Truck Traffic Impacts:

“Richardson Grove Operational Improvement Project”

and

“197/199 Safe STAA Access Project”

CRTP
Coalition for Responsible Transportation Priorities

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Abstract

The Richardson Grove Operational Improvement Project and 197/199 Safe STAA Access Project proposed by Caltrans would result in a number of uninterrupted routes through Humboldt and Del Norte Counties for the largest trucks currently allowed on US roads (called "STAA trucks") where no such routes previously existed. Assessments of the impacts of these two projects on truck traffic in Humboldt and Del Norte Counties to date have been based almost entirely on speculative survey results from local businesses and other qualitative analyses. This study brings a more rigorous, quantitative approach to the assessment of likely truck traffic impacts. Using all available Caltrans data, this study examines truck traffic volumes, intensities and rates of change on all throughway and dead end STAA truck routes as well as non-STAA truck routes throughout the state. Results indicate that throughway STAA truck routes have significantly higher volumes and intensities of overall truck traffic and of large truck traffic specifically than non-STAA truck routes. They also have higher truck volumes and intensities than dead end STAA routes by most measures. Rates of change in truck traffic volumes and intensities were also generally higher on throughway STAA routes, but these results were not significant. Overall, the findings of this study strongly suggest that the two projects in question will significantly increase truck traffic in Humboldt and Del Norte Counties, contrary to the findings of previous, less rigorous analyses.

Introduction

The largest trucks allowed to travel without special permits on major US highways are often called "STAA trucks," authorized by the Surface Transportation Assistance Act of 1982 (STAA). The STAA prohibits states from limiting the overall length of trucks or from limiting the length of truck trailers to less than 48 feet on certain designated highways (49 CFR §3111(b)). As implemented by California state law, STAA trucks have no overall length limit, but their trailers are limited to either 48 feet (with no kingpin-to-rear-axle [KPRA] limit) or 53 feet (with a 40-foot KPRA limit for double rear axles and a 38-foot KPRA limit for a single rear axle) (California Vehicle Code Section 35401.5(a)).[1]

STAA vehicles may be compared with so-called "California legal" trucks, which under California law may travel on most state highways (whether or not designated as part of the STAA network) and which have an overall length limit of 65 feet (California Vehicle Code Section 35401(a)). With no overall length limit, STAA trucks are generally assumed to be longer than California legal trucks. In practice, any extra length may come from the length of the cab (which is often a sleeper cab) rather than the length of the trailer(s). Regardless, KPRA is a more important parameter than overall length for road design, as the KPRA determines the truck's turning radius. The California Department of Transportation (Caltrans) uses the shorter STAA vehicle (48-foot trailer) as its "design vehicle" for STAA network roads because of its longer potential KPRA (generally up to 43 feet) (Caltrans Division of Design 2015).

STAA trucks are required to be allowed on the "National Network," which is the name generally applied to a designated set of large interstate highways (49 CFR §3111(b), California Vehicle Code Section 34501.5(a)). STAA trucks must also be allowed "reasonable access" to facilities and services via roads

[1] The STAA also allows double trailers. Under California law, the maximum length of each trailer in a double-trailer configuration is 28.5 feet regardless of whether it is a California legal or STAA truck, but California legal double trailers have an overall length limit of 75 feet, while STAA doubles have no overall length limit.

within 1 mile of the National Network, and on designated "Terminal Access" (TA) routes between the National Network and freight terminals or facilities (23 CFR §658.19, California Vehicle Code Section 34501.5(c)-(d)). The denial of a request for a TA designation may legally be made "only on the basis of safety and an engineering analysis of the access route" (23 CFR §658.19(i), California Vehicle Code Section 34501.5(d)).

California's coastal Humboldt and Del Norte Counties do not contain any part of the National Network, and currently the only TA route into the two counties is US 101 from the north (STAA trucks using this route can connect to the National Network in Oregon) (Caltrans Division of Traffic Operations 2017a, Tanaka 2017). A recent road realignment and TA designation in northern Humboldt County has resulted in an uninterrupted[2] TA route on US 101 from the Oregon/Del Norte County border almost to the southern border of Humboldt County. However, a short stretch at the southern border of Humboldt County in Richardson Grove State Park is not TA-designated, preventing STAA trucks from entering the two counties from the south or departing toward the south. Neither of the other two major state highways entering the counties, SR 299 from the east and US 199 from the northeast, are TA designated at the time of this writing, although SR 299 is expected to be designated soon.

The lack of uninterrupted TA designation on these three highways (US 101, US 199 and SR 299) has been due largely to "safety and engineering analyses" which have found that the STAA design vehicle could not maneuver around many of the tight curves, given the lane and road widths currently provided, without "off-tracking" (leaving its designated lane of travel). Within the last decade, Caltrans proposed construction projects on all three highways to realign and widen the roadways for the purpose of allowing the STAA design vehicle the minimum required curve radius on all curves, thus providing uninterrupted TA designation and three additional STAA access routes into the two counties. As of this writing, the project on SR 299 has completed construction, and the route is likely to be TA designated soon. The projects on US 101 ("Richardson Grove Operational Improvement Project") and US 199 ("197/199 Safe STAA Access Project") are both stalled due to previous or ongoing litigation.

Accurate assessment of the impacts of these projects requires an understanding of their effects on truck traffic on the region's roadways. This is particularly important for the two projects not yet under construction, as such an assessment may play a role in decision-making about the projects. However, truck traffic impact assessments for these two projects to date have been less than rigorous.

The Final Environmental Impact Report and Finding of No Significant Impacts (Final EIR/FONSI) for the Richardson Grove Operational Improvement Project on US 101, as well as a more recent memorandum on the subject published by Caltrans, have relied largely on a series of assumptions and qualitative assessments to conclude that truck traffic would not increase (Caltrans 2010, 42-50; Tucker 2016). The report on which these assessments were mostly based (Gallo 2008) was intended to be an economic impact assessment, and its traffic assessment was largely incidental. Gallo's data for the assessment came from a limited number of anonymous business survey responses. Respondents indicated that they expected truck trips for their businesses to decline if the project were completed, which Gallo attributed to the idea that they could ship the same volume of goods in fewer loads using STAA trucks. To reach his conclusion that there would be "no impact" on truck traffic, Gallo assumed that this projected

[2] As used here, "uninterrupted" refers to a continuous stretch of roadway with TA designation, with no non-TA designated segments between the end point of the designation and its connection to the National Network.

decline "is likely to be entirely offset by the positive effect of reduced transportation cost on local economic activity" and thus on volume of goods shipped (Gallo 2008, 3).

