



MEMORANDUM
Missouri Department of Transportation

DATE: May 17, 2018

TO: Tom Blair, P.E.
District Engineer

FROM: Jason Dohrmann, P.E.
HR Green Inc.

SUBJECT: District St. Louis - Design
Route 231, St. Louis County
Route 231 Rehabilitation
Job No. 6S3275 (HR Green Project No. 171052)
Conceptual Study Report

REMARKS

Major Route

Minor Route

DESIGN TRAFFIC

ADT (Const.) = 18,793 (2019)
 ADT (Design) = 18,793 (2015)
 DHV = unknown
 D = unknown
 % Trucks = 3.6%
 Operational (Posted) Speed = 40mph

CONCEPTUAL COST (\$1,000's)

Right of Way:
 Construction: \$4,422,000

EXISTING FACILITIES

Beginning Log Mile	Pavement		Year Built	Roadbed Width	Min. R/W Width	Access Control
	Width	Type				
15+45 to 35+00	44'	3-3/4" Mill & Fill	Unknown	Varies	80'	Normal
35+00 to 54+00	Varies 44' to 60'	3-3/4" Mill & Fill	Unknown	Varies	85' – 90'	Normal
54+00 to 97+00	44'	3-3/4" Mill & Fill	Unknown	Varies	80'	Normal
97+00 to 107+00	Varies 44' to 60'	3-3/4" Mill & Fill	Unknown	Varies	85' – 90'	Normal
107+00 to 112+50	24'	3" Mill & Fill	Unknown	Varies	60'	Normal

112+50 to 138+00	24'	3" Mill & Fill	Unknown	Varies	60'	Normal
138+00 to 151+00	Varies 24' to 48'	3-3/4" Mill & Fill	Unknown	Varies	60' – 80'	Normal
151+00 to 166+05	36'	3-3/4" Mill & Fill	Unknown	Varies	60'	Normal

EXISTING BRIDGES

Bridge No.	Location	Type	Length	Width	Year Built	Condition Ratings		
						Deck	Super	Sub
N/A								

PROPOSED DESIGN CRITERIA

Functional Classification	Design Speed	No. & Width Of Lanes	Roadbed Width	Right of Way	
				Width	Control
Principal Arterial	40 mph	2 to 4 – 11' to 12' lanes with center/left turn lanes at various locations	Varies	60' Typical	Normal

EXISTING CONDITION ASSESSMENT OVERALL

The existing Route 231 corridor is one of the last remaining miles of pavement constructed during the Smooth Roads Initiative (SRI) but the pavement is in good condition with minimal stripping. There is no evidence of rutting throughout the corridor, and the most predominant signs of distress are surface cracks mirroring the underlying joints. The most recent mainline roadway improvements (2005/2006) consisted of a 3" to 3-3/4" mill and fill operation (SP125 and SP90) between Franru Lane to River City Casino Boulevard. The existing typical section of the roadway is mainly comprised of two (2) 11 to 12 foot lanes in each direction with turn lanes at several intersections along the corridor. The majority of this section includes concrete curb and gutter located between the pavement and existing sidewalk. Much of the available gutter capacity of these curbs has been compromised due to various overlay operations over the years, and much of the curb is in average to below-average condition.

The section of roadway between Franru Lane and Jeffersonian Drive/Jefferson Barracks Road and between Southwark Lane and S. Broadway includes a variable width shoulder / parking lane separating the travel lanes and existing sidewalks. The roadway section narrows to one (1) lane in each direction between Ripa Avenue and River City Casino Boulevard with a turn lane at the signalized intersection. The existing pavement structure is comprised of multiple lifts of asphalt over an existing Portland Cement Concrete pavement ranging from 7 to 9 inches thick (see

Existing Facility table previous section.) According to the results of the Condition Survey conducted and provided by MoDOT on 11/30, 2017, the existing asphalt lifts are in fairly stable condition with existing cracks being the only distress currently present. A copy of the Condition Survey is included in [Appendix A](#).

Pedestrian accommodations are located along the extent of the corridor, but they vary widely in condition and location. Sidewalk is present on both sides between Franru Lane and Tacoma Drive; only on the west side between Tacoma Drive and S. Broadway; on both sides between S. Broadway and Hoffmeister Avenue; and only on the west side between Hoffmeister Avenue and River City Casino Boulevard. Almost all curb ramps are non-compliant from an ADA perspective as they are for the most part non-directional, do not meet slope parameters, or do not have landings. Much of the linear sidewalk (with only few exceptions for new sidewalk reconstructed as part of new or redevelopment properties) is non-compliant from width, cross slope or condition parameters. Furthermore, for this reason, almost all of the pedestrian access routes through paved approaches are also non-compliant.

PROPOSED ROADWAY AND PEDESTRIAN DESIGN

Initially the District, supported by HR Green's findings within the field visits, suggested the complete removal of all asphalt lifts from the surface to the top of the existing Portland Cement Concrete base (a thickness of asphalt mill and fill of 3-³/₄".) However, the resulting Pavement Type Selection Report provided four options for mainline treatment, including fog seal, chip seal, UBAWS or microsurfacing, or a mill and fill. After subsequent discussions with District staff, a 1-³/₄" coldmill and 1-³/₄" SP125CLP overlay is being recommended. Given the short life expectancy of a fog seal or chip seal, these are not practical options. The UBAWS or microsurfacing option would still require the need to address ADA compliance at each intersection, so this factor prohibits quickly putting a rehabilitation project together for this Route. Therefore, the mill and fill option with fully-integrated ADA improvements is the logical option for this route given the team's initial thought process. The Pavement Type Selection Report is included in [Appendix A](#).

Below is a summary of the existing and proposed improvements organized by like segments along Route 231. The following discussions detail the existing typical section of the roadway, existing pedestrian accommodations, and existing signalized intersection configurations. For each segment, proposed conceptual design improvements to provide for an ADA compliant corridor are explained in greater detail. See [Appendix B](#) for existing and proposed typical sections by segment.

Franru Lane to Telegraph Rd. / Kingston Dr.

Existing Conditions

The existing section of Route 231 between Franru Lane and Jeffersonian Drive / Jefferson Barracks Road consists of 4-11' travel lanes with adjacent on-street parking.

Immediately adjacent to the parking area is an existing sidewalk that is 4-feet wide, contains a variety of tripping hazard and pitted surface not conducive to wheelchairs. Its curb ramps are not directional for the most part, do not contain truncated domes, and generally do not meet slope or landing requirements.

The section of Route 231 from just north of Jeffersonian Drive / Jefferson Barracks Road thru the intersection of Telegraph Rd. / Kingston Dr. contains a combination concrete curb and gutter located at the edge of pavement and no existing parking lanes. There is an existing 5' sidewalk adjacent to the curb on both sides of the road. The sidewalk is in poor condition, has deficient cross slopes and widths, countless trip hazards, and missing ramps and truncated domes at intersections. There is only one section of existing sidewalk within these limits (sidewalk adjacent to Walgreens at the intersection with Jefferson Barracks Road) that contains ADA compliant cross slopes and ramps, and is suitable for reuse.

Existing power poles are located along both sides of Route 231 with the majority of these poles located within the shoulders. See **Figures 1 and 2** in the Existing Roadway and Sidewalk Conditions Appendix for photographs of this section of Route 231. There are also several Metro bus stops along this corridor that are non-compliant as well, mostly because they rely on existing sidewalks for their stops and the sidewalks are non-compliant. The existing signalized intersection at Jeffersonian Drive/Jefferson Barracks Road does not contain any pedestrian accommodations and will be upgraded as a part of this project. The intersection at Telegraph Rd. / Kingston Ave. is excluded from this study as new curb ramps and signal improvements are being included with another programmed project currently in the design phase (J6S3220 by WSP).

Proposed Improvements and Right of Way Impacts

The proposed conceptual design for this section includes both pavement rehabilitation and pedestrian facility reconstruction. The proposed work includes removal of the existing sidewalk throughout this segment with the exception of the short segment in front of Walgreens (southeast corner of Route 231 and Jefferson Barracks Rd.) Sidewalks will be replaced with 5-foot wide sidewalks adjacent to the parking lanes or where treelawns are present, and 6-foot wide sidewalks where adjacent to backs of curb. Where adjacent to parking (between Franru Lane and Jeffersonian Drive / Jefferson Barracks Road), the additional foot needed to widen the sidewalk footprint will be taken from either the parking lane or lawn area behind the existing sidewalk. North of that intersection, the additional foot needed for the sidewalk widening will be taken from adjacent parking lots and may require property acquisition.

The signalized intersection at Jeffersonian Drive / Jefferson Barracks Road is currently devoid of any pedestrian accommodations, and will require complete removal and replacement of sidewalk and ramps at all 4 corners of the intersection. Furthermore, because of the existing configuration of the signal posts, it is assumed that additional posts will be required for pedestrian push buttons in order to provide compliant crossings

at each landing. This appears to be possible by reusing the existing controller, which has the capacity to handle the additional load switches. Right of way and temporary easement will be required in order to make these improvements as shown on the conceptual stripmap and accounted for in the estimate.

The signalized intersection at Telegraph Rd. / Kingston Dr. was not included in the pedestrian audit. As stated, the signals and curb ramps are currently being designed under a separate contract and will be completed before the resurfacing work is programmed. However, the conceptual study does include milling and resurfacing operations thought this intersection.

Telegraph Rd. / Kingston Dr. to Ripa Avenue

Existing Conditions

The existing typical section between Telegraph Rd. / Kingston Dr. and Ripa Ave. consists of 4-11' travel lanes, parking lanes along both sides, and curb and gutter. Between Telegraph Rd. / Kingston Dr. and Southwark Ln., this segment has an existing 4' wide sidewalk that has a variable width (3' to 5') treelawn between the sidewalk and curb and gutter. There are existing parking lanes on both sides of the road between the driving lanes and the curb and gutter. Behind the curb and gutter is the variable treelawn, and then the sidewalk. Existing power poles are located in the treelawns for a portion of this section, but they do not appear to present any issues. The majority of sidewalk in this section is similar to the previous section, and is in poor condition, lacks ADA compliance, and need to be replaced. The sidewalk has deficient cross slopes and widths, countless trip hazards, and very few curb ramps and truncated domes. The existing intersection at Shetland Drive has curb ramps that look to be newer in appearance and include truncated domes; however they do not meet current ADA standards and will need to be replaced. Furthermore, there are several Metro bus stops along this corridor that are non-compliant as well.

The sidewalk on the east side of Route 231 terminates between Tacoma Drive and Southwark Drive. See **Figures 3 and 4** in the Existing Roadway and Sidewalk Conditions Appendix for photographs of this section.

Between Southwark Lane and Ripa Avenue, there are four 11' travel lanes with parking of the roadway and combination concrete curb and gutter for the southbound lanes. There is an existing sidewalk located along the western side of Route 231 throughout this section. It varies from sidewalk on the back of curb to a treelawn section, and varies in width. All is within existing right of way, but the conditions adjacent to it and outside of right of way get more difficult as one progresses north. On the east side of the roadway, parking lots, box culvert outlets, and apartment complexes line the route and the only existing pedestrian infrastructure present is a series of 3-foot wide paths within the apartment complexes that is outside public right of way. Similar to the previous sections of Route 231, these sidewalks have deficient cross slopes and widths, countless trip

hazards, and very few curb ramps and truncated domes. See **Figures 5 and 6** in the Existing Roadway and Sidewalk Conditions Appendix for photographs of this section. Furthermore, there are several Metro bus stops along this corridor that are non-compliant and numerous power poles located within the existing sidewalk as well. The existing signalized intersection at Ripa Avenue is excluded from this study as new curb ramps and signal improvements are being included with another programmed project currently in the design phase (J6S3220 by WSP).

An existing mid-block crossing is striped and signed (continental-type markings) between the apartment complex and the Feed My People store at 171 Kingston, just south of Clyde Avenue. This crossing is quite wide and requires users to cross four travel lanes of pavement plus two wide outside shoulders. Observations throughout the pedestrian audit showed some usage at the marked crossing, but not consistent usage as other crossings were observed in the same area outside of the marked crossing.

Proposed Improvements and Right of Way Impacts

The proposed conceptual design for this section includes both pavement rehabilitation and pedestrian facility reconstruction. The proposed work includes removal of the existing sidewalk throughout this segment. Sidewalks will be replaced with 6-foot wide sidewalks adjacent to the backs of curb because the existing treelawn is narrow in the present condition. In the area between Telegraph Rd. / Kingston Dr. and Southwark Ln., the sidewalk will be shifted to the curb line resulting in the appearance of additional grass / yard to each resident. This will require the replacement of some curb along the route, which for the purposes of estimating was calculated as 50% of the length of sidewalk being replaced. In the area on the east side of Route 231 between Tacoma and S. Broadway, where no sidewalk is present, the proposed infrastructure will include the construction of a new curb within the existing shoulder line and the addition of a new 6-foot wide sidewalk immediately behind it. This would result in a wider footprint and almost every parcel along the eastern side of Route 231 in this section will require at a minimum temporary construction easement. Additionally, a permanent sidewalk and utility easement would also be needed since this sidewalk will be outside the right-of-way. However, because of the existing slope of the road and the nearby culvert, drainage improvements required as a part of this curbing are expected to be minor. And finally, between Clyde and Ripa, are numerous retaining walls and steep back slopes adjacent to the residential houses. In this area, temporary construction easements or right-of-way may be required to construct the required sidewalk width for this section. All intersections along this section will require the complete replacement of curb ramps and installation of truncated domes.

As a part of the estimate, the existing mid-block crossing immediately south of Clyde Avenue will be upgraded with new pavement markings and an enhanced pedestrian crossing system (HAWK, or similar). This will be an important safety feature to complement the improved pedestrian infrastructure along the route, and provide a safer crossing outside of the two signalized intersections in this segment.

When considering the striping for the segment between Kingston and Ripa Avenue, a road diet reconfiguration from a four-lane to three-lane undivided roadway providing one lane in each direction with a two-way center turn lane was considered and evaluated for merit. A copy of the full Traffic Study, dated April 25, 2018 is included in **Appendix D**. The existing cross-section north of Ripa contains one through lane in each direction of travel. No traffic backups, bottlenecks or issues were observed during the field audit. At the signal with Telegraph and Kingston, the adjacent uses switch from the mostly residential section (north to Ripa) to mainly commercial uses (south to the interstate). This location is a logical point to make the switch because of the changing uses, the existing signal, and the nearly 50/50 split of daily traffic at Telegraph Road and MO-231. This lane reduction would bring several benefits, including potential traffic calming to the residential areas along Route 231, shorter distances for non-motorized users to cross in traveling from one side of the road to the other, as well as ancillary benefits from a maintenance perspective (snowplowing, etc.)

Ripa Avenue to Hoffmeister Avenue

Existing Conditions

The existing section between Ripa Avenue and Hoffmeister Avenue consists of 2-11' travel lanes with parking along both sides of the roadway and curb and gutter at the outside roadway limits. This portion of Route 231 is the stereotypical downtown suburban street of the 1940's and 50's consisting of residential and supporting commercial uses intermixed. The segment has existing sidewalks along both sides of the road, adjacent to the curb and gutter, with only a few locations where existing sidewalk is not present. The sidewalk has deficient cross slopes and widths, countless trip hazards, and very few curb ramps and truncated domes. See **Figures 7 and 8** in the Existing Roadway and Sidewalk Conditions Appendix for photographs of the existing sidewalk conditions.

Existing power poles are present along this section of Route 231, with the majority located either between the sidewalk and edge of pavement, within the existing sidewalk, or in some instances such as at Etta Ave., within the curb ramp. There are several Metro bus stops along this corridor that are non-compliant as well. Additionally, numerous residential and commercial buildings are located immediately adjacent to the back of sidewalks. As such, ADA compliance is hampered because of existing slopes, steps, building foundations, etc. and will require creative solutions during the design development process. Furthermore, several intersections in this stretch have inlets either within roundings at the intersections, or immediately adjacent to the roundings. At Loretta for instance, the inlets are actually within the curb ramps, bringing the ramps out of compliance.

