	1.6%	0.0%
379.75	380.75	2534	0	2746	0	4.4%	0.0%	7.0%	0.0%
380.00	381.00	1214	0	4066	0	5.1%	0.0%	9.1%	0.0%
380.25	381.25	0	0	5280	0	0.0%	0.0%	7.6%	0.0%
380.50	381.50	0	0	5280	0	0.0%	0.0%	8.0%	0.0%
380.75	381.75	0	0	5280	0	0.0%	0.0%	7.5%	0.0%
381.00	382.00	0	0	5280	0	0.0%	0.0%	5.7%	0.0%
381.25	382.25	0	0	5280	0	0.0%	0.0%	6.0%	0.0%
381.50	382.50	0	0	5280	0	0.0%	0.0%	6.6%	0.0%
381.75	382.75	0	0	5280	0	0.0%	0.0%	15.6%	0.0%
382.00	383.00	0	0	5280	0	0.0%	0.0%	15.7%	0.0%
382.25	383.25	739	0	4541	0	0.0%	0.0%	17.1%	0.0%
382.50	383.50	2059	0	3221	0	1.2%	0.0%	21.9%	0.0%
382.75	383.75	3379	0	1901	0	0.7%	0.0%	4.6%	0.0%
383.00	384.00	4699	0	581	0	0.5%	0.0%	0.0%	0.0%
383.25	384.25	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
383.50	384.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
383.75	384.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
384.00	385.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
384.25	385.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
384.50	385.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
384.75	385.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
385.00	386.00	5280	0	0	0	0.9%	0.0%	0.0%	0.0%
385.25	386.25	5280	0	0	0	0.9%	0.0%	0.0%	0.0%
385.50	386.50	5280	0	0	0	0.9%	0.0%	0.0%	0.0%
385.75	386.75	5280	0	0	0	0.9%	0.0%	0.0%	0.0%
386.00	387.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
386.25	387.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
386.50	387.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
386.75	387.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
387.00	388.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
387.25	388.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
387.50	388.50	5280	0	0	0	1.4%	0.0%	0.0%	0.0%
387.75	388.75	5280	0	0	0	12.8%	0.0%	0.0%	0.0%
388.00	389.00	5280	0	0	0	12.8%	0.0%	0.0%	0.0%
388.25	389.25	5280	0	0	0	12.8%	0.0%	0.0%	0.0%
388.50	389.50	5280	0	0	0	11.4%	0.0%	0.0%	0.0%
388.75	389.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
389.00	390.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
389.25	390.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
389.50	390.50	5280	0	0	0	0.1%	0.0%	0.0%	0.0%
389.75	390.75	5280	0	0	0	1.4%	0.0%	0.0%	0.0%
390.00	391.00	5280	0	0	0	4.9%	0.0%	0.0%	0.0%
390.25	391.25	5280	0	0	0	8.0%	0.0%	0.0%	0.0%
390.50	391.50	5280	0	0	0	8.0%	0.0%	0.0%	0.0%
390.75	391.75	4752	528	0	0	7.5%	0.0%	0.0%	0.0%
391.00	392.00	3432	1848	0	0	5.0%	0.0%	0.0%	0.0%
391.25	392.25	2112	3168	0	0	0.3%	0.0%	0.0%	0.0%
391.50	392.50	792	4488	0	0	0.0%	0.0%	0.0%	0.0%
391.75	392.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
392.00	393.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
392.25	393.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
392.50	393.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
392.75	393.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
393.00	394.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
393.25	394.25	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
393.50	394.50	1267	4013	0	0	3.0%	0.9%	0.0%	0.0%
393.75	394.75	2587	2693	0	0	1.5%	1.4%	0.0%	0.0%
394.00	395.00	3907	1373	0	0	1.0%	2.7%	0.0%	0.0%
394.25	395.25	5227	53	0	0	0.7%	10.0%	0.0%	0.0%
394.50	395.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
394.75	395.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
395.00	396.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
395.25	396.25	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
395.50	396.50	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
395.75	396.75	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
396.00	397.00	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
396.25	397.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
396.50	397.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
396.75	397.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
397.00	398.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
397.25	398.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
397.50	398.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
397.75	398.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
398.00	399.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
398.25	399.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
398.50	399.50	5280	0	0	0	0.2%	0.0%	0.0%	0.0%
398.75	399.75	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
399.00	400.00	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
399.25	400.25	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
399.50	400.50	5280	0	0	0	0.3%	0.0%	0.0%	0.0%
399.75	400.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
400.00	401.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
400.25	401.25	5280	0	0	0	0.1%	0.0%	0.0%	0.0%
400.50	401.50	5280	0	0	0	3.5%	0.0%	0.0%	0.0%
400.75	401.75	5280	0	0	0	7.2%	0.0%	0.0%	0.0%
401.00	402.00	5280	0	0	0	7.5%	0.0%	0.0%	0.0%
401.25	402.25	5280	0	0	0	7.4%	0.0%	0.0%	0.0%
401.50	402.50	5280	0	0	0	4.0%	0.0%	0.0%	0.0%
401.75	402.75	5280	0	0	0	0.3%	0.0%	0.0%	0.0%
402.00	403.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
402.25	403.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
402.50	403.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
402.75	403.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
403.00	404.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
403.25	404.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
403.50	404.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
403.75	404.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
404.00	405.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
404.25	405.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
404.50	405.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
404.75	405.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
405.00	406.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
405.25	406.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
405.50	406.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
405.75	406.75	5280	0	0	0	8.2%	0.0%	0.0%	0.0%
406.00	407.00	5280	0	0	0	13.1%	0.0%	0.0%	0.0%
406.25	407.25	5280	0	0	0	13.1%	0.0%	0.0%	0.0%
406.50	407.50	5280	0	0	0	13.1%	0.0%	0.0%	0.0%
406.75	407.75	5280	0	0	0	4.9%	0.0%	0.0%	0.0%
407.00	408.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
407.25	408.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
407.50	408.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
407.75	408.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
408.00	409.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
408.25	409.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
408.50	409.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
408.75	409.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
409.00	410.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
409.25	410.25	5280	0	0	0	0.3%	0.0%	0.0%	0.0%
409.50	410.50	5280	0	0	0	2.1%	0.0%	0.0%	0.0%
409.75	410.75	5280	0	0	0	6.6%	0.0%	0.0%	0.0%
410.00	411.00	5280	0	0	0	6.8%	0.0%	0.0%	0.0%
410.25	411.25	5280	0	0	0	6.6%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
410.50	411.50	5280	0	0	0	4.7%	0.0%	0.0%	0.0%
410.75	411.75	5280	0	0	0	0.2%	0.0%	0.0%	0.0%
411.00	412.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
411.25	412.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
411.50	412.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
411.75	412.75	5280	0	0	0	1.5%	0.0%	0.0%	0.0%
412.00	413.00	5280	0	0	0	2.0%	0.0%	0.0%	0.0%
412.25	413.25	5280	0	0	0	2.0%	0.0%	0.0%	0.0%
412.50	413.50	4277	0	1003	0	2.5%	0.0%	0.0%	0.0%
412.75	413.75	2957	0	2323	0	0.9%	0.0%	0.0%	0.0%
413.00	414.00	1637	0	3643	0	0.0%	0.0%	0.0%	0.0%
413.25	414.25	317	0	4963	0	0.0%	0.0%	2.4%	0.0%
413.50	414.50	0	0	5280	0	0.0%	0.0%	8.7%	0.0%
413.75	414.75	0	0	5280	0	0.0%	0.0%	11.5%	0.0%
414.00	415.00	1267	0	4013	0	0.9%	0.0%	15.2%	0.0%
414.25	415.25	2587	0	2693	0	0.4%	0.0%	18.1%	0.0%
414.50	415.50	3907	0	1373	0	0.3%	0.0%	11.0%	0.0%
414.75	415.75	5227	0	53	0	0.2%	0.0%	5.0%	0.0%
415.00	416.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
415.25	416.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
415.50	416.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 337 to MP 419 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 45.46 mi total	Exist Wood: 26.55 mi total	Upgrade Siding: 6.14 mi total	Other: 2.2 mi total
415.75	416.75	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
416.00	417.00	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
416.25	417.25	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
416.50	417.50	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
416.75	417.75	5280	0	0	0	1.5%	0.0%	0.0%	0.0%
417.00	418.00	5280	0	0	0	5.8%	0.0%	0.0%	0.0%
417.25	418.25	5280	0	0	0	8.9%	0.0%	0.0%	0.0%
417.50	418.50	5280	0	0	0	8.9%	0.0%	0.0%	0.0%
417.75	418.75	5280	0	0	0	7.8%	0.0%	0.0%	0.0%
418.00	419.00	5280	0	0	0	3.6%	0.0%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
419.21	420.21	0	5280	0	0	0.0%	0.4%	0.0%	0.0%
419.46	420.46	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
419.71	420.71	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
419.96	420.96	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
420.21	421.21	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
420.46	421.46	0	5280	0	0	0.0%	6.7%	0.0%	0.0%
420.71	421.71	0	5280	0	0	0.0%	8.5%	0.0%	0.0%
420.96	421.96	0	5280	0	0	0.0%	8.5%	0.0%	0.0%
421.21	422.21	0	5280	0	0	0.0%	6.6%	0.0%	0.0%
421.46	422.46	0	5280	0	0	0.0%	10.4%	0.0%	0.0%
421.71	422.71	0	5280	0	0	0.0%	12.9%	0.0%	0.0%
421.96	422.96	0	5280	0	0	0.0%	20.4%	0.0%	0.0%
422.21	423.21	0	5280	0	0	0.0%	30.9%	0.0%	0.0%
422.46	423.46	0	5280	0	0	0.0%	22.3%	0.0%	0.0%
422.71	423.71	0	5280	0	0	0.0%	18.1%	0.0%	0.0%
422.96	423.96	0	5280	0	0	0.0%	15.1%	0.0%	0.0%
423.21	424.21	0	5280	0	0	0.0%	5.4%	0.0%	0.0%
423.46	424.46	0	5280	0	0	0.0%	17.6%	0.0%	0.0%
423.71	424.71	0	5280	0	0	0.0%	21.6%	0.0%	0.0%
423.96	424.96	0	5280	0	0	0.0%	17.0%	0.0%	0.0%
424.21	425.21	0	5280	0	0	0.0%	28.7%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
424.46	425.46	0	5280	0	0	0.0%	36.2%	0.0%	0.0%
424.71	425.71	0	5280	0	0	0.0%	33.7%	0.0%	0.0%
424.96	425.96	0	5280	0	0	0.0%	33.7%	0.0%	0.0%
425.21	426.21	0	5280	0	0	0.0%	21.3%	0.0%	0.0%
425.46	426.46	0	5280	0	0	0.0%	11.2%	0.0%	0.0%
425.71	426.71	0	5280	0	0	0.0%	14.5%	0.0%	0.0%
425.96	426.96	0	5280	0	0	0.0%	15.2%	0.0%	0.0%
426.21	427.21	0	5280	0	0	0.0%	15.2%	0.0%	0.0%
426.46	427.46	0	5280	0	0	0.0%	5.9%	0.0%	0.0%
426.71	427.71	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
426.96	427.96	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
427.21	428.21	0	5280	0	0	0.0%	6.6%	0.0%	0.0%
427.46	428.46	0	5280	0	0	0.0%	13.6%	0.0%	0.0%
427.71	428.71	0	5280	0	0	0.0%	19.4%	0.0%	0.0%
427.96	428.96	0	5280	0	0	0.0%	21.6%	0.0%	0.0%
428.21	429.21	0	5280	0	0	0.0%	15.4%	0.0%	0.0%
428.46	429.46	0	5280	0	0	0.0%	8.0%	0.0%	0.0%
428.71	429.71	0	5280	0	0	0.0%	2.2%	0.0%	0.0%
428.96	429.96	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
429.21	430.21	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
429.46	430.46	0	5280	0	0	0.0%	0.5%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
429.71	430.71	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
429.96	430.96	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
430.21	431.21	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
430.46	431.46	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
430.71	431.71	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
430.96	431.96	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
431.21	432.21	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
431.46	432.46	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
431.71	432.71	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
431.96	432.96	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
432.21	433.21	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
432.46	433.46	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
432.71	433.71	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
432.96	433.96	0	5280	0	0	0.0%	0.2%	0.0%	0.0%
433.21	434.21	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
433.46	434.46	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
433.71	434.71	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
433.96	434.96	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
434.21	435.21	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
434.46	435.46	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
434.71	435.71	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
434.96	435.96	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
435.21	436.21	0	5280	0	0	0.0%	3.5%	0.0%	0.0%
435.46	436.46	0	5280	0	0	0.0%	5.1%	0.0%	0.0%
435.71	436.71	0	5280	0	0	0.0%	5.5%	0.0%	0.0%
435.96	436.96	0	5280	0	0	0.0%	15.6%	0.0%	0.0%
436.21	437.21	0	5280	0	0	0.0%	12.7%	0.0%	0.0%
436.46	437.46	0	5280	0	0	0.0%	11.1%	0.0%	0.0%
436.71	437.71	0	5280	0	0	0.0%	10.7%	0.0%	0.0%
436.96	437.96	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
437.21	438.21	0	5280	0	0	0.0%	0.1%	0.0%	0.0%
437.46	438.46	0	5280	0	0	0.0%	5.7%	0.0%	0.0%
437.71	438.71	0	5280	0	0	0.0%	11.0%	0.0%	0.0%
437.96	438.96	0	5280	0	0	0.0%	11.5%	0.0%	0.0%
438.21	439.21	0	5280	0	0	0.0%	12.0%	0.0%	0.0%
438.46	439.46	0	5280	0	0	0.0%	6.3%	0.0%	0.0%
438.71	439.71	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
438.96	439.96	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
439.21	440.21	0	5280	0	0	0.0%	0.4%	0.0%	0.0%
439.46	440.46	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
439.71	440.71	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
439.96	440.96	0	5280	0	0	0.0%	0.5%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
440.21	441.21	0	5280	0	0	0.0%	0.1%	0.0%	0.0%
440.46	441.46	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
440.71	441.71	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
440.96	441.96	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
441.21	442.21	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
441.46	442.46	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
441.71	442.71	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
441.96	442.96	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
442.21	443.21	0	5280	0	0	0.0%	3.2%	0.0%	0.0%
442.46	443.46	0	5280	0	0	0.0%	3.2%	0.0%	0.0%
442.71	443.71	0	5280	0	0	0.0%	3.2%	0.0%	0.0%
442.96	443.96	0	5280	0	0	0.0%	2.3%	0.0%	0.0%
443.21	444.21	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
443.46	444.46	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
443.71	444.71	0	5280	0	0	0.0%	3.4%	0.0%	0.0%
443.96	444.96	0	5280	0	0	0.0%	4.5%	0.0%	0.0%
444.21	445.21	0	5280	0	0	0.0%	2.9%	0.0%	0.0%
444.46	445.46	0	5280	0	0	0.0%	5.2%	0.0%	0.0%
444.71	445.71	0	5280	0	0	0.0%	4.3%	0.0%	0.0%
444.96	445.96	0	4435	0	845	0.0%	3.8%	0.0%	0.0%
445.21	446.21	0	3115	0	2165	0.0%	3.9%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
445.46	446.46	0	1795	0	3485	0.0%	0.0%	0.0%	0.0%
445.71	446.71	0	1584	0	3696	0.0%	6.3%	0.0%	0.0%
445.96	446.96	0	2429	0	2851	0.0%	21.4%	0.0%	0.0%
446.21	447.21	0	3749	0	1531	0.0%	13.8%	0.0%	0.0%
446.46	447.46	0	5069	0	211	0.0%	10.2%	0.0%	0.0%
446.71	447.71	0	5280	0	0	0.0%	8.2%	0.0%	0.0%
446.96	447.96	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
447.21	448.21	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
447.46	448.46	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
447.71	448.71	0	5280	0	0	0.0%	0.4%	0.0%	0.0%
447.96	448.96	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
448.21	449.21	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
448.46	449.46	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
448.71	449.71	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
448.96	449.96	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
449.21	450.21	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
449.46	450.46	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
449.71	450.71	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
449.96	450.96	0	4435	0	845	0.0%	0.0%	0.0%	0.0%
450.21	451.21	0	3115	0	2165	0.0%	0.0%	0.0%	0.0%
450.46	451.46	0	2640	0	2640	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
450.71	451.71	0	2640	0	2640	0.0%	0.0%	0.0%	0.0%
450.96	451.96	0	3485	0	1795	0.0%	0.0%	0.0%	0.0%
451.21	452.21	0	4805	0	475	0.0%	0.7%	0.0%	0.0%
451.46	452.46	317	4963	0	0	0.0%	3.6%	0.0%	0.0%
451.71	452.71	1637	3643	0	0	0.0%	5.0%	0.0%	0.0%
451.96	452.96	2957	2323	0	0	0.0%	7.8%	0.0%	0.0%
452.21	453.21	4277	1003	0	0	2.2%	14.5%	0.0%	0.0%
452.46	453.46	5280	0	0	0	3.8%	0.0%	0.0%	0.0%
452.71	453.71	5280	0	0	0	4.2%	0.0%	0.0%	0.0%
452.96	453.96	5280	0	0	0	4.2%	0.0%	0.0%	0.0%
453.21	454.21	5280	0	0	0	2.4%	0.0%	0.0%	0.0%
453.46	454.46	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
453.71	454.71	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
453.96	454.96	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
454.21	455.21	4171	0	1109	0	0.0%	0.0%	1.8%	0.0%
454.46	455.46	2851	0	2429	0	0.0%	0.0%	1.2%	0.0%
454.71	455.71	1531	0	3749	0	0.0%	0.0%	5.1%	0.0%
454.96	455.96	211	0	5069	0	0.0%	0.0%	4.2%	0.0%
455.21	456.21	0	0	5280	0	0.0%	0.0%	4.3%	0.0%
455.46	456.46	0	0	5280	0	0.0%	0.0%	5.7%	0.0%
455.71	456.71	0	0	5280	0	0.0%	0.0%	3.1%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
455.96	456.96	0	0	5280	0	0.0%	0.0%	2.6%	0.0%
456.21	457.21	0	0	5280	0	0.0%	0.0%	2.2%	0.0%
456.46	457.46	0	0	5280	0	0.0%	0.0%	0.9%	0.0%
456.71	457.71	0	0	5280	0	0.0%	0.0%	0.5%	0.0%
456.96	457.96	1109	0	4171	0	0.0%	0.0%	0.6%	0.0%
457.21	458.21	2429	0	2851	0	5.7%	0.0%	0.3%	0.0%
457.46	458.46	3749	0	1531	0	9.9%	0.0%	0.0%	0.0%
457.71	458.71	5069	0	211	0	12.7%	0.0%	0.0%	0.0%
457.96	458.96	5280	0	0	0	17.8%	0.0%	0.0%	0.0%
458.21	459.21	5280	0	0	0	15.9%	0.0%	0.0%	0.0%
458.46	459.46	5280	0	0	0	11.4%	0.0%	0.0%	0.0%
458.71	459.71	5280	0	0	0	6.3%	0.0%	0.0%	0.0%
458.96	459.96	5280	0	0	0	0.7%	0.0%	0.0%	0.0%
459.21	460.21	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
459.46	460.46	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
459.71	460.71	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
459.96	460.96	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
460.21	461.21	5280	0	0	0	0.1%	0.0%	0.0%	0.0%
460.46	461.46	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
460.71	461.71	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
460.96	461.96	5280	0	0	0	0.5%	0.0%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
461.21	462.21	5280	0	0	0	0.4%	0.0%	0.0%	0.0%
461.46	462.46	5280	0	0	0	1.2%	0.0%	0.0%	0.0%
461.71	462.71	5280	0	0	0	1.4%	0.0%	0.0%	0.0%
461.96	462.96	5280	0	0	0	1.4%	0.0%	0.0%	0.0%
462.21	463.21	5280	0	0	0	1.4%	0.0%	0.0%	0.0%
462.46	463.46	5280	0	0	0	0.1%	0.0%	0.0%	0.0%
462.71	463.71	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
462.96	463.96	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
463.21	464.21	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
463.46	464.46	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
463.71	464.71	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
463.96	464.96	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
464.21	465.21	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
464.46	465.46	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
464.71	465.71	5280	0	0	0	3.1%	0.0%	0.0%	0.0%
464.96	465.96	5280	0	0	0	3.6%	0.0%	0.0%	0.0%
465.21	466.21	5280	0	0	0	3.2%	0.0%	0.0%	0.0%
465.46	466.46	5280	0	0	0	3.6%	0.0%	0.0%	0.0%
465.71	466.71	5280	0	0	0	1.0%	0.0%	0.0%	0.0%
465.96	466.96	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
466.21	467.21	5280	0	0	0	1.7%	0.0%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
466.46	467.46	5280	0	0	0	1.4%	0.0%	0.0%	0.0%
466.71	467.71	5280	0	0	0	2.6%	0.0%	0.0%	0.0%
466.96	467.96	5280	0	0	0	4.2%	0.0%	0.0%	0.0%
467.21	468.21	5280	0	0	0	3.9%	0.0%	0.0%	0.0%
467.46	468.46	5280	0	0	0	3.8%	0.0%	0.0%	0.0%
467.71	468.71	5280	0	0	0	2.6%	0.0%	0.0%	0.0%
467.96	468.96	5280	0	0	0	1.0%	0.0%	0.0%	0.0%
468.21	469.21	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
468.46	469.46	5280	0	0	0	4.9%	0.0%	0.0%	0.0%
468.71	469.71	5280	0	0	0	11.6%	0.0%	0.0%	0.0%
468.96	469.96	5280	0	0	0	22.8%	0.0%	0.0%	0.0%
469.21	470.21	4752	0	528	0	25.8%	0.0%	4.3%	0.0%
469.46	470.46	3432	0	1848	0	28.3%	0.0%	6.6%	0.0%
469.71	470.71	2112	0	3168	0	29.0%	0.0%	4.4%	0.0%
469.96	470.96	792	0	4488	0	2.8%	0.0%	3.1%	0.0%
470.21	471.21	0	0	5280	0	0.0%	0.0%	2.2%	0.0%
470.46	471.46	0	0	5280	0	0.0%	0.0%	0.3%	0.0%
470.71	471.71	0	0	5280	0	0.0%	0.0%	0.8%	0.0%
470.96	471.96	264	0	5016	0	0.0%	0.0%	0.9%	0.0%
471.21	472.21	1584	0	3696	0	6.5%	0.0%	1.3%	0.0%
471.46	472.46	2904	0	2376	0	6.9%	0.0%	2.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
471.71	472.71	4224	0	1056	0	4.7%	0.0%	0.3%	0.0%
471.96	472.96	5280	0	0	0	3.8%	0.0%	0.0%	0.0%
472.21	473.21	5280	0	0	0	2.3%	0.0%	0.0%	0.0%
472.46	473.46	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
472.71	473.71	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
472.96	473.96	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
473.21	474.21	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
473.46	474.46	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
473.71	474.71	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
473.96	474.96	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
474.21	475.21	5280	0	0	0	0.3%	0.0%	0.0%	0.0%
474.46	475.46	5280	0	0	0	0.8%	0.0%	0.0%	0.0%
474.71	475.71	5280	0	0	0	6.9%	0.0%	0.0%	0.0%
474.96	475.96	5280	0	0	0	9.0%	0.0%	0.0%	0.0%
475.21	476.21	5280	0	0	0	8.7%	0.0%	0.0%	0.0%
475.46	476.46	5280	0	0	0	9.3%	0.0%	0.0%	0.0%
475.71	476.71	5280	0	0	0	7.0%	0.0%	0.0%	0.0%
475.96	476.96	5280	0	0	0	13.4%	0.0%	0.0%	0.0%
476.21	477.21	5280	0	0	0	14.8%	0.0%	0.0%	0.0%
476.46	477.46	5280	0	0	0	14.5%	0.0%	0.0%	0.0%
476.71	477.71	5280	0	0	0	10.6%	0.0%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
476.96	477.96	5280	0	0	0	3.0%	0.0%	0.0%	0.0%
477.21	478.21	5280	0	0	0	1.7%	0.0%	0.0%	0.0%
477.46	478.46	5280	0	0	0	1.1%	0.0%	0.0%	0.0%
477.71	478.71	5280	0	0	0	3.2%	0.0%	0.0%	0.0%
477.96	478.96	5280	0	0	0	3.2%	0.0%	0.0%	0.0%
478.21	479.21	5280	0	0	0	5.6%	0.0%	0.0%	0.0%
478.46	479.46	5280	0	0	0	5.4%	0.0%	0.0%	0.0%
478.71	479.71	5280	0	0	0	3.2%	0.0%	0.0%	0.0%
478.96	479.96	5280	0	0	0	2.3%	0.0%	0.0%	0.0%
479.21	480.21	5280	0	0	0	0.6%	0.0%	0.0%	0.0%
479.46	480.46	5280	0	0	0	5.7%	0.0%	0.0%	0.0%
479.71	480.71	5280	0	0	0	11.5%	0.0%	0.0%	0.0%
479.96	480.96	5280	0	0	0	15.3%	0.0%	0.0%	0.0%
480.21	481.21	5280	0	0	0	14.7%	0.0%	0.0%	0.0%
480.46	481.46	5280	0	0	0	15.6%	0.0%	0.0%	0.0%
480.71	481.71	5280	0	0	0	9.8%	0.0%	0.0%	0.0%
480.96	481.96	5280	0	0	0	6.0%	0.0%	0.0%	0.0%
481.21	482.21	5280	0	0	0	6.0%	0.0%	0.0%	0.0%
481.46	482.46	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
481.71	482.71	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
481.96	482.96	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
482.21	483.21	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
482.46	483.46	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
482.71	483.71	5122	158	0	0	0.0%	1.6%	0.0%	0.0%
482.96	483.96	3802	1478	0	0	0.0%	2.5%	0.0%	0.0%
483.21	484.21	2482	2798	0	0	0.0%	2.6%	0.0%	0.0%
483.46	484.46	1162	4118	0	0	0.0%	3.5%	0.0%	0.0%
483.71	484.71	0	5280	0	0	0.0%	4.8%	0.0%	0.0%
483.96	484.96	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
484.21	485.21	0	5280	0	0	0.0%	17.3%	0.0%	0.0%
484.46	485.46	0	5280	0	0	0.0%	16.8%	0.0%	0.0%
484.71	485.71	792	4488	0	0	0.0%	17.6%	0.0%	0.0%
484.96	485.96	2112	3168	0	0	0.0%	19.2%	0.0%	0.0%
485.21	486.21	3432	1848	0	0	0.0%	3.5%	0.0%	0.0%
485.46	486.46	4752	528	0	0	2.5%	3.3%	0.0%	0.0%
485.71	486.71	5280	0	0	0	2.3%	0.0%	0.0%	0.0%
485.96	486.96	5280	0	0	0	2.3%	0.0%	0.0%	0.0%
486.21	487.21	5280	0	0	0	2.3%	0.0%	0.0%	0.0%
486.46	487.46	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
486.71	487.71	5280	0	0	0	2.8%	0.0%	0.0%	0.0%
486.96	487.96	5280	0	0	0	2.8%	0.0%	0.0%	0.0%
487.21	488.21	5280	0	0	0	2.8%	0.0%	0.0%	0.0%