The basis for the truck traffic assessment found in the Final EIR/FONSI for the 197/199 Safe STAA Access Project (Caltrans 2013) is somewhat more rigorous, as in this case the consultant collected baseline traffic data (Fehr & Peers 2010). However, the Fehr & Peers assessment of any possible changes to the baseline data is also based solely on interviews with local businesses.

The projections of local businesses of their own future truck trips provide useful information to be incorporated into a more comprehensive or quantitative assessment. However, on their own, these projections are of limited use. The responses of local business owners and representatives are necessarily somewhat speculative. Furthermore, their responses pertain to their businesses alone. Such responses may not be broadly generalizable to other businesses and may also fail to account for a range of traffic-influencing factors such as throughway trucking, induced growth, and other secondary or synergistic effects.

Moreover, no assessment of the cumulative truck traffic impact of the two projects (or of the three projects, to include the one on SR 299) has been attempted to date. The projects combined would create potential throughways for STAA truck traffic. Optimization of truck routes has been the subject of extensive research in recent decades, and combining human (driver) behavior with the application of complex and often dynamic algorithms means that it is not possible to easily predict routing decisions in advance (see for example Pillac et al. 2013). However, it may be reasonably hypothesized that because changing the functional nature of a truck route changes the options available to drivers and to routing algorithms, such actions will have some effect on routing decisions and thus on truck traffic. In particular, throughway routes may have a different impact on truck traffic than current "dead end" routes as a result of the greater potential use of throughway routes for dynamic re-routing to avoid delays on other roadways, static re-routing to reduce deadheading, etc.[3] It is not sufficient to dismiss this hypothesis out of hand with no quantitative analysis, as the Richardson Grove Final EIR and recent Caltrans memorandum both did, by simply asserting on the basis of a brief qualitative analysis that "it is not likely that truck traffic would be diverted from the I-5 corridor" into Humboldt and Del Norte Counties when the projects are completed (Caltrans 2010, 47; see also Tucker 2016).

Comparing truck traffic on a variety of road segments throughout the existing state highway system provides a stronger basis for assessing the likely truck traffic impact of creating throughway TA routes, as these two projects propose, than speculative survey responses. Therefore, the purpose of this study is to compare current truck traffic and changes in truck traffic over time on throughway TA routes and dead end TA routes, both of which allow STAA truck traffic, as well as state highway segments which are not TA-designated and thus do not allow STAA truck traffic.

[3] As used in this study, "through" and "throughway" refer to TA-designated highway segments which provide access at both ends to other TA-designated or National Network roadways, and thus allow STAA trucks the possibility of leaving and rejoining the National Network without turning around and "back-tracking" along the same route. "Dead end" refers to TA-designated highway segments which connect to other TA-designated or National Network roadways on only one end.

Methods

At the time of this study, compilations of Caltrans truck traffic counts for various points on the state highway system were publicly available for most years starting in 1993 and ending in 2015 (Caltrans Division of Traffic Operations 2017b). Each count was listed as either "estimated" or "verified." However, not all counts were estimated or verified in the year in which they were published. Rather, each published compilation listed the year in which each count had been either estimated or verified.

Records were requested in late 2015 from Caltrans for all highway segments designated as Terminal Access (TA) routes between 1993 and 2015 (see Appendix A). In response, Caltrans provided two lists of TA-designated segments, one for 1991 and one for 2015, and stated that "Caltrans does not maintain records of the dates of each designation change back to 1990" (see Appendix B). Subsequent communications with Caltrans revealed that no other date-specific TA lists were available from the early 1990s or after 2008 (Tanaka 2015).

Newly Designated TA Segments

The 1991 and 2015 TA lists were compared and used to identify all newly TA-designated segments in the intervening time period. Some qualitative judgments were required when comparing the TA lists, as exact beginning and ending reference points for segments were often slightly different while the general location and length of the segment remained unchanged. These cases were assumed to be the result of road realignment or other changes not directly related to TA designation per se, and only segments which were clearly newly TA-designated were included in the list of newly TA-designated segments. This list of newly designated segments was narrowed to include only those for which traffic counts for at least one point within the segments (or from the endpoint of the segment looking "back" or the beginning point looking "ahead") were available in the oldest (1993) and most recent (2015) published truck traffic count compilations (Caltrans Division of Traffic Operations 2017b). Then the list was narrowed still further to include only segments for which the traffic counts in the segment were either estimated or verified between 1988 and 1993 for the 1993 list, and between 2010 and 2015 for the 2015 list, in order to ensure that a comparable amount of time had passed between actual traffic counts. However, this final narrowing resulted in only 8 newly designated segments with complete information. Because of the high statewide variability in rates of change of truck traffic among segments, this was considered too small a sample to provide meaningful results.

Current Designations and Traffic Counts on the State Highway System

Analysis of current truck traffic utilized a different data set. To build this data set, all state highway segments which contained counts published in 2015 that were either estimated or verified in 2010 or more recently were examined. Segments which were part of the designated National Network, as determined by comparison with the regional truck route maps published by Caltrans as of the 2015 date the traffic data were obtained (Caltrans Division of Traffic Operations 2017a, Tanaka 2017), were excluded from examination. Remaining segments were determined to be either currently TA-designated or not based on the 2015 TA list provided by Caltrans. Subsequently, TA-designated segments were classified as either "through," if they connected to either the National Network or another TA-designated segment at both ends, or "dead end," if they connected to the National Network and/or another TA-designated segment at only one end (or in the case of a segment broken at a county line, if it was part of a longer continuous dead-end length of TA-designated road). Information used to make these classifications came from both the then-current (2015) Caltrans regional truck route maps (Caltrans Division of Traffic Operations 2017a, Tanaka 2017) and the 2015 TA list provided by Caltrans.