Proposed Improvements and Right of Way Impacts

The proposed conceptual design for this section includes both pavement rehabilitation and pedestrian facility reconstruction. The proposed work includes removal of the existing sidewalk throughout this segment. Sidewalks will be replaced with 6-foot wide sidewalks adjacent to the backs of to match the existing suburban downtown section. This will require the replacement of some curb along the route, which for the purposes of estimating was calculated as 50% of the length of sidewalk being replaced. Furthermore, in areas where adjacent buildings flank the sidewalk, the sidewalk will be replaced from back of curb to face of building in order to provide ample room to correct cross slopes and remove obstructions within the pedestrian access route.

There is a short segment where sidewalk infrastructure is missing south of Arlee Avenue on the eastern side, adjacent to some businesses that have parking lot access along Route 231. The proposed improvements include the removal of the existing parking lot to provide working room to construct new compliant sidewalk. It is anticipated this work will require at a minimum temporary construction easement as well as permanent sidewalk and utility easement for the parcels adjacent to this new section of sidewalk. Because of the suburban downtown character of this segment, there are numerous retaining walls, steps, building facades, and other built improvements adjacent to the existing and proposed sidewalk. For this reason, temporary construction easements and/or right-of-way may be required to construct the required sidewalk width for this section. All intersections along this section will require the complete replacement of curb ramps and installation of truncated domes.

The intersection of Hoffmeister Avenue and Route 231 is signalized, but contains no pedestrian accommodations. It is assumed that improvements will entail complete removal and replacement of sidewalk and ramps at all 4 corners of the intersection. Furthermore, because of the existing configuration of the signal posts, it is assumed that additional posts will be required for pedestrian push buttons in order to provide compliant crossings at each landing. This appears to be possible by reusing the existing controller, which has the capacity to handle the additional load switches. Right of way and temporary easement will be required in order to make these improvements as shown on the conceptual stripmap and accounted for in the estimate.

Hoffmeister Avenue to River City Casino Boulevard

Existing Conditions

The existing section of Route 231 between Hoffmeister Avenue and River City Casino Boulevard consists of 2-11' travel lanes with a continuous striped two way left turn lane. There is a parking lane along the southbound travel lanes between Weiss Avenue and River City Casino Blvd. and from Weiss to Hoffmeister, that parking becomes a second northbound travel lane that switches to right turn lane to westbound Hoffmeister Avenue. Concrete curbs and enclosed drainage run down both sides of the alignment for the entire segment.

There is existing sidewalk is present at both the east and west side of Route 231 immediately north of the intersection with Hoffmeister Avenue. After about 100 feet, the sidewalk on the east side stops at an existing bus shelter. The sidewalk on the west side of Route 231 continues for the entire extent of this segment, and ties into a sidewalk running along the south side of River City Casino Blvd. At the intersection with River City Casino Blvd., existing sidewalk is also present on the east side of the road, constructed as a part of the River City Casino improvements and extending only about 100 feet to the south of the intersection. These improvements also constructed new pedestrian signals and pushbuttons, some of which are no longer in compliance. See **Figures 9 and 10** in the Existing Roadway and Sidewalk Conditions Appendix for photographs of the existing sidewalk conditions. There are several Metro bus stops along this portion that are non-compliant as well.

Existing power poles are present along both sides of the segment, with the majority located either between the sidewalk and edge of pavement or within the existing sidewalk on the western side of the roadway. In addition to these obstructions, there are several retaining walls of varying materials, ages, and conditions – all adjacent to the back of the existing sidewalk. Creative solutions will be required along the west side of the alignment in order to achieve a compliant pedestrian accessible route for the entire segment.

Proposed Improvements and Right of Way Impacts

The proposed conceptual design for this section includes both pavement rehabilitation and pedestrian facility reconstruction. The proposed work includes removal of the existing sidewalk on the western side throughout this segment. Sidewalks will be replaced with 6-foot wide sidewalks adjacent to the backs of curb because the existing treelawn is narrow in the present condition, and existing walls and buildings are adjacent to the back of the existing walk. This will result in several power poles being located within the confines of the new sidewalk, but final design should include wider walk in these areas to provide the necessary pedestrian access route. Furthermore, these improvements will require the replacement of some curb along the route, which for the purposes of estimating was calculated as 50% of the length of sidewalk being replaced. In areas where adjacent buildings flank the sidewalk, the sidewalk will be replaced from back of curb to face of building in order to provide ample room to correct cross slopes and remove obstructions within the pedestrian access route.

New sidewalks are not proposed on the east side of Route 231 within this segment of the project because this segment only fronts MSD's Lemay Wastewater Treatment Plant. However, an existing bus stop is located on the east side of the road directly across from Weiss Avenue. This location will be upgraded with new pavement markings and an enhanced pedestrian crossing system (HAWK or similar). This will be an important safety feature to complement the improved pedestrian infrastructure along the west side of the route, and provide a safe crossing for bus users to get to the sidewalks.

At the intersection of River City Casino Blvd., a complete replacement of curb ramps, installation of truncated domes, and reconstruction of some pedestrian push buttons are assumed as they were constructed prior to the ADA requirements currently in effect.

OTHER DESIGN CONSIDERATIONS

Metro Bus Stops

There are thirty-one (31) existing bus stops within the limits of this study and in general, most are not compliant or accessible due to poor condition or lack of connecting pedestrian facilities. Most of the bus stop locations are existing sidewalk adjacent to the roadway which neither meets cross slope minimum requirements or width/length preferences. In other locations, there are bus landing pads (which still do not meet slope requirements) that have no compliant infrastructure leading to or from them, leaving the bus users nowhere to go after boarding/un-boarding. An example of this type of scenario can be found in **Figure 11** of the Existing Roadway and Sidewalk Conditions Appendix.

The conceptual design shown on the project stripmaps follows published guidelines from Metro, as accumulated from previous projects and through previous interaction on projects such as this. All bus stop locations included at least a 7'x8' bus pad, and where possible, an additional 3 feet of widened area to provide space for a bench. Currently there is one (1) existing bus shelter on the east side of Route 231 just north of Hoffmeister, which will not be impacted by the proposed improvements and will be reused in place. This estimate only includes the necessary concrete to provide these specific bus stop improvements, and there are no right of way or easement impacts specifically attributed to bus facilities. Once the conceptual study is approved and the project programmed, it is expected that the design team will coordinate with Metro on what final improvements will be made along the project corridor. These final design discussions are expected to cover relocation of signage, installation of benches and trash receptacles, or new bus shelters.

Drainage Recommendations

The existing drainage system consists of an enclosed storm sewers system maintained by the Metropolitan St. Louis Sewer District (MSD), and primarily located within the Mississippi River watershed. The proposed project limits can generally be broken down into three sub-drainage areas, each with different drainage characteristics as described below:

- At the southern end of the project between Franru Lane and Telegraph, stormwater runoff is captured by inlets tied to an enclosed drainage system, and ultimately conveyed to the east toward the Mississippi River through a series of enclosed pipe, open channels, and swales. The existing inlets are sporadically spaced and in many locations, are located within the shoulder and no adjacent to a curb. This situation allows stormwater bypass and field observations prove it to be inefficient in runoff capture.

- The middle portion of the project between Telegraph Road and Hoffmeister Avenue contains an enclosed storm sewer system which drains towards two main outlet points. The first reach of pipe outfalls at an existing culvert / channel between Tacoma Drive and Southwark Lane. The second reach of pipe outfalls ties into an existing 54-inch trunk sewer crossing Route 231 just north of S. Broadway. This segment of the project contains more consistent inlet spacing but contains several locations where area inlets are placed immediately behind the sidewalk to capture stormwater from private properties. These inlets cause a potential for tripping hazards and therefore handrails have been placed alongside the sidewalk.
- At the northern end of the project between Hoffmeister Avenue and River City Casino Blvd., stormwater runoff is captured by inlets tied to an enclosed drainage system, and ultimately conveyed to the northern project limits. Here the existing pipe crosses River City Casino Boulevard and ultimately outlets to the Mississippi River by way of the River des Peres drainage channel.

The proposed design improvements consist primarily of modifications to the existing storm sewer system and supplemental structures where needed to provide additional opportunities for increased efficiency and collection. New curb inlet top stones and/or sills will replace damaged facilities as needed throughout the corridor. Additional flanking inlets should be at roadway profile low points to further assist in draining the pavement. At the existing culvert outfalls at Southwark Lane and at Southampton Drive, debris, overgrown vegetation and failing/damaged concrete should be evaluated and addressed during the final design improvements stage. MSD has recently started to require owners of projects such as this to camera (CCTV) the trunk lines to make sure they are in reasonable condition both before and after construction. The future design project should anticipate this request by setting aside some funds to complete this work.

PROPOSED TRAFFIC SIGNAL DESIGN

To bring the corridor into full compliance with current ADA standards, traffic signal modifications will be necessary throughout. There are four existing signalized intersections within the project corridor, which are Jeffersonian Drive, Telegraph Rd. / Kingston Dr., Ripa Avenue, and Hoffmeister Avenue. The existing traffic signals at the project terminus – River City Casino Boulevard – was not included in this project as ADA improvements were completed when the roadway was constructed as the casino was built (2009-2010). However, it should be noted that many of the standards and requirements for ADA compliance have changed since then, and during the pedestrian audit of the corridor, noticeable discrepancies were identified at this signal. Furthermore, after the concept study for the corridor was scoped, it was determined that two of the intersections – Telegraph Rd. / Kingston Dr. and Ripa Avenue, would be excluded from the conceptual design estimate because they were going to be escalated and taken to final design in 2017/2018 as part of a separate contract. Therefore, the conceptual design study will only focus on the intersections of Jeffersonian Avenue and Hoffmeister Avenue.

The design modifications for the signalized intersections above should be based on the latest MoDOT standards current at the time of final design. Specifically, PROWAG design guidelines should be used to determine ideal pushbutton locations to allow for optimal installation of audible pedestrian signals (APS). Both signals should be upgraded to the latest standards for APS and countdown pedestrian indications.

Both signalized intersections should be upgraded to Flashing Yellow Arrow (FYA) signal faces. The implementation of the FYA operation will provide a safer and more efficient left turn for motorists within the corridor. The proposed design should also evaluate the technology gaps and life expectancy between the existing controllers and new signal controllers at each location.

During the mill and fill operations proposed, the existing loop detection systems at each of the intersections will be destroyed. The optional signal detection JSP current at the time of final design should be used for contractors regarding whether the loop detection is replaced or if other vehicle detection systems, such as video detection or wireless detection pucks are introduced. For the purposes of the conceptual estimate, \$25,000 has been assigned to each intersection to estimate these costs.

Jeffersonian Drive

At the intersection of Route 231 and Jeffersonian Drive, existing pedestrian accommodations include sidewalk ramps at all four corners but no crosswalk striping at any of the legs of the intersection. There are no pedestrian pushbuttons and all of the sidewalk ramps are all non-compliant. The intersection presents several challenges with existing infrastructure:

- On the northeast corner there is a light standard and several pull boxes and utility vaults in the vicinity of the proposed improvements;
- On the southeast corner there is a large vault in-line with the proposed pedestrian infrastructure;
- On the northwest corner there is landscaping, a power pole, a signal pole and the existing parking lot / curb stop in-line with the proposed improvements;
- On the southwest corner there is an existing light standard, power pole, utility vault and manhole located within the existing sidewalk and in the vicinity of the proposed improvements. In addition the controller and an existing signal post are located in this quadrant as well.

The traffic signal operated with a protected/permissive flashing yellow arrow for the southbound left turn phase, and a permissive flashing yellow arrow only northbound left turn. The side streets operate with permissive only phasing. As previously stated, the controller is located in the southwest quadrant and in-line with potential improvements at that corner. The traffic signal is controlled with a Siemens M50 controller. The cabinet is equipped with 12-position load switch bays, of which phases 1 – SB Left, 2 – NB Thru, 4 – EB, 5 – NB OL, 6 – SB, 8 – WB, and 9 – SB OL are currently being utilized. See **Figures 12 and 13** in the Existing Signal Conditions Appendix for photographs of this existing signalized intersection. Aerial

photography and review of St. Louis County parcel information boundaries indicate all signal equipment appears to be within the existing right-of-way or easements.

The proposed improvements should include directional, compliant pedestrian ramps and countdown timers on all legs of the intersection. The existing signal posts on Route 231 appear capable of reuse and can be left in place, but the signal indications for the sideroads are positioned on pedestal poles. Signal poles with mast arms will provide a more traditional traffic signal layout at this intersection. Additionally, if pedestrian crossings are desired at each leg of the intersection, eight new pedestrian APS pushbuttons assemblies, signs, and countdown indications on new pedestals or on the existing posts will be required for compliance in conjunction with the directional ramps. Additional FYA overlap phase and pedestrian phases will require additional load switches to be installed in the cabinet. Rewiring of the back panel may be necessary to accommodate the additional signal phasing, as necessary.

The existing grade of the pavement west on Jeffersonian Drive and east on Jefferson Barracks Road is steep, and the cross slope of the existing pedestrian access route across the intersection (if marked) would exceed 2%. Flattening or tabling of the intersection should be evaluated in final design, although it does not seem practical given the length of sideroad improvements which appear necessary to make up the grade difference.

In order to construct the proposed improvements, it appears both right-of-way acquisition and temporary easement acquisition will be required from the northeast, northwest, and southwest quadrants. It appears that sufficient right of way is present to accommodate all proposed improvements on the southeast quadrant.

Hoffmeister Avenue

At the intersection of Route 231 and Hoffmeister Avenue, existing pedestrian accommodations include sidewalk ramps for the northeast, northwest and southwest corners but no crosswalk striping currently exists for any of the intersection legs. There are no pedestrian pushbuttons and all of the sidewalk ramps are all non-compliant.

The traffic signal operates with a protected/permissive flashing yellow arrow for the northbound left turn phase, and a permissive only southbound left turn. The side streets operate with permissive only left turn phasing. The controller is located in the northeast quadrant and in-line with potential improvements at that corner. The traffic signal is controlled with a Siemens M60 controller. The cabinet is equipped with 12-position load switch bays, of which phases 1 – SB Left, 2 – NB Thru, 3 – WB OL , 4 - EB, 5 – NB Left, 6 – SB, 7 – EB OL, 8 – WB, and 9 – NB OL are currently being utilized. Existing vehicle detection appears to be accommodated with a Gridsmart video detection system. See **Figures 14 and 15** in the Existing Signal Conditions Appendix for photographs of this existing signalized intersection. Aerial photography and review of St. Louis County parcel information boundaries indicate that all signal equipment appears to be within the existing right-of-way or easements.

The proposed improvements should include directional, compliant pedestrian ramps and countdown timers on all legs of the intersection. This includes the addition of new sidewalk and infrastructure on the southeast corner, which will require the adjustment or relocation of pull boxes, a guy wire from a power pole, and potentially some chain link fence separating the right of way from the adjacent property. In addition, improvements to the northwest corner will be challenging as this used car lot has vehicles parked right up to (and potentially on) right of way. In addition to the existing signal pole, a utility pole is also located in the existing sidewalk immediately adjacent to the intersection, leaving little room for improvements to work around them within right of way. Directional ramp configuration will require additional property from this owner and challenging coordination should be expected since the lot already appears undersized for its use. Additionally, if pedestrian crossings are desired at each leg of the intersection, eight new pedestrian APS pushbuttons assemblies, signs, and countdown indications on new pedestals or on the existing posts will be required for compliance in conjunction with the directional ramps. Additional FYA overlap phase and pedestrian phases will require additional load switches to be installed in the cabinet. Rewiring of the back panel may be necessary to accommodate the additional signal phasing, as necessary.

Furthermore, overhead cable facilities run along the west side of Route 231 in front of the signal indications which can become an obstruction for motorists. During the final design process, the clearance between the power lines and mast arm should be evaluated. For video detection or lighting to be a viable option from this mast arm, utility relocation may be required.

In order to construct the proposed improvements, it appears both right-of-way acquisition and temporary easement acquisition will be required from the northeast, northwest, and southeast quadrants. It appears that sufficient right of way is present to accommodate all proposed improvements on the southwest quadrant.