Main 1 - MP 419 to MP 490 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 31.03 mi total	Exist Wood 33.87 mi total	Upgrade Siding 4.55 mi total	Other 1.2 mi total
487.46	488.46	5280	0	0	0	2.8%	0.0%	0.0%	0.0%
487.71	488.71	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
487.96	488.96	5280	0	0	0	1.1%	0.0%	0.0%	0.0%
488.21	489.21	5280	0	0	0	1.1%	0.0%	0.0%	0.0%
488.46	489.46	5280	0	0	0	1.1%	0.0%	0.0%	0.0%
488.71	489.71	5280	0	0	0	1.0%	0.0%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
489.86	490.86	0	0	5280	0	0.0%	0.0%	50.9%	0.0%
490.11	491.11	0	0	5280	0	0.0%	0.0%	52.9%	0.0%
490.36	491.36	0	0	5280	0	0.0%	0.0%	46.7%	0.0%
490.61	491.61	0	0	5280	0	0.0%	0.0%	50.7%	0.0%
490.86	491.86	0	106	5174	0	0.0%	75.2%	49.2%	0.0%
491.11	492.11	0	1426	3854	0	0.0%	17.5%	31.8%	0.0%
491.36	492.36	0	2746	2534	0	0.0%	9.1%	37.3%	0.0%
491.61	492.61	0	4066	1214	0	0.0%	6.2%	54.6%	0.0%
491.86	492.86	0	5280	0	0	0.0%	4.5%	0.0%	0.0%
492.11	493.11	0	5280	0	0	0.0%	2.6%	0.0%	0.0%
492.36	493.36	0	5280	0	0	0.0%	2.6%	0.0%	0.0%
492.61	493.61	0	5280	0	0	0.0%	5.6%	0.0%	0.0%
492.86	493.86	0	5280	0	0	0.0%	8.4%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
493.11	494.11	0	5280	0	0	0.0%	11.1%	0.0%	0.0%
493.36	494.36	0	5280	0	0	0.0%	15.2%	0.0%	0.0%
493.61	494.61	0	5280	0	0	0.0%	19.6%	0.0%	0.0%
493.86	494.86	0	5280	0	0	0.0%	35.6%	0.0%	0.0%
494.11	495.11	0	5280	0	0	0.0%	54.2%	0.0%	0.0%
494.36	495.36	0	5280	0	0	0.0%	57.3%	0.0%	0.0%
494.61	495.61	0	5280	0	0	0.0%	61.3%	0.0%	0.0%
494.86	495.86	0	5280	0	0	0.0%	64.1%	0.0%	0.0%
495.11	496.11	0	5280	0	0	0.0%	41.8%	0.0%	0.0%
495.36	496.36	0	5280	0	0	0.0%	39.9%	0.0%	0.0%
495.61	496.61	0	5280	0	0	0.0%	29.3%	0.0%	0.0%
495.86	496.86	0	5280	0	0	0.0%	6.5%	0.0%	0.0%
496.11	497.11	0	5280	0	0	0.0%	6.2%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
496.36	497.36	0	5280	0	0	0.0%	7.3%	0.0%	0.0%
496.61	497.61	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
496.86	497.86	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
497.11	498.11	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
497.36	498.36	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
497.61	498.61	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
497.86	498.86	0	5280	0	0	0.0%	7.7%	0.0%	0.0%
498.11	499.11	0	5280	0	0	0.0%	7.7%	0.0%	0.0%
498.36	499.36	0	5280	0	0	0.0%	9.9%	0.0%	0.0%
498.61	499.61	0	5280	0	0	0.0%	17.3%	0.0%	0.0%
498.86	499.86	0	5280	0	0	0.0%	13.6%	0.0%	0.0%
499.11	500.11	0	5280	0	0	0.0%	14.7%	0.0%	0.0%
499.36	500.36	0	5280	0	0	0.0%	13.6%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
499.61	500.61	0	5280	0	0	0.0%	4.6%	0.0%	0.0%
499.86	500.86	0	5280	0	0	0.0%	8.7%	0.0%	0.0%
500.11	501.11	0	5280	0	0	0.0%	12.5%	0.0%	0.0%
500.36	501.36	0	5280	0	0	0.0%	13.1%	0.0%	0.0%
500.61	501.61	0	5280	0	0	0.0%	13.8%	0.0%	0.0%
500.86	501.86	0	5280	0	0	0.0%	7.3%	0.0%	0.0%
501.11	502.11	0	5280	0	0	0.0%	2.5%	0.0%	0.0%
501.36	502.36	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
501.61	502.61	0	5280	0	0	0.0%	6.0%	0.0%	0.0%
501.86	502.86	0	5280	0	0	0.0%	12.7%	0.0%	0.0%
502.11	503.11	0	5280	0	0	0.0%	12.7%	0.0%	0.0%
502.36	503.36	0	5280	0	0	0.0%	12.2%	0.0%	0.0%
502.61	503.61	0	5280	0	0	0.0%	10.9%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
502.86	503.86	0	5280	0	0	0.0%	8.0%	0.0%	0.0%
503.11	504.11	0	5280	0	0	0.0%	8.0%	0.0%	0.0%
503.36	504.36	0	5280	0	0	0.0%	8.0%	0.0%	0.0%
503.61	504.61	0	5280	0	0	0.0%	3.8%	0.0%	0.0%
503.86	504.86	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
504.11	505.11	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
504.36	505.36	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
504.61	505.61	0	5280	0	0	0.0%	6.0%	0.0%	0.0%
504.86	505.86	0	5280	0	0	0.0%	4.7%	0.0%	0.0%
505.11	506.11	0	5280	0	0	0.0%	7.8%	0.0%	0.0%
505.36	506.36	0	5280	0	0	0.0%	7.8%	0.0%	0.0%
505.61	506.61	0	5280	0	0	0.0%	3.6%	0.0%	0.0%
505.86	506.86	0	5280	0	0	0.0%	3.1%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
506.11	507.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
506.36	507.36	0	5280	0	0	0.0%	0.2%	0.0%	0.0%
506.61	507.61	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
506.86	507.86	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
507.11	508.11	0	5280	0	0	0.0%	2.3%	0.0%	0.0%
507.36	508.36	0	5280	0	0	0.0%	2.2%	0.0%	0.0%
507.61	508.61	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
507.86	508.86	0	5280	0	0	0.0%	1.3%	0.0%	0.0%
508.11	509.11	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
508.36	509.36	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
508.61	509.61	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
508.86	509.86	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
509.11	510.11	0	5280	0	0	0.0%	0.9%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
509.36	510.36	0	5280	0	0	0.0%	5.8%	0.0%	0.0%
509.61	510.61	0	5280	0	0	0.0%	12.7%	0.0%	0.0%
509.86	510.86	0	5280	0	0	0.0%	12.7%	0.0%	0.0%
510.11	511.11	0	5280	0	0	0.0%	11.8%	0.0%	0.0%
510.36	511.36	0	5280	0	0	0.0%	6.9%	0.0%	0.0%
510.61	511.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
510.86	511.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
511.11	512.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
511.36	512.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
511.61	512.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
511.86	512.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
512.11	513.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
512.36	513.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
512.61	513.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
512.86	513.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
513.11	514.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
513.36	514.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
513.61	514.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
513.86	514.86	0	5280	0	0	0.0%	0.2%	0.0%	0.0%
514.11	515.11	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
514.36	515.36	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
514.61	515.61	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
514.86	515.86	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
515.11	516.11	0	5280	0	0	0.0%	3.7%	0.0%	0.0%
515.36	516.36	0	5280	0	0	0.0%	3.1%	0.0%	0.0%
515.61	516.61	0	5280	0	0	0.0%	2.3%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
515.86	516.86	0	5280	0	0	0.0%	2.8%	0.0%	0.0%
516.11	517.11	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
516.36	517.36	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
516.61	517.61	0	5280	0	0	0.0%	4.3%	0.0%	0.0%
516.86	517.86	0	5280	0	0	0.0%	5.3%	0.0%	0.0%
517.11	518.11	0	5280	0	0	0.0%	6.1%	0.0%	0.0%
517.36	518.36	0	5280	0	0	0.0%	5.7%	0.0%	0.0%
517.61	518.61	0	5280	0	0	0.0%	4.0%	0.0%	0.0%
517.86	518.86	0	5280	0	0	0.0%	2.9%	0.0%	0.0%
518.11	519.11	0	5280	0	0	0.0%	8.9%	0.0%	0.0%
518.36	519.36	0	5280	0	0	0.0%	8.1%	0.0%	0.0%
518.61	519.61	0	5280	0	0	0.0%	8.9%	0.0%	0.0%
518.86	519.86	0	5280	0	0	0.0%	8.4%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
519.11	520.11	0	5280	0	0	0.0%	2.2%	0.0%	0.0%
519.36	520.36	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
519.61	520.61	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
519.86	520.86	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
520.11	521.11	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
520.36	521.36	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
520.61	521.61	0	5280	0	0	0.0%	0.1%	0.0%	0.0%
520.86	521.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
521.11	522.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
521.36	522.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
521.61	522.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
521.86	522.86	0	5280	0	0	0.0%	1.5%	0.0%	0.0%
522.11	523.11	0	5280	0	0	0.0%	6.0%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
522.36	523.36	0	5280	0	0	0.0%	11.3%	0.0%	0.0%
522.61	523.61	0	5280	0	0	0.0%	14.1%	0.0%	0.0%
522.86	523.86	0	5280	0	0	0.0%	12.6%	0.0%	0.0%
523.11	524.11	0	5280	0	0	0.0%	8.1%	0.0%	0.0%
523.36	524.36	0	5280	0	0	0.0%	2.8%	0.0%	0.0%
523.61	524.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
523.86	524.86	0	5280	0	0	0.0%	2.5%	0.0%	0.0%
524.11	525.11	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
524.36	525.36	0	5280	0	0	0.0%	3.9%	0.0%	0.0%
524.61	525.61	0	5280	0	0	0.0%	3.9%	0.0%	0.0%
524.86	525.86	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
525.11	526.11	0	5280	0	0	0.0%	3.6%	0.0%	0.0%
525.36	526.36	0	5280	0	0	0.0%	8.1%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
525.61	526.61	0	5280	0	0	0.0%	8.1%	0.0%	0.0%
525.86	526.86	0	5280	0	0	0.0%	8.1%	0.0%	0.0%
526.11	527.11	0	5280	0	0	0.0%	5.7%	0.0%	0.0%
526.36	527.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
526.61	527.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
526.86	527.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
527.11	528.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
527.36	528.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
527.61	528.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
527.86	528.86	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
528.11	529.11	0	5280	0	0	0.0%	5.9%	0.0%	0.0%
528.36	529.36	0	5280	0	0	0.0%	5.9%	0.0%	0.0%
528.61	529.61	0	5280	0	0	0.0%	5.9%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
528.86	529.86	0	5280	0	0	0.0%	4.6%	0.0%	0.0%
529.11	530.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
529.36	530.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
529.61	530.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
529.86	530.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
530.11	531.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
530.36	531.36	0	5280	0	0	0.0%	3.3%	0.0%	0.0%
530.61	531.61	0	5280	0	0	0.0%	5.1%	0.0%	0.0%
530.86	531.86	0	5280	0	0	0.0%	8.2%	0.0%	0.0%
531.11	532.11	0	5280	0	0	0.0%	8.2%	0.0%	0.0%
531.36	532.36	0	5280	0	0	0.0%	4.9%	0.0%	0.0%
531.61	532.61	0	5280	0	0	0.0%	3.0%	0.0%	0.0%
531.86	532.86	0	5280	0	0	0.0%	0.6%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
		A	B	C	X	A	B	C	X
532.11	533.11	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
532.36	533.36	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
532.61	533.61	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
532.86	533.86	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
533.11	534.11	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
533.36	534.36	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
533.61	534.61	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
533.86	534.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
534.11	535.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
534.36	535.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
534.61	535.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
534.86	535.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
535.11	536.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
535.36	536.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
535.61	536.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
535.86	536.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
536.11	537.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
536.36	537.36	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
536.61	537.61	0	5280	0	0	0.0%	2.9%	0.0%	0.0%
536.86	537.86	0	5280	0	0	0.0%	3.9%	0.0%	0.0%
537.11	538.11	0	5280	0	0	0.0%	3.9%	0.0%	0.0%
537.36	538.36	0	5280	0	0	0.0%	14.7%	0.0%	0.0%
537.61	538.61	0	5280	0	0	0.0%	14.9%	0.0%	0.0%
537.86	538.86	0	5280	0	0	0.0%	14.3%	0.0%	0.0%
538.11	539.11	0	5280	0	0	0.0%	15.4%	0.0%	0.0%
538.36	539.36	0	5280	0	0	0.0%	7.2%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
538.61	539.61	0	5280	0	0	0.0%	5.4%	0.0%	0.0%
538.86	539.86	0	5280	0	0	0.0%	5.0%	0.0%	0.0%
539.11	540.11	0	5280	0	0	0.0%	4.0%	0.0%	0.0%
539.36	540.36	0	5280	0	0	0.0%	0.2%	0.0%	0.0%
539.61	540.61	0	5280	0	0	0.0%	3.0%	0.0%	0.0%
539.86	540.86	0	5280	0	0	0.0%	4.6%	0.0%	0.0%
540.11	541.11	0	5280	0	0	0.0%	9.0%	0.0%	0.0%
540.36	541.36	0	5280	0	0	0.0%	13.7%	0.0%	0.0%
540.61	541.61	0	5280	0	0	0.0%	10.9%	0.0%	0.0%
540.86	541.86	0	5280	0	0	0.0%	9.4%	0.0%	0.0%
541.11	542.11	0	5280	0	0	0.0%	5.6%	0.0%	0.0%
541.36	542.36	0	5280	0	0	0.0%	11.6%	0.0%	0.0%
541.61	542.61	0	5280	0	0	0.0%	11.6%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
541.86	542.86	0	5280	0	0	0.0%	11.6%	0.0%	0.0%
542.11	543.11	0	5280	0	0	0.0%	10.9%	0.0%	0.0%
542.36	543.36	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
542.61	543.61	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
542.86	543.86	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
543.11	544.11	0	5280	0	0	0.0%	2.0%	0.0%	0.0%
543.36	544.36	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
543.61	544.61	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
543.86	544.86	0	5280	0	0	0.0%	1.3%	0.0%	0.0%
544.11	545.11	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
544.36	545.36	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
544.61	545.61	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
544.86	545.86	0	5280	0	0	0.0%	1.1%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
		A	B	C	X	A	B	C	X
545.11	546.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
545.36	546.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
545.61	546.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
545.86	546.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
546.11	547.11	0	5280	0	0	0.0%	2.5%	0.0%	0.0%
546.36	547.36	0	5280	0	0	0.0%	5.7%	0.0%	0.0%
546.61	547.61	0	5280	0	0	0.0%	5.7%	0.0%	0.0%
546.86	547.86	0	5280	0	0	0.0%	5.7%	0.0%	0.0%
547.11	548.11	0	5280	0	0	0.0%	3.2%	0.0%	0.0%
547.36	548.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
547.61	548.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
547.86	548.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
548.11	549.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 1 - MP 490 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete 0.00 mi total	Exist Wood 58.16 mi total	Upgrade Siding 1.98 mi total	Other 0.00 mi total
548.36	549.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
548.61	549.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
548.86	549.86	0	5280	0	0	0.0%	0.9%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
279.64	278.64	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
279.39	278.39	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
279.14	278.14	0	5280	0	0	0.0%	1.7%	0.0%	0.0%
278.89	277.89	0	5280	0	0	0.0%	1.0%	0.0%	0.0%
278.64	277.64	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
278.39	277.39	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
278.14	277.14	0	5280	0	0	0.0%	1.5%	0.0%	0.0%
277.89	276.89	0	5280	0	0	0.0%	3.2%	0.0%	0.0%
277.64	276.64	0	5280	0	0	0.0%	5.3%	0.0%	0.0%
277.39	276.39	0	5280	0	0	0.0%	5.2%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
277.14	276.14	0	5280	0	0	0.0%	4.1%	0.0%	0.0%
276.89	275.89	0	5280	0	0	0.0%	2.5%	0.0%	0.0%
276.64	275.64	0	5280	0	0	0.0%	0.4%	0.0%	0.0%
276.39	275.39	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
276.14	275.14	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
275.89	274.89	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
275.64	274.64	0	5280	0	0	0.0%	0.4%	0.0%	0.0%
275.39	274.39	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
275.14	274.14	0	5280	0	0	0.0%	9.5%	0.0%	0.0%
274.89	273.89	0	5280	0	0	0.0%	10.2%	0.0%	0.0%
274.64	273.64	0	5280	0	0	0.0%	15.9%	0.0%	0.0%
274.39	273.39	0	5280	0	0	0.0%	14.0%	0.0%	0.0%
274.14	273.14	0	5280	0	0	0.0%	7.2%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
273.89	272.89	0	5280	0	0	0.0%	6.5%	0.0%	0.0%
273.64	272.64	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
273.39	272.39	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
273.14	272.14	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
272.89	271.89	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
272.64	271.64	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
272.39	271.39	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
272.14	271.14	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
271.89	270.89	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
271.64	270.64	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
271.39	270.39	0	5280	0	0	0.0%	3.6%	0.0%	0.0%
271.14	270.14	0	5280	0	0	0.0%	3.3%	0.0%	0.0%
270.89	269.89	0	5280	0	0	0.0%	3.1%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
270.64	269.64	0	5280	0	0	0.0%	4.0%	0.0%	0.0%
270.39	269.39	0	5280	0	0	0.0%	7.8%	0.0%	0.0%
270.14	269.14	0	5280	0	0	0.0%	6.5%	0.0%	0.0%
269.89	268.89	0	5280	0	0	0.0%	8.4%	0.0%	0.0%
269.64	268.64	0	5280	0	0	0.0%	7.8%	0.0%	0.0%
269.39	268.39	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
269.14	268.14	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
268.89	267.89	0	5280	0	0	0.0%	0.2%	0.0%	0.0%
268.64	267.64	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
268.39	267.39	0	5280	0	0	0.0%	8.2%	0.0%	0.0%
268.14	267.14	0	5280	0	0	0.0%	8.2%	0.0%	0.0%
267.89	266.89	0	5280	0	0	0.0%	8.2%	0.0%	0.0%
267.64	266.64	0	5280	0	0	0.0%	6.7%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
267.39	266.39	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
267.14	266.14	0	5280	0	0	0.0%	0.3%	0.0%	0.0%
266.89	265.89	0	5280	0	0	0.0%	2.0%	0.0%	0.0%
266.64	265.64	0	5280	0	0	0.0%	2.0%	0.0%	0.0%
266.39	265.39	0	5280	0	0	0.0%	2.6%	0.0%	0.0%
266.14	265.14	0	5280	0	0	0.0%	2.3%	0.0%	0.0%
265.89	264.89	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
265.64	264.64	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
265.39	264.39	0	5280	0	0	0.0%	0.1%	0.0%	0.0%
265.14	264.14	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
264.89	263.89	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
264.64	263.64	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
264.39	263.39	0	5280	0	0	0.0%	0.5%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
264.14	263.14	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
263.89	262.89	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
263.64	262.64	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
263.39	262.39	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
263.14	262.14	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
262.89	261.89	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
262.64	261.64	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
262.39	261.39	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
262.14	261.14	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
261.89	260.89	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
261.64	260.64	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
261.39	260.39	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
261.14	260.14	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
260.89	259.89	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
260.64	259.64	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
260.39	259.39	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
260.14	259.14	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
259.89	258.89	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
259.64	258.64	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
259.39	258.39	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
259.14	258.14	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
258.89	257.89	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
258.64	257.64	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
258.39	257.39	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
258.14	257.14	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
257.89	256.89	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
		A	B	C	X	A	B	C	X
257.64	256.64	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
257.39	256.39	0	5280	0	0	0.0%	0.1%	0.0%	0.0%
257.14	256.14	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
256.89	255.89	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
256.64	255.64	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
256.39	255.39	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
256.14	255.14	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
255.89	254.89	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
255.64	254.64	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
255.39	254.39	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
255.14	254.14	0	5280	0	0	0.0%	1.0%	0.0%	0.0%
254.89	253.89	0	5280	0	0	0.0%	1.5%	0.0%	0.0%
254.64	253.64	0	5280	0	0	0.0%	2.0%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
254.39	253.39	0	5280	0	0	0.0%	2.0%	0.0%	0.0%
254.14	253.14	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
253.89	252.89	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
253.64	252.64	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
253.39	252.39	0	5280	0	0	0.0%	2.5%	0.0%	0.0%
253.14	252.14	0	5280	0	0	0.0%	3.5%	0.0%	0.0%
252.89	251.89	0	5280	0	0	0.0%	3.5%	0.0%	0.0%
252.64	251.64	0	5280	0	0	0.0%	10.6%	0.0%	0.0%
252.39	251.39	0	5280	0	0	0.0%	13.9%	0.0%	0.0%
252.14	251.14	0	5280	0	0	0.0%	13.0%	0.0%	0.0%
251.89	250.89	0	5280	0	0	0.0%	13.0%	0.0%	0.0%
251.64	250.64	0	5280	0	0	0.0%	5.9%	0.0%	0.0%
251.39	250.39	0	5280	0	0	0.0%	0.1%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
251.14	250.14	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
250.89	249.89	0	5280	0	0	0.0%	0.3%	0.0%	0.0%
250.64	249.64	0	5280	0	0	0.0%	1.0%	0.0%	0.0%
250.39	249.39	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
250.14	249.14	0	5280	0	0	0.0%	2.2%	0.0%	0.0%
249.89	248.89	0	5280	0	0	0.0%	2.6%	0.0%	0.0%
249.64	248.64	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
249.39	248.39	0	5280	0	0	0.0%	1.7%	0.0%	0.0%
249.14	248.14	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
248.89	247.89	0	5280	0	0	0.0%	1.5%	0.0%	0.0%
248.64	247.64	0	5280	0	0	0.0%	2.6%	0.0%	0.0%
248.39	247.39	0	5280	0	0	0.0%	2.6%	0.0%	0.0%
248.14	247.14	0	5280	0	0	0.0%	2.5%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
247.89	246.89	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
247.64	246.64	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
247.39	246.39	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
247.14	246.14	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
246.89	245.89	0	5280	0	0	0.0%	5.5%	0.0%	0.0%
246.64	245.64	0	5280	0	0	0.0%	6.4%	0.0%	0.0%
246.39	245.39	0	5280	0	0	0.0%	6.4%	0.0%	0.0%
246.14	245.14	0	5280	0	0	0.0%	5.3%	0.0%	0.0%
245.89	244.89	0	5280	0	0	0.0%	1.0%	0.0%	0.0%
245.64	244.64	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
245.39	244.39	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
245.14	244.14	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
244.89	243.89	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 240 to MP 280 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 38.75 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
244.64	243.64	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
244.39	243.39	0	5280	0	0	0.0%	4.7%	0.0%	0.0%
244.14	243.14	0	5280	0	0	0.0%	9.6%	0.0%	0.0%
243.89	242.89	0	5280	0	0	0.0%	11.0%	0.0%	0.0%
243.64	242.64	0	5280	0	0	0.0%	11.7%	0.0%	0.0%
243.39	242.39	0	5280	0	0	0.0%	7.1%	0.0%	0.0%
243.14	242.14	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
242.89	241.89	0	5280	0	0	0.0%	1.7%	0.0%	0.0%
242.64	241.64	0	5280	0	0	0.0%	3.5%	0.0%	0.0%
242.39	241.39	0	5280	0	0	0.0%	5.5%	0.0%	0.0%
242.14	241.14	0	5280	0	0	0.0%	6.0%	0.0%	0.0%
241.89	240.89	0	5280	0	0	0.0%	5.5%	0.0%	0.0%