In an effort to ensure greater independence of data and not include large numbers of traffic counts which occurred at points very close to each other geographically, traffic was analyzed at the level of the segment rather than at the level of the individual traffic count. Endpoints of segments were considered to be locations where either the legal designation (TA, non-TA, or National Network) or the functional nature of the segment ("dead end" or "through") changed. Segments were also ended at county lines to prevent some segments from becoming so long that the full range of traffic on certain highways was not fully represented. All counts within each segment were averaged so that each segment was represented by only one datum in the statistical analyses.

For each segment, each of the following values was calculated:

(1) average annual daily total truck traffic;

(2) average proportion of total average annual daily traffic comprised of trucks;

(3) average annual daily traffic of trucks with 5 or more axles;[4]

(4) average proportion of total average annual daily traffic comprised of trucks with 5 or more axles.

Values were then grouped based on whether the segment was designated "Non-TA", "Dead End TA," or "Through TA" based on the then-current (2015) Caltrans regional truck route maps (Caltrans Division of Traffic Operations 2017a, Tanaka 2017) and the 2015 TA list provided by Caltrans, as described above. The statistical normality of the data was assessed using a Shapiro-Wilk normality test to determine whether the data could be analyzed using parametric statistics. Because almost all data sets failed the normality test, comparisons among the groups were conducted using a Kruskal-Wallis one-way analyses of variance, which is a non-parametric test appropriate for use on data sets that do not meet the assumption of normality. Where a significant difference among all groups was detected, a post hoc multiple comparison procedure was conducted using Dunn's Method to determine where significant differences existed between specific pairs of groups.

Rates of Change of Truck Traffic on the State Highway System

All state highway segments which contained counts published in 1993 that were either estimated or verified between 1988 and 1993 and which contained counts from the same locations published in 2015 that were either estimated or verified between 2010 and 2015 were examined. Segments which were part of the designated National Network, as determined by comparison with the then-current (2015) regional truck route maps published by Caltrans (Caltrans Division of Traffic Operations 2017a, Tanaka 2017), were excluded from examination, because they were expected to have distinct truck traffic characteristics which were not of interest in this study. Remaining segments were determined to have been either TA-designated for the entire time period or to not have been TA-designated at all during the

[4] Trucks with 5 or more axles are generally tractor-trailer combinations, and almost all "STAA trucks" would fall into this category.

time period based on the 1991 TA list provided by Caltrans. Newly TA-designated segments during the time period were excluded from the analysis because, as described above, the sample was considered too small to provide meaningful results. Subsequently, TA-designated segments remaining in the data set were classified as either “through” or “dead end” using the same protocol as above. Segments were broken using the same protocol as above.

For each segment, each of the following values was calculated:

(1) annualized rate of change of average annual daily total truck traffic;

(2) annualized rate of change of average proportion of total average annual daily traffic comprised of all trucks;

(3) annualized rate of change of average annual daily traffic of trucks with 5 or more axles;

(4) annualized rate of change of average proportion of total average annual daily traffic comprised of trucks with 5 or more axles.

Rates of change were calculated by comparing traffic counts at the same points in different years, and rates of change for different points within the same segment were averaged to produce a single datum for each segment, as above. A small number of data in the “Non-TA” set were discarded because rates could not be calculated where 1993 average annual daily traffic counts of trucks and/or of trucks with 5 or more axles equaled zero. Rates were annualized by dividing the overall rate by the number of years between when the counts were actually estimated and/or verified. Rates were grouped based on the segments’ TA designations of “Non-TA”, “Dead End TA,” and “Through TA.”

Normality was assessed using the Shapiro-Wilk normality test. Because almost all data sets failed the normality test, comparisons among the groups were conducted using non-parametric Kruskal-Wallis one-way analyses of variance. Where a significant difference among groups was detected, a post hoc multiple comparison procedure was conducted using Dunn’s Method.

Results

Results are summarized in Table 1. For almost all measures of truck traffic and rates of growth in truck traffic, throughway Terminal Access (TA) segments had higher median values than either dead end TA segments or non-TA segments. The only exception was in the annualized growth rate of all truck traffic, where the throughway TA segments had a lower rate than either non-TA or dead end TA segments.

Surprisingly, many of the segments saw decreased total truck volumes and volumes of trucks with 5 or more axles during the last 20 years. Many also have lower proportions of total traffic comprised of trucks today than they did 20 years ago. In fact, median annualized rates of change were slightly negative for most variables on non-TA and dead end TA segments.

Current Designations and Traffic Counts on the State Highway System

Volume of truck traffic with 5 or more axles, as well as proportions of total traffic comprised of all trucks and of trucks with 5 or more axles, were all significantly higher on throughway TA segments than on either dead end TA or non-TA segments (Figures 2-4). Truck traffic with 5 or more axles was intermediate on dead end TA segments, but still significantly higher than on non-TA segments (Figure 3).

Total truck traffic was significantly greater on both dead end and throughway TA segments than on non-TA segments (Figure 1). The proportions of total truck traffic (Figure 2) and of truck traffic with 5 or more axles (Figure 4) did not differ significantly between dead end TA and non-TA segments.

Rates of Change of Truck Traffic on the State Highway System

Median annualized rates of change in the proportions of traffic made up of all trucks (Figure 6) and of trucks with 5 or more axles (Figure 8) were lowest (and negative) for non-TA segments, intermediate (and still negative) for dead end TA segments, and highest (positive) for throughway TA segments. The median annualized rate of change in volumes of trucks with 5 or axles was higher for dead end TA segments than for non-TA segments, but both rates were negative and less than the (positive) rate of change for throughway TA segments (Figure 7). Interestingly, the overall trend seemed to be reversed for the annualized rate of change in overall truck traffic, with throughway TA segments showing the lowest rates of change, followed by dead end TA segments and then non-TA segments (Figure 5). None of the differences in any of the rates of change among the three types of segments was statistically significant.

Table 1. Summary of Results. Each letter indicates a statistically distinct group for that variable (Dunn's multiple comparison test). Thus, when all pairs of categories were statistically different from each other, they are labeled "A," "B" and "C." When two categories were not significantly different from each other, both are labeled "A," while a third category which was significantly different from both of the others is labeled "B." When two categories were significantly different from each other and labeled "A" and "B," but the third intermediate category was not significantly different from either of the others, it is labeled "AB." When there were no significant differences among the categories, all are labeled "A."