Proposed Mid-Block Crossings

The proposed project includes the upgrade of an existing mid-block crossing immediately south of Clyde Avenue in front of Feed My People. See **Figure 16** in the Existing Signal Conditions Appendix for a photograph of this existing mid-block crossing. In addition, a new mid-block crossing is proposed at the existing bus stop near Route 231 and Weiss Avenue. Advanced flashing beacons for both directions of vehicular traffic along Route 231 as well as additional signage and striping based on the current guidelines and latest version of the MUTCD are recommended to provide for advance warning of the mid-block crossing. To further increase safety, the installation of an actuated pedestrian crossing, such as a High Intensity Activated Crosswalk Beacon (or HAWK system) should be evaluated in final design if further warning is desired for pedestrians using the crosswalk.

ACCIDENT DATA AND SAFETY ENHANCEMENTS

Project Accident Rate

5-year Average (2012-2016): 522 (NB), 581 (SB)

A summary of accident data is attached in **Appendix F**.

Statewide rate for a similar class of roadway

Statewide Average: 179 (NB), 179 (SB)

Locations within or adjacent to the project limits which are on the “High Severity Location Lists” in the TMS database – **None**

UTILITIES

The proposed Route 231 project corridor from Franru Lane to River City Casino Boulevard is an urban environment that is mostly comprised of residential homes and several commercial establishments. The corridor is an older established area with a narrow existing right-of-way (60’ typical width). Stormwater utilities have already been discussed in the previous drainage section. This section will focus on underground and overhead utilities other than drainage.

There are existing power poles along the entire length of the project. The majority of the power poles are located immediately adjacent to the back of the existing curb or edge of pavement. A summary of the existing utilities by segment follows:

- From the beginning of the project at Franru Lane and travelling north along Route 231 to Jeffersonian Drive/Jefferson Barracks, power poles run along both sides of the roadway within the shoulder / parking areas. Since the existing and proposed sidewalk is outside of the parking area, there is sufficient ample room to avoid existing conflicts. Minimal impacts to utilities are expected within this stretch of improvements.
- Continuing north, the power poles shift to only the west side of the road to Telegraph Road. The poles are located immediately behind the existing 5-foot wide sidewalk. In this area, proposed improvements call for widening the sidewalk to 6-feet but ADA guidelines allow for the “brief narrowing” of the sidewalk to avoid obstacles. Therefore, the relocation of this powerline is expected and minimal impacts to other utilities are expected.
- The overhead lines switch over to the east side at Telegraph and continue to run along the east side of the road between Telegraph Road and Atlas Drive in a small treelawn. At Atlas, the overhead lines cross to the west and continue to run behind the residential properties. Where the poles are present, these three poles will require relocation because a proposed 6-foot sidewalk adjacent to the back of curb will conflict with their existing location. Additionally, four streetlights mounted on poles at Tacoma, Southwark, Pentonville, and Walworth conflict with curb ramp improvements and should be relocated. However, outside of these impacts, only minimal impacts to other utilities such as adjustments of gas or water valves are expected.

- From the intersection of Atlas Drive to Clyde, there are several street lights and a few overhead utility lines crossing Route 231, but nothing running parallel with the alignment. Minimal impacts to utilities are expected within this stretch of improvements.
- Between Clyde and South Broadway, existing overhead power runs along the east side of the road in front of the commercial businesses. Since there is no sidewalk here presently, it is expected that these two poles will require relocation.
- Between South Broadway and Hoffmeister Avenue, the existing power poles are located along both sides of the roadway and located within many curb ramps, adjacent to paved approaches, and generally in locations that do facilitate the establishment of an accessible pedestrian access route. This will be the segment that requires the most creativity and potential relocation of existing facilities during the final design process. The conceptual estimate includes provisions for thirty poles to be relocated in order to construct a compliant pedestrian corridor in the future. Additionally, other manholes, valve boxes and adjacent utilities are present within the segment, but will only require slight vertical adjustments as a part of the proposed work.
- Between Hoffmeister and River City Casino Drive the power poles are on the west side of the road either directly adjacent to the curb line or within a small treelawn. There are a few overhead lines crossing the roadway as well. Many of the existing poles have a narrow sidewalk behind them, with a wall or other obstruction immediately behind the walk. In order to construct a compliant pedestrian corridor in the future, provisions for thirteen poles to be relocated are included in the conceptual estimate. Additionally, other valve boxes are present within the segment, but will only require slight vertical adjustments as a part of the proposed work.

It is anticipated that the proposed improvements will involve coordination with Ameren to relocate fifty-two (52) utility poles within the existing right-of-way.

ENVIRONMENTAL SUMMARY

Recommendations or Comments: _____

Attachments

Approved by:

Tom Blair, P.E.
St. Louis District Engineer
May 16, 2018

cc: Design Division
Construction and Materials Division
Traffic Division

TABLE OF APPENDICES

Appendix A.....	Condition Survey / Pavement Type Selection (by MoDOT)
Appendix B.....	Typical Sections
Appendix C.....	Existing Roadway / Sidewalk Conditions (Photos)
Appendix D.....	Traffic Study
Appendix E.....	Existing Signals (Photos)
Appendix F.....	Accident / Traffic Data

APPENDIX A
CONDITION SURVEY

Missouri Department of Transportation

1590 Woodlake Drive
Chesterfield, Missouri 63017-5712
314.275.1500
Fax: 573.522.6475
1.888.ASK MODOT (275.6636)

TO: Tom Montes de Oca -pmsl
Jason Blomberg -cm
Aaron Groff -desl

FROM: Phil Ruffus
Senior Pavement Specialist

DATE: November 30, 2017

SUBJECT: Condition Survey
Job No.: J6S3275
Route: 231, St. Louis County

In response to a request made on October 10, 2017, we have conducted a condition survey to determine the existing state and depth of the asphalt pavement on Route 231 from Franru Lane to the St. Louis City Limits.

Seven cores were cut at random locations along the job. Drilling entailed coring the asphalt to the underlying concrete or rock aggregate. The logs of the pavement types encountered are attached along with photos and a map showing the approximate location of the cores.

Existing conditions along this section of roadway exhibit up to five asphalt lifts of varying thickness. Concrete from the original two lane road underlies the asphalt. However, subsequent realignments during numerous projects have placed a myriad of materials in the subgrade including the original granite pavers.

Overall, the most predominant sign of distress is surface cracking mirroring the underlying concrete joints or repairs. The longitudinal construction joints are also raveled at times.

Based on observations in the field and supported by the extracted cores, the following can be stated:

1. Sections of this roadway are the last remaining lanes miles in the District constructed during the Smooth Roads Initiative (SRI). During SRI, 3.75" of roadway were milled and replaced with SP125 CLP and SP 190.
2. Several stretches of curb and gutter are present intermittently along the route.
3. There is no evidence of rutting throughout the route.
4. Route 231 was constructed at different times prior to its designation as a state route. As such, the travelled way varies greatly in the subgrade.



The existing wearing surface is 11 years old and needs to be sealed up. The existing cracks are the only distress currently present. As such, this route in its current state is an excellent candidate for a preventative maintenance treatment.

Several options should be considered for this route. Listed below are some potential treatments with associated comments:

1. A crack filling/crack sealing treatment would serve the existing needs of the pavement. As this project is not currently assigned a construction year in the STIP, this treatment will likely not be applicable in several years' time.
2. A chip seal treatment would effectively seal the existing pavement. The use of a high float cationic emulsion would also mitigate the existing cracks in the wearing surface. Chip seal is considered a short to moderate term maintenance treatment. As such, extensive efforts to adjust all the curb ramps and intersection improvements triggered by ADA would not be required. The current political climate may prohibit a chip seal in this area. However, St. Louis County Highway Department has placed chip seals on heavily travelled roads with success.
3. A microsurfacing would also be solution based on its relative affordability. This treatment also seals the existing surface but delivers a smoother riding surface in an added bonus for bicyclists. It would provide a moderately long design life of 8-10 years.
4. A thin overlay would be a viable long term option. However, as mentioned earlier, curb and gutter along with associated numerous entrances will cause serious ADA and drainage challenges.

Historical records indicate that the most recent treatment was in 2006 (J6S1721). The concrete was placed in stages during the 1930s. The granite pavers like date from the turn of the century.

Please call if you have any further questions.

**MISSOURI DEPARTMENT OF TRANSPORTATION
SYSTEM MANAGEMENT: ST. LOUIS METRO DISTRICT**

Sheet 1 of 2

County: St. Louis Route: 231 Job No.: J6S3275

Logged by: Ruffus/Smith Date Work Performed: October 23, 2017

LOCATION	LOG OF MATERIALS	CLASSIFIED BY
Core 1 0.2 miles n/o Franru Lane, NB, Lane 1	0.00-0.17' Asphalt, surface mix, fair condition. (LP) 0.17-0.33' Asphalt, subsurface mix, fair condition. 0.33-0.45' Asphalt, surface mix, poor condition, moderately stripped. 0.45-0.46' Chip seal. 0.46-0.52' Asphalt, surface mix, poor condition, moderately stripped. 0.52-0.62' Asphalt, subsurface mix, poor condition, moderately stripped. 0.62-0.75' Asphalt, subsurface mix, fair condition. 0.75- Base rock.	B-31 Mobile Drill with 3" core bit
Core 2 1.0 miles n/o Franru Lane, NB, Lane 1	0.00-0.12' Asphalt, surface mix, fair condition. (LP) 0.12-0.31' Asphalt, subsurface mix, fair condition. 0.31-0.36' Asphalt, subsurface mix, poor condition, moderately stripped. 0.36-0.53' Asphalt, subsurface mix, fair/poor condition, slightly stripped. 0.53- Concrete.	"
Core 3 2.1 miles n/o Franru Lane, NB, Lane 1	0.00-0.15' Asphalt, surface mix, fair condition. (LP) 0.15-0.30' Asphalt, subsurface mix, fair condition. 0.30-0.72' Asphalt, subsurface mix, fair/poor condition, slightly stripped. 0.72- Rock Aggregate.	"
Core 4 2.5 miles n/o Franru Lane, SB, Lane 2	0.00-0.15' Asphalt, surface mix, fair condition. (LP) 0.15-0.32' Asphalt, subsurface mix, fair condition. 0.32- Granite pavers.	"
Core 5 2.3 miles n/o Franru Lane, SB, Lane 2	0.00-0.12' Asphalt, surface mix, fair condition. (LP) 0.12-0.33' Asphalt, subsurface mix, fair condition. 0.33-0.50' Asphalt, subsurface mix, fair/poor condition, slightly stripped. 0.50- Concrete.	"

**MISSOURI DEPARTMENT OF TRANSPORTATION
SYSTEM MANAGEMENT: ST. LOUIS METRO DISTRICT**

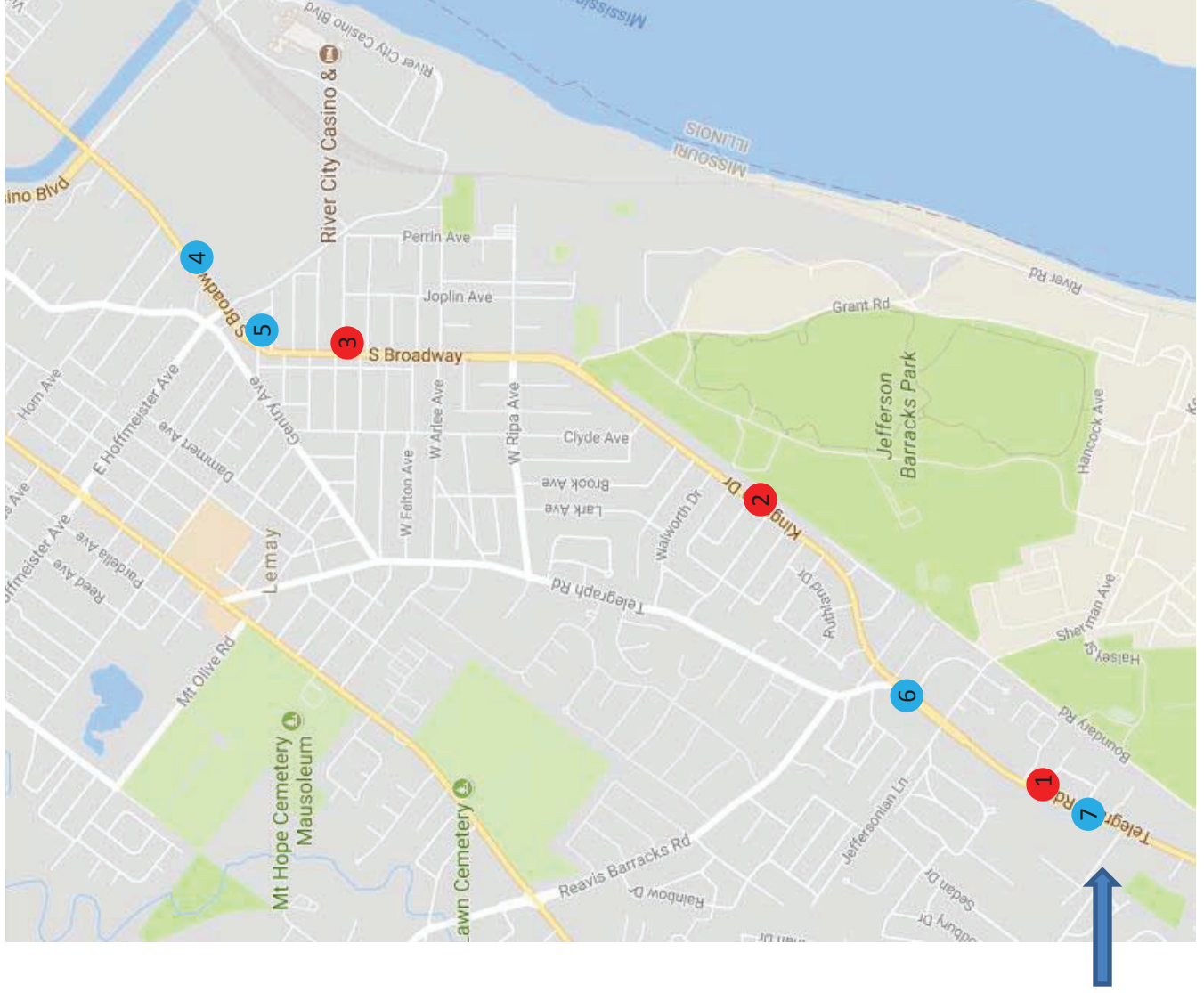
Sheet 2 of 2

County: St. Louis Route: 231 Job No.: J6S3275

Logged by: Ruffus/Smith Date Work Performed: October 23, 2017

LOCATION	LOG OF MATERIALS	CLASSIFIED BY
Core 6 0.6 miles n/o Franru Lane, SB, Lane 2	0.00-0.15' Asphalt, surface mix, fair condition, (LP). 0.15-0.31' Asphalt, subsurface mix, fair condition. 0.31-0.50' Asphalt, subsurface mix, fair/poor condition, slightly stripped. 0.50-0.63' Asphalt, surface mix, fair/poor condition, slightly stripped. 0.63-0.82' Asphalt, subsurface mix, fair/poor condition, slightly stripped. 0.82-0.83' Chip seal. 0.83-1.35' Asphalt, blade mix, poor condition, severely stripped. 1.35- Rock aggregate.	B-31 Mobile Drill with 3" core bit
Core 7 0.1 miles n/o Franru Lane, SB, Lane 2	0.00-0.15' Asphalt, surface mix, fair condition, (LP). 0.15-0.31' Asphalt, subsurface mix, fair condition. 0.31-0.41' Asphalt, subsurface mix, fair/poor condition, slightly stripped. 0.41-0.67' Asphalt, subsurface mix, fair/poor condition, slightly stripped. 0.67-0.68' Chip seal. 0.68-0.69' Chip seal. 0.69-1.30' Asphalt, blade mix, poor condition, severely stripped. 1.30- Rock aggregate.	"