Main 2 - MP 280 to MP 299 - Rolling One-Mile Window									
		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 2.00 mi total	Exist Wood: 14.56 mi total	Upgrade Siding: 2.80 mi total	Other: 0.00 mi total
299.00	298.00	0	5280	0	0	0.0%	4.0%	0.0%	0.0%
298.75	297.75	0	5280	0	0	0.0%	2.3%	0.0%	0.0%
298.50	297.50	0	5280	0	0	0.0%	2.3%	0.0%	0.0%
298.25	297.25	0	5280	0	0	0.0%	2.3%	0.0%	0.0%
298.00	297.00	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
297.75	296.75	0	5280	0	0	0.0%	5.0%	0.0%	0.0%
297.50	296.50	0	5280	0	0	0.0%	6.1%	0.0%	0.0%
297.25	296.25	0	5280	0	0	0.0%	7.4%	0.0%	0.0%

Main 2 - MP 280 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 2.00 mi total	Exist Wood: 14.56 mi total	Upgrade Siding: 2.80 mi total	Other: 0.00 mi total
297.00	296.00	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
296.75	295.75	0	5280	0	0	0.0%	3.9%	0.0%	0.0%
296.50	295.50	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
296.25	295.25	0	5280	0	0	0.0%	2.0%	0.0%	0.0%
296.00	295.00	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
295.75	294.75	0	5280	0	0	0.0%	3.5%	0.0%	0.0%
295.50	294.50	0	5280	0	0	0.0%	3.2%	0.0%	0.0%
295.25	294.25	0	5280	0	0	0.0%	2.0%	0.0%	0.0%
295.00	294.00	0	5280	0	0	0.0%	3.1%	0.0%	0.0%
294.75	293.75	0	5280	0	0	0.0%	6.6%	0.0%	0.0%
294.50	293.50	0	5280	0	0	0.0%	6.6%	0.0%	0.0%
294.25	293.25	0	5280	0	0	0.0%	6.6%	0.0%	0.0%
294.00	293.00	0	5280	0	0	0.0%	5.5%	0.0%	0.0%

Main 2 - MP 280 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 2.00 mi total	Exist Wood: 14.56 mi total	Upgrade Siding: 2.80 mi total	Other: 0.00 mi total
293.75	292.75	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
293.50	292.50	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
293.25	292.25	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
293.00	292.00	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
292.75	291.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
292.50	291.50	0	5280	0	0	0.0%	6.9%	0.0%	0.0%
292.25	291.25	0	5280	0	0	0.0%	9.4%	0.0%	0.0%
292.00	291.00	0	5280	0	0	0.0%	9.4%	0.0%	0.0%
291.75	290.75	0	5280	0	0	0.0%	9.4%	0.0%	0.0%
291.50	290.50	0	5280	0	0	0.0%	2.5%	0.0%	0.0%
291.25	290.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
291.00	290.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
290.75	289.75	0	5280	0	0	0.0%	0.5%	0.0%	0.0%

Main 2 - MP 280 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 2.00 mi total	Exist Wood: 14.56 mi total	Upgrade Siding: 2.80 mi total	Other: 0.00 mi total
290.50	289.50	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
290.25	289.25	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
290.00	289.00	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
289.75	288.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
289.50	288.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
289.25	288.25	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
289.00	288.00	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
288.75	287.75	211	5069	0	0	0.0%	0.7%	0.0%	0.0%
288.50	287.50	1531	3749	0	0	0.0%	1.0%	0.0%	0.0%
288.25	287.25	2851	2429	0	0	0.2%	0.0%	0.0%	0.0%
288.00	287.00	4171	1109	0	0	2.3%	0.0%	0.0%	0.0%
287.75	286.75	5280	0	0	0	2.1%	0.0%	0.0%	0.0%
287.50	286.50	5280	0	0	0	2.3%	0.0%	0.0%	0.0%

Main 2 - MP 280 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 2.00 mi total	Exist Wood: 14.56 mi total	Upgrade Siding: 2.80 mi total	Other: 0.00 mi total
287.25	286.25	5280	0	0	0	2.8%	0.0%	0.0%	0.0%
287.00	286.00	5280	0	0	0	1.7%	0.0%	0.0%	0.0%
286.75	285.75	5069	0	211	0	2.0%	0.0%	0.0%	0.0%
286.50	285.50	3749	0	1531	0	2.3%	0.0%	4.0%	0.0%
286.25	285.25	2429	0	2851	0	2.4%	0.0%	3.0%	0.0%
286.00	285.00	1109	0	4171	0	2.5%	0.0%	4.0%	0.0%
285.75	284.75	0	0	5280	0	0.0%	0.0%	3.2%	0.0%
285.50	284.50	0	211	5069	0	0.0%	0.0%	2.1%	0.0%
285.25	284.25	0	1531	3749	0	0.0%	0.0%	2.2%	0.0%
285.00	284.00	0	2851	2429	0	0.0%	0.0%	0.0%	0.0%
284.75	283.75	0	4171	1109	0	0.0%	0.0%	0.0%	0.0%
284.50	283.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
284.25	283.25	0	5280	0	0	0.0%	1.8%	0.0%	0.0%

Main 2 - MP 280 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 2.00 mi total	Exist Wood: 14.56 mi total	Upgrade Siding: 2.80 mi total	Other: 0.00 mi total
284.00	283.00	0	5280	0	0	0.0%	7.9%	0.0%	0.0%
283.75	282.75	0	5280	0	0	0.0%	9.4%	0.0%	0.0%
283.50	282.50	0	5280	0	0	0.0%	9.4%	0.0%	0.0%
283.25	282.25	0	5280	0	0	0.0%	8.0%	0.0%	0.0%
283.00	282.00	0	5280	0	0	0.0%	2.2%	0.0%	0.0%
282.75	281.75	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
282.50	281.50	0	5280	0	0	0.0%	1.3%	0.0%	0.0%
282.25	281.25	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
282.00	281.00	0	4277	1003	0	0.0%	0.7%	0.0%	0.0%
281.75	280.75	0	2957	2323	0	0.0%	1.1%	0.0%	0.0%
281.50	280.50	0	1637	3643	0	0.0%	0.0%	1.6%	0.0%
281.25	280.25	0	317	4963	0	0.0%	0.0%	1.3%	0.0%
281.00	280.00	0	0	5280	0	0.0%	0.0%	1.2%	0.0%

Main 2 - MP 280 to MP 299 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 2.00 mi total	Exist Wood: 14.56 mi total	Upgrade Siding: 2.80 mi total	Other: 0.00 mi total
280.75	279.75	0	0	5280	0	0.0%	0.0%	4.7%	0.0%

Main 2 - MP 337 to MP 367 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 10.00 mi total	Exist Wood: 11.99 mi total	Upgrade Siding: 6.21 mi total	Other: 2.13 mi total
367.33	366.33	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
367.08	366.08	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
366.83	365.83	106	0	5174	0	0.0%	0.0%	0.6%	0.0%
366.58	365.58	1426	0	3854	0	0.0%	0.0%	0.8%	0.0%
366.33	365.33	2746	0	2534	0	1.8%	0.0%	1.2%	0.0%
366.08	365.08	4066	0	1214	0	1.9%	0.0%	2.6%	0.0%
365.83	364.83	5280	0	0	0	1.9%	0.0%	0.0%	0.0%
365.58	364.58	5280	0	0	0	3.9%	0.0%	0.0%	0.0%
365.33	364.33	5280	0	0	0	4.1%	0.0%	0.0%	0.0%
365.08	364.08	5280	0	0	0	3.6%	0.0%	0.0%	0.0%
364.83	363.83	5280	0	0	0	3.1%	0.0%	0.0%	0.0%
364.58	363.58	5280	0	0	0	1.1%	0.0%	0.0%	0.0%
364.33	363.33	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 337 to MP 367 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 10.00 mi total	Exist Wood: 11.99 mi total	Upgrade Siding: 6.21 mi total	Other: 2.13 mi total
364.08	363.08	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
363.83	362.83	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
363.58	362.58	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
363.33	362.33	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
363.08	362.08	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
362.83	361.83	5280	0	0	0	0.8%	0.0%	0.0%	0.0%
362.58	361.58	5280	0	0	0	0.8%	0.0%	0.0%	0.0%
362.33	361.33	5227	0	0	53	1.5%	0.0%	0.0%	0.0%
362.08	361.08	3907	0	0	1373	2.0%	0.0%	0.0%	0.0%
361.83	360.83	3432	0	0	1848	1.1%	0.0%	0.0%	0.0%
361.58	360.58	3432	0	0	1848	2.8%	0.0%	0.0%	0.0%
361.33	360.33	3485	0	0	1795	2.4%	0.0%	0.0%	0.0%
361.08	360.08	4805	0	0	475	1.8%	0.0%	0.0%	0.0%

Main 2 - MP 337 to MP 367 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 10.00 mi total	Exist Wood: 11.99 mi total	Upgrade Siding: 6.21 mi total	Other: 2.13 mi total
360.83	359.83	5280	0	0	0	2.2%	0.0%	0.0%	0.0%
360.58	359.58	5280	0	0	0	1.7%	0.0%	0.0%	0.0%
360.33	359.33	5280	0	0	0	1.4%	0.0%	0.0%	0.0%
360.08	359.08	5280	0	0	0	2.3%	0.0%	0.0%	0.0%
359.83	358.83	5280	0	0	0	1.7%	0.0%	0.0%	0.0%
359.58	358.58	5280	0	0	0	1.5%	0.0%	0.0%	0.0%
359.33	358.33	5174	0	106	0	1.6%	0.0%	0.0%	0.0%
359.08	358.08	3854	0	1426	0	0.8%	0.0%	0.4%	0.0%
358.83	357.83	2534	0	2746	0	1.2%	0.0%	3.5%	0.0%
358.58	357.58	1214	0	4066	0	1.0%	0.0%	4.3%	0.0%
358.33	357.33	0	0	5280	0	0.0%	0.0%	4.2%	0.0%
358.08	357.08	0	0	5280	0	0.0%	0.0%	7.9%	0.0%
357.83	356.83	0	0	5280	0	0.0%	0.0%	7.8%	0.0%

Main 2 - MP 337 to MP 367 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 10.00 mi total	Exist Wood: 11.99 mi total	Upgrade Siding: 6.21 mi total	Other: 2.13 mi total
357.58	356.58	0	0	5280	0	0.0%	0.0%	7.8%	0.0%
357.33	356.33	0	0	5280	0	0.0%	0.0%	11.5%	0.0%
357.08	356.08	0	0	5280	0	0.0%	0.0%	8.3%	0.0%
356.83	355.83	0	0	5280	0	0.0%	0.0%	6.8%	0.0%
356.58	355.58	106	0	5174	0	10.5%	0.0%	6.0%	0.0%
356.33	355.33	1426	0	3854	0	5.3%	0.0%	1.7%	0.0%
356.08	355.08	2746	0	2534	0	3.7%	0.0%	1.4%	0.0%
355.83	354.83	4066	0	1214	0	3.3%	0.0%	2.6%	0.0%
355.58	354.58	5280	0	0	0	3.3%	0.0%	0.0%	0.0%
355.33	354.33	5280	0	0	0	3.2%	0.0%	0.0%	0.0%
355.08	354.08	5280	0	0	0	4.5%	0.0%	0.0%	0.0%
354.83	353.83	5280	0	0	0	5.7%	0.0%	0.0%	0.0%
354.58	353.58	5280	0	0	0	6.1%	0.0%	0.0%	0.0%

Main 2 - MP 337 to MP 367 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 10.00 mi total	Exist Wood: 11.99 mi total	Upgrade Siding: 6.21 mi total	Other: 2.13 mi total
354.33	353.33	5280	0	0	0	5.0%	0.0%	0.0%	0.0%
354.08	353.08	5280	0	0	0	4.9%	0.0%	0.0%	0.0%
353.83	352.83	5280	0	0	0	4.3%	0.0%	0.0%	0.0%
353.58	352.58	4382	0	898	0	4.2%	0.0%	11.8%	0.0%
353.33	352.33	3062	0	2218	0	5.9%	0.0%	19.1%	0.0%
353.08	352.08	1742	0	3538	0	5.2%	0.0%	14.5%	0.0%
352.83	351.83	422	0	4858	0	7.5%	0.0%	10.6%	0.0%
352.58	351.58	0	0	5280	0	0.0%	0.0%	7.7%	0.0%
352.33	351.33	0	0	5280	0	0.0%	0.0%	1.7%	0.0%
352.08	351.08	0	0	5280	0	0.0%	0.0%	0.5%	0.0%
351.83	350.83	0	0	5280	0	0.0%	0.0%	1.0%	0.0%
351.58	350.58	0	1003	4277	0	0.0%	0.0%	1.2%	0.0%
351.33	350.33	0	2323	2957	0	0.0%	0.0%	1.8%	0.0%

Main 2 - MP 337 to MP 367 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 10.00 mi total	Exist Wood: 11.99 mi total	Upgrade Siding: 6.21 mi total	Other: 2.13 mi total
351.08	350.08	0	3643	1637	0	0.0%	0.0%	1.6%	0.0%
350.83	349.83	0	4963	317	0	0.0%	0.0%	0.0%	0.0%
350.58	349.58	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
350.33	349.33	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
350.08	349.08	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
349.83	348.83	0	5280	0	0	0.0%	0.3%	0.0%	0.0%
349.58	348.58	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
349.33	348.33	0	5280	0	0	0.0%	1.7%	0.0%	0.0%
349.08	348.08	0	5280	0	0	0.0%	3.0%	0.0%	0.0%
348.83	347.83	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
348.58	347.58	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
348.33	347.33	0	5280	0	0	0.0%	1.7%	0.0%	0.0%
348.08	347.08	0	5280	0	0	0.0%	1.7%	0.0%	0.0%

Main 2 - MP 337 to MP 367 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 10.00 mi total	Exist Wood: 11.99 mi total	Upgrade Siding: 6.21 mi total	Other: 2.13 mi total
347.83	346.83	0	5280	0	0	0.0%	2.0%	0.0%	0.0%
347.58	346.58	0	5280	0	0	0.0%	2.9%	0.0%	0.0%
347.33	346.33	0	5280	0	0	0.0%	4.1%	0.0%	0.0%
347.08	346.08	0	5280	0	0	0.0%	2.9%	0.0%	0.0%
346.83	345.83	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
346.58	345.58	0	5280	0	0	0.0%	1.4%	0.0%	0.0%
346.33	345.33	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
346.08	345.08	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
345.83	344.83	0	5280	0	0	0.0%	3.1%	0.0%	0.0%
345.58	344.58	0	5280	0	0	0.0%	3.6%	0.0%	0.0%
345.33	344.33	0	5280	0	0	0.0%	5.1%	0.0%	0.0%
345.08	344.08	0	5280	0	0	0.0%	3.8%	0.0%	0.0%
344.83	343.83	0	5280	0	0	0.0%	2.6%	0.0%	0.0%

Main 2 - MP 337 to MP 367 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 10.00 mi total	Exist Wood: 11.99 mi total	Upgrade Siding: 6.21 mi total	Other: 2.13 mi total
344.58	343.58	0	5280	0	0	0.0%	3.4%	0.0%	0.0%
344.33	343.33	0	5280	0	0	0.0%	2.6%	0.0%	0.0%
344.08	343.08	0	5280	0	0	0.0%	2.0%	0.0%	0.0%
343.83	342.83	0	5280	0	0	0.0%	2.2%	0.0%	0.0%
343.58	342.58	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
343.33	342.33	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
343.08	342.08	0	5280	0	0	0.0%	7.4%	0.0%	0.0%
342.83	341.83	0	5280	0	0	0.0%	14.6%	0.0%	0.0%
342.58	341.58	0	5280	0	0	0.0%	14.1%	0.0%	0.0%
342.33	341.33	0	5280	0	0	0.0%	14.8%	0.0%	0.0%
342.08	341.08	0	5280	0	0	0.0%	10.1%	0.0%	0.0%
341.83	340.83	0	4488	0	792	0.0%	5.0%	0.0%	0.2%
341.58	340.58	0	3168	0	2112	0.0%	5.0%	0.0%	0.1%