	Median of Non-Terminal Access Segments	**Median of Dead End Terminal Access Segments**	**Median of Throughway Terminal Access Segments**
Average Annual Daily Traffic – All Trucks	160 (A)	649 (B)	1,011 (B)
Trucks as a Proportion of Total Traffic	8.3% (A)	7.2% (A)	11.1% (B)
Average Annual Daily Traffic – Trucks with 5 or More Axles	41 (A)	101 (B)	348 (C)
5-axle Trucks as a Proportion of Total Traffic	1.6% (A)	1.4% (A)	4.7% (B)
Annualized Growth Rate of Trucks, [1988-1993] to [2008-2013]	0.7% (A)	0.4% (A)	0.2% (A)

Annualized Growth Rate of Trucks as a Proportion of Total Traffic, [1988-1993] to [2008-2013]	-0.4% (A)	-0.3% (A)	0.1% (A)
Annualized Growth Rate of Trucks with 5 or More Axles, [1988-1993] to [2008-2013]	-0.2% (A)	-0.8% (A)	1.1% (A)
Annualized Growth Rate of Trucks with 5 or More Axles as a Proportion of Total Traffic, [1988-1993] to [2008-2013]	-1.1% (A)	-0.1% (A)	0.7% (A)

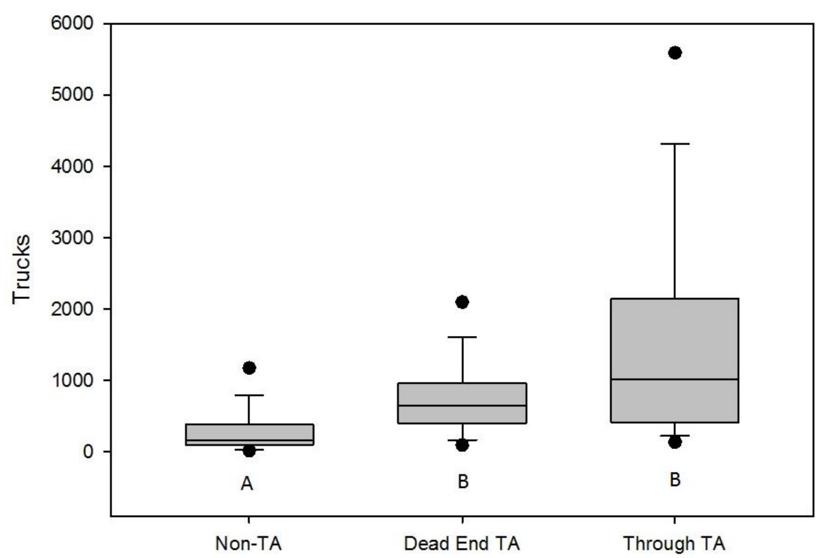

Figure 1. Average Annual Daily Traffic – All Trucks. All official counts on the state highway system that were estimated or verified between 2010 and 2015 are included. "Non-TA" includes segments which are not designated as Terminal Access or part of the National Network. "Dead End TA" includes Terminal Access segments which connected with other designated Terminal Access or National Network segments on one end only. "Through TA" includes Terminal Access segments which connected with other designated Terminal Access or National Network segments on both ends. Each letter indicates a statistically distinct group ($p<0.05$, Dunn's multiple comparison test following a Kruskal-Wallis one-way analysis of variance). Thus, as shown here, Non-TA segments had significantly lower truck traffic counts than Dead End TA and Through TA segments, but the latter two groups did not differ significantly from each other. Median values are shown, along with 5th, 10th, 25th, 75th, 90th and 95th percentiles (5th and 95th percentiles appear as points).

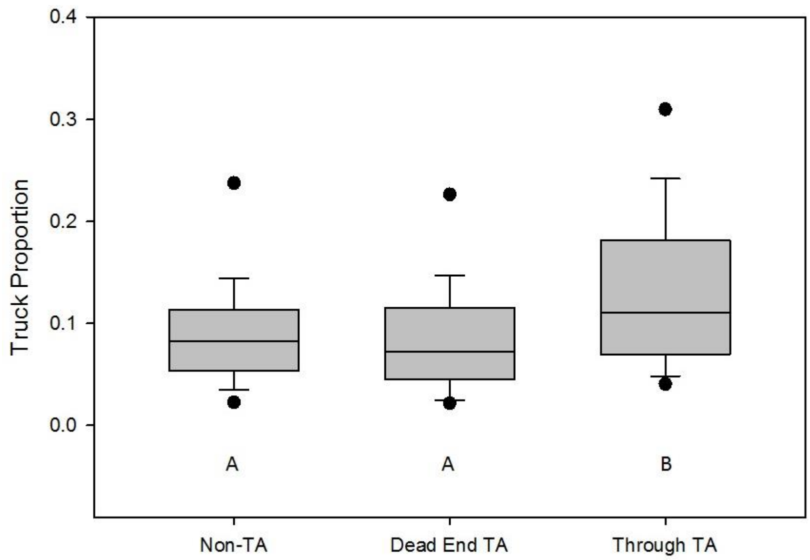

Figure 2. Trucks as a Proportion of Total Traffic. Data parameters, labels and terminology as described in Figure 1. Non-TA and Dead End TA segments did not differ significantly from each other, but Through TA segments differed significantly from both of the other types of segments.