J6S3275 Route 231 St. Louis County

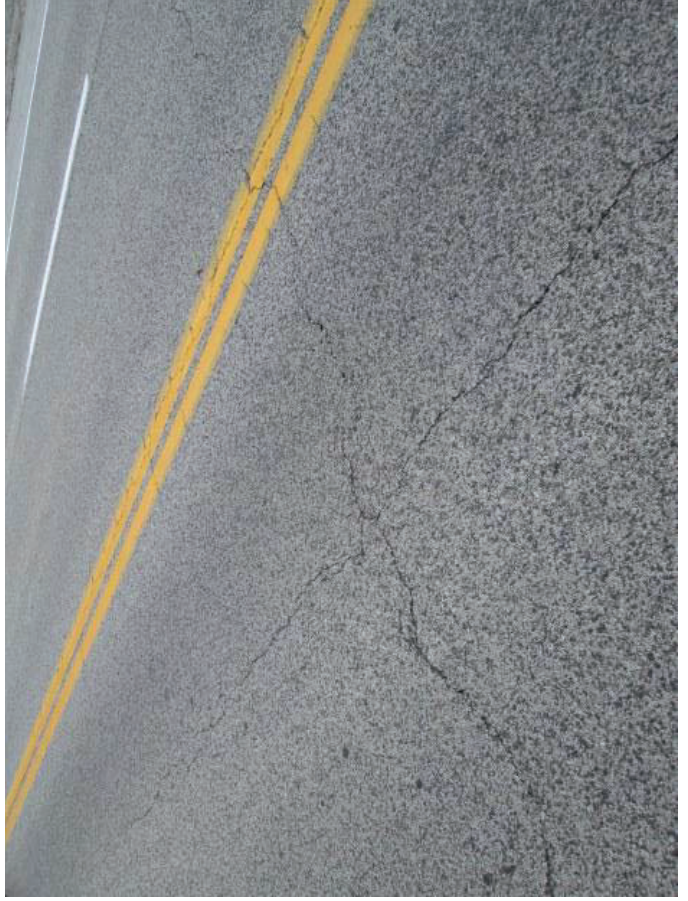
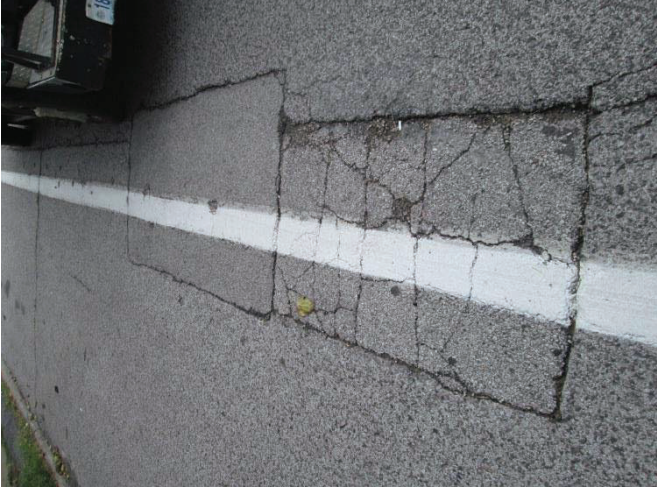


J6S3275 Route 231 St. Louis County



Cores 1 through 7 from left to right

Typical Distress



Macrotexture



Underlying materials vary greatly



Missouri Department of Transportation

1617 Mo. Blvd. P.O. Box 270
Jefferson City, Missouri 65102

TO: Jenn Becker – SLde
FROM: Jason Blomberg - COcm
DATE: April 12, 2018
SUBJECT: J6S3275_Rte231_St. Louis
Pavement Type Selection

Project Description:

This project involves pavement improvements on MO 231 that extends from Franru Lane to the St. Louis City limits. The ADT for this route is approximately 10,000 vehicles a day with approximately 400 trucks.

Pavement Rehabilitation Recommendation:

The existing pavement contains variable thicknesses of asphalt overlays over existing PCC pavement. The previous surface treatment for the majority of the project consisted of a 3 ¾" SuperPave mill and overlay conducted in 2005 under project number J6S1721.

Based upon the condition survey, the top 3 ¾-inches of the previous SuperPave material is in good condition with minimal stripping. The majority of the lifts appear to be bonded. Severe stripping and unstable material was noted at the bottom asphalt lifts from older pre-SuperPave asphalt mixtures. The core below illustrates the typical condition of the pavement section.



Top 3 ¾-inch of asphalt structure very stable material with good bond to underlying lifts.

Underlying layers have some stripping and are soft weaker materials that pre-date SuperPave.

Since the top lifts are well bonded and in good condition, there are multiple options for the core team to consider. However, timing will be key in determining the best solution. Since this project is currently not funded; a more substantial treatment may be needed to meet future needs.

If programmed in time, a preventative maintenance treatment is the most cost effective to preserve the existing overlay. There are a couple of options that could be considered that would not trigger ADA. These options are listed under Option 1 and 2 below for the District to consider.

Option	Mainline Treatment
<p>Option 1 – (5 year treatment)</p> <p>Fog Seal/Rejuvenating Treatment</p>	<p><u>Surface Prep:</u> Partial Depth Repairs as estimated by the project office.</p> <p><u>Mainline Treatment:</u> (Allow all three options for competitiveness) CRF rejuvenating restorative seal (Proprietary product by CAM materials) Ravel Check (Proprietary product by (Proprietary product by Unique Paving Materials) Surface Seal (Proprietary product by Invia)</p>
<p>Option 2 – (5 to 7 year treatment)</p>	<p><u>Surface Prep:</u> Partial Depth Repairs as estimated by the project office.</p> <p><u>Mainline Treatment:</u> Grade A2 chip seal with lightweight aggregate</p>
<p>Option 3 – (5 to 7 year treatment)</p> <p>Thin Lift Overlay</p>	<p><u>Surface Prep:</u> Partial Depth Repairs as estimated by the project office.</p> <p><u>Mainline Treatment:</u> (Allow all three options for competitiveness) Type B UBAWS; Type III Microsurface; ¾” Bonded SP048FLP w/ PG70-22</p>
<p>Option 4 – (7 to 9 year treatment)</p> <p>Mill/Fill w/ SuperPave</p>	<p><u>Surface Prep:</u> Partial Depth Repairs as estimated by the project office.</p> <p><u>Mainline Treatment:</u> Coldmill 1 ¾” and Replace with 1 ¾” SP125CLP w/ PG 70-22</p>

Option 1 cost approximately \$1.25 per square yard. This option would not trigger ADA cost and would preserve the life of the existing asphalt. The downside effect is that the surface treatment itself has a relatively short service life where another treatment would be required within 5 years.

Option 2 cost approximately \$2.50 per square yard, would not trigger ADA costs, and would preserve the life of the existing asphalt for a relatively longer period of time. The downside effect is the construction issues with windshield claims and the negative public perception. Management will need to be on board to support this treatment.

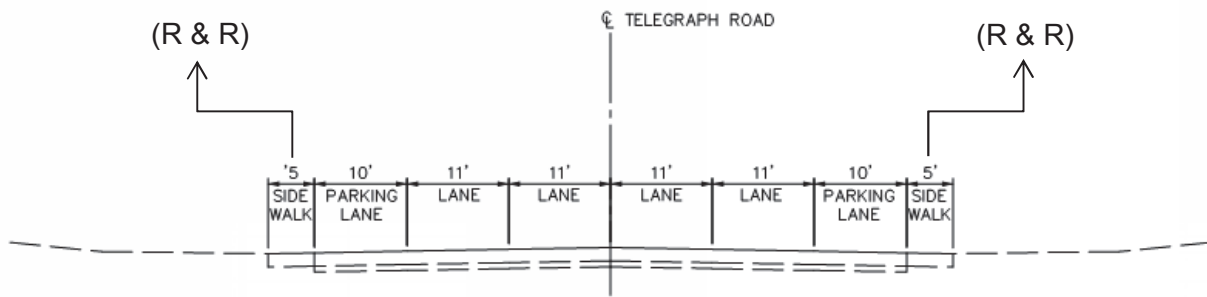
Option 3 cost approximately \$3.50 per square yard. This option would trigger ADA requirements; however, the treatments would preserve the life of the existing material and last for a longer period of time (~ 5 to 7 years).

Option 4 cost approximately \$7.50 per square yard. This option is the most costly that would trigger ADA requirements and is considered a standard short-term treatment with a service life of 7 to 9 years.

Please contact me at (573) 526-4338 if you have any further questions.

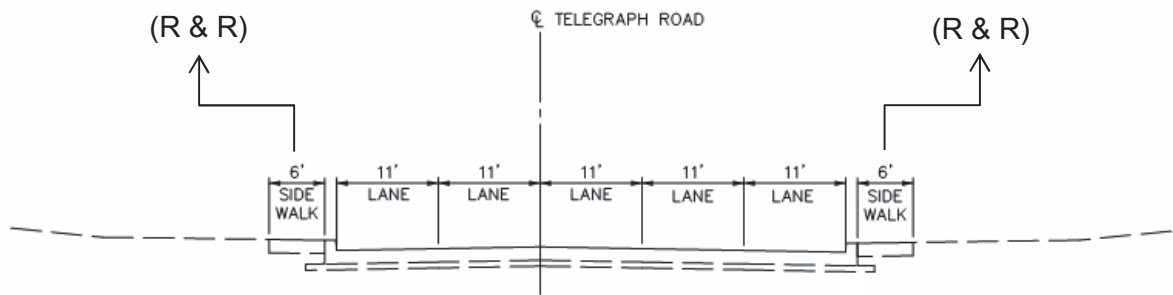
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APPENDIX B
EXISTING AND PROPOSED TYPICAL SECTIONS
BY SEGMENT



TYPICAL SECTION ROUTE 231

STA. 15+45.00 TO STA. 39+38.00
FRANRU LANE TO JEFFERSONIAN DRIVE/JACKSON BARRACKS ROAD



TYPICAL SECTION ROUTE 231

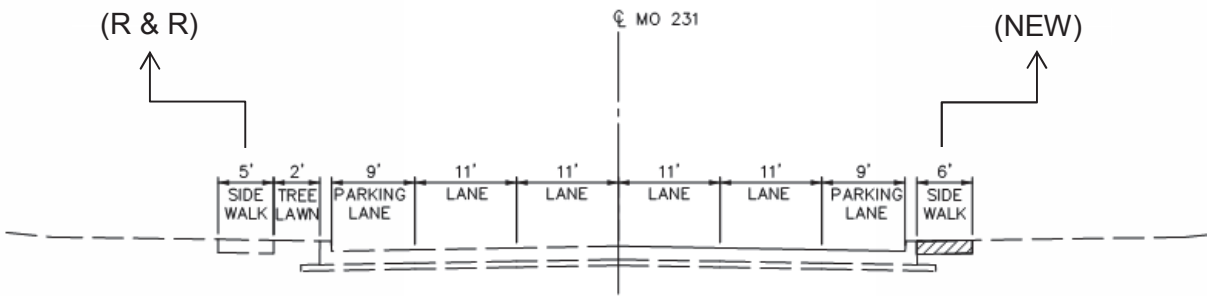
STA. 39+38.00 TO STA. 46+50.00
JEFFERSONIAN DRIVE/JACKSON BARRACKS ROAD TO TELEGRAPH ROAD



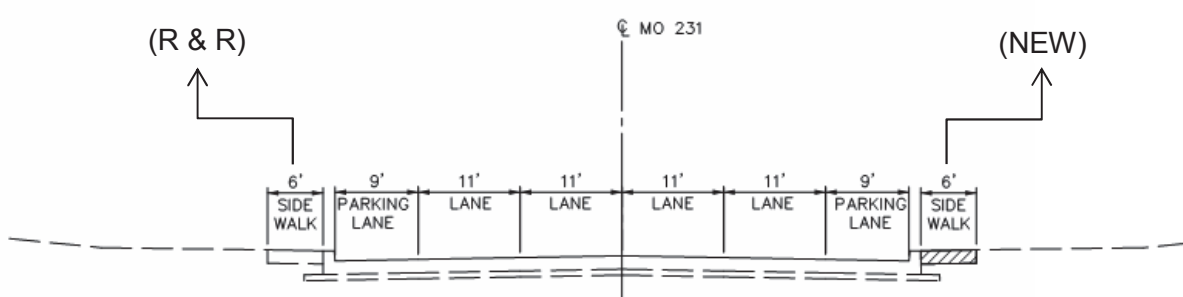
Existing and Proposed Typical Sections
Job No.: J6S3275

MO Route 231
Franru Lane to Telegraph Rd. / Kingston Dr.





TYPICAL SECTION ROUTE 231
 STA. 46+50.00 TO STA. 66+65.00
 TELEGRAPH ROAD TO SOUTHWARK LANE



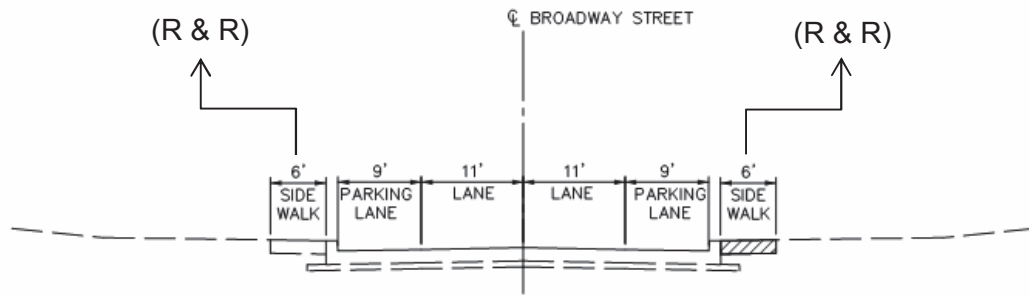
TYPICAL SECTION ROUTE 231
 STA. 66+65.00 TO STA. 107+00.00
 SOUTHWARK LANE TO RIPA AVENUE



Existing and Proposed Typical Sections
Job No.: J6S3275

MO Route 231
 Telegraph Rd. / Kingston Dr. to Ripa Avenue





TYPICAL SECTION ROUTE 231

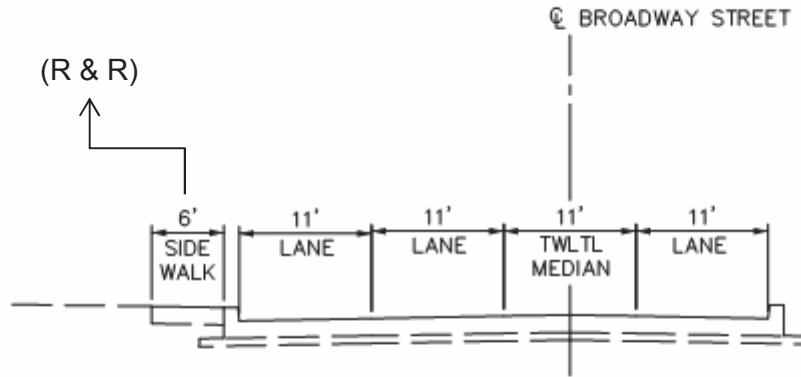
STA. 107+00.00 TO STA. 142+25.00
 RIPA AVENUE TO HOFFMEISTER AVENUE



Existing and Proposed Typical Sections
Job No.: J6S3275



MO Route 231
 Ripa Avenue to Hoffmeister Avenue





TYPICAL SECTION ROUTE 231

STA. 142+25.00 TO STA. 148+80.00
 HOFFMEISTER AVENUE TO RIVER CITY CASINO BOULEVARD

	<p align="center">Existing and Proposed Typical Sections Job No.: J6S3275</p> <p align="center">MO Route 231 Hoffmeister Avenue to River City Casino Boulevard</p>	
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APPENDIX C

EXISTING ROADWAY AND SIDEWALK CONDITIONS



Figure 1: Franru Lane to Sigsbee Avenue (looking North at Willette Terrace)



Figure 2: Franru Lane to Sigsbee Avenue (looking South at Brilliant Avenue)



Existing Roadway and Pedestrian Conditions
Job No.: J6S3275

MO Route 231
Franru Lane to Telegraph Rd. / Kingston Dr.