Main 2 - MP 337 to MP 367 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 10.00 mi total	Exist Wood: 11.99 mi total	Upgrade Siding: 6.21 mi total	Other: 2.13 mi total
341.33	340.33	0	1848	0	3432	0.0%	6.2%	0.0%	0.0%
341.08	340.08	0	528	0	4752	0.0%	14.8%	0.0%	0.0%
340.83	339.83	0	0	0	5280	0.0%	0.0%	0.0%	0.0%
340.58	339.58	0	0	0	5280	0.0%	0.0%	0.0%	0.0%
340.33	339.33	0	0	0	5280	0.0%	0.0%	0.0%	0.0%
340.08	339.08	0	634	0	4646	0.0%	1.8%	0.0%	0.0%
339.83	338.83	0	1954	0	3326	0.0%	4.0%	0.0%	0.0%
339.58	338.58	0	3274	0	2006	0.0%	2.4%	0.0%	0.0%
339.33	338.33	0	4594	0	686	0.0%	1.7%	0.0%	0.0%
339.08	338.08	0	5280	0	0	0.0%	1.3%	0.0%	0.0%
338.83	337.83	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
338.58	337.58	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
338.33	337.33	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 337 to MP 367 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 10.00 mi total	Exist Wood: 11.99 mi total	Upgrade Siding: 6.21 mi total	Other: 2.13 mi total
338.08	337.08	0	5280	0	0	0.0%	0.4%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
497.36	496.36	0	0	5280	0	0.0%	0.0%	13.6%	0.0%
497.11	496.11	0	0	5280	0	0.0%	0.0%	4.1%	0.0%
496.86	495.86	158	0	5122	0	0.0%	0.0%	0.7%	0.0%
496.61	495.61	1478	0	3802	0	0.0%	0.0%	0.9%	0.0%
496.36	495.36	2798	0	2482	0	5.0%	0.0%	1.3%	0.0%
496.11	495.11	4118	0	1162	0	3.4%	0.0%	0.0%	0.0%
495.86	494.86	5280	0	0	0	3.2%	0.0%	0.0%	0.0%
495.61	494.61	5280	0	0	0	3.2%	0.0%	0.0%	0.0%
495.36	494.36	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
495.11	494.11	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
494.86	493.86	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
494.61	493.61	5280	0	0	0	2.3%	0.0%	0.0%	0.0%
494.36	493.36	5280	0	0	0	2.5%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
494.11	493.11	5280	0	0	0	2.5%	0.0%	0.0%	0.0%
493.86	492.86	5280	0	0	0	2.0%	0.0%	0.0%	0.0%
493.61	492.61	5280	0	0	0	0.2%	0.0%	0.0%	0.0%
493.36	492.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
493.11	492.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
492.86	491.86	4330	950	0	0	0.0%	0.0%	0.0%	0.0%
492.61	491.61	3010	2270	0	0	0.0%	12.3%	0.0%	0.0%
492.36	491.36	1690	3590	0	0	0.0%	14.7%	0.0%	0.0%
492.11	491.11	370	4910	0	0	0.0%	10.7%	0.0%	0.0%
491.86	490.86	0	5280	0	0	0.0%	10.2%	0.0%	0.0%
491.61	490.61	0	5280	0	0	0.0%	6.3%	0.0%	0.0%
491.36	490.36	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
491.11	490.11	0	5280	0	0	0.0%	1.8%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
490.86	489.86	0	5280	0	0	0.0%	4.0%	0.0%	0.0%
490.61	489.61	0	5280	0	0	0.0%	5.1%	0.0%	0.0%
490.36	489.36	0	5280	0	0	0.0%	5.5%	0.0%	0.0%
490.11	489.11	0	5280	0	0	0.0%	5.5%	0.0%	0.0%
489.86	488.86	0	5280	0	0	0.0%	3.1%	0.0%	0.0%
489.61	488.61	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
489.36	488.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
489.11	488.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
488.86	487.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
488.61	487.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
488.36	487.36	0	5280	0	0	0.0%	8.6%	0.0%	0.0%
488.11	487.11	0	5280	0	0	0.0%	8.6%	0.0%	0.0%
487.86	486.86	0	5280	0	0	0.0%	8.6%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
487.61	486.61	0	5280	0	0	0.0%	9.3%	0.0%	0.0%
487.36	486.36	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
487.11	486.11	0	5280	0	0	0.0%	1.7%	0.0%	0.0%
486.86	485.86	0	5280	0	0	0.0%	2.3%	0.0%	0.0%
486.61	485.61	0	5280	0	0	0.0%	1.7%	0.0%	0.0%
486.36	485.36	0	4330	950	0	0.0%	2.1%	0.0%	0.0%
486.11	485.11	0	3010	2270	0	0.0%	1.1%	0.0%	0.0%
485.86	484.86	0	1690	3590	0	0.0%	0.0%	0.8%	0.0%
485.61	484.61	0	370	4910	0	0.0%	0.0%	1.5%	0.0%
485.36	484.36	0	0	5280	0	0.0%	0.0%	2.9%	0.0%
485.11	484.11	0	0	5280	0	0.0%	0.0%	5.5%	0.0%
484.86	483.86	0	0	5280	0	0.0%	0.0%	4.9%	0.0%
484.61	483.61	0	264	5016	0	0.0%	0.0%	4.3%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
484.36	483.36	0	1584	3696	0	0.0%	0.0%	3.7%	0.0%
484.11	483.11	0	2904	2376	0	0.0%	0.0%	0.0%	0.0%
483.86	482.86	0	4224	1056	0	0.0%	0.7%	0.0%	0.0%
483.61	482.61	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
483.36	482.36	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
483.11	482.11	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
482.86	481.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
482.61	481.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
482.36	481.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
482.11	481.11	0	5280	0	0	0.0%	9.5%	0.0%	0.0%
481.86	480.86	0	4594	0	686	0.0%	13.4%	0.0%	0.0%
481.61	480.61	0	3274	0	2006	0.0%	18.8%	0.0%	0.0%
481.36	480.36	0	1954	0	3326	0.0%	31.6%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
481.11	480.11	0	686	0	4594	0.0%	17.7%	0.0%	1.7%
480.86	479.86	0	1373	0	3907	0.0%	30.4%	0.0%	2.0%
480.61	479.61	0	2693	0	2587	0.0%	15.5%	0.0%	3.0%
480.36	479.36	0	4013	0	1267	0.0%	11.1%	0.0%	6.1%
480.11	479.11	0	4330	0	950	0.0%	10.1%	0.0%	0.0%
479.86	478.86	0	3010	0	2270	0.0%	0.9%	0.0%	0.0%
479.61	478.61	0	1690	0	3590	0.0%	1.6%	0.0%	0.0%
479.36	478.36	0	370	0	4910	0.0%	0.0%	0.0%	0.0%
479.11	478.11	0	0	0	5280	0.0%	0.0%	0.0%	0.0%
478.86	477.86	0	0	0	5280	0.0%	0.0%	0.0%	0.0%
478.61	477.61	0	0	0	5280	0.0%	0.0%	0.0%	0.0%
478.36	477.36	0	0	0	5280	0.0%	0.0%	0.0%	0.0%
478.11	477.11	0	158	0	5122	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
477.86	476.86	0	1478	0	3802	0.0%	0.0%	0.0%	0.0%
477.61	476.61	0	2798	0	2482	0.0%	1.2%	0.0%	0.0%
477.36	476.36	0	4118	0	1162	0.0%	0.8%	0.0%	0.0%
477.11	476.11	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
476.86	475.86	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
476.61	475.61	0	5280	0	0	0.0%	0.1%	0.0%	0.0%
476.36	475.36	0	5280	0	0	0.0%	3.3%	0.0%	0.0%
476.11	475.11	0	5280	0	0	0.0%	3.3%	0.0%	0.0%
475.86	474.86	0	5280	0	0	0.0%	3.3%	0.0%	0.0%
475.61	474.61	0	5280	0	0	0.0%	3.2%	0.0%	0.0%
475.36	474.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
475.11	474.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
474.86	473.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
474.61	473.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
474.36	473.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
474.11	473.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
473.86	472.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
473.61	472.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
473.36	472.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
473.11	472.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
472.86	471.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
472.61	471.61	0	5280	0	0	0.0%	0.1%	0.0%	0.0%
472.36	471.36	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
472.11	471.11	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
471.86	470.86	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
471.61	470.61	0	5280	0	0	0.0%	2.3%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
471.36	470.36	0	5280	0	0	0.0%	0.2%	0.0%	0.0%
471.11	470.11	0	5280	0	0	0.0%	4.3%	0.0%	0.0%
470.86	469.86	0	5280	0	0	0.0%	4.3%	0.0%	0.0%
470.61	469.61	0	5280	0	0	0.0%	5.2%	0.0%	0.0%
470.36	469.36	0	5280	0	0	0.0%	13.8%	0.0%	0.0%
470.11	469.11	0	5280	0	0	0.0%	12.0%	0.0%	0.0%
469.86	468.86	0	5280	0	0	0.0%	21.4%	0.0%	0.0%
469.61	468.61	0	5280	0	0	0.0%	25.9%	0.0%	0.0%
469.36	468.36	0	5280	0	0	0.0%	17.4%	0.0%	0.0%
469.11	468.11	0	5280	0	0	0.0%	15.1%	0.0%	0.0%
468.86	467.86	0	5280	0	0	0.0%	5.6%	0.0%	0.0%
468.61	467.61	0	5280	0	0	0.0%	0.3%	0.0%	0.0%
468.36	467.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
468.11	467.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
467.86	466.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
467.61	466.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
467.36	466.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
467.11	466.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
466.86	465.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
466.61	465.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
466.36	465.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
466.11	465.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
465.86	464.86	0	4594	0	686	0.0%	0.0%	0.0%	0.0%
465.61	464.61	0	3749	0	1531	0.0%	0.0%	0.0%	0.0%
465.36	464.36	0	3749	0	1531	0.0%	6.1%	0.0%	0.0%
465.11	464.11	0	3749	0	1531	0.0%	6.7%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
464.86	463.86	0	4435	0	845	0.0%	5.6%	0.0%	0.0%
464.61	463.61	0	5280	0	0	0.0%	4.7%	0.0%	0.0%
464.36	463.36	0	5280	0	0	0.0%	0.4%	0.0%	0.0%
464.11	463.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
463.86	462.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
463.61	462.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
463.36	462.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
463.11	462.11	0	5280	0	0	0.0%	3.6%	0.0%	0.0%
462.86	461.86	0	5280	0	0	0.0%	3.8%	0.0%	0.0%
462.61	461.61	0	5280	0	0	0.0%	3.8%	0.0%	0.0%
462.36	461.36	0	5280	0	0	0.0%	3.8%	0.0%	0.0%
462.11	461.11	0	5280	0	0	0.0%	0.2%	0.0%	0.0%
461.86	460.86	0	5280	0	0	0.0%	0.7%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
461.61	460.61	0	5280	0	0	0.0%	4.5%	0.0%	0.0%
461.36	460.36	0	5280	0	0	0.0%	5.5%	0.0%	0.0%
461.11	460.11	0	5280	0	0	0.0%	5.5%	0.0%	0.0%
460.86	459.86	0	5280	0	0	0.0%	5.8%	0.0%	0.0%
460.61	459.61	0	5280	0	0	0.0%	2.8%	0.0%	0.0%
460.36	459.36	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
460.11	459.11	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
459.86	458.86	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
459.61	458.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
459.36	458.36	0	5280	0	0	0.0%	3.4%	0.0%	0.0%
459.11	458.11	0	5280	0	0	0.0%	4.0%	0.0%	0.0%
458.86	457.86	0	5280	0	0	0.0%	4.5%	0.0%	0.0%
458.61	457.61	0	5280	0	0	0.0%	4.5%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
458.36	457.36	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
458.11	457.11	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
457.86	456.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
457.61	456.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
457.36	456.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
457.11	456.11	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
456.86	455.86	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
456.61	455.61	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
456.36	455.36	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
456.11	455.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
455.86	454.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
455.61	454.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
455.36	454.36	0	4594	0	686	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
455.11	454.11	0	3960	0	1320	0.0%	0.0%	0.0%	0.0%
454.86	453.86	0	3960	0	1320	0.0%	0.8%	0.0%	0.0%
454.61	453.61	0	3960	0	1320	0.0%	0.8%	0.0%	0.0%
454.36	453.36	0	3960	0	1320	0.0%	1.1%	0.0%	2.3%
454.11	453.11	0	3274	0	2006	0.0%	1.3%	0.0%	2.2%
453.86	452.86	0	1954	0	3326	0.0%	0.5%	0.0%	3.0%
453.61	452.61	0	634	0	4646	0.0%	1.4%	0.0%	2.3%
453.36	452.36	0	0	0	5280	0.0%	0.0%	0.0%	1.5%
453.11	452.11	0	0	422	4858	0.0%	0.0%	0.0%	1.9%
452.86	451.86	0	0	1742	3538	0.0%	0.0%	0.0%	1.0%
452.61	451.61	0	0	3062	2218	0.0%	0.0%	0.0%	1.3%
452.36	451.36	0	0	4382	898	0.0%	0.0%	0.4%	2.8%
452.11	451.11	0	0	5280	0	0.0%	0.0%	0.5%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
451.86	450.86	0	0	5280	0	0.0%	0.0%	0.5%	0.0%
451.61	450.61	0	0	5280	0	0.0%	0.0%	0.5%	0.0%
451.36	450.36	0	0	5280	0	0.0%	0.0%	0.2%	0.0%
451.11	450.11	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
450.86	449.86	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
450.61	449.61	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
450.36	449.36	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
450.11	449.11	422	0	4858	0	0.0%	0.0%	0.0%	0.0%
449.86	448.86	1742	0	3538	0	0.0%	0.0%	0.0%	0.0%
449.61	448.61	3062	0	2218	0	0.0%	0.0%	0.0%	0.0%
449.36	448.36	4382	0	898	0	0.0%	0.0%	0.0%	0.0%
449.11	448.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
448.86	447.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
448.61	447.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
448.36	447.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
448.11	447.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
447.86	446.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
447.61	446.61	5280	0	0	0	1.7%	0.0%	0.0%	0.0%
447.36	446.36	5280	0	0	0	1.7%	0.0%	0.0%	0.0%
447.11	446.11	5280	0	0	0	1.7%	0.0%	0.0%	0.0%
446.86	445.86	5280	0	0	0	1.7%	0.0%	0.0%	0.0%
446.61	445.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
446.36	445.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
446.11	445.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
445.86	444.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
445.61	444.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
445.36	444.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
445.11	444.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
444.86	443.86	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
444.61	443.61	5280	0	0	0	0.8%	0.0%	0.0%	0.0%
444.36	443.36	5280	0	0	0	1.2%	0.0%	0.0%	0.0%
444.11	443.11	5280	0	0	0	1.8%	0.0%	0.0%	0.0%
443.86	442.86	5280	0	0	0	1.8%	0.0%	0.0%	0.0%
443.61	442.61	5280	0	0	0	1.5%	0.0%	0.0%	0.0%
443.36	442.36	5280	0	0	0	1.1%	0.0%	0.0%	0.0%
443.11	442.11	5280	0	0	0	0.5%	0.0%	0.0%	0.0%
442.86	441.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
442.61	441.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
442.36	441.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
442.11	441.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
441.86	440.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
441.61	440.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
441.36	440.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
441.11	440.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
440.86	439.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
440.61	439.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
440.36	439.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
440.11	439.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
439.86	438.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
439.61	438.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
439.36	438.36	5280	0	0	0	0.7%	0.0%	0.0%	0.0%
439.11	438.11	4858	0	422	0	1.7%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
438.86	437.86	3538	0	1742	0	2.4%	0.0%	0.0%	0.0%
438.61	437.61	2218	0	3062	0	3.8%	0.0%	0.0%	0.0%
438.36	437.36	898	0	4382	0	5.4%	0.0%	0.0%	0.0%
438.11	437.11	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
437.86	436.86	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
437.61	436.61	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
437.36	436.36	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
437.11	436.11	0	0	5280	0	0.0%	0.0%	0.0%	0.0%
436.86	435.86	0	0	5280	0	0.0%	0.0%	9.0%	0.0%
436.61	435.61	950	0	4330	0	0.0%	0.0%	11.2%	0.0%
436.36	435.36	2270	0	3010	0	0.0%	0.0%	16.1%	0.0%
436.11	435.11	3590	0	1690	0	0.0%	0.0%	28.6%	0.0%
435.86	434.86	4910	0	370	0	0.0%	0.0%	1.9%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
435.61	434.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
435.36	434.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
435.11	434.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
434.86	433.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
434.61	433.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
434.36	433.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
434.11	433.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
433.86	432.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
433.61	432.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
433.36	432.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
433.11	432.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
432.86	431.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
432.61	431.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
432.36	431.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
432.11	431.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
431.86	430.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
431.61	430.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
431.36	430.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
431.11	430.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
430.86	429.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
430.61	429.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
430.36	429.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
430.11	429.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
429.86	428.86	4066	0	1214	0	0.0%	0.0%	12.2%	0.0%
429.61	428.61	2746	0	2534	0	0.0%	0.0%	13.4%	0.0%
429.36	428.36	1426	0	3854	0	0.0%	0.0%	12.5%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
429.11	428.11	106	0	5174	0	0.0%	0.0%	13.5%	0.0%
428.86	427.86	0	0	5280	0	0.0%	0.0%	23.5%	0.0%
428.61	427.61	0	0	5280	0	0.0%	0.0%	27.5%	0.0%
428.36	427.36	0	0	5280	0	0.0%	0.0%	25.3%	0.0%
428.11	427.11	0	0	5280	0	0.0%	0.0%	23.5%	0.0%
427.86	426.86	0	0	5280	0	0.0%	0.0%	11.2%	0.0%
427.61	426.61	950	0	4330	0	0.0%	0.0%	4.3%	0.0%
427.36	426.36	2270	0	3010	0	3.8%	0.0%	5.4%	0.0%
427.11	426.11	3590	0	1690	0	3.6%	0.0%	2.5%	0.0%
426.86	425.86	4910	0	370	0	2.6%	0.0%	0.0%	0.0%
426.61	425.61	5280	0	0	0	2.4%	0.0%	0.0%	0.0%
426.36	425.36	5280	0	0	0	0.8%	0.0%	0.0%	0.0%
426.11	425.11	5280	0	0	0	1.9%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
425.86	424.86	5280	0	0	0	10.1%	0.0%	0.0%	0.0%
425.61	424.61	5280	0	0	0	10.3%	0.0%	0.0%	0.0%
425.36	424.36	5280	0	0	0	10.3%	0.0%	0.0%	0.0%
425.11	424.11	5280	0	0	0	8.4%	0.0%	0.0%	0.0%
424.86	423.86	5280	0	0	0	0.2%	0.0%	0.0%	0.0%
424.61	423.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
424.36	423.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
424.11	423.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
423.86	422.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
423.61	422.61	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
423.36	422.36	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
423.11	422.11	5280	0	0	0	0.0%	0.0%	0.0%	0.0%
422.86	421.86	5280	0	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
422.61	421.61	5280	0	0	0	0.6%	0.0%	0.0%	0.0%
422.36	421.36	4594	0	686	0	1.3%	0.0%	4.0%	0.0%
422.11	421.11	3274	0	2006	0	1.9%	0.0%	1.4%	0.0%
421.86	420.86	1954	0	3326	0	3.1%	0.0%	0.8%	0.0%
421.61	420.61	634	0	4646	0	5.0%	0.0%	7.5%	0.0%
421.36	420.36	0	0	5280	0	0.0%	0.0%	6.5%	0.0%
421.11	420.11	0	0	5280	0	0.0%	0.0%	9.1%	0.0%
420.86	419.86	0	0	5280	0	0.0%	0.0%	10.9%	0.0%
420.61	419.61	0	0	5280	0	0.0%	0.0%	4.9%	0.0%
420.36	419.36	0	0	5280	0	0.0%	0.0%	4.4%	0.0%
420.11	419.11	0	422	4858	0	0.0%	0.0%	2.0%	0.0%
419.86	418.86	0	1742	3538	0	0.0%	0.0%	0.0%	0.0%
419.61	418.61	0	3062	2218	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
419.36	418.36	0	4382	898	0	0.0%	0.0%	0.0%	0.0%
419.11	418.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
418.86	417.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
418.61	417.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
418.36	417.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
418.11	417.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
417.86	416.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
417.61	416.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
417.36	416.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
417.11	416.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
416.86	415.86	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
416.61	415.61	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
416.36	415.36	0	5280	0	0	0.0%	2.4%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
416.11	415.11	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
415.86	414.86	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
415.61	414.61	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
415.36	414.36	0	5280	0	0	0.0%	3.8%	0.0%	0.0%
415.11	414.11	0	5280	0	0	0.0%	11.3%	0.0%	0.0%
414.86	413.86	0	5280	0	0	0.0%	17.5%	0.0%	0.0%
414.61	413.61	0	5280	0	0	0.0%	18.2%	0.0%	0.0%
414.36	413.36	0	5280	0	0	0.0%	15.9%	0.0%	0.0%
414.11	413.11	0	5280	0	0	0.0%	8.3%	0.0%	0.0%
413.86	412.86	0	5280	0	0	0.0%	1.5%	0.0%	0.0%
413.61	412.61	0	5280	0	0	0.0%	4.9%	0.0%	0.0%
413.36	412.36	0	5280	0	0	0.0%	10.4%	0.0%	0.0%
413.11	412.11	0	5280	0	0	0.0%	11.2%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
412.86	411.86	0	5280	0	0	0.0%	11.2%	0.0%	0.0%
412.61	411.61	0	5280	0	0	0.0%	7.0%	0.0%	0.0%
412.36	411.36	0	5280	0	0	0.0%	0.7%	0.0%	0.0%
412.11	411.11	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
411.86	410.86	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
411.61	410.61	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
411.36	410.36	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
411.11	410.11	0	5280	0	0	0.0%	8.1%	0.0%	0.0%
410.86	409.86	0	5280	0	0	0.0%	14.3%	0.0%	0.0%
410.61	409.61	0	5280	0	0	0.0%	14.3%	0.0%	0.0%
410.36	409.36	0	5280	0	0	0.0%	13.7%	0.0%	0.0%
410.11	409.11	0	5280	0	0	0.0%	6.2%	0.0%	0.0%
409.86	408.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
409.61	408.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
409.36	408.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
409.11	408.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
408.86	407.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
408.61	407.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
408.36	407.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
408.11	407.11	0	5280	0	0	0.0%	6.0%	0.0%	0.0%
407.86	406.86	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
407.61	406.61	0	5280	0	0	0.0%	8.6%	0.0%	0.0%
407.36	406.36	0	5280	0	0	0.0%	14.2%	0.0%	0.0%
407.11	406.11	0	5280	0	0	0.0%	9.5%	0.0%	0.0%
406.86	405.86	0	5280	0	0	0.0%	8.7%	0.0%	0.0%
406.61	405.61	0	5280	0	0	0.0%	7.7%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	A Concrete	B Exist Wood	C Upgrade Siding	X Other	A Concrete: 28.05 mi total	B Exist Wood: 82.11 mi total	C Upgrade Siding: 15.01 mi total	X Other: 4.86 mi total
406.36	405.36	0	5280	0	0	0.0%	8.9%	0.0%	0.0%
406.11	405.11	0	5280	0	0	0.0%	8.0%	0.0%	0.0%
405.86	404.86	0	5280	0	0	0.0%	10.0%	0.0%	0.0%
405.61	404.61	0	5280	0	0	0.0%	11.9%	0.0%	0.0%
405.36	404.36	0	5280	0	0	0.0%	5.1%	0.0%	0.0%
405.11	404.11	0	5280	0	0	0.0%	4.6%	0.0%	0.0%
404.86	403.86	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
404.61	403.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
404.36	403.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
404.11	403.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
403.86	402.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
403.61	402.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
403.36	402.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
403.11	402.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
402.86	401.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
402.61	401.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
402.36	401.36	0	5280	0	0	0.0%	3.5%	0.0%	0.0%
402.11	401.11	0	5280	0	0	0.0%	5.7%	0.0%	0.0%
401.86	400.86	0	5280	0	0	0.0%	6.3%	0.0%	0.0%
401.61	400.61	0	5280	0	0	0.0%	6.3%	0.0%	0.0%
401.36	400.36	0	5280	0	0	0.0%	2.8%	0.0%	0.0%
401.11	400.11	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
400.86	399.86	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
400.61	399.61	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
400.36	399.36	0	5280	0	0	0.0%	4.2%	0.0%	0.0%
400.11	399.11	0	5280	0	0	0.0%	7.4%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
399.86	398.86	0	5280	0	0	0.0%	6.8%	0.0%	0.0%
399.61	398.61	0	5280	0	0	0.0%	6.8%	0.0%	0.0%
399.36	398.36	0	5280	0	0	0.0%	4.2%	0.0%	0.0%
399.11	398.11	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
398.86	397.86	0	5280	0	0	0.0%	7.8%	0.0%	0.0%
398.61	397.61	0	5280	0	0	0.0%	10.3%	0.0%	0.0%
398.36	397.36	0	5280	0	0	0.0%	10.0%	0.0%	0.0%
398.11	397.11	0	5280	0	0	0.0%	10.0%	0.0%	0.0%
397.86	396.86	0	5280	0	0	0.0%	3.2%	0.0%	0.0%
397.61	396.61	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
397.36	396.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
397.11	396.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
396.86	395.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
396.61	395.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
396.36	395.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
396.11	395.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
395.86	394.86	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
395.61	394.61	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
395.36	394.36	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
395.11	394.11	0	4541	739	0	0.0%	1.8%	0.0%	0.0%
394.86	393.86	0	3221	2059	0	0.0%	0.0%	0.0%	0.0%
394.61	393.61	0	1901	3379	0	0.0%	0.0%	0.0%	0.0%
394.36	393.36	0	581	4699	0	0.0%	0.0%	0.6%	0.0%
394.11	393.11	0	0	5280	0	0.0%	0.0%	0.8%	0.0%
393.86	392.86	0	0	5280	0	0.0%	0.0%	1.2%	0.0%
393.61	392.61	0	0	5280	0	0.0%	0.0%	2.3%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
393.36	392.36	1214	0	4066	0	25.8%	0.0%	2.4%	0.0%
393.11	392.11	2534	0	2746	0	12.4%	0.0%	3.0%	0.0%
392.86	391.86	3854	0	1426	0	8.1%	0.0%	4.5%	0.0%
392.61	391.61	5174	0	106	0	6.1%	0.0%	2.8%	0.0%
392.36	391.36	5122	158	0	0	0.0%	0.0%	0.0%	0.0%
392.11	391.11	3802	1478	0	0	0.0%	0.0%	0.0%	0.0%
391.86	390.86	2482	2798	0	0	0.0%	1.6%	0.0%	0.0%
391.61	390.61	1162	4118	0	0	0.0%	9.2%	0.0%	0.0%
391.36	390.36	0	5280	0	0	0.0%	8.1%	0.0%	0.0%
391.11	390.11	0	5280	0	0	0.0%	8.1%	0.0%	0.0%
390.86	389.86	0	5280	0	0	0.0%	7.3%	0.0%	0.0%
390.61	389.61	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
390.36	389.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
390.11	389.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
389.86	388.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
389.61	388.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
389.36	388.36	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
389.11	388.11	0	5280	0	0	0.0%	6.0%	0.0%	0.0%
388.86	387.86	0	5280	0	0	0.0%	9.2%	0.0%	0.0%
388.61	387.61	0	5280	0	0	0.0%	9.2%	0.0%	0.0%
388.36	387.36	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
388.11	387.11	0	5280	0	0	0.0%	6.9%	0.0%	0.0%
387.86	386.86	0	5280	0	0	0.0%	4.5%	0.0%	0.0%
387.61	386.61	0	5280	0	0	0.0%	4.9%	0.0%	0.0%
387.36	386.36	0	5280	0	0	0.0%	4.9%	0.0%	0.0%
387.11	386.11	0	5280	0	0	0.0%	1.2%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
386.86	385.86	0	5280	0	0	0.0%	0.4%	0.0%	0.0%
386.61	385.61	0	5280	0	0	0.0%	4.2%	0.0%	0.0%
386.36	385.36	0	5280	0	0	0.0%	4.2%	0.0%	0.0%
386.11	385.11	0	5280	0	0	0.0%	4.2%	0.0%	0.0%
385.86	384.86	0	5280	0	0	0.0%	4.2%	0.0%	0.0%
385.61	384.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
385.36	384.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
385.11	384.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
384.86	383.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
384.61	383.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
384.36	383.36	0	5280	0	0	0.0%	0.4%	0.0%	0.0%
384.11	383.11	0	5280	0	0	0.0%	4.7%	0.0%	0.0%
383.86	382.86	0	5280	0	0	0.0%	4.7%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
383.61	382.61	0	5280	0	0	0.0%	4.8%	0.0%	0.0%
383.36	382.36	0	5280	0	0	0.0%	15.5%	0.0%	0.0%
383.11	382.11	0	5280	0	0	0.0%	11.4%	0.0%	0.0%
382.86	381.86	0	5280	0	0	0.0%	12.8%	0.0%	0.0%
382.61	381.61	0	5280	0	0	0.0%	14.9%	0.0%	0.0%
382.36	381.36	0	5280	0	0	0.0%	10.8%	0.0%	0.0%
382.11	381.11	0	5280	0	0	0.0%	10.5%	0.0%	0.0%
381.86	380.86	0	5280	0	0	0.0%	9.1%	0.0%	0.0%
381.61	380.61	0	5280	0	0	0.0%	7.8%	0.0%	0.0%
381.36	380.36	0	5280	0	0	0.0%	7.3%	0.0%	0.0%
381.11	380.11	0	5280	0	0	0.0%	7.4%	0.0%	0.0%
380.86	379.86	0	5280	0	0	0.0%	10.8%	0.0%	0.0%
380.61	379.61	0	5280	0	0	0.0%	10.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
380.36	379.36	0	5280	0	0	0.0%	8.8%	0.0%	0.0%
380.11	379.11	0	5280	0	0	0.0%	9.6%	0.0%	0.0%
379.86	378.86	0	5280	0	0	0.0%	7.8%	0.0%	0.0%
379.61	378.61	0	5280	0	0	0.0%	7.8%	0.0%	0.0%
379.36	378.36	0	5280	0	0	0.0%	3.6%	0.0%	0.0%
379.11	378.11	0	5280	0	0	0.0%	2.6%	0.0%	0.0%
378.86	377.86	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
378.61	377.61	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
378.36	377.36	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
378.11	377.11	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
377.86	376.86	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
377.61	376.61	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
377.36	376.36	0	5280	0	0	0.0%	2.1%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
377.11	376.11	0	5280	0	0	0.0%	2.6%	0.0%	0.0%
376.86	375.86	0	5280	0	0	0.0%	2.6%	0.0%	0.0%
376.61	375.61	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
376.36	375.36	0	5280	0	0	0.0%	2.9%	0.0%	0.0%
376.11	375.11	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
375.86	374.86	0	5280	0	0	0.0%	2.4%	0.0%	0.0%
375.61	374.61	0	5280	0	0	0.0%	2.5%	0.0%	0.0%
375.36	374.36	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
375.11	374.11	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
374.86	373.86	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
374.61	373.61	0	5280	0	0	0.0%	7.4%	0.0%	0.0%
374.36	373.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
374.11	373.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
373.86	372.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
373.61	372.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
373.36	372.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
373.11	372.11	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
372.86	371.86	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
372.61	371.61	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
372.36	371.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
372.11	371.11	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
371.86	370.86	0	5280	0	0	0.0%	2.1%	0.0%	0.0%
371.61	370.61	0	5280	0	0	0.0%	8.4%	0.0%	0.0%
371.36	370.36	0	5280	0	0	0.0%	9.8%	0.0%	0.0%
371.11	370.11	0	5280	0	0	0.0%	7.8%	0.0%	0.0%
370.86	369.86	0	5280	0	0	0.0%	8.2%	0.0%	0.0%