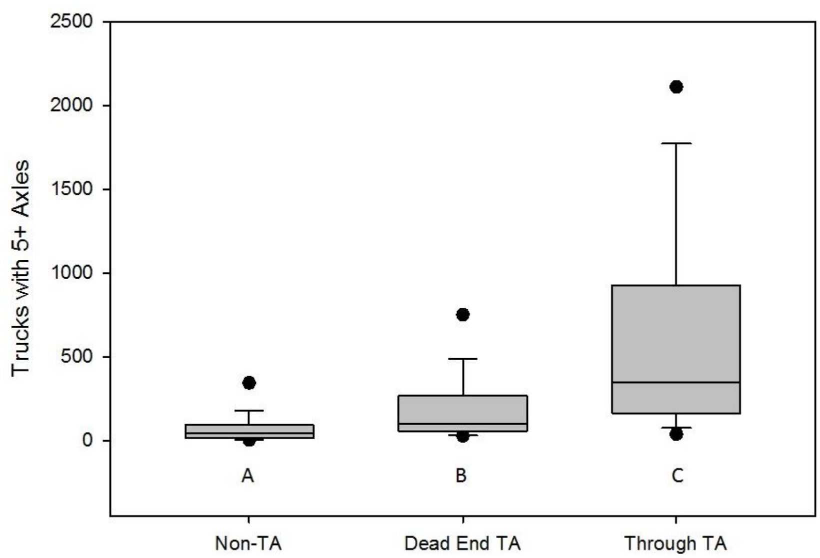

Figure 3. Average Annual Daily Traffic – Trucks with 5 or More Axles. Data parameters, labels and terminology as described in Figure 1. All types of segments differed significantly all other types.

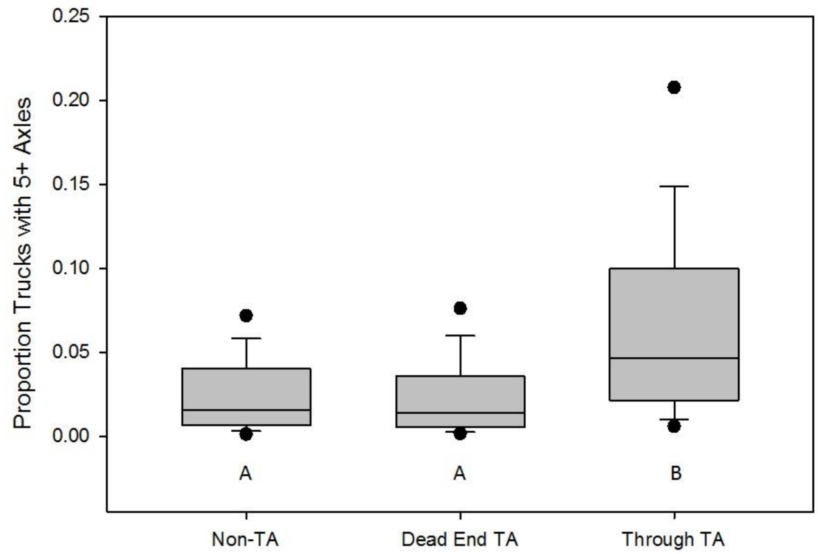

Figure 4. Trucks with 5 or More Axles as a Proportion of Total Traffic. Data parameters, labels and terminology as described in Figure 1. Non-TA and Dead End TA segments did not differ significantly from each other, but Through TA segments differed significantly from both of the other types of segments.

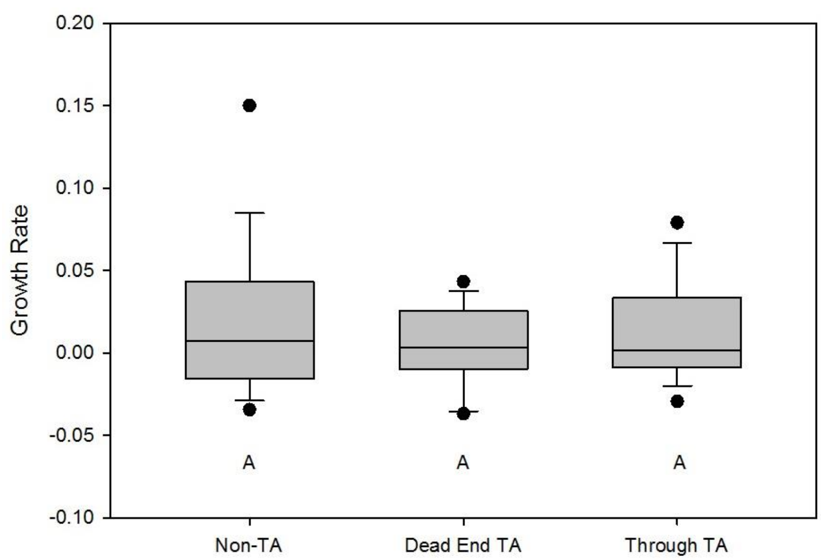

Figure 5. Annualized Growth Rate – All Trucks. Data parameters, labels and terminology as described in Figure 1. A Kruskal-Wallis one-way analysis of variance found no significant difference among the three types of segments.

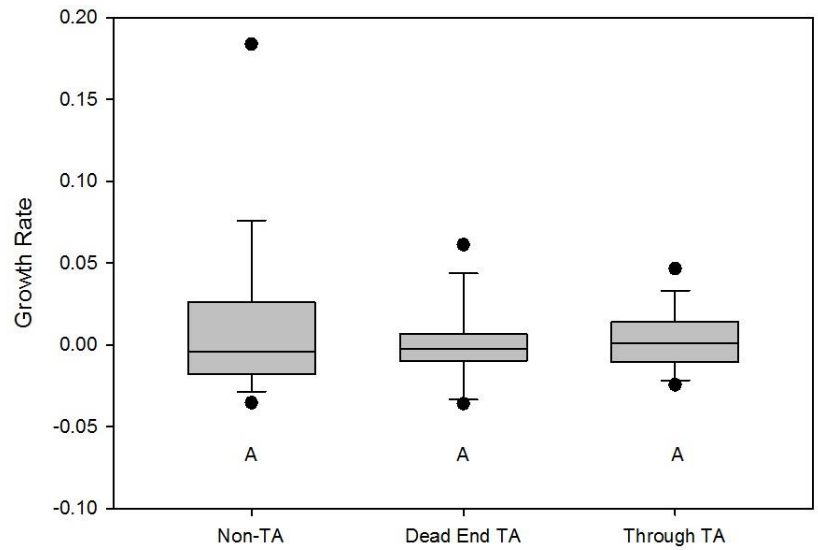

Figure 6. Annualized Growth Rate – Trucks as a Proportion of Total Traffic. Data parameters, labels and terminology as described in Figure 1. A Kruskal-Wallis one-way analysis of variance found no significant difference among the three types of segments.