Figure 3: Sigsbee Avenue to Southwark Lane (looking North at Terrel Drive)



Figure 4: Sigsbee Avenue to Southwark Lane (looking South at Tacoma Drive)



Existing Roadway and Pedestrian Conditions
Job No.: J6S3275

MO Route 231
Telegraph Rd. / Kingston Dr. to Ripa Avenue





Figure 5: Southwark Lane to Ripa Avenue (looking North at Southwark Lane)



Figure 6: Southwark Lane to Ripa Avenue (looking South at Clyde Avenue)



	<p>Existing Roadway and Pedestrian Conditions Job No.: J6S3275</p> <p>MO Route 231 Telegraph Rd. / Kingston Dr. to Ripa Avenue</p>	
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Figure 7: Ripa Avenue to Hoffmeister Avenue (looking South at Velma Avenue)



Figure 8: Ripa Avenue to Hoffmeister Avenue (looking South at Cartwright Avenue)



Existing Roadway and Pedestrian Conditions
Job No.: J6S3275

MO Route 231
Ripa Avenue to Hoffmeister Avenue





Figure 9: Hoffmeister Avenue to River City Casino Boulevard (looking South at Horn Avenue)



Figure 10: Hoffmeister Avenue to River City Casino Boulevard (looking South at River City Casino Blvd)



Existing Roadway and Pedestrian Conditions
Job No.: J6S3275

MO Route 231
Hoffmeister Avenue to River City Casino Boulevard





Figure 11: Metro Bus Stop Landing Pad (looking South at Southampton Drive)



Existing Roadway and Pedestrian Conditions
Job No.: J6S3275

MO Route 231
Metro Bus Stops



APPENDIX D
TRAFFIC STUDY

Technical Memorandum

**Traffic Engineering Study
Missouri Route 231 Lane Reduction
From Telegraph Road to Ripa Avenue
St. Louis, MO**

April 2018

Prepared For:
Missouri Department of Transportation

Prepared By:



HR Green Job No.: 171052

INTRODUCTION

A conceptual review of Missouri Route 231 (MO-231) between Telegraph Road and Ripa Avenue was completed in an effort to evaluate existing and future traffic operating conditions, as well as to identify potential safety improvement benefits to upgrade traffic flow through this corridor by modifying the existing lane configuration from a four-lane, undivided roadway to a three-lane roadway providing one lane in each direction with a two-way center turn lane. The MO-231 corridor is owned and maintained by the Missouri Department of Transportation (MoDOT), and is located in St. Louis County, Missouri. **Figure 1** shows the project location map and limits. This technical memorandum will provide brief discussions on the existing conditions and characteristics of the approximately 1.15 mile long section of MO-231 between Ripa Avenue to the north, and Telegraph Road to the south. It will specifically review the traffic operating conditions at the intersections of Telegraph Road with MO-231 (Kingston Drive), Ripa Avenue with MO-231 (Kingston Drive), and consider the safety impacts of local side streets, driveways, and transit activities along the corridor.

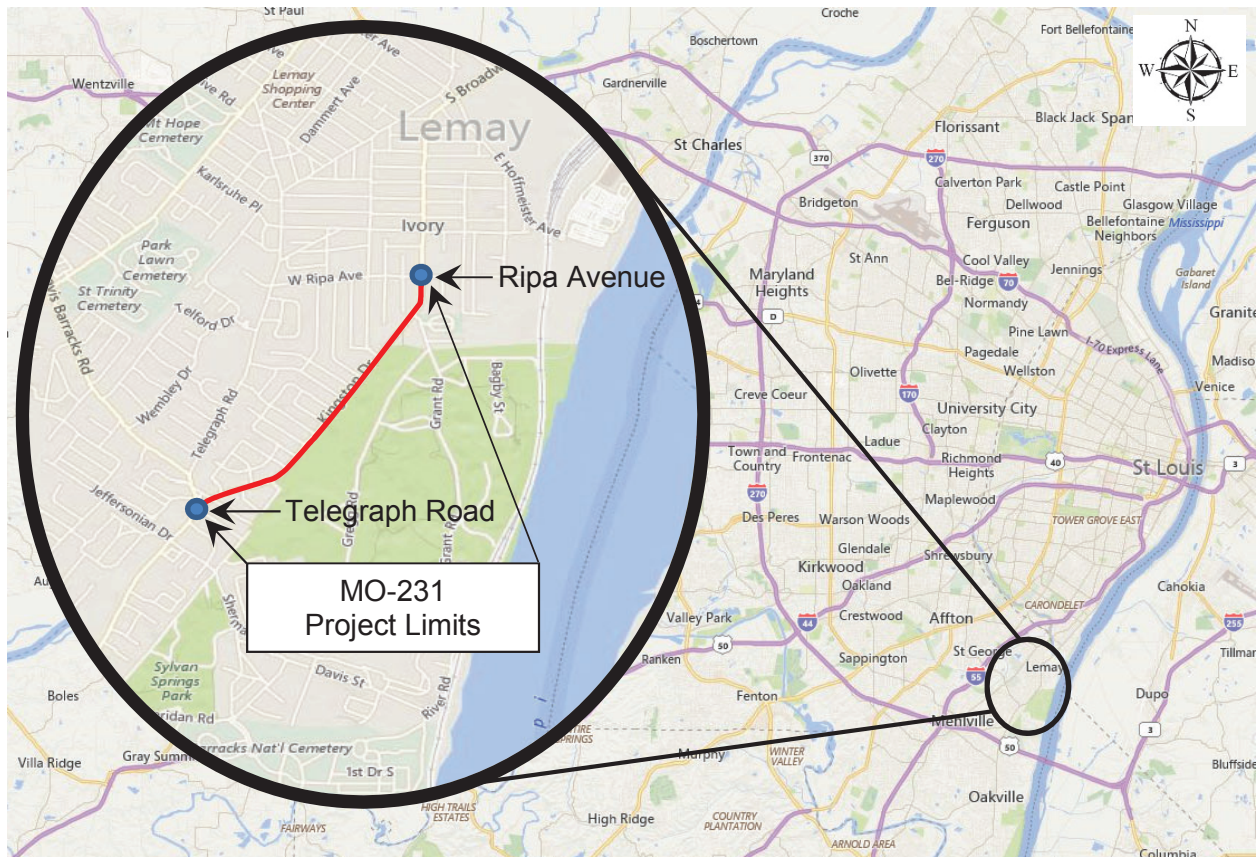


Figure 1: Project Location Map

EXISTING CONDITIONS

MO-231 is primarily a north-to-south undivided roadway functionally classified as a minor arterial facility which serves local commuters and provides direct connections to Interstate Route 255 to the south and Interstate Route 55 to the north. This section of MO-231 between Telegraph Road and Ripa Avenue currently consists of four (4) 11-foot travel lanes, permitted parking along both sides of the roadway, shared bicycle paths, and curb and gutter as shown in **Figure 2**. Sidewalks are provided along both sides of the roadway south of Southwark Lane intersection. Several side streets, driveways accesses, and Metro bus stops are also located along both sides on MO-231. The posted speed limit of MO-231 south of Ripa Avenue and north of Telegraph Road is 40 miles per hour (mph).



Figure 2: View of MO-231 looking north (Google Street View)

Although majority of the land use along MO-231 appears residential in nature, there are several commercial and institutional land uses within proximity of this section of MO-231, including The Pavilion at Lemay Recreation Center and Jefferson Barracks Park east of MO-231, and Hancock Senior High School and Notre Dame High School to the north along Ripa Avenue.

The intersection of Telegraph Road with MO-231 (Kingston Drive) operates as a three-leg signalized intersection consisting of two through lanes and a separate left turn lane northbound along MO-231, two through lanes and a separate left turn lane southbound along MO-231, and two dedicated right turn lanes southbound along Telegraph Road, as shown in **Figure 3**.

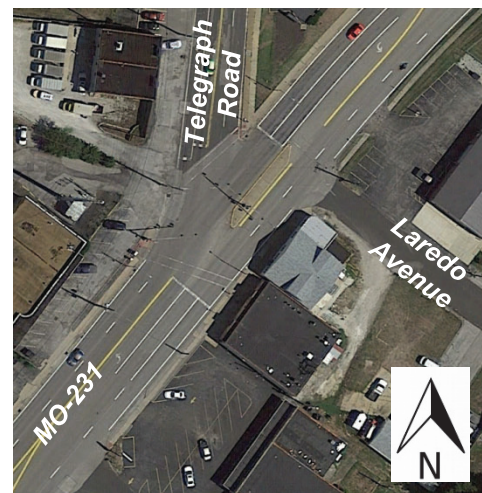


Figure 3: Telegraph Road at MO-231

Two lanes are provided on all approaches exiting this intersection.

The intersection of Telegraph Road with MO-231 is unique in that Telegraph Road meets MO-231 at a skewed angle, and there is a side street access (Laredo Avenue) approximately 50 feet north of the intersection as shown in **Figure 3**. Laredo Avenue operates as a limited access stop controlled side street. No westbound left turns are permitted on Laredo Avenue at MO-231. This is due primarily to the proximity of Laredo Avenue to the signalized intersection of Telegraph Road with MO-231. Although not restricted by signage, the southbound right turn movement of MO-231 to Telegraph Road is physically limited due to the skewed approach angle. The eastbound left turn movement of Telegraph Road to MO-231 is restricted by a raised median.

The intersection of Ripa Avenue with MO-231 (Kingston Drive) operates as a four-leg signalized intersection. The northbound direction of travel provides a separate left turn lane, a through lane, and a right turn lane along MO-231. The southbound direction of travel provides a separate left turn lane and a shared through/right turn lane along MO-231. The west-to-east street, Ripa Avenue, operates as a one-way eastbound movement. A single shared through/left/right turn lane is provided in the eastbound direction of travel along Ripa Avenue, as shown in **Figure 4**.



Figure 4: Ripa Avenue at MO-231

Existing Traffic Volumes

Existing traffic turning movement counts were collected in 2016 by MoDOT at the two signalized intersections of Telegraph Road with MO-231, and Ripa Avenue with MO-231 during both the morning and afternoon peak periods. Local side streets turning movement counts were estimated based on common trip generation rates associated with nearby homes and distributed based on existing traffic patterns. **Table 1** shows the directional distribution of existing traffic along MO-231 during the morning and afternoon peak hours.

	Directional Distribution	
	AM Peak	PM Peak
MO-231 NB	65%	45%
MO-231 SB	35%	55%

Table 1: Directional Distribution of Traffic on MO-231

Traffic data revealed the traffic peak hours were from 7:00 to 8:00 AM for the morning peak hour and from 4:30 to 5:30 PM for the afternoon peak hour. Lambeth Lane and Carrington Lane were the local side street accesses determined to have the greatest traffic volume impacts simply due to the number of homes along the streets which have direct access to MO-231. Inbound and outbound traffic at these intersections were estimated based on standard ITE trip generation rates. As a conservative measure, trip generation was based on the assumption that all residential units along the local street would use MO-231 for access. The existing peak hour traffic volumes are summarized in **Figure 5**. Given the traffic characteristics in the study area and the anticipated trip generation from the surrounding neighborhood, the peak periods identified would represent a “worst-case scenario” with regards to the traffic impact. If traffic operations are acceptable during these weekday peak hours, it can be reasoned that conditions would be acceptable throughout the remainder of the day.

It should be noted that the Annual Average Daily Traffic (AADT) along MO-231 and Telegraph Road were also collected and used to validate and confirm existing traffic patterns and peak hour volumes through the study area. The AADT of MO-231, south of Telegraph Road, was found to be approximately 18,906 vehicles per day (vpd) for both the northbound and southbound directions of travel combined. However, to the north of Telegraph Road, the AADT of MO-231 and Telegraph Road were found to be approximately 9,193 vpd and 9,713 vpd, respectively. This implies a nearly 50/50 split of daily traffic on Telegraph Road and MO-231 as shown in the peak hour turning movement counts.

The study intersections were each analyzed to review its capacity, as well as the traffic flow and corridor safety along MO-231. The analysis focused on the following traffic scenarios:

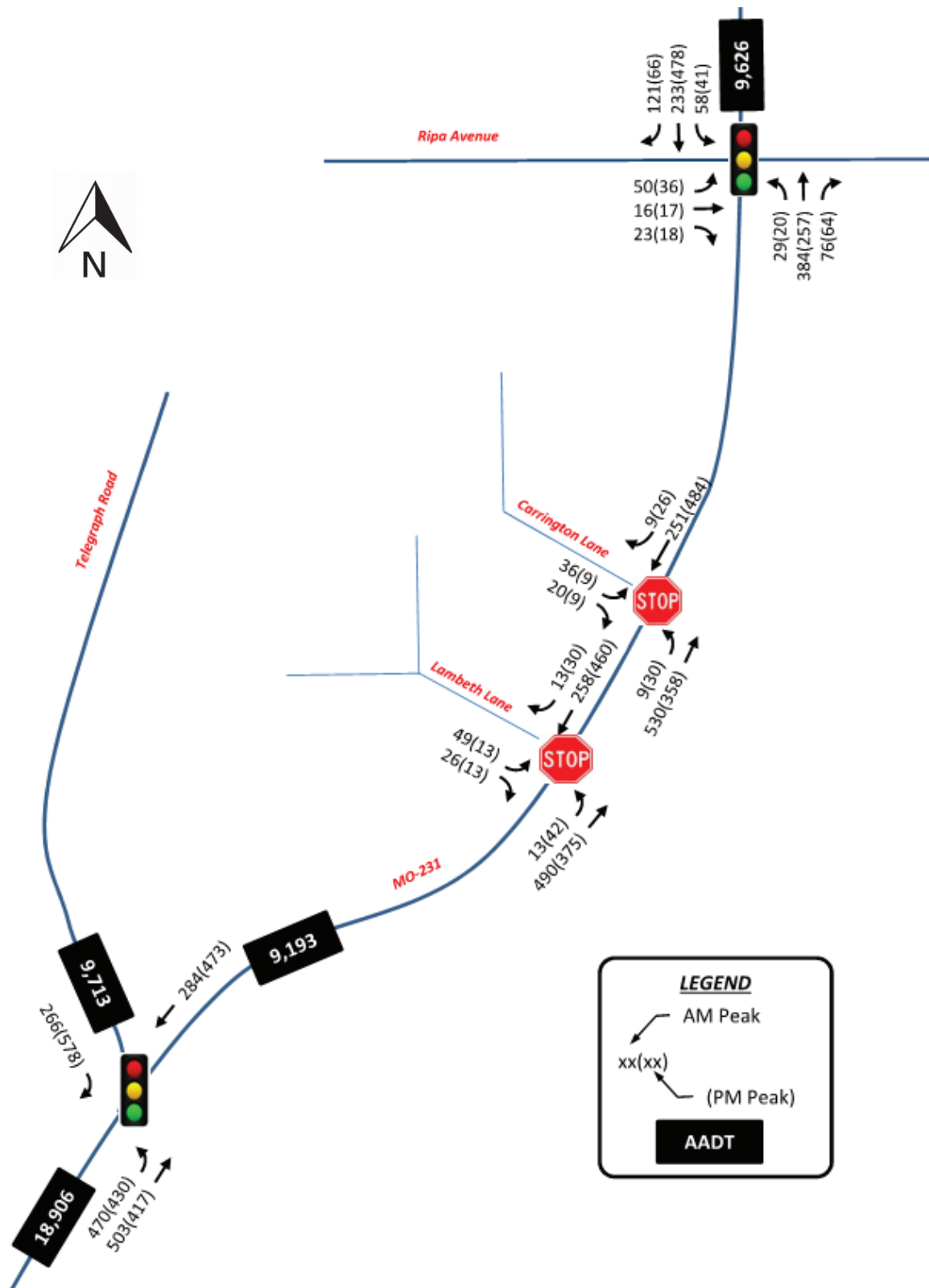


Figure 5: 2018 Traffic Volumes

- Existing (No-Build) AM Peak Hour Traffic
- Existing (No-Build) PM Peak Hour Traffic
- Existing (Build) AM Peak Hour Traffic
- Existing (Build) PM Peak Hour Traffic
- Future (No-Build) AM Peak Hour Traffic
- Future (No-Build) PM Peak Hour Traffic
- Future (Build) AM Peak Hour Traffic
- Future (Build) PM Peak Hour Traffic

The “No Build” scenarios represent the traffic operating conditions where no improvements or mitigation strategies are implemented. The “Build” scenarios represent the traffic operating conditions based on the implementation of a reduced lane configuration (from four-lane to three-lane) of the approximately 1.15 mile long section of MO-231 between Ripa Avenue and Telegraph Road.