Main 2 - MP 367 to MP 497 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 28.05 mi total	Exist Wood: 82.11 mi total	Upgrade Siding: 15.01 mi total	Other: 4.86 mi total
370.61	369.61	0	5280	0	0	0.0%	2.0%	0.0%	0.0%
370.36	369.36	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
370.11	369.11	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
369.86	368.86	0	5280	0	0	0.0%	3.3%	0.0%	0.0%
369.61	368.61	0	5280	0	0	0.0%	7.1%	0.0%	0.0%
369.36	368.36	0	5280	0	0	0.0%	7.3%	0.0%	0.0%
369.11	368.11	0	5280	0	0	0.0%	7.3%	0.0%	0.0%
368.86	367.86	0	5280	0	0	0.0%	4.0%	0.0%	0.0%
368.61	367.61	0	5280	0	0	0.0%	0.2%	0.0%	0.0%
368.36	367.36	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
550.00	549.00	0	5280	0	0	0.0%	7.4%	0.0%	0.0%
549.75	548.75	0	5280	0	0	0.0%	7.4%	0.0%	0.0%
549.50	548.50	0	5280	0	0	0.0%	7.3%	0.0%	0.0%
549.25	548.25	0	5280	0	0	0.0%	6.5%	0.0%	0.0%
549.00	548.00	0	5280	0	0	0.0%	0.2%	0.0%	0.0%
548.75	547.75	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
548.50	547.50	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
548.25	547.25	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
548.00	547.00	0	5280	0	0	0.0%	1.0%	0.0%	0.0%
547.75	546.75	0	5280	0	0	0.0%	2.5%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
547.50	546.50	0	5280	0	0	0.0%	2.5%	0.0%	0.0%
547.25	546.25	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
547.00	546.00	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
546.75	545.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
546.50	545.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
546.25	545.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
546.00	545.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
545.75	544.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
545.50	544.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
545.25	544.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
545.00	544.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
544.75	543.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
544.50	543.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
544.25	543.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
544.00	543.00	0	5280	0	0	0.0%	3.4%	0.0%	0.0%
543.75	542.75	0	5280	0	0	0.0%	6.5%	0.0%	0.0%
543.50	542.50	0	5280	0	0	0.0%	7.1%	0.0%	0.0%
543.25	542.25	0	5280	0	0	0.0%	7.1%	0.0%	0.0%
543.00	542.00	0	5280	0	0	0.0%	3.8%	0.0%	0.0%
542.75	541.75	0	5280	0	0	0.0%	0.6%	0.0%	0.0%
542.50	541.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
542.25	541.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
542.00	541.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
541.75	540.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
541.50	540.50	0	5280	0	0	0.0%	1.1%	0.0%	0.0%
541.25	540.25	0	5280	0	0	0.0%	4.7%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
541.00	540.00	0	5280	0	0	0.0%	4.7%	0.0%	0.0%
540.75	539.75	0	5280	0	0	0.0%	4.8%	0.0%	0.0%
540.50	539.50	0	5280	0	0	0.0%	4.2%	0.0%	0.0%
540.25	539.25	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
540.00	539.00	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
539.75	538.75	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
539.50	538.50	0	5280	0	0	0.0%	0.4%	0.0%	0.0%
539.25	538.25	0	5280	0	0	0.0%	3.6%	0.0%	0.0%
539.00	538.00	0	5280	0	0	0.0%	4.7%	0.0%	0.0%
538.75	537.75	0	5280	0	0	0.0%	5.5%	0.0%	0.0%
538.50	537.50	0	5280	0	0	0.0%	5.5%	0.0%	0.0%
538.25	537.25	0	5280	0	0	0.0%	1.8%	0.0%	0.0%
538.00	537.00	0	5280	0	0	0.0%	0.8%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
537.75	536.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
537.50	536.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
537.25	536.25	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
537.00	536.00	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
536.75	535.75	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
536.50	535.50	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
536.25	535.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
536.00	535.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
535.75	534.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
535.50	534.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
535.25	534.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
535.00	534.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
534.75	533.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
534.50	533.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
534.25	533.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
534.00	533.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
533.75	532.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
533.50	532.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
533.25	532.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
533.00	532.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
532.75	531.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
532.50	531.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
532.25	531.25	0	5280	0	0	0.0%	3.4%	0.0%	0.0%
532.00	531.00	0	5280	0	0	0.0%	3.8%	0.0%	0.0%
531.75	530.75	0	5280	0	0	0.0%	3.8%	0.0%	0.0%
531.50	530.50	0	5280	0	0	0.0%	3.8%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
531.25	530.25	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
531.00	530.00	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
530.75	529.75	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
530.50	529.50	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
530.25	529.25	0	5280	0	0	0.0%	0.3%	0.0%	0.0%
530.00	529.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
529.75	528.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
529.50	528.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
529.25	528.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
529.00	528.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
528.75	527.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
528.50	527.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
528.25	527.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
528.00	527.00	0	5280	0	0	0.0%	5.9%	0.0%	0.0%
527.75	526.75	0	5280	0	0	0.0%	6.6%	0.0%	0.0%
527.50	526.50	0	5280	0	0	0.0%	6.6%	0.0%	0.0%
527.25	526.25	0	5280	0	0	0.0%	6.6%	0.0%	0.0%
527.00	526.00	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
526.75	525.75	0	5280	0	0	0.0%	1.6%	0.0%	0.0%
526.50	525.50	0	5280	0	0	0.0%	2.2%	0.0%	0.0%
526.25	525.25	0	5280	0	0	0.0%	2.2%	0.0%	0.0%
526.00	525.00	0	5280	0	0	0.0%	5.8%	0.0%	0.0%
525.75	524.75	0	5280	0	0	0.0%	5.4%	0.0%	0.0%
525.50	524.50	0	5280	0	0	0.0%	4.8%	0.0%	0.0%
525.25	524.25	0	5280	0	0	0.0%	4.8%	0.0%	0.0%
525.00	524.00	0	5280	0	0	0.0%	1.1%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
524.75	523.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
524.50	523.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
524.25	523.25	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
524.00	523.00	0	5280	0	0	0.0%	7.4%	0.0%	0.0%
523.75	522.75	0	5280	0	0	0.0%	9.7%	0.0%	0.0%
523.50	522.50	0	5280	0	0	0.0%	10.5%	0.0%	0.0%
523.25	522.25	0	5280	0	0	0.0%	9.3%	0.0%	0.0%
523.00	522.00	0	5280	0	0	0.0%	3.0%	0.0%	0.0%
522.75	521.75	0	5280	0	0	0.0%	0.8%	0.0%	0.0%
522.50	521.50	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
522.25	521.25	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
522.00	521.00	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
521.75	520.75	0	5280	0	0	0.0%	0.9%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
521.50	520.50	0	5280	0	0	0.0%	0.1%	0.0%	0.0%
521.25	520.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
521.00	520.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
520.75	519.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
520.50	519.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
520.25	519.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
520.00	519.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
519.75	518.75	0	5280	0	0	0.0%	11.3%	0.0%	0.0%
519.50	518.50	0	5280	0	0	0.0%	11.3%	0.0%	0.0%
519.25	518.25	0	5280	0	0	0.0%	11.3%	0.0%	0.0%
519.00	518.00	0	5280	0	0	0.0%	11.3%	0.0%	0.0%
518.75	517.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
518.50	517.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
518.25	517.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
518.00	517.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
517.75	516.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
517.50	516.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
517.25	516.25	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
517.00	516.00	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
516.75	515.75	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
516.50	515.50	0	5280	0	0	0.0%	0.5%	0.0%	0.0%
516.25	515.25	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
516.00	515.00	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
515.75	514.75	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
515.50	514.50	0	5280	0	0	0.0%	2.7%	0.0%	0.0%
515.25	514.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
515.00	514.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
514.75	513.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
514.50	513.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
514.25	513.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
514.00	513.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
513.75	512.75	0	5280	0	0	0.0%	14.0%	0.0%	0.0%
513.50	512.50	0	5280	0	0	0.0%	15.2%	0.0%	0.0%
513.25	512.25	0	5280	0	0	0.0%	15.2%	0.0%	0.0%
513.00	512.00	0	5280	0	0	0.0%	16.1%	0.0%	0.0%
512.75	511.75	0	5280	0	0	0.0%	3.1%	0.0%	0.0%
512.50	511.50	0	5280	0	0	0.0%	1.9%	0.0%	0.0%
512.25	511.25	0	5280	0	0	0.0%	8.6%	0.0%	0.0%
512.00	511.00	0	5280	0	0	0.0%	7.7%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
511.75	510.75	0	5280	0	0	0.0%	6.7%	0.0%	0.0%
511.50	510.50	0	5280	0	0	0.0%	6.7%	0.0%	0.0%
511.25	510.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
511.00	510.00	0	5280	0	0	0.0%	13.0%	0.0%	0.0%
510.75	509.75	0	5280	0	0	0.0%	17.8%	0.0%	0.0%
510.50	509.50	0	5280	0	0	0.0%	17.8%	0.0%	0.0%
510.25	509.25	0	5280	0	0	0.0%	17.8%	0.0%	0.0%
510.00	509.00	0	5280	0	0	0.0%	4.8%	0.0%	0.0%
509.75	508.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
509.50	508.50	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
509.25	508.25	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
509.00	508.00	0	5280	0	0	0.0%	0.0%	0.0%	0.0%
508.75	507.75	0	5280	0	0	0.0%	0.0%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
508.50	507.50	0	5280	0	0	0.0%	0.9%	0.0%	0.0%
508.25	507.25	0	5280	0	0	0.0%	1.2%	0.0%	0.0%
508.00	507.00	0	5280	0	0	0.0%	7.7%	0.0%	0.0%
507.75	506.75	0	5280	0	0	0.0%	8.8%	0.0%	0.0%
507.50	506.50	0	5280	0	0	0.0%	7.9%	0.0%	0.0%
507.25	506.25	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
507.00	506.00	0	5280	0	0	0.0%	2.3%	0.0%	0.0%
506.75	505.75	0	5280	0	0	0.0%	4.3%	0.0%	0.0%
506.50	505.50	0	5280	0	0	0.0%	4.3%	0.0%	0.0%
506.25	505.25	0	5280	0	0	0.0%	16.0%	0.0%	0.0%
506.00	505.00	0	5280	0	0	0.0%	15.3%	0.0%	0.0%
505.75	504.75	0	5280	0	0	0.0%	12.3%	0.0%	0.0%
505.50	504.50	0	5280	0	0	0.0%	16.9%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
505.25	504.25	0	5280	0	0	0.0%	8.3%	0.0%	0.0%
505.00	504.00	0	5280	0	0	0.0%	11.9%	0.0%	0.0%
504.75	503.75	0	5280	0	0	0.0%	13.4%	0.0%	0.0%
504.50	503.50	0	5280	0	0	0.0%	9.4%	0.0%	0.0%
504.25	503.25	0	5280	0	0	0.0%	9.7%	0.0%	0.0%
504.00	503.00	0	5280	0	0	0.0%	6.4%	0.0%	0.0%
503.75	502.75	0	5280	0	0	0.0%	7.6%	0.0%	0.0%
503.50	502.50	0	5280	0	0	0.0%	7.2%	0.0%	0.0%
503.25	502.25	0	5280	0	0	0.0%	3.9%	0.0%	0.0%
503.00	502.00	0	5280	0	0	0.0%	3.0%	0.0%	0.0%
502.75	501.75	0	5280	0	0	0.0%	4.0%	0.0%	0.0%
502.50	501.50	0	5280	0	0	0.0%	4.9%	0.0%	0.0%
502.25	501.25	0	5280	0	0	0.0%	5.5%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
						Geometry Car Runs from 2007 thru 2011			
		A	B	C	X	A	B	C	X
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
502.00	501.00	0	5280	0	0	0.0%	8.2%	0.0%	0.0%
501.75	500.75	0	5280	0	0	0.0%	5.6%	0.0%	0.0%
501.50	500.50	0	5280	0	0	0.0%	14.1%	0.0%	0.0%
501.25	500.25	0	5280	0	0	0.0%	25.7%	0.0%	0.0%
501.00	500.00	0	5280	0	0	0.0%	30.2%	0.0%	0.0%
500.75	499.75	0	5280	0	0	0.0%	30.7%	0.0%	0.0%
500.50	499.50	0	5280	0	0	0.0%	23.2%	0.0%	0.0%
500.25	499.25	0	5280	0	0	0.0%	19.0%	0.0%	0.0%
500.00	499.00	0	5280	0	0	0.0%	12.6%	0.0%	0.0%
499.75	498.75	0	5280	0	0	0.0%	11.6%	0.0%	0.0%
499.50	498.50	0	5280	0	0	0.0%	10.4%	0.0%	0.0%
499.25	498.25	0	5280	0	0	0.0%	11.7%	0.0%	0.0%
499.00	498.00	0	5280	0	0	0.0%	11.2%	0.0%	0.0%

Main 2 - MP 497 to MP 550 - Rolling One-Mile Window

		Length of Trackbed Type (ft)				Average Percent Length Exceeding SQI Threshold			
		A	B	C	X	Geometry Car Runs from 2007 thru 2011			
Begin MP	End MP	Concrete	Exist Wood	Upgrade Siding	Other	Concrete: 0.00 mi total	Exist Wood: 52.64 mi total	Upgrade Siding: 0.00 mi total	Other: 0.00 mi total
498.75	497.75	0	5280	0	0	0.0%	10.5%	0.0%	0.0%
498.50	497.50	0	5280	0	0	0.0%	9.5%	0.0%	0.0%

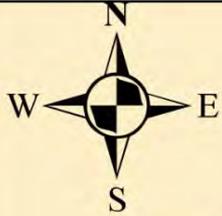
Appendix D: Power Point Presentation briefing for BNSF

BNSF Panhandle Subdivision
Trackbed Performance Research Project
Fall 2011 – Summer 2012
University of Kentucky

Professor Rose, Professor Souleyrette
Luke Saladin
Mike Martello

BNSF Transcon Corridor - Panhandle Subdivision

Approximately 330 Miles



Colorado

Nebraska

Iowa

Kansas

Missouri

Wellington, KS

Alva, OK

Woodward, OK

Pampa, TX

Amarillo, TX

Oklahoma

Arkansas

New Mexico

Texas

Louisiana

Objective

Compare Performance (Geometry Defects) of Three Trackbed Types:

- Existing Trackbed:
Wood Ties w/ Granular Ballast
- New Trackbed:
Upgraded Sidings: Wood Ties w/ Granular Ballast
- New Trackbed:
Concrete Ties w/ Granular Ballast w/ HMA Separation Layer

Summary of Trackbed Types Evaluated

Main 1		Length (mi)	Percent
	Concrete w/HMA	120.94	44.4%
	Existing Wood	126.29	46.4%
	Upgraded Wood Siding	21.51	7.9%
	<i>Other</i>	<i>3.40</i>	<i>1.2%</i>
	Total	272.14	

Summary of Trackbed Types Evaluated

Main 2		Length (mi)	Percent
	Concrete w/HMA	40.05	14.7%
	Existing Wood	198.87	73.1%
	Upgraded Wood Siding	23.84	8.8%
	<i>Other</i>	<i>9.38</i>	<i>3.4%</i>
	Total	272.14	

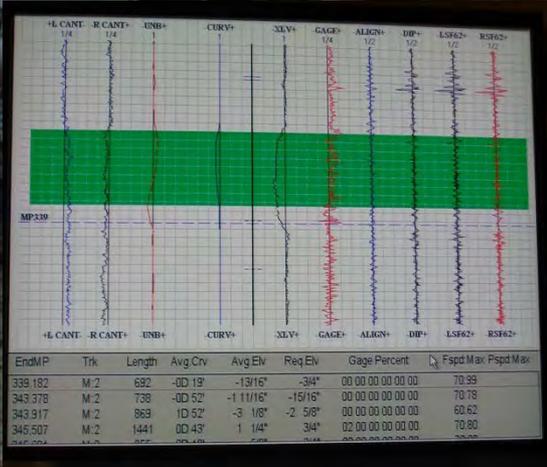
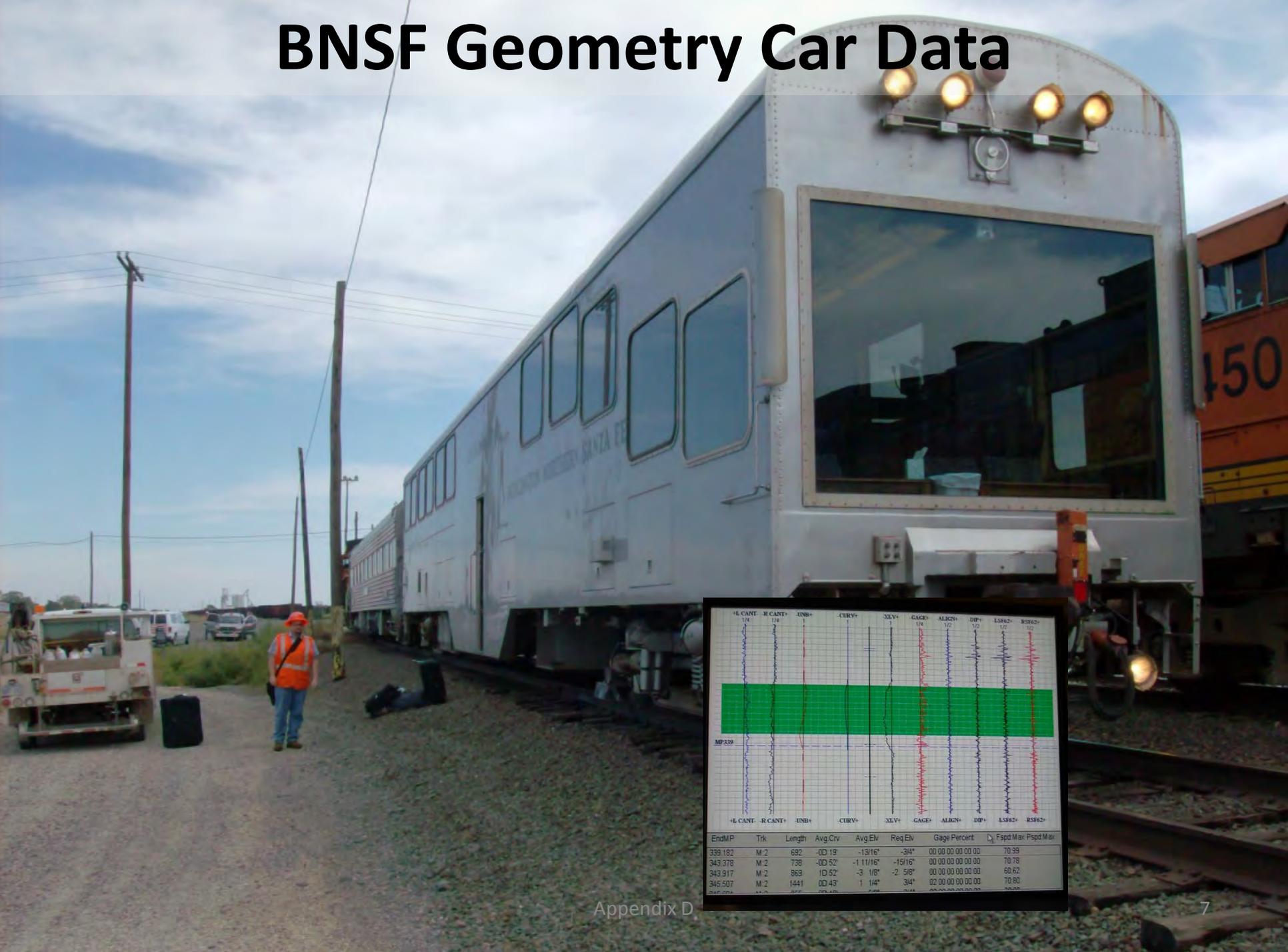
Measure of Performance Surface Quality Index (SQI)

An Index Calculated for a Track Segment Used to Recommend Track Surface Maintenance

Initially Calculated for 500-ft Lengths of Track Which Can Accumulate at 100-ft Increments

When SQI Exceeds BNSF Designated Threshold of 25, Data is Recorded: BEGIN MP and SQI_LENGTH

BNSF Geometry Car Data



Measure of Performance

Used to Compare Three Trackbed Types

- Percent Length of Trackbed Along The BNSF Corridor That Exceeds the SQI Threshold (Designated by BNSF)
- SQI Data Collected from 2007 thru 2011
- About 4 Geometry Cars Runs Made per Year Along Corridor

Surface Quality Index (SQI)

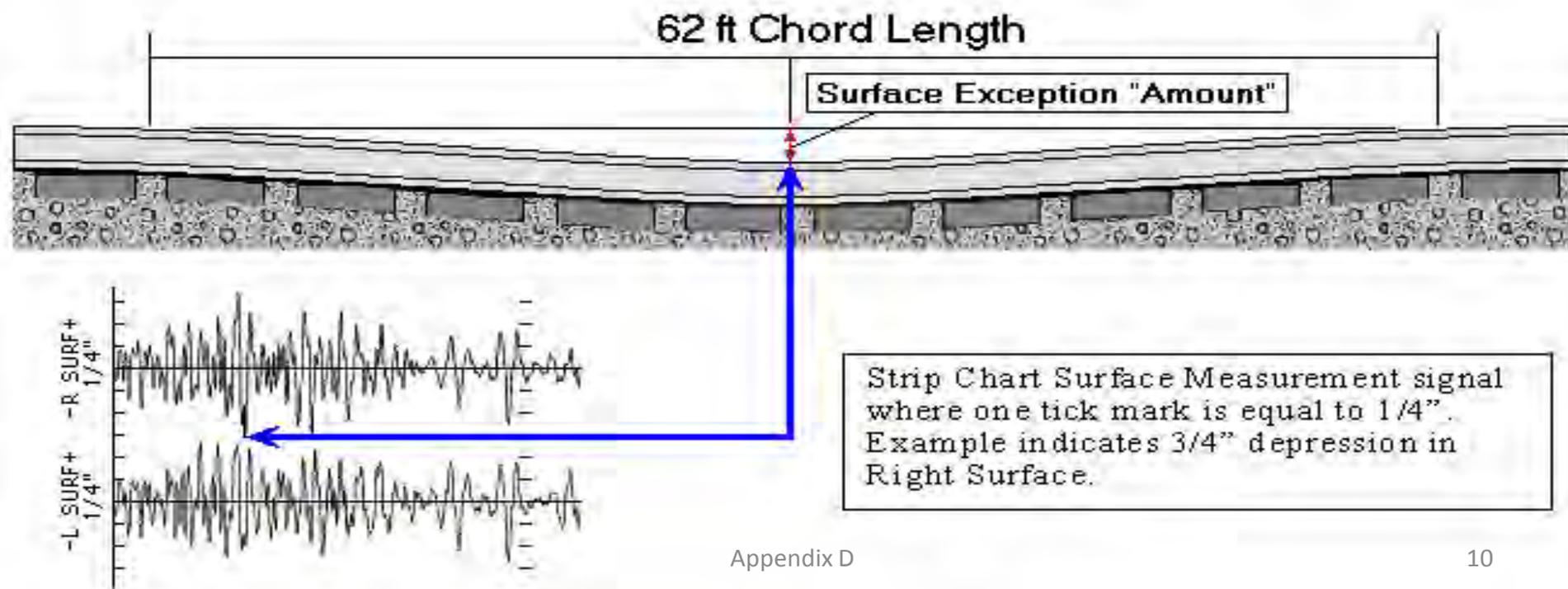
SQI is a Combination of Several Track Geometry Parameters Measured by Geometry Car:

- Left Surface
- Right Surface
- Left Alignment
- Right Alignment
- Cross Level

Surface Quality Index (SQI)

Left & Right Surface

Left or Right Rail Surface is measured over a 62-foot chord, the same chord length as the FRA Specification.