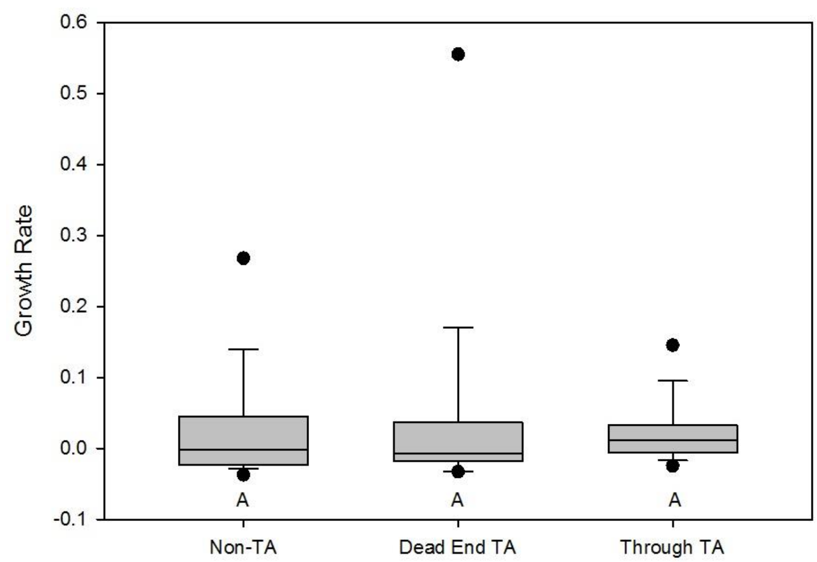

Figure 7. Annualized Growth Rate – Trucks with 5 or More Axles. Data parameters, labels and terminology as described in Figure 1. A Kruskal-Wallis one-way analysis of variance found no significant difference among the three types of segments.

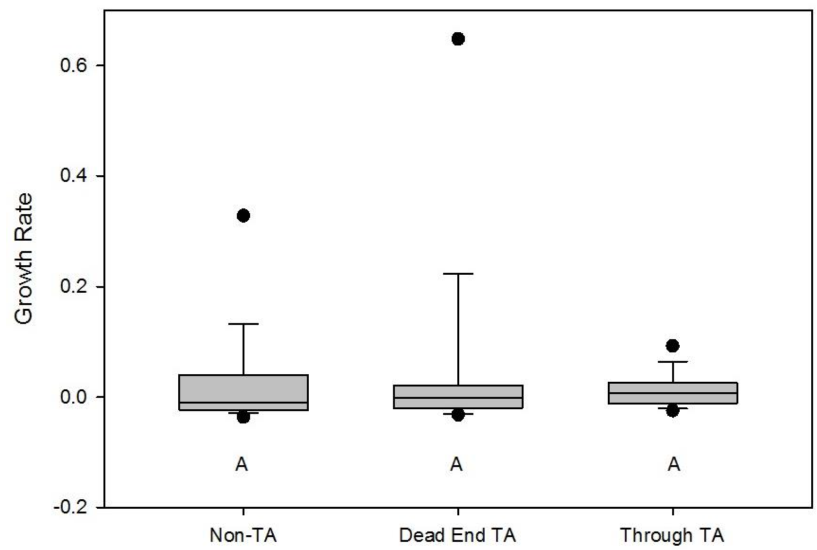

Figure 8. Annualized Growth Rate – Trucks with 5 or More Axles as a Proportion of Total Traffic. Data parameters, labels and terminology as described in Figure 1. A Kruskal-Wallis one-way analysis of variance found no significant difference among the three types of segments.

Discussion

"Terminal Access" (TA) designation is intended under both federal and California law as a way to ensure access for STAA trucks between the National Network and freight "terminals" (23 CFR §658.19, California Vehicle Code Section 34501.5(c)-(d)). With that in mind, one might expect that most TA routes would be dead ends, simply connecting a National Network highway with a particular logistics center or distribution hub and going no further. However, of the current TA-designated roadway segments in California examined in this study, 104 were determined to be throughway segments providing access to other STAA roadways at both ends, while only 34 were determined to be dead ends for STAA trucks. An examination of current California truck route maps confirms that most TA routes are throughway rather than dead end routes (Caltrans Division of Traffic Operations 2017a). This suggests that TA designations are in fact being used more as de facto extensions of the National Network than as true "Terminal Access" routes.

The results of this study demonstrate that throughway TA segments have significantly different truck traffic characteristics than dead end TA segments or non-TA segments. For all measures of current truck traffic, throughway TA segments showed significantly higher volumes and greater intensity (proportion) of truck traffic generally and large (5-axle) truck traffic specifically than non-TA segments (Table 1). For all but one measure (total truck traffic), throughway TA segments also showed significantly greater volumes and intensities than dead end TA segments (Table 1). Indeed, for both measures of truck traffic intensity, dead end TA segments did not differ significantly from non-TA segments. Throughway TA segments also showed qualitatively higher rates of growth in large truck traffic and in truck traffic intensity than either dead end TA or non-TA segments from 1988-1993 through 2010-2015. Although these results were not statistically significant, it is notable that median values for large truck traffic and both measures of truck traffic intensity have actually decreased overall over the last 20 years on dead end TA and non-TA segments, while they have increased on throughway TA segments.

Given the complexity of human (driver) behavior, as well as the extensive use of complex algorithms to solve modern commercial truck routing problems (see for example Coelho et al. 2015), it may be impossible to provide a comprehensive list of the factors which contribute to higher volumes and intensities on throughway TA segments than dead end TA or non-TA segments. However, two likely factors are readily apparent:

(1) For both single-destination and multiple-destination trips, a throughway segment may provide direct routes for STAA trucks between points which are not on the segment itself. A dead end TA segment can only provide a direct route to destinations on the segment itself.
(2) A throughway segment may provide convenient alternate routes which are less direct than other TA or National Network routes but which become more heavily used when primary routes are blocked or slowed, such as by weather conditions, accidents or construction. A dead end TA segment cannot serve such a purpose, as it never rejoins another route.