Existing (No-Build) Operating Conditions

Existing (No-Build) operating conditions for the study intersections were evaluated using SYNCHRO 10, which is based on procedure outlined in the *Highway Capacity Manual* (HCM) to determine estimates of capacity and operational performance of signalized and unsignalized intersections. The traffic operations analysis includes measures of effectiveness generated by the SYNCHRO software.

The operating conditions were graded in accordance with six levels of traffic service (from Level A “Free Flow” to Level F “Fully Saturated”) established by the *Highway Capacity Manual*. Levels of service (LOS) measures of traffic flow consider factors such as speed, delay, traffic interruptions, safety, driver comfort, and convenience. Level C, which is normally used for highway design, represents a roadway with volumes ranging from 70% to 80% of its capacity. However, Level D is generally considered acceptable for peak period conditions in urban and suburban areas. **Table 2** summarizes the thresholds used in the analysis for signalized and unsignalized intersections.

Level of Service (LOS)	Average Control Delay (Seconds/vehicle)	
	Signalized Intersection	Unsignalized Intersection
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Table 2: HCM Level of Service Thresholds

The study intersections were evaluated using the methodologies described above. The results of the SYNCHRO evaluations for the existing (No-Build) traffic operating conditions are summarized in **Table 3**. As shown, the operating conditions for the signalized and unsignalized intersections operate at overall desirable levels (LOS C or better) during the AM and PM peak hours. However, the eastbound approach of Lambeth Lane currently operates at LOS F during both the AM and PM peak hours. This is not an uncommon occurrence for side street accesses along arterial roadways during peak traffic periods. The 95th percentile queue length of vehicles eastbound on Lambeth Lane is 115 feet during the AM peak hour, and 36 feet during the PM peak hour.

Intersection Approach (Movement)	2018 AM Peak Hour		2018 PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
MO-231 at Telegraph Road (Signalized)				
Eastbound Telegraph Road (Right-turn)	A	<1.0	A	<1.0
Northbound MO-231 (Left-turn)	A	3.7	A	4.9
Southbound MO-231 (Through)	A	3.1	A	4.2
Overall Intersection	A	1.8	A	2.2
MO-231 at Lambeth Lane (Unsignalized)				
Eastbound Lambeth Lane	F	111.2	F	74.3
Northbound MO-231 (Left-turn)	A	<1.0	A	2.9
Southbound MO-231	A	<1.0	A	<1.0
Overall Intersection	B	10.3	A	3.3
MO-231 at Carrington Lane (Unsignalized)				
Eastbound Carrington Lane	B	13.2	B	14.5
Northbound MO-231 (Left-turn)	A	<1.0	A	<1.0
Southbound MO-231	A	<1.0	A	<1.0
Overall Intersection	A	1.0	A	<1.0
MO-231 at Ripa Avenue (Signalized)				
Eastbound Ripa Avenue	C	20.6	B	19.4
Northbound MO-231 (Through)	B	11.9	A	8.3
Southbound MO-231 (Through/Right-turn)	A	9.2	A	10.0
Overall Intersection	B	10.3	A	9.3

Table 3: 2018 (No-Build) Operating Condition

Existing (Build) Operating Conditions

Considering the existing traffic volumes, characteristics, and operating conditions of this section of MO-231, a proposed road diet from four (4) to three (3) lanes conversion of MO-231 between Telegraph Road and Ripa Avenue would improve traffic flow and safety through this corridor. This implies restriping MO-231, north of Telegraph Road and south of Ripa Avenue, from a four (4) 11-foot travel lane section to a three (3) travel lane section of roadway, with one 11-foot through lane in each direction of travel and a 12-foot Two-Way Left Turn Lane (TWLTL) in the center for left turning vehicles. **Figure 6** shows the proposed layout of MO-231, north of Telegraph Road and south of Ripa Avenue.

Specifically, the intersection of Telegraph Road with MO-231 shall continue to operate as a three-leg signalized intersection, but restriped to allow one through lane and two separate left turn lanes northbound along MO-231 at Laredo Avenue, two through lanes and a separate left turn lane southbound along MO-231, and two dedicated right turn lanes southbound along Telegraph Road. Two departure lanes shall be provided at the south leg of MO-231 and north leg of Telegraph Road. A single departure lane shall be provided at the north leg of MO-231 signifying the beginning of the road diet.

The side street access (Laredo Avenue) shall remain as is; however, the 50-foot median at this intersection shall be widened to allow only a single through lane northbound along MO-231. Sufficient signage shall be provided to prohibit left turns out of Laredo Avenue and Telegraph Road, and right turns southbound along MO-231 due to the skewed intersection angles and sight triangles.

The intersection of Ripa Avenue with MO-231 shall continue to operate as a four-leg signalized intersection. The northbound direction of travel shall provide a separate left turn lane, a through lane, and a dedicated right turn lane along MO-231 as in the existing conditions. The southbound direction of travel shall provide a separate left turn lane and a shared through/right turn lane along MO-231 as in the existing conditions. The west-to-east movement on Ripa Avenue shall remain as is.

The proposed alternative also allows sufficient spacing for dedicated bicycle lanes, transit bus stop areas, curb extensions, and/or off-street parking where appropriate along MO-231, as illustrated in **Figure 7**, given the existing traffic characteristics and surrounding land use to improve traffic flow and safety through the corridor.



Figure 6: Proposed layout of MO-231

Crash data involving the study area was not provided for this analysis. Nevertheless, road diets are a proven safety-focused alternative to four-lane, undivided roadways in many case studies throughout the country. Its overall crash modification factors (CMFs) can range from 0.81 to 0.53, demonstrating a notable decrease in crashes depending upon the surrounding environment. According to the Federal Highway Administration (FHWA), studies indicate a 19 to 47 percent reduction in overall crashes when road diet is installed on a previously four-lane undivided facility. For pedestrians, this results in fewer lanes to cross and provide an opportunity to install refuge islands and curb extensions that slow vehicles in the midblock crossing areas, which is where about 70 percent of pedestrian fatalities occur, according to a 2010 FHWA Road Diet Study^{1,2}.

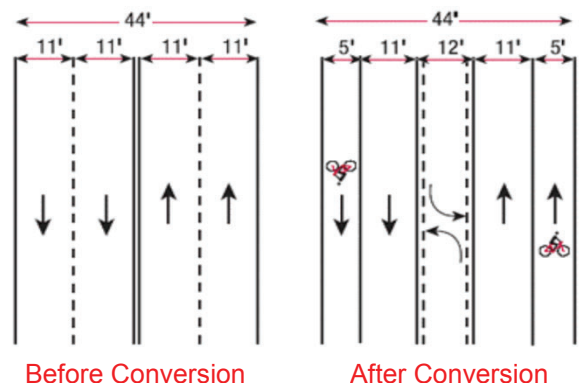


Figure 7: Four to three lanes conversion

The proposed road diet from four (4) to three (3) lanes conversion of MO-231 between Telegraph Road and Ripa Avenue also reduces the number of conflict points that contributes to crashes by removing left turning vehicles from the through lanes on MO-231 mainline. Doing so can ultimately reduce the total number of crashes, especially those involving left turns and rear end collisions. Nonetheless, it is important to note that because of the decreased number of lanes, there exists the possibility for drivers to experience increased delay while traversing the 3-lane section of MO-231 due to the traffic calming effect of road diets. Key characteristics observed to significantly impact the effect of a road diet, according to one *Iowa Road Diet Study*³, are defined in **Table 4**. The proposed 3-lane section of MO-231 meets at the least four (4) of the five (5) key traffic characteristics observed to impact the effect of a road diet. Furthermore, bicycle enhancements coupled with transit bus stop areas along MO-231 may result in a safer and more complete streets environment for drivers as well as pedestrians in this neighborhood.

Characteristics observed to significantly impact the effect of road diets	Met
Roadway Average Daily Traffic (ADT) < 20,000 vehicles per day	✓
Arterial or Collector roadway facility with posted speed limit of 30 to 45 miles per hour	✓
History of left turn related crashes (broadside and rear end collisions)	N/A
Significant commercial and/or residential driveway density	✓
Significant left turning volumes turning volumes	✓

Table 4: Road diet key characteristics (*Iowa Road Diet Study*³)

The existing (Build) operating conditions for the study intersections were re-evaluated using the same methodologies applied to the Existing (No-Build) conditions in an effort to identify the traffic impacts of the proposed road diet. No significant shifts in the existing peak hour volumes and traffic characteristics were assumed for the existing (Build) operating conditions compared to the existing (No-Build) conditions. Results of the SYNCHRO evaluations for the existing (Build) traffic operating conditions are summarized in **Table 5**.

As shown, the existing (Build) operating conditions for the signalized and unsignalized intersections would operate at overall desirable levels (LOS C or better) during the AM and PM peak hours. Specifically, the eastbound approach of Lambeth Lane is expected to operate at LOS E during both the AM and PM peak hours; nonetheless, it should not get any worse than the existing (No-Build) conditions. The 95th percentile queue length of vehicles eastbound on Lambeth Lane would likely decrease from about 125 feet to 75 feet during the AM peak hour and from 50 feet to 25 feet during the PM peak hour. The maximum volume-to-capacity (v/c) ratio at this intersection would decrease from 0.81 to 0.47 during the AM peak hour and from 0.37 to 0.34 during the PM peak hour for the eastbound approach when comparing the No-Build to Build existing traffic conditions.

Intersection Approach (Movement)	2018 AM Peak Hour		2018 PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
MO-231 at Telegraph Road (Signalized)				
Eastbound Telegraph Road (Right-turn)	A	<1.0	A	<1.0
Northbound MO-231 (Left-turn)	C	22.9	C	23.3
Southbound MO-231 (Through)	A	7.9	A	7.9
Overall Intersection	A	8.7	A	7.4
MO-231 at Lambeth Lane (Unsignalized)				
Eastbound Lambeth Lane	E	39.7	E	37.8
Northbound MO-231 (Left-turn)	B	14.6	C	18.7
Southbound MO-231	A	<1.0	A	<1.0
Overall Intersection	A	3.8	A	1.9
MO-231 at Carrington Lane (Unsignalized)				
Eastbound Carrington Lane	B	12.5	B	12.9
Northbound MO-231 (Left-turn)	A	7.9	A	8.8
Southbound MO-231	A	<1.0	A	<1.0
Overall Intersection	A	<1.0	A	<1.0
MO-231 at Ripa Avenue (Signalized)				
Eastbound Ripa Avenue	C	20.6	B	19.4
Northbound MO-231 (Through)	A	9.8	A	8.3
Southbound MO-231 (Through/Right-turn)	A	8.6	A	10.0
Overall Intersection	B	10.3	A	9.3

Table 5: 2018 (Build) Operating Condition

Even with the lane reduction on MO-231, side street operations were shown to improve due to the ability to make left turns onto the TWLTL then move to the through lane. This maneuver is commonly known as a two-stage gap acceptance.

The max v/c ratio for the intersection of Telegraph Road with MO-231 would increase from 0.62 to 0.63 during the AM peak hour but would decrease from 0.66 to 0.62 during the PM peak hour for the northbound left turn movement when comparing the No-Build to Build existing traffic conditions. The max v/c ratio for the intersection of Ripa Avenue with MO-231 would remain unchanged for both the AM and PM peak hours, as the roadway lane configurations do not change with the road diet.

FUTURE CONDITIONS

Although the adjacent neighborhood and surrounding land use along this corridor of MO-231 is mostly built out, it is reasonable to expect a modest increase to the existing traffic volumes due to a number of reasons, including increases in local population and commuter through traffic after the roadway improvement. For this reason, a background linear traffic growth was used to develop 20-year traffic volume projections for the “design year”. An average annual growth rate of 0.5% was applied to the background traffic within the study area to account for MoDOT’s Long Range Transportation Plan (LRTP) for this section of MO-231. **Figure 8** shows the future peak hour traffic volumes projections. It should be noted that because the area surrounding this section of MO-231 is currently built out, no additional changes to the existing traffic pattern and characteristics were projected to the future traffic volumes.

The study intersections were further analyzed to review its capacity, as well as the traffic flow and corridor safety along MO-231 using the future peak hour traffic volumes. As described previously, the “No Build” scenarios represent the traffic operating conditions where no improvements or mitigation strategies were implemented. The “Build” scenarios represent the traffic operating conditions based on the implementation of the proposed road diet from four (4) to three (3) lanes conversion of MO-231 between Telegraph Road and Ripa Avenue.

Future (No-Build) and (Build) Operating Conditions

The future (No-Build) and (Build) operating conditions for the study intersections were re-evaluated using the same methodologies applied to the Existing (No-Build) and (Build) conditions in an effort to identify the projected traffic impacts of the proposed road diet. No significant shifts in the future peak hour volumes and traffic characteristics were assumed for the future (Build) operating conditions compared to the future (No-Build) conditions. **Table 6** and **Table 7** summarize the results of the SYNCHRO evaluations of the future (No-Build) and (Build) AM and PM peak hour traffic operating conditions, respectively.

Comparing the No-Build to Build conditions, the signalized and unsignalized intersections are expected to continue to operate at overall desirable levels (LOS C or better) during the AM peak hour, as shown in **Table 6**. Specifically, the eastbound approach of Lambeth Lane is expected to operate at LOS E in the Build scenario as opposed to LOS F in the No-Build scenario. The 95th percentile queue length of vehicles eastbound on Lambeth Lane would expect to be 75 feet in the Build scenario as opposed to 150 feet in the No-Build scenario during the AM peak hour. The max v/c ratio at this intersection would expect to decrease from 0.96 to 0.53 for the eastbound approach during the AM peak hour when comparing the No-Build to Build future traffic conditions.