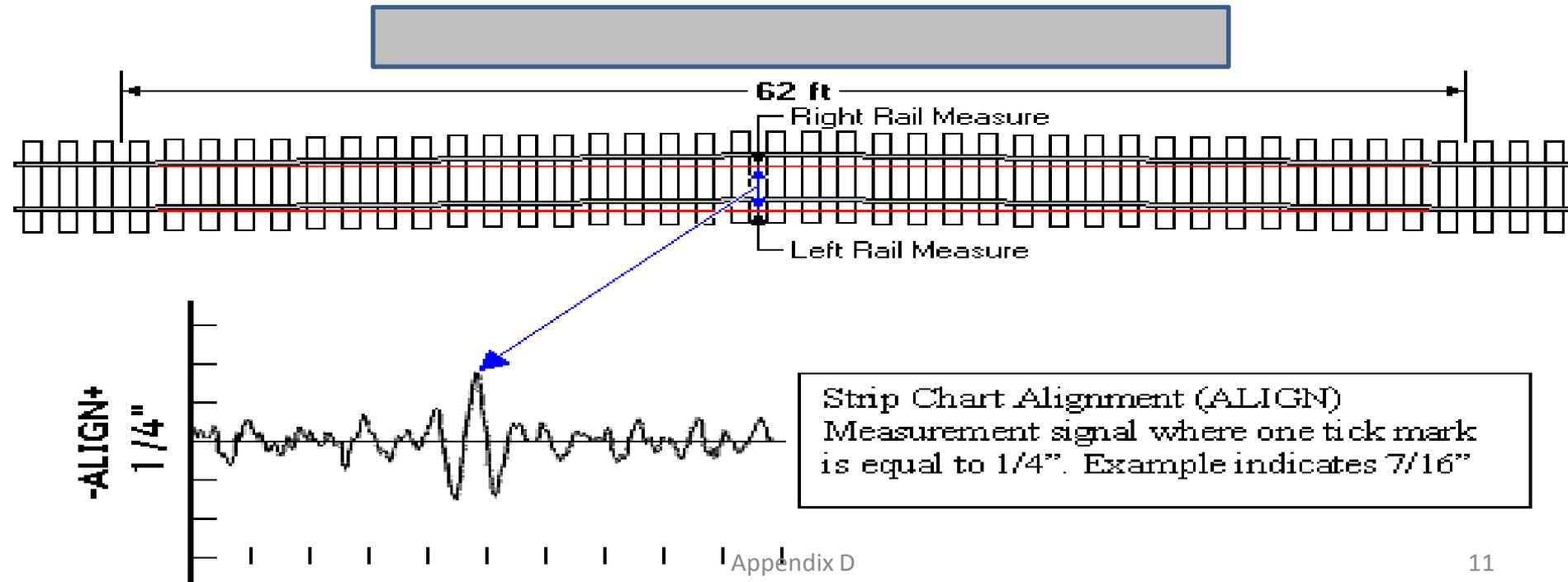
Surface Quality Index (SQI)

Left & Right Alignment

Mid-Ordinate Offset measured over a 62-foot chord.

Tangent: Should be Zero

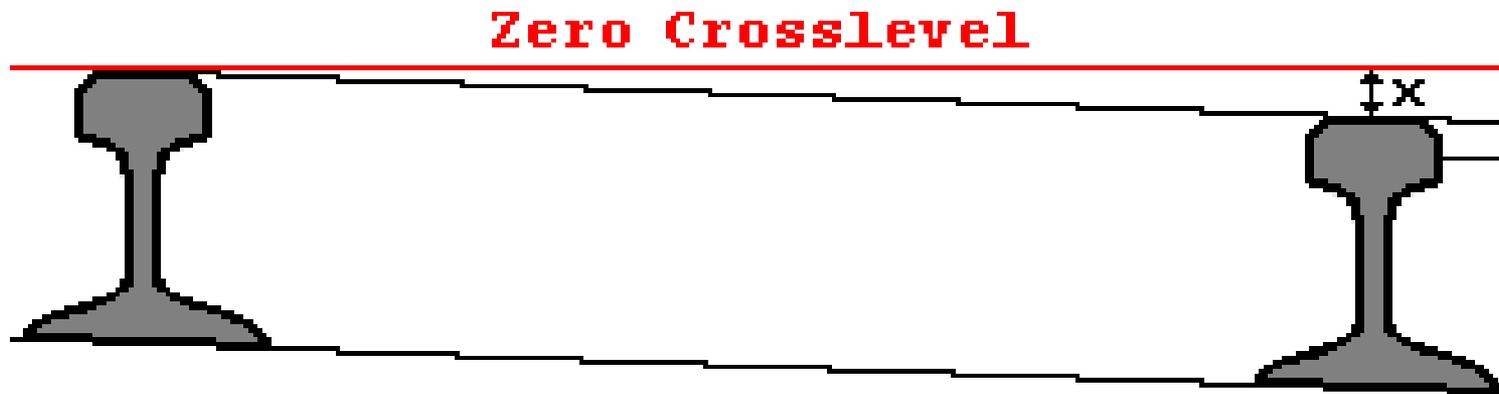
Curve: Should be 1-inch per 1-degree of curve



Surface Quality Index (SQI)

Cross-Level

Difference in Elevation Between the Top Surfaces of the Rails at a Single Point in a Tangent or Curve Track Segment. For Superelevated Curve, Difference in Rail Head Heights Compared to Design Superelevation.



Compiling the Data to Estimate Percent Length of Each Trackbed Type That Exceeds SQI Threshold

Two Issues With BNSF SQL Geometry Car Data

Making Continuous Run on Main 1 or Main 2

For a given section of track, was the geometry car diverting back-and-forth between Main 1 and Main 2?

Direction of Travel of Geometry Car

Right-Hand-Rule?

Sample of BNSF SQL Data – Only Recorded By Geometry Car When SQL Threshold Is Exceeded

TRACK_TYPE	TRACK_SDTK_NBR	RIS1MPB	SQL_LGTH	TEST_DT	GEO_CAR_NME
M	1	223.85398	500	10/19/2007	CAR080
M	1	224.49716	1500	10/19/2007	CAR080
M	1	225.80909	500	10/19/2007	CAR080
M	1	226.08011	900	10/19/2007	CAR080
M	1	226.43409	1747	10/19/2007	CAR080
M	1	227.01383	600	10/19/2007	CAR080
		227.50379	500	10/19/2007	CAR080
		229.08807	500	10/19/2007	CAR080
		231.02386	1665		
		233.10436	2200		

Begin MP Where
SQL Threshold is
Exceeded

Length of Track Where
SQL Threshold is
Exceeded



Associate SQL Data
With BNSF Trackbed Type



Calculate Percent Length of Each Trackbed Type
That Exceeds SQL Threshold

BNSF Track MP

Geometry Car Run

H23900 fx 0

MP 243.3

BNSF Trackbed Type

Time

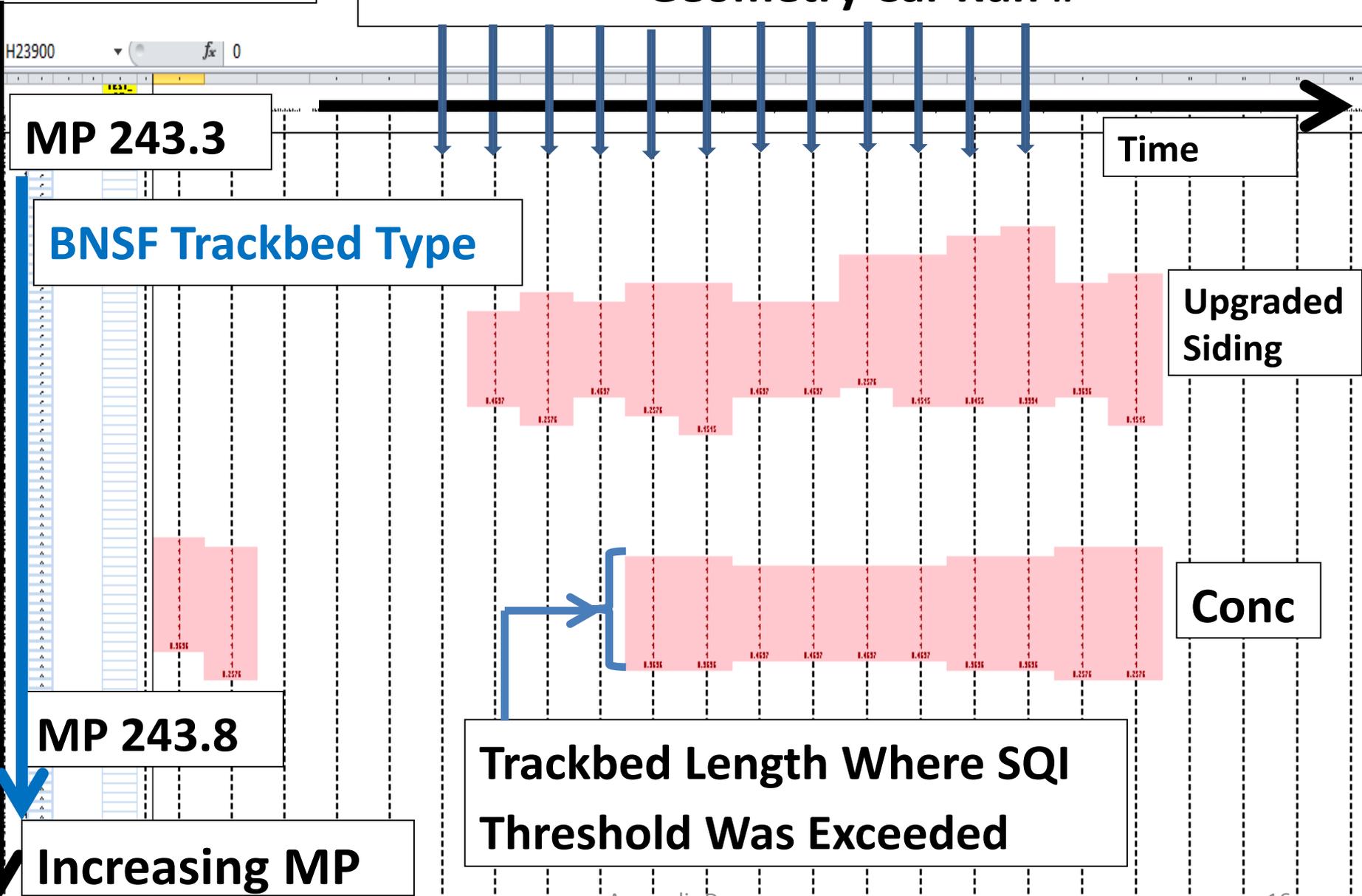
Upgraded Siding

Conc

MP 243.8

Increasing MP

Trackbed Length Where SQL Threshold Was Exceeded



Measure of Performance Calculation

Percent Length of Trackbed That Exceeds Threshold:

\sum of SQI Length for n Geometry Car Runs

(Length of Track Segment Being Evaluated) * (n)

Example Results

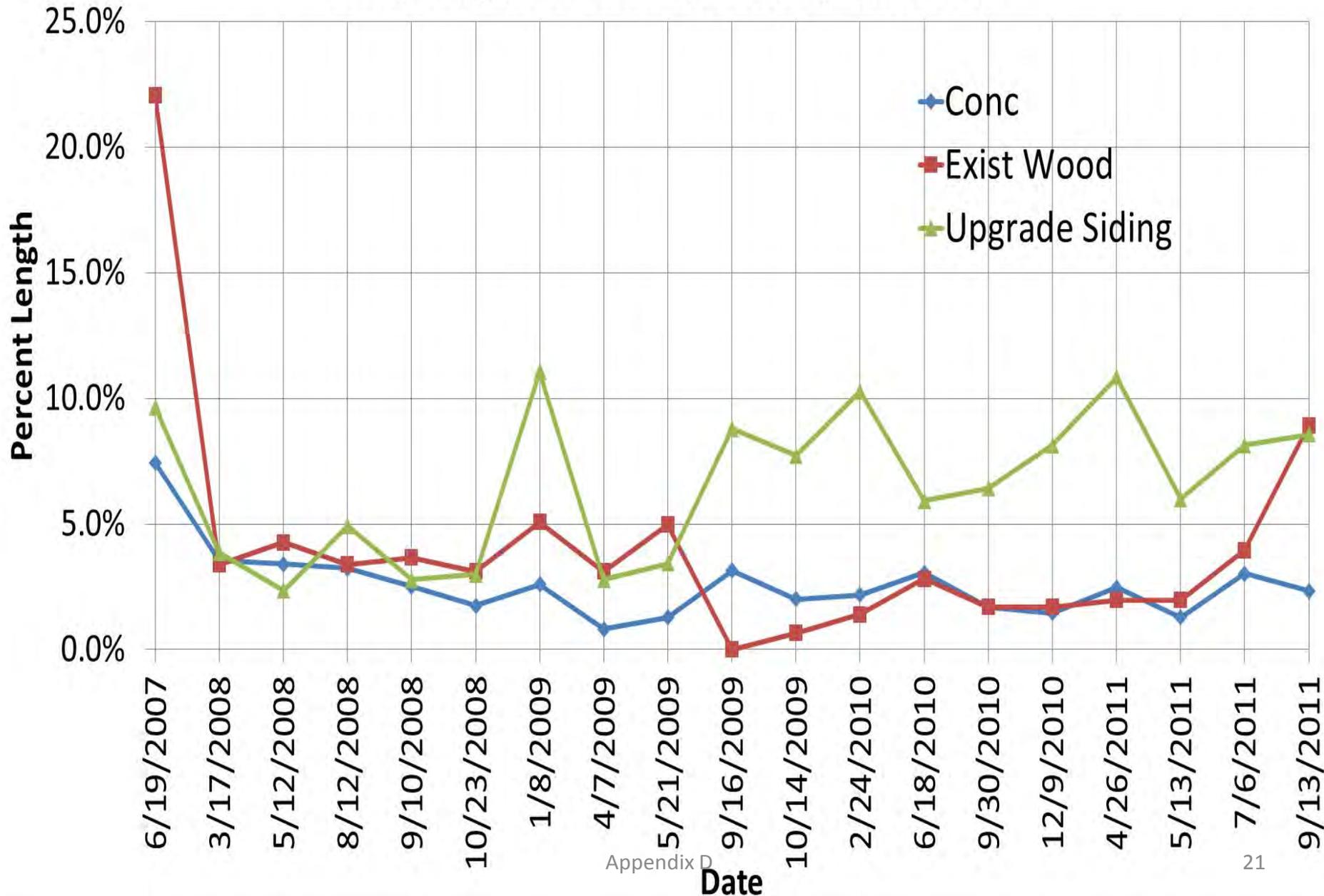
Percent Length Track Exceeding SQI Threshold

Run	Date	Conc	Exist Wood	Upgrade Siding
1	6/19/2007	0.0744	0.2208	0.0965
2	3/17/2008	0.0354	0.0339	0.0386
3	5/12/2008	0.0340	0.0427	0.0236
4	8/12/2008	0.0324	0.0339	0.0493
5	9/10/2008	0.0251	0.0367	0.0279
6	10/23/2008	0.0175	0.0310	0.0300
7	1/8/2009	0.0260	0.0508	0.1105
8	4/7/2009	0.0081	0.0310	0.0279
9	5/21/2009	0.0128	0.0497	0.0343
10	9/16/2009	0.0315	0.0000	0.0878
11	10/14/2009	0.0200	0.0067	0.0771
12	2/24/2010	0.0217	0.0141	0.1028
13	6/18/2010	0.0307	0.0282	0.0592
14	9/30/2010	0.0170	0.0169	0.0643
15	12/9/2010	0.0145	0.0169	0.0814
16	4/26/2011	0.0247	0.0198	0.1084
17	5/13/2011	0.0128	0.0198	0.0600
18	7/6/2011	0.0303	0.0395	0.0814
19	9/13/2011	0.0234	0.0393	0.0857

Main 1 Results

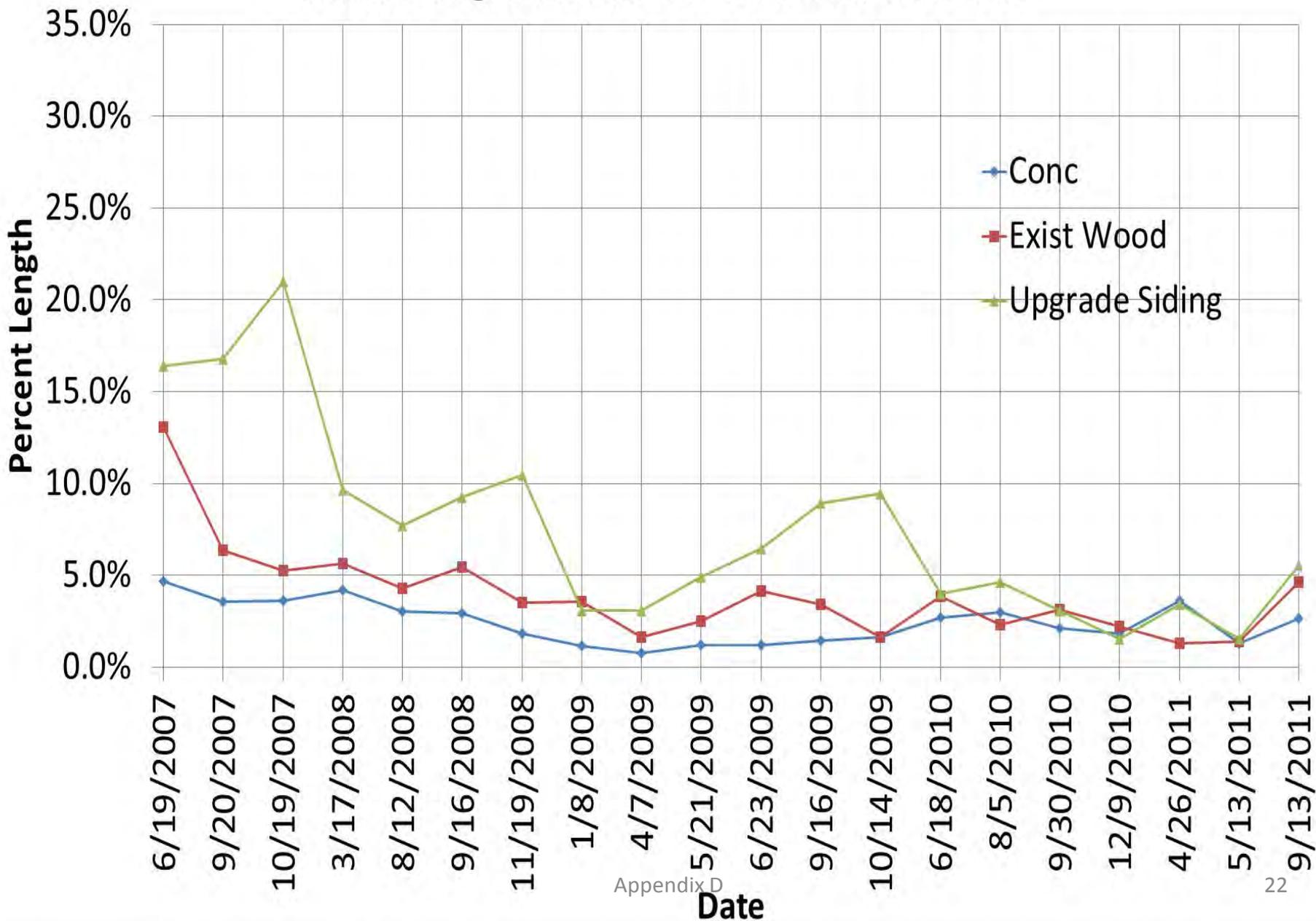
Transcon MP 239 to MP 299 - Main 1 - Year 2007 thru Year 2011