Factor (1) is a consideration which must influence even the most basic route planning approach. Factor (2) is a likely consideration of any driver, and its practical importance is confirmed by its inclusion in commercial routing software. For example, one company advertises that, using “the unlimited power, flexibility and dynamic data of off-board Internet servers,” its “unique algorithm prioritizes roads based on a wide range of factors, including user preferences, adverse weather and road closures” (Telogis Navigation 2015).

The Richardson Grove Operational Improvement Project and the 197/199 Safe STAA Access Project would both result in throughway TA segments. In the former case, two long dead end TA segments of US 101 would be connected to form a new continuous throughway TA segment, and in the latter case a new throughway TA segment between I-5 and US 101 would be created on Routes 199 and 197 on previously non-TA segments. The project recently completed on SR 299 will result in yet another throughway TA segment from previously dead end and non-TA segments. Combined, the projects will create a number of possible uninterrupted TA routes through Humboldt and Del Norte Counties. The results of this study strongly suggest that these changes will increase the volumes and intensities (proportions) of both truck traffic generally and large truck traffic specifically on all of these major roads.

Caltrans has claimed that “it is not likely that truck traffic would be diverted from the I-5 corridor” to US 101 following the completion of the Richardson Grove Operational Improvement project (Caltrans 2010, 47; see also Tucker 2016), and presumably the agency would make the same argument about the other projects discussed here. This qualitative analysis is based solely on the assumption that the I-5 usually provides a straighter, faster, and less expensive route between origins and destinations outside of Humboldt and Del Norte Counties and other coastal communities served by US 101. However, it fails to account for the complexity of factors influencing human (driver) decisions and the results of modern truck routing software and algorithms. It also fails to fully account for either of the two likely throughway route-influencing factors listed above, as follows:

(1) Single-destination or multiple-destination truck trips connecting points in coastal southern Oregon or northern Mendocino County (just south of Richardson Grove State Park) are likely to be routed through Humboldt and Del Norte Counties once US 101 becomes a throughway TA route in the region.

(2) While trucks may not under "normal" circumstances divert from the I-5 corridor when all origins and destinations are outside of Humboldt and Del Norte Counties and nearby coastal areas, there is no apparent reason for them not to divert if one or more destinations of a multiple-destination trip are within the two counties or if there are significant potential delays from bad weather, accidents or construction on the I-5 corridor.

Induced growth is another possible source of heavier truck traffic on throughway TA routes which cannot be ignored. Gallo (2008) argues that direct STAA truck access will lower the price of goods in Humboldt and Del Norte Counties and acknowledges that this would have the effect of inducing some additional truck traffic. Gallo's analysis examined only one TA access route and did not take into account the US 199 and SR 299 projects and those resultant throughway TA routes. However, following Gallo's reasoning, direct STAA truck access from multiple points on the National Network or other TA routes may cause an even greater increase in truck traffic than he projected.

Cevero (2003) emphasizes that highway expansion projects do not induce vehicle trips directly. Rather, it is the increased speed of travel resulting from expansion projects which induces more traffic. Cevero and most other researchers have focused on the impacts of adding lane miles rather than on other types of highway expansion, and mostly do not differentiate among vehicle types in their analyses of traffic impacts. However, Gallo (2008) argues that one of the primary benefits of the Richardson Grove Operational Improvement Project is to reduce trucking delays resulting from the need to shift freight from one type of truck to another. If the two projects under examination reduce trucking delays and thus effectively increase the speed of travel for trucks, then Cevero's analysis supports the idea that they may induce truck traffic.

Cevero (2003) also found that highway expansion projects induced all types of land development activities in highway corridors. Cevero's projects increased lane miles available to all vehicles, while the projects studied here would increase lane miles available to STAA trucks only. Thus, it might be expected that these projects would only induce truck-dependent industrial land uses. However, given the interdependence of different types of land use on a regional scale, industrial land uses are unlikely to increase without affecting other types of land use, and STAA throughway routes may also induce growth in nearby residential and commercial development.

For the Richardson Grove Operational Improvement Project and the 197/199 Safe STAA Access Project, induced growth is only one of the additional considerations raised by the prospect of greater truck traffic caused by the projects. Other potential secondary impacts which deserve further consideration in light of the findings of this study include the impacts of greater truck traffic on air quality, noise, safety, and deterioration of infrastructure, both at the project sites and throughout Humboldt and Del Norte Counties and surrounding areas, as follows:

- Trucks emit more of most pollutants than do passenger vehicles (US Environmental Protection Agency 2008a & 2008b), and truck traffic density is correlated with air pollution-related health impacts in major transportation corridors (California Air Resources Board 2005). The Final EIR/FONSI for the Richardson Grove Operational Improvement Project claims exemption from an analysis of "Mobile Source Air Toxics" (MSAT) impacts based on the contention that the project "will not result in any meaningful changes in traffic volumes, vehicle mix…or any other factor that would cause an increase in emissions impacts" (92). Similarly, the Final EIR/FONSI for the 197/199 Safe STAA Access Project concludes that the project has "low potential MSAT effects" based on the conclusion that it would generate minimal additional truck traffic (2.2-47). This study calls these contentions into question and demands that MSAT impacts and air quality impacts generally be reexamined.

- Truck traffic produces more noise than car traffic, and Federal Highway Administration guidelines state that "heavier traffic volumes, higher speeds, and greater numbers of trucks increase the loudness of highway traffic noise" (2012). The Final EIR/FONSI for the 197/199 Safe STAA Access Project asserts that the project "does not qualify as a Type I project" for the purposes of noise-related impacts (2.2-56), where Type I projects include those that "increase the volume or speed of traffic" (2.2-53). The Final EIR/FONSI for the Richardson Grove Operational Improvement Project similarly excludes that project from most noise impact analyses (95 et seq.). However, this study suggests that the projects will likely result in a significant increase in truck traffic and thus demands a new assessment of the projects' noise-related impacts.
- The rate of fatal accidents is disproportionately high for large trucks. Large trucks account for only 4% of registered vehicles and 9% of miles traveled, but 11% of deaths in traffic accidents and 23% of car occupant deaths in multiple-vehicle crashes (Insurance Institute for Highway Safety 2015). The Final EIRs/FONSIs for both projects claim that the projects will increase traffic safety and do not contain any assessments of potential negative safety impacts of the projects. The potential for substantial increases in truck traffic demonstrated by this study demands a new assessment of the projects' traffic safety impacts, particularly in light of the mandatory design standard exemptions found in both projects for curve radius and other safety parameters (see for example Smith 2012).
- Trucks contribute disproportionately to damage done to roads and bridges. Doubling the weight borne by a vehicle axle is estimated to increase some pavement damage by a factor of 15 to 20, and a heavy truck axle may bear 20 times more weight than the average passenger vehicle (Federal Highway Administration 2014). Thus, this study highlights the potential for the projects to increase the rate of deterioration of local and regional transportation infrastructure. Such potential impacts were not considered in either Final EIR/FONSI, but they clearly deserve serious consideration by both Caltrans and local public agencies.
- Other analyses throughout both Final EIRs/FONSIs rely directly or indirectly on the assumption that the projects will not result in any significant increase in traffic volumes. All of these analyses should be revisited in light of the results of this study.