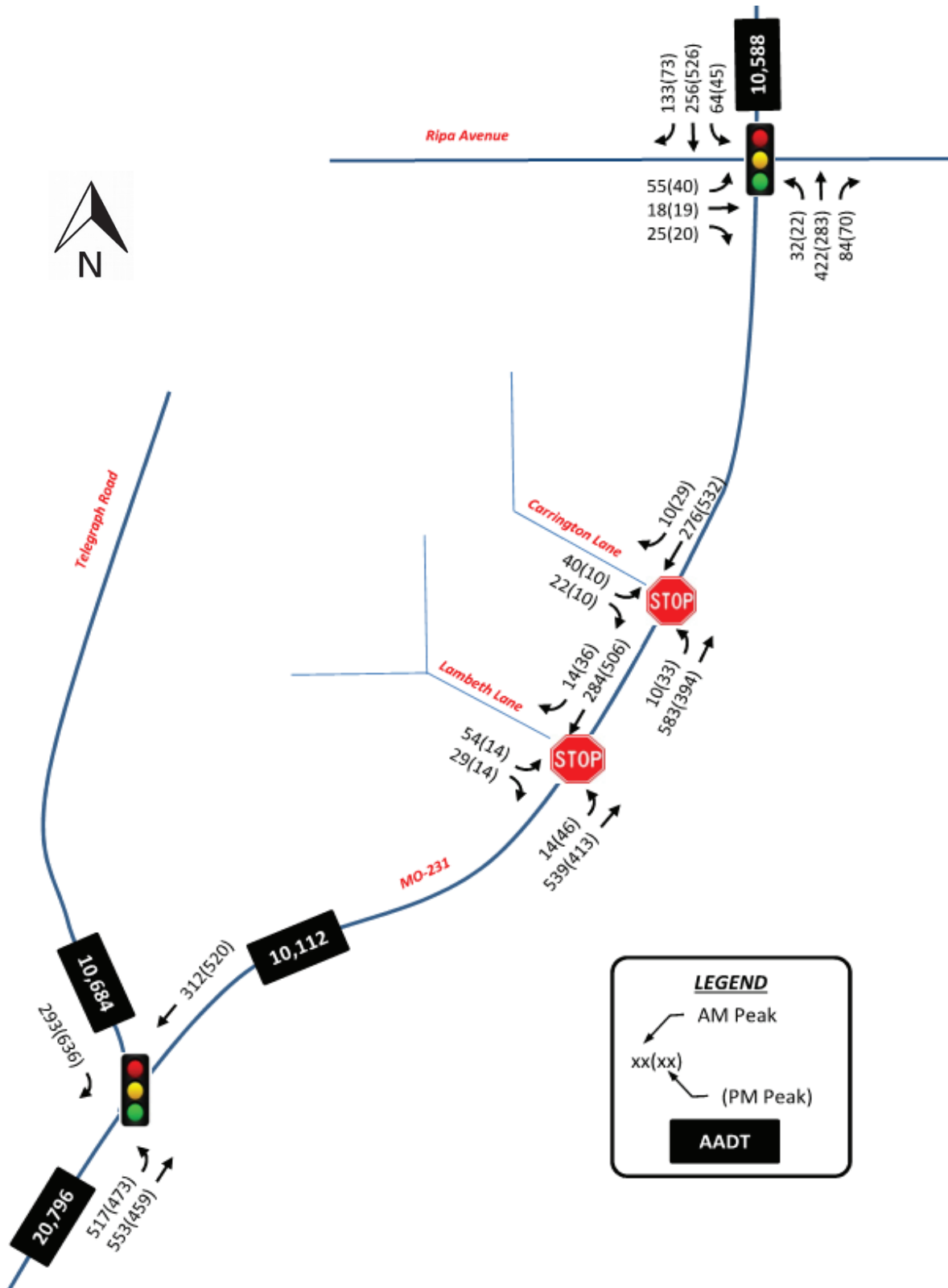


Figure 8: 2038 Traffic Volumes

Intersection Approach (Movement)	2038 AM Peak Hour			
	No-Build Condition		Build Condition	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
MO-231 at Telegraph Road (Signalized)				
Eastbound Telegraph Road (Right-turn)	A	<1.0	A	<1.0
Northbound MO-231 (Left-turn)	A	4.9	C	22.5
Southbound MO-231 (Through)	A	3.8	A	8.5
Overall Intersection	A	2.3	A	8.7
MO-231 at Lambeth Lane (Unsignalized)				
Eastbound Lambeth Lane	F	155.2	E	45.4
Northbound MO-231 (Left-turn)	A	<1.0	B	14.9
Southbound MO-231	A	<1.0	A	<1.0
Overall Intersection	B	14.1	A	4.2
MO-231 at Carrington Lane (Unsignalized)				
Eastbound Carrington Lane	B	14.2	B	13.2
Northbound MO-231 (Left-turn)	A	<1.0	A	8.0
Southbound MO-231	A	<1.0	A	<1.0
Overall Intersection	A	1.0	A	1.0
MO-231 at Ripa Avenue (Signalized)				
Eastbound Ripa Avenue	C	21.1	C	21.1
Northbound MO-231 (Through)	B	12.8	B	12.8
Southbound MO-231 (Through/Right-turn)	A	10.0	A	10.0
Overall Intersection	B	11.0	B	11.0

Table 6: 2038 (No-Build) and (Build) AM Operating Condition

In the same capacity, the signalized and unsignalized intersections should continue to operate at overall desirable levels (LOS C or better) during the PM peak hour when comparing the No-Build to Build conditions, as shown in **Table 7**. The eastbound approach of Lambeth Lane is expected to operate at LOS E in the Build scenario as opposed to LOS F in the No-Build scenario. The 95th percentile queue length of vehicles eastbound on Lambeth Lane would expect to be 25 feet in the Build scenario as supposed to 50 feet in the No-Build scenario during the PM peak hour.

Intersection Approach (Movement)	2038 PM Peak Hour			
	No-Build Condition		Build Condition	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
MO-231 at Telegraph Road (Signalized)				
Eastbound Telegraph Road (Right-turn)	A	<1.0	A	<1.0
Northbound MO-231 (Left-turn)	A	6.9	C	23.0
Southbound MO-231 (Through)	A	5.7	A	8.7
Overall Intersection	A	3.1	A	7.6
MO-231 at Lambeth Lane (Unsignalized)				
Eastbound Lambeth Lane	F	97.1	E	42.4
Northbound MO-231 (Left-turn)	A	4.1	C	19.8
Southbound MO-231	A	<1.0	A	<1.0
Overall Intersection	A	4.2	A	2.1
MO-231 at Carrington Lane (Unsignalized)				
Eastbound Carrington Lane	C	15.7	B	13.6
Northbound MO-231 (Left-turn)	A	<1.0	A	9.0
Southbound MO-231	A	<1.0	A	<1.0
Overall Intersection	A	<1.0	A	<1.0
MO-231 at Ripa Avenue (Signalized)				
Eastbound Ripa Avenue	C	20.7	C	20.7
Northbound MO-231 (Through)	B	10.4	B	10.4
Southbound MO-231 (Through/Right-turn)	B	12.3	B	12.3
Overall Intersection	B	11.2	B	11.2

Table 7: 2038 (No-Build) and (Build) PM Operating Condition

The max v/c ratio at this intersection would expect to decrease from 0.48 to 0.26 for the eastbound approach during the PM peak hour when comparing the No-Build to Build future traffic conditions.

The max v/c ratio for all other intersections in the Build scenario would expect to be less than or equal to those of the No-Build scenario during both the AM and PM peak hours.

SUMMARY

Missouri Route 231 (MO-231) continues to serve as a multimodal minor arterial facility for both motorized and nonmotorized road users in St. Louis County, Missouri. This technical memorandum presents a conceptual review of the 1.15 mile long section of MO-231 between Telegraph Road and Ripa Avenue. Based upon the preceding discussion, the following may be concluded regarding the traffic operations and safety impacts of the proposed road diet:

1. All study intersections, namely:
 - a. Telegraph Road at MO-231 (signalized),
 - b. Lambeth Lane at MO-231 (unsignalized),
 - c. Carrington Lane at MO-231 (unsignalized), and
 - d. Ripa Avenue at MO-231 (signalized),currently operate at overall desirable levels of service (LOS C or better) during both the AM and PM peak hours of a typical week day.
2. The proposed conversion of the existing four (4) to three (3) lanes cross-section of MO-231 between Telegraph Road and Ripa Avenue is anticipated to improve traffic flow and safety through the corridor by:
 - a. Reducing the number of conflict points that contributes to crashes by removing left turning vehicles from the through lanes,
 - b. Providing sufficient lateral spacing for dedicated bicycle lanes, transit bus stop areas bays, pedestrian refuge islands, curb extensions, bump-outs, and/or off-street parking to promote nonmotorists safety, and
 - c. Producing a traffic calming effect that slows vehicles down through the corridor creating a safer and more complete streets environment for all road users.
3. The intersection capacity analysis of the existing and future traffic operating conditions revealed some benefits to the proposed road diet:
 - a. The operations of the side streets and driveway accesses along MO-231 are anticipated to improve overall with the addition of a Two-Way Left Turn Lane (TWLTL) as the center lane along MO-231.
 - b. The dual left turn northbound lanes at the intersection of Telegraph Road with MO-231 are anticipated to be effective due to the near 50/50 split of daily traffic on Telegraph Road from MO-231.

We trust that the information provided in this technical memorandum should effectively address the traffic and safety characteristics associated with the proposed road diet of MO-231 between Telegraph Road and Ripa Avenue in St. Louis County, Missouri. This traffic impact study may be used as a tool to identify implementation strategies. We greatly appreciate this opportunity to be of service to you on this project. Please contact us should you have any questions or comments concerning this material.

REFERENCES

¹ FHWA, Evaluation of Lane Reduction “Road Diet” Measures on Crashes. 2004 (FHWA-HRT-04-082)

² The FHWA Summary Report, “Evaluation of Lane Reduction Road Diet Measures on Crashes” (FHWA-HRT-10-053), is available at <http://www.fhwa.dot.gov/publications/research/safety/10053/>

³ Pawlovich, M., Wen, L., Carriquiry, A., and Welch, T. (2006). "Iowa's Experience with Road Diet Measures: Use of Bayesian Approach to Assess Impacts on Crash Frequencies and Crash Rates," Transportation Research Record 1953, 163-171.

APPENDIX E
EXISTING SIGNAL CONDITIONS



Figure 12: Route 231 at Jeffersonian Drive/Jackson Barracks Road (Northbound)



Figure 13: Route 231 at Jeffersonian Drive/Jackson Barracks Road (Southbound)



Existing Signal Conditions
Job No.: J6S3275

MO Route 231
 Route 231 and Jeffersonian Drive





Figure 14: Route 231 at Hoffmeister Avenue (Northbound)



Figure 15: Route 231 at Hoffmeister Avenue (Southbound)



Existing Signal Conditions
Job No.: J6S3275

MO Route 231
Route 231 and Hoffmeister Avenue





Figure 16: Mid-block Crossing at Feed My People (South of Clyde Avenue)



Existing Signal Conditions
Job No.: J6S3275

MO Route 231
Mid-Block Crossings



APPENDIX F
ACCIDENT / TRAFFIC DATA

J6S3275 - Rte 231 - Traffic Data

Location	Log to	Log	2016 AADT	Directional Distribution %	% Commercial	DHV %
Rte 231 SB	0.000	1.265	5,054	51.2%	3.50%	9.80%
Rte 231 SB	1.265	2.280	4,621	50.3%	3.50%	9.80%
Rte 231 SB	2.280	3.441	9,503	50.3%	3.50%	9.80%
Rte 231 NB	8.791	9.952	9,403	49.70%	3.70%	8.00%
Rte 231 NB	9.952	10.967	4,572	49.70%	3.70%	7.50%
Rte 231 NB	10.967	12.232	4,572	49.70%	3.70%	7.50%

OFFSET	TRAVEL WAY ID	DESIGNATION	TRAVEL WAY NAME	DIRECTION	BEGIN LOG	END LOG	BEGIN DISTRICT	END DISTRICT	BEGIN COUNTY	END COUNTY	COUNTY BEGIN LOG	COUNTY END LOG	BEGIN DESCRIPTION	END DESCRIPTION
	6256	MO	231	S	0.001	2.856	5	5	ST. LOUIS	ST. LOUIS	0.001	2.856	.001 mile(s) after CST BROADWAY ST S	.007 mile(s) before CRD FRANRU LNE

TYPE	2012	2013	2014	2015	2016	TOTAL
FATAL	1	0	0	0	0	1
DISABLING INJURY	5	1	4	0	5	15
MINOR INJURY	12	4	21	23	21	81
PROPERTY DAMAGE ONLY	43	39	39	55	79	255
TOTAL	61	44	64	78	105	352
AADT	12132	12022	11878	11380	11449	

TYPE	2012	2013	2014	2015	2016	Rate Level
CRASH RATE	482.5	351.22	517.06	657.74	896.84	
STATE RATE-MO	220.33	215.97	213.15	204.77		ROUTE DESG
STATE RATE-TWO-LANE	181.51	180.88	176.8	178.44	0	ROADWAY TYPE

TYPE	2012	2013	2014	2015	2016	TOTAL
ANIMAL DRAWN VEH OR RIDDEN ANIMAL	0	0	0	0	0	0
ANIMAL NOT DEER/DOG/FARM ANIMAL	0	0	0	0	0	0
ANIMAL OTHER THAN DEER	0	0	0	0	0	0
AVOIDING	0	0	0	0	0	0
BACKING	0	0	0	0	1	1
CHANGING LANE	0	0	1	0	1	2
CROSS MEDIAN	0	0	0	0	0	0
DEER	1	3	2	3	5	14
DOG	0	0	0	0	0	0
DUAL LEFTS COLLIDE	0	0	1	0	0	1
DUAL RIGHTS COLLIDE	0	0	0	0	0	0
FARM ANIMAL	0	0	0	0	0	0
FIXED OBJECT	0	2	0	0	0	2
HEAD ON	5	4	5	0	6	20
JACKKNIFE	0	0	0	0	0	0
LEFT TURN	2	0	2	6	5	15
LEFT TURN RIGHT ANGLE COLLISION	3	1	2	7	9	22
OTHER	1	1	0	0	1	3
OUT OF CONTROL	13	5	9	9	8	44
PARKING OR PARKED CAR	6	1	8	8	6	29
PASSING	3	3	2	5	3	16
PEDALCYCLE	0	0	0	2	2	4
PEDESTRIAN	0	0	0	2	1	3
REAR END	20	22	26	29	50	147
RIGHT ANGLE	2	0	2	4	4	12
RIGHT TURN	0	1	1	0	0	2
RIGHT TURN RIGHT ANGLE COLLISION	1	0	1	2	1	5
SIDESWIPE	4	0	0	1	1	6
TOWED UNIT DISCONNECTS	0	0	0	0	0	0
U - TURN	0	1	2	0	3	6
WRONG WAY ON DIVIDED HIGHWAY	0	0	0	0	0	0
TOTAL	61	44	64	78	107	0

This report contains information that is protected from disclosure by federal law, 23 USC Section 409 and the Missouri Open Records Law (Sunshine Act), Section 610.021 RSMo. Please review MoDOT's policy and procedure manual on the Sunshine Act before releasing any of the information contained herein.