Percent Length That Exceeded SQI Threshold of 25



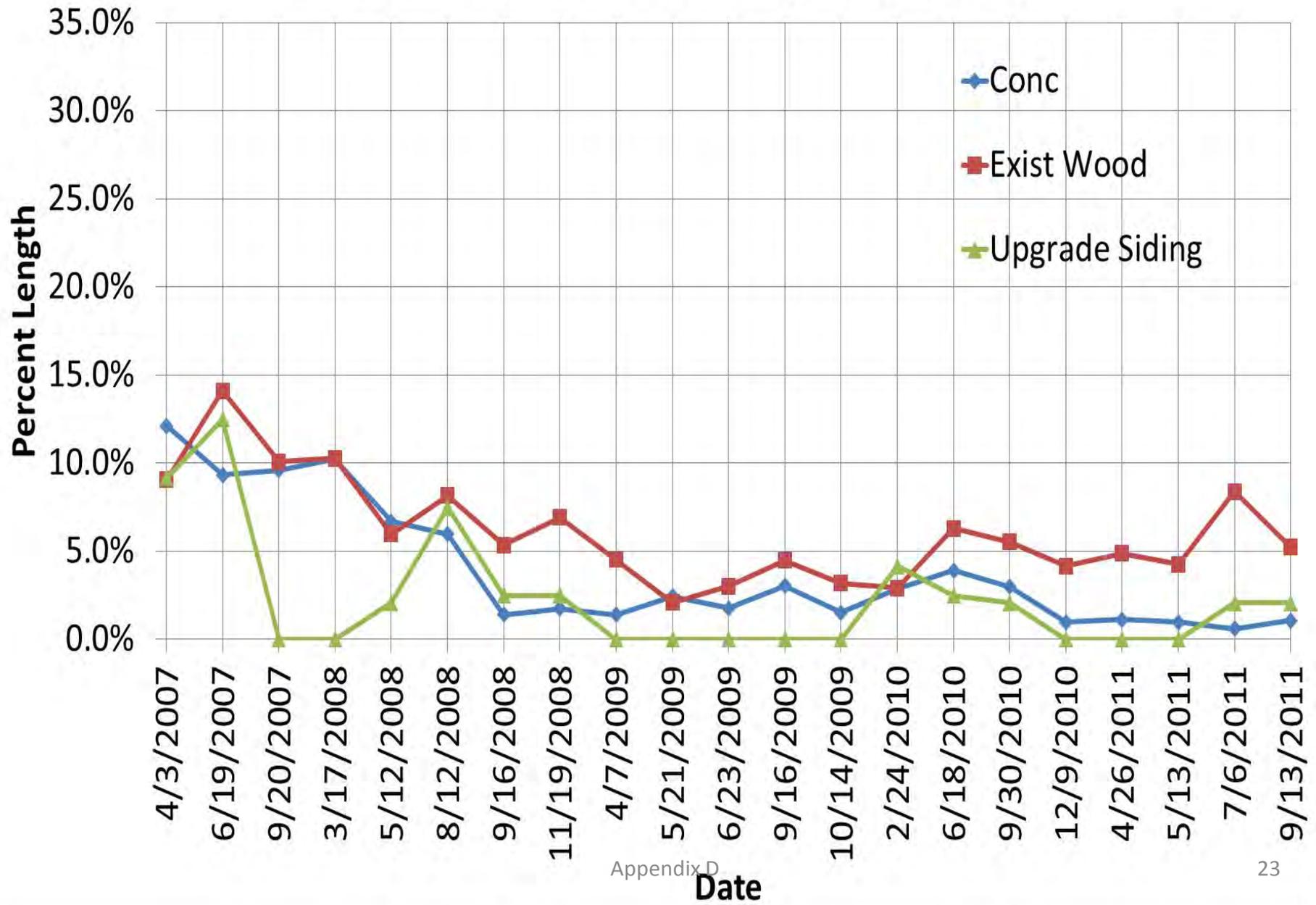
Transcon MP 337.00 to MP 419.21 - Main 1 - Year 2007 thru Year 2011

Percent Length That Exceeded SQI Threshold of 25



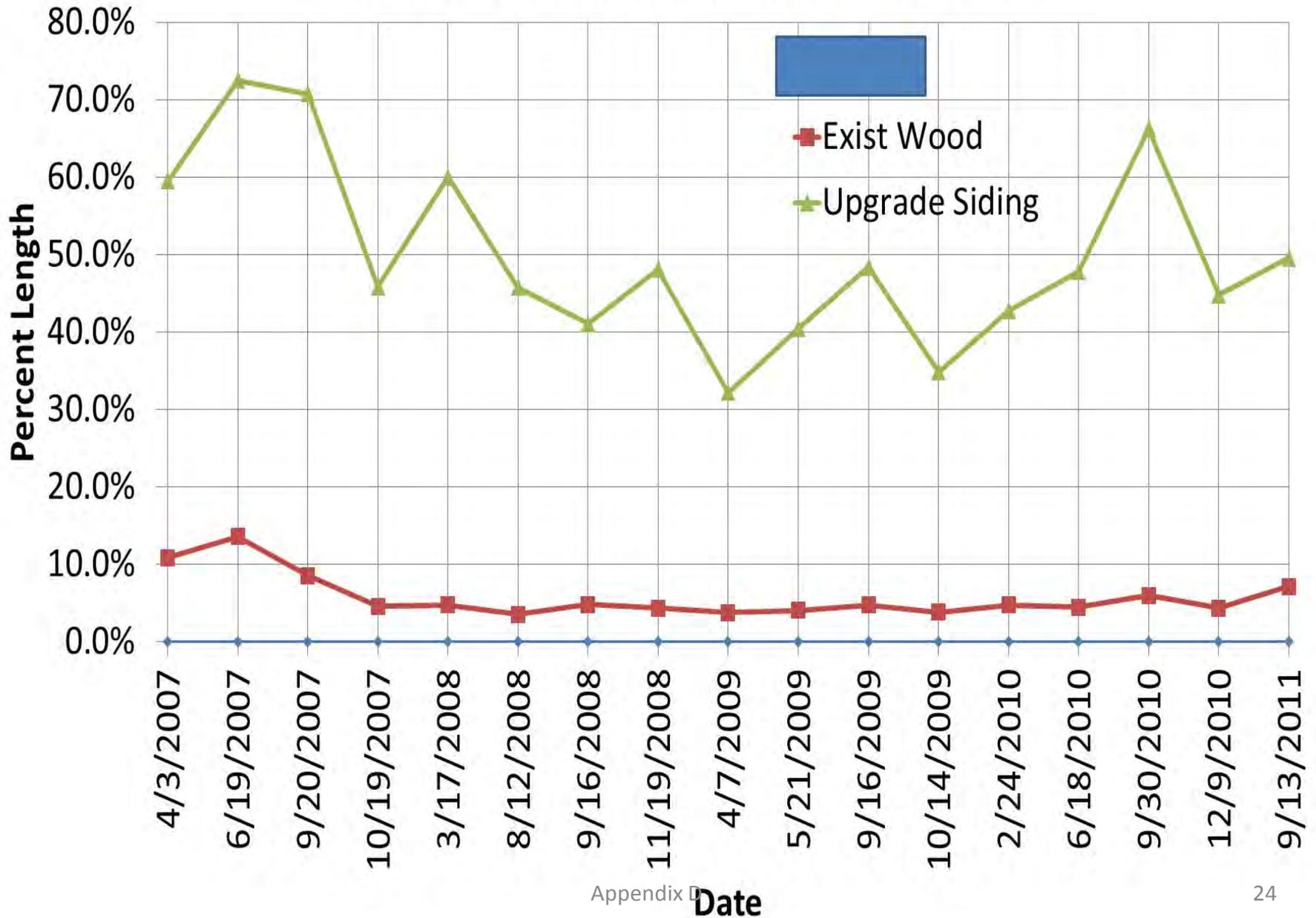
Transcon MP 419.21 to MP 489.86 - Main 1 - Year 2007 thru Year 2011

Percent Length That Exceeded SQI Threshold of 25



Transcon MP 489.86 to MP 550.00 - Main 1 - Year 2007 thru Year 2011

Percent Length That Exceeded SQI Threshold of 25



Main 1 Summary Results

On Average:

Concrete Ties w/ HMA	2.5% to 4.0%
Existing Wood Ties w/ Granular	4.0% to 6.0%
Upgrade Siding Wood Ties w/ Granular	2.5% to 50%

Main 1 Summary Results

Range:

Concrete Ties w/ HMA	1% to 12%
Existing Wood Ties w/ Granular	0% to 22%
Upgrade Siding Wood Ties w/ Granular	0% to 72%

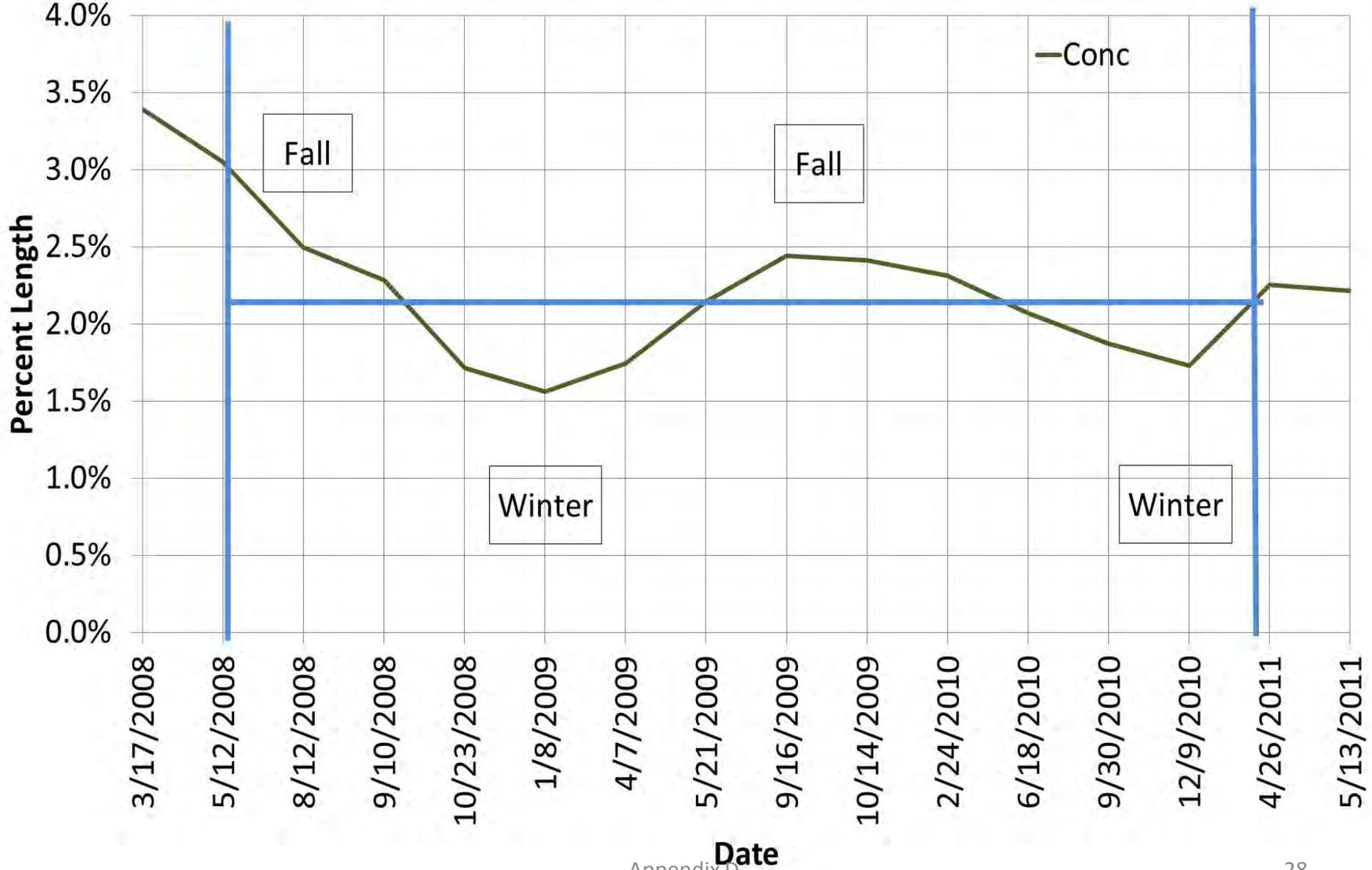
Main 1 Summary Results

Possible Time Series Issues to Evaluate

Seasonal Variation

Transcon MP 239 to MP 299 - Main 1 - Year 2007 thru Year 2011

3-Point Running Average Percent Length That Exceeded SQI Threshold of 25

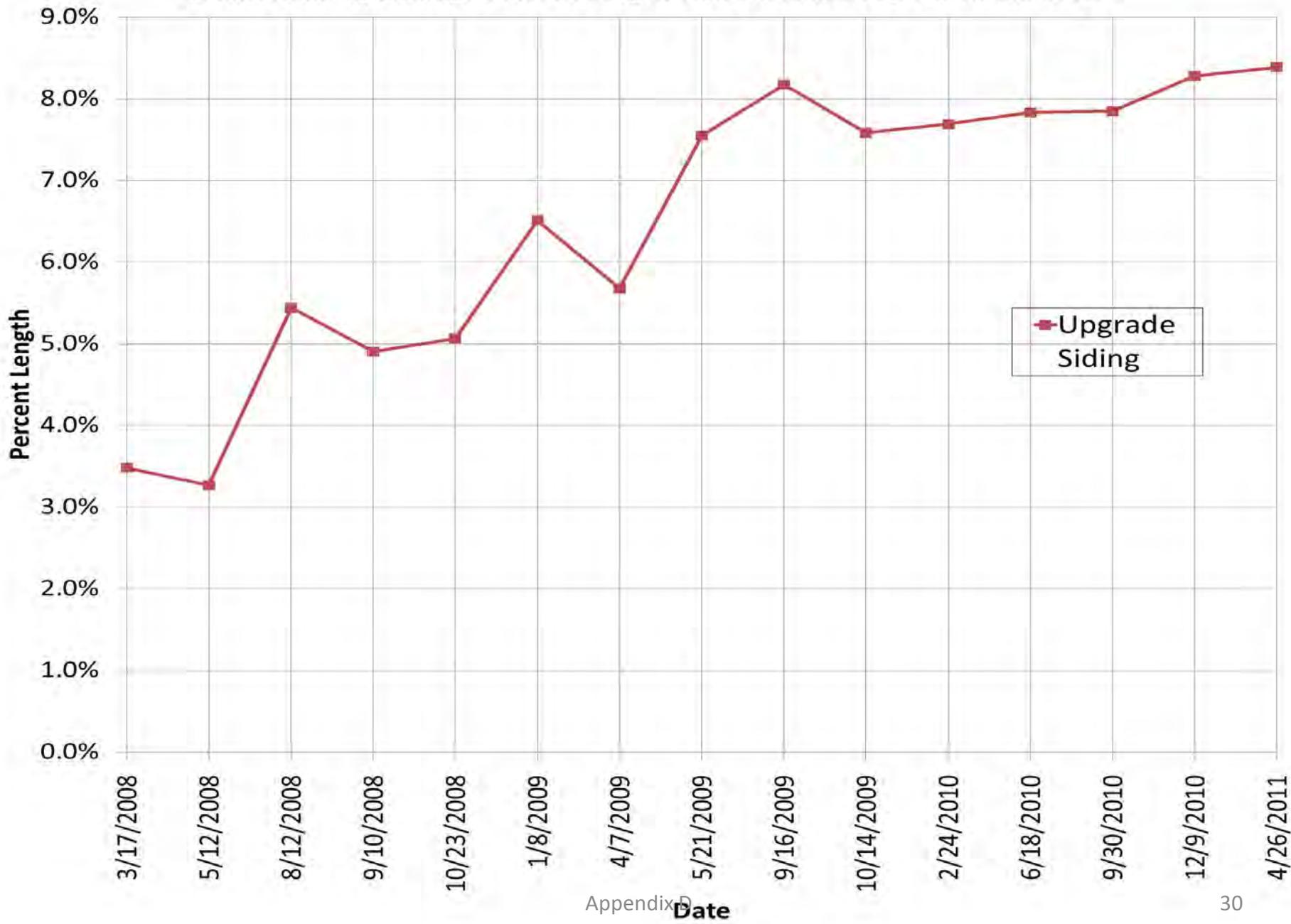


Main 1 Summary Results

Possible Time Series Issues to Evaluate

Long Term Trend

Transcon MP 239 to MP 299 - Main 1 - Year 2007 thru Year 2011
4-Point Running Average Percent Length That Exceeded SQI Threshold of 25



Main 2 Results

Main 2 Summary Results

On Average:

Concrete Ties w/ HMA	1.1% to 2.4%
Existing Wood Ties w/ Granular	2.6% to 4.3%
Upgrade Siding Wood Ties w/ Granular	3.0% to 5.4%

Main 2 Summary Results

Range:

Concrete Ties w/ HMA 0% to 33%

Existing Wood Ties w/ Granular 0% to 13%

Upgrade Siding Wood Ties w/ Granular 0% to 21%

Issues

- Maintenance Data and Ton-Miles Data Need to be Incorporated into the Analysis
- Investigate Possible Time Series Characteristics

Additional Analysis

Luke Saladin Master's Degree Report, June 2012

Questions?



Appendix E: Transcon GIS Analysis

BNSF Transcon GIS Analysis
Luke Saladin and Mike McHenry

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1.0 Introduction

Over the last 30 years the use of hot-mix asphalt (HMA) as a track bed underlayment has increased in popularity due to a number of benefits. The use of HMA underlayment, though, has always been limited to instances where traditional granular track structures have proven inadequate, most notably when soft soil subgrade is present. Research has shown that HMA underlayment can increase track modulus, provide an impervious separation layer between the ballast and subgrade, prevent surface water from entering and weakening the subgrade soils, prevent subgrade mud pumping problems and improve track geometry (Li 2002). To date, though, no study has been performed comparing the general performance of the traditional granular trackbeds with those utilizing HMA underlayment along major stretches of heavy-tonnage mainline track.

The BNSF Transcon line is a primarily east-west corridor used to transport freight cross-country between Chicago and west coast ports. The Panhandle subdivision between Amarillo, Texas and Wellington, Kansas stretches more than 300 miles and along the Transcon and, when originally constructed, consisted of a traditional granular trackbed with wood ties. Over the last 20 years, to comply with demand, BNSF has gradually constructed a second main through most of the Panhandle subdivision.

The Panhandle subdivision offers a unique opportunity to evaluate the performance of HMA underlayment relative to traditional granular trackbeds. Currently along the Panhandle, sections of HMA underlayment run parallel to traditional granular track structures through much of the corridor, offering a unique opportunity to compare the differences in performance while limiting variables (e.g. soil types, drainage, temperature) that often muddle the analysis of two track structures examined in different locations.

2.0 Objective

This study seeks to analyze the association of three parameters with track quality on the Transcon Corridor. To measure track quality, the Surface Quality Index (SQI), a designation developed by BNSF to determine which sections of track require surfacing, was used. The three parameters affecting track quality studied herein include track type (asphalt with concrete ties vs. granular with wood ties), the presence of curves on the track, and native subgrade soil. SQI is based solely on track geometry, specifically, the deviations in track geometry from FRA regulations

The analysis in this paper will include the use of linear referencing of the Transcon Corridor using ArcGIS 10. Observations will be made as to the relative association of bad SQI sections with the three primary parameters. The focus of the study was using GIS to conduct such an analysis, so special attention is paid to GIS tools and procedures where applicable.

3.0 Background

3.1 Transcon History

The Transcon line provides a major shipping route between Chicago, the major central hub for railroads in the United States, and major west coast ports, most notably in Long Beach, Calif. Much of the Transcon, including the Panhandle, is a direct route with few branch lines. This means that traffic, for the most part, is consistent along long stretches of track throughout the Transcon Corridor. BNSF

officials in the late 1980s decided there was enough traffic through the Panhandle section of the Transcon to warrant expanding from a single to double mainline.

BNSF had used HMA underlayment since the 1980s to combat problems of poor subgrade support and soil saturation. In the case of the Panhandle, though, the decision to use HMA was strictly economical. The region contains little aggregate that could serve as ballast and subballast in traditional granular trackbeds. Shipments of such aggregate – both immediately and during future maintenance and replacement – would have proven expensive throughout the Panhandle subdivision. Contractors hired to construct the second mainline recommending using HMA as a less expensive alternative to traditional underlayment.

The first sections of new mainline track utilizing HMA underlayment were laid in 1994. Subsequent additions were made in 1995, 1996 and 2003-2007. Today, the Panhandle is comprised almost entirely of double main track. As a result of the two mains, in many sections a traditional granular track structure runs alongside a track utilizing HMA underlayment. This situation offers a unique opportunity to compare the relative performance of HMA and Granular trackbeds under similar conditions.

3.2 HMA Trackbeds

Since it was first introduced just over 30 years ago, an increasing number of railroads have implemented track utilizing a hot-mix asphalt (HMA) underlayment. This is particularly true in areas where soft or weak subgrade produces a track modulus that is below acceptable levels, or where an impervious separation layer is needed in order to prevent surface water from entering and weakening the subgrade soils. When utilized properly, HMA underlayment has been shown to lengthen surface cycles in problem areas by 10 to 20 times (Li et al. 2001).

A typical HMA track structure includes a 4- to 8-inch HMA layer between a 4" subballast layer below and an 8- to 12-inch ballast layer on top. The first sections of HMA installed along the Panhandle were constructed west of Codman between MP 485.6 and MP 289.9. Beginning in 2005, the standard HMA track design was 6" of HMA – laid in two lifts – over select subgrade. In many instances quality subgrade soil was not present along the route so "select" or better quality soil had to be relocated from the surrounding areas. Generally the top two feet of subgrade was made up of this relocated "select" subgrade.

The HMA underlayment on the Transcon throughout the corridor is somewhat unique relative to other installations across the country in that it uses concrete ties – rather than wood – almost exclusively. The lone exception is a small stretch from MP 361.00 to 361.35 near Quinlin where HMA underlayment is utilized with wood ties.

3.3 Granular Trackbeds

Traditional granular trackbeds make up a bulk of the track along the Panhandle subdivision. A typical granular structure includes about 16 to 18 inches of ballast and five inches of subballast spread over the subgrade soil. While some granular structures using concrete ties do exist in the panhandle, this report will only deal with granular track structures utilizing wood ties.

3.4 Other Trackbeds

Several other track structures can be found along the portion of the Transcon, but none were evaluated in the 23 sections under consideration in this study. In many instances sidings were upgraded to mainline track in order to utilize the available rail and wood ties. These materials used in these upgraded sidings, though, were often deficient relative to the existing mains that utilized granular trackbeds with wood ties, and thus were not included as part of this study.

4.0 Measuring Track Quality

4.1 BNSF Geometry Car

In addition to on-site inspections by employees, BNSF utilizes several track maintenance vehicles to monitor the geometry of its rail system. Specifically, railroads such as BNSF have come to rely heavily on geometry car fleets to provide precise measurements of track geometry over large geographic regions. Geometry cars will typically inspect several hundred miles of mainline track per day using state-of-the-art laser measurement systems. Because the technology provides track supervisors with large amounts of computerized data over a large geographic area, geometry cars have become one of the most important tools in maintenance planning. The sheer speed at which geometry cars operate allow for the same stretch of track to be evaluated several times throughout the year. This is extremely useful in identifying trends with regard to track geometry deterioration and maintenance utilization.

The measurements obtained by the geometry car include rail gage (the distance between the left and right rail measured 5/8 inch below the railhead), cant (the angle of the rail), and twist (the distance between two crosslevel measurements 12 feet apart). Three types of track measurements – surface, alignment and crosslevel – are used in the calculation of SQI used in this report.

4.2 Surface Quality Index (SQI)

BNSF developed a designation known as Surface Quality Index (SQI) in order to determine whether a section of track requires maintenance. The recommendation is calculated from several track measurement parameters all of which are measured routinely by the BNSF geometry car fleet. These parameters are based solely on track geometry and do not include other factors that may affect maintenance. BNSF uses SQI to assist in the planning of system-wide maintenance by identifying track territories with the largest concentration of recommended surfacing area which are placed close together (BNSF).

A total of four geometry parameters of railroad track are used in the calculation of SQI:

- Left Surface
- Right Surface
- Left Alignment
- Right Alignment
- Cross Level

4.2.1 Surface

Track surface describes the evenness or uniformity of track in short distances measured along the tread of the rails. When calculating SQI, surface is defined as the mid-chord offset of a 62-foot chord. Under load the track structure gradually deteriorates due to dynamic and mechanical wear effects of passing trains. Improper drainage, unstable roadbed, inadequate tamping and deferred maintenance can create surfaced irregularities. On Class 1 track, the Federal Railroad Administration limits the surface deviation to 3 inches when based on a 62-inch chord (FRA 2011). When calculating SQI, both the left and right surface measurements are used.

4.2.2 Alignment

Alignment is the variation in curvature of each rail of the track over a short distance as seen from the plan view. On tangent track, the intended curvature is zero, thus the alignment is measured as the deviation from zero. In a curve, the alignment is measured as the deviation from the uniform alignment over a specified distance. Alignment is also measured using a 62-inch chord. For Class 1 track the FRA limits alignment deviation to 5 inches for both tangent and curved track (FRA 2011).

Cross Level

Crosslevel is the difference in elevation between the top surfaces of the rails at a single point. On tangent track both rails should be the same height, a term known as zero crosslevel.