This study was based entirely on data provided by Caltrans. It must be noted that when TA designation data were first requested by the authors, the only recent data made available by Caltrans were those which were then current (2015), while the most recent available truck traffic data were published in 2013. Therefore, the authors waited for over a year until 2015 truck traffic data were published before conducting the study, in order to be able to use TA designation and truck traffic data from the same year.

However, not all of the data limitations could be overcome. Most notably, because of substantial variations in the dates associated with data for each road segment, traffic data published in 2015 were used if they had been estimated or verified anytime from 2010 through 2015. This means that some more recent TA designations may have had "current" traffic counts taken before their designations occurred. However, this potential source of error would likely result in more conservative conclusions, and thus is not considered to confound any findings of significance in the study.

Regardless of any limitations, this study provides the most rigorous assessment to date of the likely truck traffic impacts of the Richardson Grove Operational Improvement Project and the 197/199 Safe STAA Access Project. Its findings that the projects are likely to increase the volume and intensity of truck traffic generally and large truck traffic specifically contradict the findings of previous, less rigorous assessments. These findings have broad implications and should be taken seriously by Caltrans and all other stakeholders and affected parties.

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Appendix A

CRTP
Coalition for Responsible
Transportation Priorities

11 August 2015

Marcy Freer
Public Records Officer
Caltrans
marcy.freer@dot.ca.gov
(916) 654-3644

Ms. Freer:

Pursuant to the California Public Records Act (CPRA), Sections 6250-6270 of the California Government Code, I am writing to request copies of public records. In particular, I request copies of records pertaining to any roads under the jurisdiction of Caltrans which have been designated as "Terminal Access" routes pursuant to California Vehicle Code Sections 35401.5(a), (c) or (d), when such designation occurred at any time between 1 January 1993 and today, provided that such designation was requested or initiated by any public agency (including Caltrans itself). Specifically, I request copies of records containing the following information:

1. The number/name of the route/road so designated;
2. The beginning and ending post mile numbers of the segment of the route/road so designated; and
3. The date such designation became effective.

Pursuant to Section 6253(c) of the California Government Code, I request that copies of these records be provided to me not later than 21 August 2015. I would prefer that copies be provided in an electronic form and emailed to me at the email address listed below. If you anticipate any fees or charges associated with this request, please contact me first with an estimate before proceeding.

Should you deny any or all of my request, please explain the basis for the denial and include any relevant citations. If you have any questions or concerns with my request, please contact me at the email address listed below.

Thank you for your assistance.

Sincerely,

Colin Fiske
Campaign Coordinator
Coalition for Responsible Transportation Priorities
colin@transportationpriorities.org
PO Box 2280
McKinleyville, CA 95519

Appendix B

Colin Fiske
Campaign Coordinator
Coalition for Responsible Transportation Priorities
PO Box 2280
McKinleyville, CA 95519

Dear Mr. Fiske:

Thank you for contacting the California Department of Transportation (Caltrans) with your public records request for Terminal Access route designations that were initiated by government agencies since 1993.

Request: Your request specified, as paraphrased here, records pertaining to any roads under Caltrans jurisdiction which have been designated "Terminal Access" (TA) pursuant to California Vehicle Code Sections 35401.5(a), (c) or (d), since January 1, 1993, provided that such designation was requested or initiated by any public agency (including Caltrans). Your records request included this list:

1. The number/name of the route/road;
2. The beginning and ending post miles of the designated TA segment; and
3. The date such designation became effective.

Legal Basis: As you may know, the federal 1982 Surface Transportation Assistance Act (STAA) allowed longer truck tractor-semitrailers on the National Network. Federal law requires that the states allow "reasonable access" from the National Network to their terminals, per the Code of Federal Regulations, Section 658.19. Terminal Access routes are those State and local routes off the National Network that have been approved for STAA trucks to access their terminals. "Reasonable access" means that the route can accommodate the STAA vehicle; for example, the truck can remain on the pavement and does not cross the centerline. This is usually demonstrated with computer software.

Caltrans Policy: Caltrans policy on design vehicles is contained in the Caltrans Highway Design Manual, Topic 404, which is online at: http://www.dot.ca.gov/hq/oppd/hdm/pdf/english/chp0400.pdf. The section "Design Considerations" in Topic 404 also includes more detailed criteria for reasonable access.

Documents: Attached you will find the following documents:

1. Federal and state laws pertaining to STAA trucks.
2. Caltrans Highway Design Manual, Topic 404 – Design Considerations, STAA Advisory Standard, and STAA Design Vehicle
3. Truck Route Lists –1991 & 2015
4. Truck Maps – 1990 and 2007

Dates: Caltrans does not maintain records of the dates of each designation change back to 1990; however, some time periods can be estimated by comparing the various truck route lists. More exact dates for the changes since 2000 may be available, but the research would require a thorough search of approximately 130 22-page lists.

TA Procedures: Local TA routes are usually requested by the trucking industry, not by local agencies. The applicant applies to the local agency, which may not deny access except on the basis of safety and an engineering analysis per State and federal law. The local agency informs Caltrans, who evaluates the State ramps or intersections that connect to the proposed local TA route. The procedures are outlined on this Caltrans web page: http://www.dot.ca.gov/hq/traffops/trucks/routes/ta-process.htm.

Please let us know if you need more information. For questions, you may contact ___________ at _________________.