4.2.3 Steps to Calculating SQI

1. Compute the roughness for each of the five parameters of used in the SQI calculation using the following equation:

$$Roughness = \sqrt{\frac{\sum_{N+150}^{N-150} Parm^2}{300} - \frac{(\sum_{N+150}^{N-150} Parm)(\sum_{N+150}^{N-150} Parm)}{300^2}}$$

RS = Roughness of Left Surface Paramter

LS = Roughness of Right Surface Paramter

RA = Roughness of Left Aligment

LA = Roughness of Left Alignment

XL = Roughness of Crosslevel

2. Compute the total roughness by applying weight constants to each parameter using the following equation:

$$TR = (RS * Sw) + (LS * Sw) + (RA * Aw) + (LA * Aw) + (XL * Xw)$$

Sw = Surface Paramter Weight Constant = 1.4

Aw = Alignment Paramter Weight Constnat = 1.2

Xw = Crosslevel Paramter Weight Constant = 3.452

3. Compute the Adjusted Roughness (AR)

If $(TR - Limit) \geq 0.0 \rightarrow AR = TR - Limit$

Otherwise

$AR = 0.0$

Limit = Constant value based on maximum track speed (i. e. Class)

Class1 = 1.3

Class2 = 1.2

Class 3 = 1.1

Class 4 = 1.0

Class 5 = 0.9

4. Compute Roughness Area (RA), which is the sum of the Adjusted Roughness values over a 500-foot moving window. This number is also known as the Surface Quality Index (SQI).

$$RA = SQI = \sum_{N+250}^{N-250} Parm$$

BNSF recommends surfacing for any portion of track where the SQI is in excess of 25.0. After an initial 500-foot section is shown to be in need of surfacing, the SQI is checked every 100 feet to determine if the SQI is still above the 25.0 threshold. If it is, an additional 100 feet is added the initial 500-foot section to determine the total length of surfacing required. Maintenance priority is given to those track sections with the highest SQI. If two recommended surfacing sections are within 500 feet of each other they are chained together as a single recommended surfacing area.

5.0 Methodology

5.1 Data Collection

Data for the analysis was collected from numerous agencies including BNSF Railway. Shapefiles for soil data was obtained through (NRCS). These shapefiles only included polygon delineations of changing soil type.

5.2 Route Methodology

Several factors went into selected the four routes utilized in this analysis. Most notable was the desire to maximize the number of geometry car runs over a given section in order to provide the largest sample size possible. BNSF desires its geometry car runs on a given day to occur on one main. That is often not possible, though, due to traffic, maintenance and other events that warrant track time. When a corridor includes a double main, the geometry car will often switch mains temporarily in order to avoid lengthy delays due to a given impediment. While prudent from a productivity standpoint, this occurrence causes gaps in data collection that make it difficult to compare the relative performance a

single main along a given route. In fact, between 2007 and 2011, BNSF geometry cars never once complete a geometry car run over the entire Panhandle sub, from MP 237.00 in Wellington, KS to MP 554.00 in Amarillo, Texas, on a single mainline.

With the help of a computer program and utilizing a trial and error process, the Panhandle subdivision was broken up into four routes which yielded anywhere from 14 to 20 complete geometry car runs on mains 1 and 2. These runs occurred between 2007 and 2011. The completed runs allow for multiple analysis exercise based on a known amount of “good” track (i.e. SQI<25.0) versus those miles that are in need of maintenance (i.e. SQI>25.0). The routes and their associated runs on each main are identified in Table 1, while Figure 1 highlights the routes on a map of the Panhandle subdivision.

Figure1: Map of routes 1-4 used in this analysis.

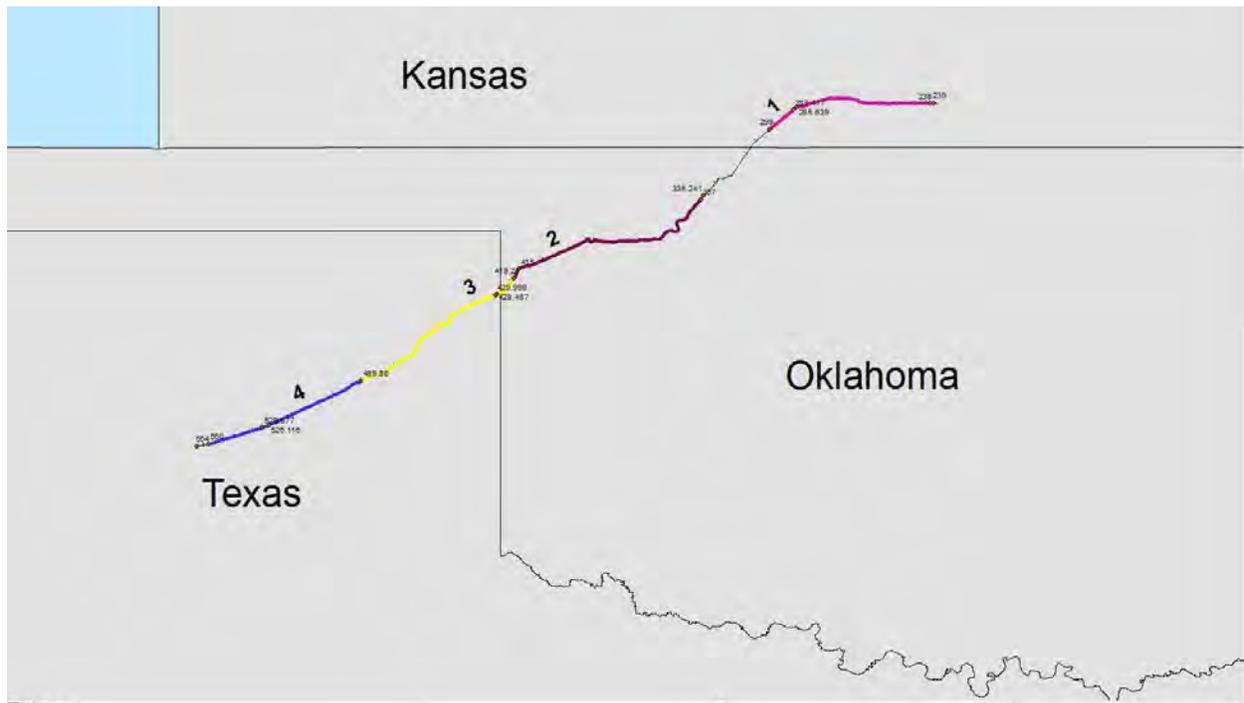


Table 1: Routes used in Transcon analysis

Route No.	Begin MP	END MP	Total Miles	Geometry Car Runs (2007-2011)	
				Main 1	Main 2
1	239.00	299.00	60.00	18	16
2	337.00	419.21	82.21	19	14
3	419.21	489.86	70.65	20	20
4	489.86	550.00	60.14	17	19
Total			273.00		

As Table 1 and Figure 1 illustrate, there is a gap in the routes between MP 399.00 and 337.00. This portion of the Panhandle was omitted from this analysis for two reasons. First, a portion of the

corridor in that section is single main. This causes problems when comparing the performance of that track with other sections, where rail traffic is spread over two mains. Secondly, the gap includes a section of HMA underlayment that wasn't installed until late 2007. Had that section been included, geometry car data would have to be limited to runs taking place after 2008. This would have greatly reduced the amount of data available for analysis, thus it was determined more prudent to simply omit the section and continue using geometry car data that was collected during 2007.

Figure 2: Entire Transcon Corridor with Green Offsets Representing Bad SQI



6.0 GIS Analysis and Results

6.1 Aggregate SQI and Track Structure

While it is useful to offset, based on the geometry car run, the individual SQI events at a given location, in order to analyze the performance of track over time against the track structure at given locations it is necessary to aggregate the SQI into a single route event. ArcGIS does not provide a simple means of doing this, so the aggregate table was compiled using Excel. Rather than a table of overlapping SQI route events, the total number of SQI events for every 100th of a mile increment was calculated and placed in a route event table.

Figure 3 shows the route event table for the aggregate SQI for the Route 1 corridor on main 1. The "NO_SQI" field in the attribute table indicates the number of SQI events that occurred over that segment. The first item, for instance, states that between MP 239.00 and 239.04 there were a total of three SQI events out of a possible 18 – since that was the number of geometry car runs on that section. The percent "bad" runs (i.e. runs in which that section of track was found to need maintenance divided by the total number of runs) was found to be .166667 or 16.7%. As Figure 3 illustrates, there is a break in the route every time the "NO_SQI" field changes, which signifies a new route event.

Figure 3: Attribute table for aggregate SQI route events

OBJECTID *	Begin_MP	End_MP	NO_SQI	GEO_RUNS	PERCENT_BAD	RKEY	Offset
1	239	239.04	3	18	0.166667	1	0.000474
2	239.04	239.05	4	18	0.222222	1	0.000474
3	239.05	239.08	3	18	0.166667	1	0.000474
4	239.08	239.09	4	18	0.222222	1	0.000474
5	239.09	239.12	5	18	0.277778	1	0.000474
6	239.12	239.13	9	18	0.5	1	0.000474
7	239.13	239.14	8	18	0.444444	1	0.000474
8	239.14	239.18	7	18	0.388889	1	0.000474
9	239.18	239.22	6	18	0.333333	1	0.000474

When illustrate as a layer, the attribute table above shows a single continuous line colored according to the frequency of SQI events along that segment. Figure 4 illustrates both methods of illustrating SQI data. Set off just to the north of the route (signified by the train tracks on the map) is the SQI aggregate layer, which is identifiable by its color scheme ranging from dark green (no SQI events) to red (34% to 78% frequency of SQI events). Beyond that line to the north are the individual SQI events from another route event table. The numbers above the individual SQI events illustrate the geometry car run in which the event was recorded. The red region of the aggregate SQI route event should have the most individual SQI event offset from it, since those are the individual events that comprise the aggregate route.

Figure 4: Depiction of aggregate and individual SQI events



Both the aggregate and individual method for depicting SQI make it easy to identify problem areas along the route – just look for red in the aggregate SQI layer or bunches of individual events in the individual SQI layer. But in terms of analysis the aggregate layer is far superior because, using the linear referencing overlay tool, a comparison can be made between the frequency of SQI events and any other route events that occur along the route, such as track structure or curves.

In this analysis, the frequency of SQI will be compared with track structures along Route 1 on both main 1 and main 2. To do this, a route event table was prepared for both main 1 and main 2 depicting the various track structures along the corridor. Using the “overlay route events” in the Linear Referencing Toolbox, the track structures route event table was overlaid with the aggregate SQI route event table. This technique uses dynamic segmentation to take the two event tables and merge or “intersect” them so each point along the route has both a track structure type, an aggregate SQI number and, by association, a percent “bad” total. Once this unified table is created, a number of analyses can be performed using the “Select by Attributes” commands and the accompanying calculator.

Tables 1 and 3 illustrate the type of analysis that can be performed using the linear referencing route overlay tool. Using the overlaid SQI aggregate and track structure route event tables, the track can be subdivided by a number of factors. In this case, the frequency of SQI events was evaluated in five different increments. Each increment was further divided by track structure to determine the frequency at which each track type experiences SQI events.

On Main 1, for instance, 33.45 miles of track structure consisting of concrete ties with HMA underlayment was found to have no instances of SQI events, which is a positive since an SQI event indicates the need for maintenance. About 65.4% Track that utilized wood ties with granular track support was found to have no instances of SQI, while only 55.1% of the track utilizing upgraded wood sidings was found to have no instances of SQI. Looking at the other extreme, only about 1.6% of the track utilizing the concrete/HMA structure was found in the most extreme category of 34% to 78% frequency of SQI. The wood/granular structure came in just a bit higher at 1.6%, followed by upgraded wood siding. If the frequency of SQI events on a given track structure is an indicator of performance, on Main 1 concrete/HMA performed the best, followed by wood/granular and finally upgraded siding.

Table 2: Frequency of SQI Events - Main 1

Frequency of SQI Events	Existing Wood/Granular		Concrete Ties w/HMA Underlayment		Upgraded Wood Siding	
	Miles	% of Track Structure Type	Miles	% of Track Structure Type	Miles	% of Track Structure Type
0%	4.38	65.4%	33.45	75.3%	4.88	55.1%
1%-6%	1.54	23.0%	7.23	16.3%	2.01	22.7%
7%-17%	0.28	4.2%	2.32	5.2%	1.02	11.5%
18%-33%	0.33	4.9%	0.75	1.7%	0.46	5.2%
34%-78%	0.17	2.5%	0.70	1.6%	0.48	5.4%
Total Miles: 60	6.7		44.45		8.85	

The picture is not quite as clear for Main 2, most likely due to disproportionate amount of wood/granular track structure, making up nearly 92% of the track miles along the corridor. As Table 3 illustrates, wood/granular track had the highest rate of zero SQI events with 86.3%, followed by upgraded wood siding (75.0%) and concrete/HMA (65.5%). Again, it is difficult to just the results of this analysis just because there were so few miles of track containing concrete/HMA or upgraded wood siding track structures.

Table 3: Frequency of SQI Events – Main 2

Frequency of SQI Events	Existing Wood/Granular		Concrete Ties w/HMA Underlayment		Upgraded Wood Siding	
	Miles	% of Track Structure Type	Miles	% of Track Structure Type	Miles	% of Track Structure Type
0%	45.91	86.3%	1.31	65.5%	2.1	75.0%
1%-6%	4.26	8.0%	0.59	29.5%	0.33	11.8%
7%-17%	1.13	2.1%	0.1	5.0%	0.21	7.5%

18%-33%	0.9	1.7%	0	0.0%	0.16	5.7%
34%-78%	1	1.9%	0	0.0%	0	0.0%
Total Miles: 58.0*	53.2	100.0%	2	100.0%	2.8	100.0%

*Excludes 2.0 miles of new wood/granular track structure

6.2 Curve Analysis

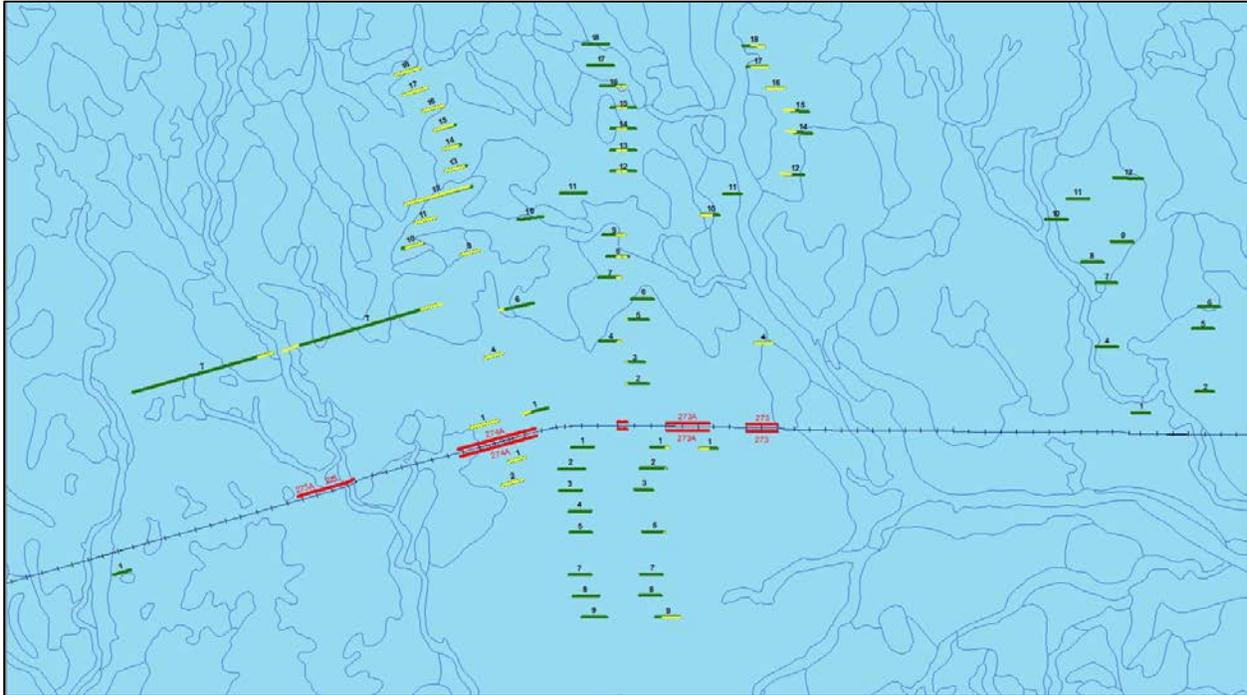
It is common knowledge in the railroad industry that horizontal curves tend to require more maintenance than tangent track due to the dynamic forces of the loads. To test this theory, an analysis was performed using ArcGIS to determine if there was any correlation between SQI events and horizontal curves on a track. In order to do this a route event table was compiled for both main 1 and main 2 listing the locations of curves along the four Panhandle routes used in this study. The route event table for curve events along the Panhandle is illustrated in Figure 5. As with SQI data there is field for beginning and end mile posts and a curve identifier field that uses the same identification system BNSF uses for its curves. The table also includes the degree of curves, but due to the fact that there were no severe curves along the Panhandle this field was not used.

Figure 5: Route event table for curves

OBJECTID *	Begin_MP	End_MP	Degree_Curve	Curve_ID	RKEY	Offset	Main	Shape *
1	239.15	239.41	1	239	1	0.000316	1	Polyline M
2	239.58	239.68	1.1	239A	1	0.000316	1	Polyline M
3	240.96	241	0.5	241	1	0.000316	1	Polyline M
4	241.12	241.18	0.5	241A	1	0.000316	1	Polyline M
5	242	242.2	1	242	1	0.000316	1	Polyline M
6	242.41	242.43	0.5	242A	1	0.000316	1	Polyline M
7	242.49	242.51	0.5	242B	1	0.000316	1	Polyline M
8	243.1	243.2	0.16667	243	1	0.000316	1	Polyline M
9	243.3	243.4	0.16667	243A	1	0.000316	1	Polyline M
10	246	246.18	0.25	246	1	0.000316	1	Polyline M
11	250.19	250.33	0.25	250	1	0.000316	1	Polyline M
12	252.39	252.55	0.33333	252	1	0.000316	1	Polyline M
13	255.07	255.49	0.9	255	1	0.000316	1	Polyline M

Because there is much overlap in the SQI sections the individual SQI layer – rather than the aggregate SQI layer used in the track structure analysis – to perform this analysis. Again, an overlay table was created from the individual SQI and curve route event tables. This combined overlay table used the same offset scheme so it would sit overtop the original SQI events pictured on the map. Figure 6 illustrates the finished product. The red lines next to the track represent curves (Main 1 events are located to the north of the track, Main 2 events are located to the south). The green marks represent the lengths of SQI events for a given run. The number of the run is located above each SQI event in black. The yellow lines represent the overlay layer/event table, which depicts sections of the SQI events that occur on curved track. Theoretically, the yellow sections should correspond only to portions of the track where curves and SQI events are present. This appears to be the case as the green SQI events change into yellow when crossing into the portion of the route that is curved.

Figure 6: Map showing curves, SQI events and SQI events overlaid with curves.



Using this procedure on both Main 1 and Main 2 produces all the data one needs to perform an analysis of curves and SQI along the Transcon. By right clicking the attribute tables and using the statistical tool to sum up the total length of SQI using the SQI events table and the SQI occurring on curves from the SQI/Curves overlay table, it can be determined what percentage of SQI occurs on curves for both Main 1 and Main 2. The results are listed in Table 5.

Table 5: Curve Analysis

	Main 1	Main 2
Total SQI Length (miles) 2007-2011	232.7	146.1
Total SQI Length on Curves (miles)	88.2	29.3
% of SQI Length on Curves	37.9%	20.0%

The calculations in Table 5, though, are meaningless unless one knows something about the ratio of curves to tangent track on the transcon. This can easily be obtained again by using the statistics tool to calculate the total miles of curves track on Main 1 and Main 2. This is performed by summing the

“End_MP” field and subtracting the sum of the “Begin_MP” field in the original curve event tables. The results are listed below in Table 6. Concerning Main 1, curves represent only 19.4% of the route miles yet curve track accounts for 37.9% of the total SQI events, meaning curves have a much higher rate of SQI events than the tangent track. Main 2, contrasts that assertion because 20.0% of SQI length is located on curved track. That is roughly proportional to the amount of curved track on Main 2 – 18.9% of the length. This indicates that further analysis may be needed to better define the relationship between SQI events and curved track.

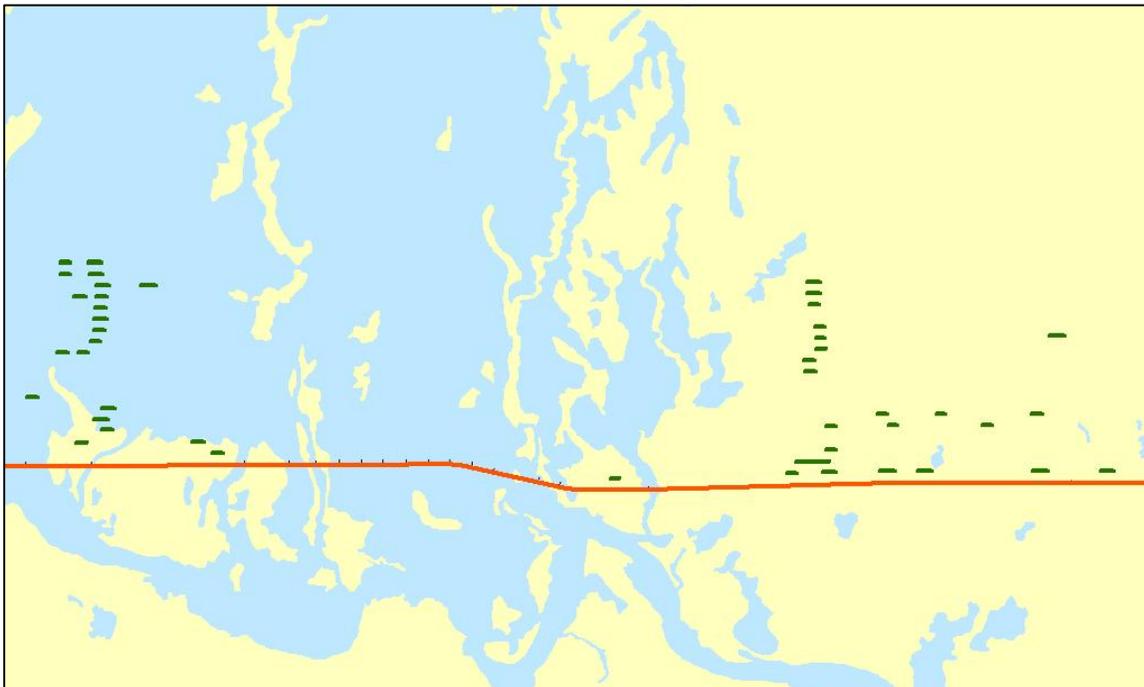
Table 6: Curves on Routes 1-4

	Main 1	Main 2
Total Miles, Routes 1-4	273	273
Total Miles of Curves, Routes 1-4	53	51.63
Percent of Route Miles that are Curves	19.4%	18.9%

6.3 Native Subgrade Soil Analysis

The analysis to determine the correlation of native subgrade soil type with bad SQI track sections proved to be difficult. Because there were only 20 known mileposts, the route mileposts were not properly calibrated to actual mileposts on the Transcon and thus did not correspond well with the SQI sections provided by BNSF. Despite this, a general trend of frequently bad SQI was observed in subgrade soils of type A-6 and A-7 (fine grained soils including high plasticity clays). Figure 7 depicts such a situation.

Figure 7: Visual inspection shows SQI Events (Green lines) occur more frequently on A-6 and A7 soils (shown in yellow) compared to other soils (shown in light blue).



7.0 Conclusions and Recommendations

Overall, the analysis proved to be a successful “proof of concept” test. This study represents an initial use of GIS analysis to correlate track quality with various parameters including track type, curves, and subgrade soil (the three studied in this research). Many other parameters could be studied in a similar fashion including track tonnage, frequency of maintenance, rainfall, or even fastening system type. This study also shows the versatility of the linear referencing procedure in ArcGIS 10 and its application to the railway industry.

For future study of the Transcon, more known mileposts need to be entered to better calibrate the linear referenced route and route events to their actual geographic locations. With the large uncertainty in the accuracy of the route mileposts, correlating SQI route events with native subgrade soil involves a great deal of error. Soil conditions varied greatly, sometimes changing every 500 feet or less

along the corridor. As only 20 known mileposts were able to be input, the SQI data was likely only accurate to within 500 feet on either end of the bad track sections.

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