ST. LOUIS	CRD RIPA AVE E	0.589 HEAD ON	8/24/2013	0130052266	310146	DARK W/ STREET LIGHTS ON	DRY	CLEAR	10/7643 SAT	2030	0	157521092
ST. LOUIS	MO 211 S	0.594 REAR END	4/30/2013	0130023259	308318	DAYLIGHT	DRY	CLEAR	6256 WED	1445	0	157478455
ST. LOUIS	MO 211 S	0.597 OUT OF CONTROL	12/24/2014	2160059069	308318	DARK W/ STREET LIGHTS ON	WET	RAIN	6256 SAT	635	OTHER	157951060
ST. LOUIS	MO 211 S	0.6 OUT OF CONTROL	11/19/2014	0140081571	308318	DAYLIGHT	DRY	CLEAR	6256 WED	600	0	157711597
ST. LOUIS	MO 211 S	0.645 PARKING OR PARKED CAR	4/18/2012	0120032344	308512	DAYLIGHT	DRY	CLEAR	6256 WED	600	0	157979754
ST. LOUIS	MO 211 S	0.645 OUT OF CONTROL	3/25/2013	0130023268	308512	DARK W/ STREET LIGHTS ON	WET	SNOW	6256 MON	30	0	157484714
ST. LOUIS	MO 211 S	0.673 PARKING OR PARKED CAR	11/42/2015	0150011961	308625	DARK W/ STREET LIGHTS OFF	DRY	CLEAR	6256 WED	1840	0	157776249
ST. LOUIS	MO 211 S	0.678 HEAD ON	11/2/2016	2160044606	308625	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256 SAT	1930	0	157975469
ST. LOUIS	MO 211 S	0.682 REAR END	7/25/2012	0150053163	308625	DAYLIGHT	DRY	CLEAR	6256 SAT	1040	0	157975469
ST. LOUIS	MO 211 S	0.682 REAR END	3/19/2012	0120026734	308625	DAYLIGHT	DRY	CLEAR	6256 MON	1705	0	157909223
ST. LOUIS	MO 211 S	0.688 SIDESWIPE	6/21/2015	0150045970	308625	DAYLIGHT	DRY	CLOUDY	6256 SUN	1925	0	157474990
ST. LOUIS	MO 211 S	0.689 REAR END	11/12/2016	0140048378	308625	DAYLIGHT	DRY	CLEAR	6256 TUE	1650	0	158021060
ST. LOUIS	MO 211 S	0.693 SIDESWIPE	12/5/2012	2160051150	308687	DAYLIGHT	DRY	CLEAR	6256 MON	1015	0	158046312
ST. LOUIS	MO 211 S	0.698 PARKING OR PARKED CAR	12/25/2012	0120088177	308687	DAYLIGHT	DRY	CLEAR	6256 TUE	755	0	157396653
ST. LOUIS	MO 211 S	0.698 REAR END	9/12/2015	0150066982	308687	DAYLIGHT	DRY	CLEAR	6256 SAT	1230	0	157474651
ST. LOUIS	MO 211 S	0.707 HEAD ON	7/21/2016	2160028860	308687	DAYLIGHT	DRY	CLEAR	6256 MON	1627	0	158001721
ST. LOUIS	MO 211 S	0.71 PARKING OR PARKED CAR	12/19/2016	2160059055	308687	DAYLIGHT	DRY	CLEAR	6256 MON	1115	0	157948599
ST. LOUIS	MO 211 S	0.738 REAR END	2/19/2014	0140018175	308829	DAYLIGHT	DRY	CLEAR	6256 WED	910	0	157611764
ST. LOUIS	MO 211 S	0.738 PARKING OR PARKED CAR	10/22/2014	0140080839	308829	DAYLIGHT	DRY	CLEAR	6256 WED	1630	0	157714468
ST. LOUIS	MO 211 S	0.754 RIGHT ANGLE	3/7/2012	0120024891	308875	DAYLIGHT	DRY	CLEAR	6256 WED	1117	0	157290736
ST. LOUIS	MO 211 S	0.754 HEAD ON	5/10/2016	2160015273	308875	DAYLIGHT	DRY	CLEAR	6256 TUE	1610	0	157936446
ST. LOUIS	MO 211 S	0.754 REAR END	10/6/2015	0150073863	308875	DARK W/ STREET LIGHTS ON	DRY	UNKNOWN	6256 TUE	1930	0	157875387
ST. LOUIS	MO 211 S	0.849 RIGHT TURN RIGHT ANGLE COLLISION	5/26/2015	0150039992	309174	DAYLIGHT	DRY	CLEAR	6256 TUE	1300	0	157822488
ST. LOUIS	MO 211 S	0.864 REAR END	11/10/2014	0140081990	308994	DAYLIGHT	DRY	CLEAR	6256 MON	1748	0	157724875
ST. LOUIS	MO 211 S	0.785 PARKING OR PARKED CAR	3/29/2015	0150027593	308994	DAYLIGHT	DRY	CLEAR	6256 MON	1355	OTHER	157724875
ST. LOUIS	MO 211 S	0.788 OUT OF CONTROL	9/19/2014	0140066678	309398	DAYLIGHT	DRY	CLEAR	6256 SUN	805	OTHER	157908924
ST. LOUIS	MO 211 S	0.852 REAR END	9/19/2014	0140066693	309398	DAYLIGHT	DRY	CLEAR	6256 SUN	1503	0	157727416
ST. LOUIS	MO 211 S	0.838 REAR END	11/20/2013	0130070210	309174	DAYLIGHT	WET	CLOUDY	6256 FRI	1427	0	157561891
ST. LOUIS	MO 211 S	0.849 LEFT TURN RIGHT ANGLE COLLISION	11/9/2012	0120078189	309174	DARK W/ STREET LIGHTS OFF	DRY	CLEAR	6256 FRI	1800	0	157834904
ST. LOUIS	MO 211 S	0.849 U-TURN	4/16/2014	0140033850	309174	DAYLIGHT	DRY	CLEAR	6256 WED	1145	0	157333943
ST. LOUIS	MO 211 S	0.849 RIGHT TURN RIGHT ANGLE COLLISION	5/26/2015	0150039992	309174	DAYLIGHT	DRY	CLEAR	6256 TUE	1300	0	157822488
ST. LOUIS	MO 211 S	0.864 REAR END	10/3/2016	2160039387	309592	DAYLIGHT	DRY	CLEAR	6256 MON	1643	2836369	164326211
ST. LOUIS	MO 211 S	0.892 REAR END	9/5/2015	0140078678	309592	DAYLIGHT	WET	CLOUDY	6256 TUE	730	0	157723080
ST. LOUIS	MO 211 S	0.913 LEFT TURN RIGHT ANGLE COLLISION	3/16/2014	0140255555	309426	DAYLIGHT	WET	CLOUDY	6256 SUN	1100	0	157874701
ST. LOUIS	MO 211 S	0.913 REAR END	1/7/2016	0160014962	309426	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256 SUN	1230	0	157633224
ST. LOUIS	MO 211 S	0.915 LEFT TURN	10/30/2016	2160044486	309426	DAYLIGHT	DRY	CLEAR	6256 THU	1800	0	162707646
ST. LOUIS	MO 211 S	0.922 LEFT TURN RIGHT ANGLE COLLISION	9/18/2016	2160036604	0	DAYLIGHT	DRY	CLOUDY	6256 SUN	1415	0	157986605
ST. LOUIS	MO 211 S	0.958 REAR END	2/20/2014	0140018205	309592	DAYLIGHT	DRY	CLEAR	6256 SUN	1540	0	164145220
ST. LOUIS	MO 211 S	0.958 REAR END	5/18/2016	2160017100	309592	DAYLIGHT	DRY	CLEAR	6256 THU	1545	0	157610645
ST. LOUIS	MO 211 S	0.961 RIGHT TURN RIGHT ANGLE COLLISION	10/14/2014	0140078678	309592	DAYLIGHT	WET	CLOUDY	6256 WED	1305	0	157934852
ST. LOUIS	MO 211 S	0.961 LEFT TURN RIGHT ANGLE COLLISION	5/3/2016	2160014249	309592	DAYLIGHT	DRY	CLEAR	6256 TUE	730	0	157723080
ST. LOUIS	MO 211 S	0.961 LEFT TURN RIGHT ANGLE COLLISION	8/28/2016	2160034039	309592	DAYLIGHT	DRY	CLEAR	6256 TUE	1715	0	157934854
ST. LOUIS	MO 211 S	0.961 LEFT TURN RIGHT ANGLE COLLISION	1/22/2016	0160018272	309592	DAYLIGHT	DRY	CLEAR	6256 SUN	1852	0	162720487
ST. LOUIS	MO 211 S	0.961 PASSING	1/6/2015	0150040543	309631	DAYLIGHT	DRY	CLEAR	6256 FRI	1540	0	157968871
ST. LOUIS	MO 211 S	0.961 LEFT TURN RIGHT ANGLE COLLISION	4/19/2015	0150032058	309592	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256 TUE	1805	0	157846183
ST. LOUIS	MO 211 S	0.961 LEFT TURN RIGHT ANGLE COLLISION	7/7/2015	0150052287	309592	DAYLIGHT	WET	CLOUDY	6256 SUN	1608	0	15787332
ST. LOUIS	MO 211 S	0.965 PARKING OR PARKED CAR	7/15/2016	2160026263	309631	DAYLIGHT	DRY	CLEAR	6256 TUE	812	0	157918382
ST. LOUIS	MO 211 S	0.967 RIGHT ANGLE	4/29/2012	0120034076	309631	DAYLIGHT	DRY	CLEAR	6256 FRI	2120	2652739	164003669
ST. LOUIS	MO 211 S	0.967 OUT OF CONTROL	2/28/2015	0150022036	309631	DAYLIGHT	DRY	CLOUDY	6256 SUN	1050	0	157216044
ST. LOUIS	MO 211 S	0.967 LEFT TURN RIGHT ANGLE COLLISION	12/14/2015	0150021585	309631	DAYLIGHT	SNOW	SNOW	6256 SAT	1050	OTHER	157763252
ST. LOUIS	MO 211 S	0.976 OUT OF CONTROL	12/14/2015	0150040543	309631	DAYLIGHT	DRY	SLEET	6256 SUN	1710	0	157770071
ST. LOUIS	MO 211 S	0.976 REAR END	10/5/2015	0150071605	0	DAYLIGHT	DRY	CLEAR	6256 MON	1050	OTHER	157822487
ST. LOUIS	CRD HOFFMEISTER AVE E	1.008 OUT OF CONTROL	4/19/2012	0120032671	307891	DARK W/ STREET LIGHTS ON	DRY	CLOUDY	6256 MON	740	4220467	166219907
ST. LOUIS	MO 211 S	1.008 DEER	8/17/2013	0130051494	309779	DARK W/ STREET LIGHTS OFF	DRY	CLEAR	74012 THU	2335	OTHER	157469242
ST. LOUIS	CRD HOFFMEISTER AVE E	1.011 REAR END	1/29/2013	0130011343	307891	DAYLIGHT	DRY	CLEAR	6256 SAT	300	0	157405668
ST. LOUIS	CRD HOFFMEISTER AVE E	1.011 OUT OF CONTROL	12/5/2013	0130073904	307891	DARK W/ STREET LIGHTS ON	WET	CLOUDY	74012 THU	1620	0	157460790
ST. LOUIS	CRD HOFFMEISTER AVE E	1.011 REAR END	2/11/2016	2160023307	307891	DARK W/ STREET LIGHTS ON	DRY	RAIN	74012 THU	541	OTHER	157595791
ST. LOUIS	CRD HOFFMEISTER AVE E	1.011 PEDALCYCLE	7/10/2016	2160029318	307891	DAYLIGHT	DRY	CLEAR	74012 THU	1800	0	158045427
ST. LOUIS	MO 211 S	1.018 REAR TURN	5/4/2016	0140042370	309779	DAYLIGHT	DRY	CLEAR	74012 THU	1605	0	157963350
ST. LOUIS	MO 211 S	1.018 REAR END	5/4/2016	2160015799	309779	DAYLIGHT	DRY	CLEAR	6256 SAT	1333	0	157677668
ST. LOUIS	MO 211 S	1.104 OUT OF CONTROL	1/31/2015	0150017108	310146	DARK W/ STREET LIGHTS ON	DRY	CLOUDY	6256 WED	1730	0	157938856
ST. LOUIS	MO 211 S	1.114 OUT OF CONTROL	12/27/2012	0120090038	310146	DARK W/ STREET LIGHTS ON	DRY	CLOUDY	6256 SAT	235	OTHER	15797402
ST. LOUIS	MO 211 S	1.123 REAR END	11/16/2013	0130070148	310146	DAYLIGHT	WET	CLEAR	6256 THU	730	0	157398993
ST. LOUIS	MO 211 S	1.123 RIGHT ANGLE	1/11/2016	0160016218	310146	DARK W/ STREET LIGHTS ON	WET	CLOUDY	6256 SAT	1247	0	157616665
ST. LOUIS	MO 211 S	1.123 OUT OF CONTROL	5/21/2016	2160017046	310146	DAYLIGHT	DRY	CLEAR	6256 MON	1705	0	158037135
ST. LOUIS	MO 211 S	1.123 HEAD ON	5/3/2013	0130028551	310146	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256 SAT	1405	0	157944820
ST. LOUIS	MO 211 S	1.128 REAR END	10/15/2012	0120069948	310146	DAYLIGHT	DRY	RAIN	6256 FRI	2045	0	157469844
ST. LOUIS	MO 211 S	1.132 OUT OF CONTROL	9/12/2013	0130057199	310146	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256 MON	1805	0	157456540
ST. LOUIS	MO 211 S	1.135 OUT OF CONTROL	11/14/2012	0120079187	310146	DARK W/ STREET LIGHTS ON	DRY	CLOUDY	6256 FRI	2343	OTHER	157526624
ST. LOUIS	MO 211 S	1.143 OUT OF CONTROL	11/14/2012	0140068884	310146	NOT STATED/UNKNOWN	DRY	CLEAR	6256 WED	9999	0	15731605
ST. LOUIS	MO 211 S	1.151 U-TURN	7/22/2016	2160027334	0	DAYLIGHT	DRY	CLEAR	6256 SAT	2239	OTHER	157970344
ST. LOUIS	MO 211 S	1.207 PARKING OR PARKED CAR	10/6/2015	0150073864	0	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256 FRI	1638	0	157944820
ST. LOUIS	MO 211 S	1.217 PASSING	6/9/2015	0150045283	0	DAYLIGHT	DRY	CLEAR	6256 TUE	2308	0	157846465
ST. LOUIS	MO 211 S	1.259 REAR END	7/30/2013	0130047996	310456	DAYLIGHT	WET	RAIN	6256 TUE	1150	0	157537692

ST. LOUIS	MO 21 S	2.403	LEFT TURN	6/4/2015	0159044103	313165	DAYLIGHT	WET	RAIN	6256 THU	1345	0	157860083
ST. LOUIS	MO 21 S	2.403	LEFT TURN	5/3/2015	0150034664	313165	DAYLIGHT	DRY	CLEAR	6256 THU	1310	0	157951163
ST. LOUIS	MO 21 S	2.403	LEFT TURN	4/30/2015	0150033331	313165	DAYLIGHT	DRY	CLEAR	6256 THU	738	0	157972192
ST. LOUIS	MO 21 S	2.403	RIGHT ANGLE	2/9/2015	0150019833	313165	DARK W/ STREET LIGHTS ON	DRY	CLOUDY	6256 MON	2150	0	157855478
ST. LOUIS	MO 21 S	2.403	HEAD ON	3/12/2014	0140024691	313165	DAYLIGHT	DRY	CLEAR	6256 WED	1750	0	157644593
ST. LOUIS	MO 21 S	2.403	REAR END	12/13/2013	0130075923	313165	DARK W/ STREET LIGHTS ON	SNOW	SNOW	6256 FRI	2205	0	157538632
ST. LOUIS	MO 21 S	2.403	REAR END	6/29/2013	0130042448	313165	DAYLIGHT	DRY	CLEAR	6256 SAT	1320	0	157606675
ST. LOUIS	MO 21 S	2.403	REAR END	6/19/2013	0130039432	313165	DAYLIGHT	DRY	CLEAR	6256 WED	1530	0	157568229
ST. LOUIS	MO 21 S	2.403	REAR END	4/6/2013	0130023111	313165	DAYLIGHT	DRY	CLEAR	6256 SAT	1130	0	157537691
ST. LOUIS	MO 21 S	2.403	REAR END	1/19/2013	0130011064	313165	DAYLIGHT	DRY	CLEAR	6256 SAT	1554	0	157451523
ST. LOUIS	MO 21 S	2.403	PASSING	1/18/2013	0130011034	313165	DAYLIGHT	DRY	CLEAR	6256 FRI	1240	0	157451311
ST. LOUIS	MO 21 S	2.403	SIDEWALK	11/11/2012	0120079110	313165	DARK W/ STREET LIGHTS ON	WET	RAIN	6256 SUN	1915	0	157276855
ST. LOUIS	MO 21 S	2.403	OUT OF CONTROL	10/31/2012	0120074313	313165	DAYLIGHT	DRY	CLEAR	6256 WED	740	MODOT	157279177
ST. LOUIS	MO 21 S	2.403	OUT OF CONTROL	6/10/2012	0120043175	313165	DAYLIGHT	DRY	CLEAR	6256 SUN	1430	0	157167042
ST. LOUIS	MO 21 S	2.404	REAR END	3/19/2012	0120026728	313165	DAYLIGHT	DRY	CLEAR	6256 MON	1540	0	157294885
ST. LOUIS	MO 21 S	2.412	OUT OF CONTROL	8/26/2012	0120062887	313165	DAYLIGHT	DRY	CLEAR	6256 SUN	1220	OTHER	157402754
ST. LOUIS	MO 21 S	2.412	PASSING	6/30/2015	0150045656	313165	DAYLIGHT	DRY	CLEAR	6256 TUE	1845	0	157866824
ST. LOUIS	MO 21 S	2.422	LEFT TURN	1/6/2015	0150011422	313165	DAYLIGHT	DRY	CLEAR	6256 TUE	1609	0	157846182
ST. LOUIS	MO 21 S	2.427	LEFT TURN RIGHT ANGLE COLLISION	8/3/2014	0130028927	313165	DAYLIGHT	DRY	CLOUDY	6256 MON	735	0	157953559
ST. LOUIS	MO 21 S	2.431	REAR END	8/3/2014	0140057357	313165	DAYLIGHT	DRY	CLEAR	6256 MON	1832	0	157693465
ST. LOUIS	MO 21 S	2.431	PASSING	12/18/2014	0140083196	0	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256 THU	1730	0	157708330
ST. LOUIS	MO 21 S	2.436	PASSING	7/11/2016	2160025904	0	DAYLIGHT	DRY	CLEAR	6256 MON	1343	0	158038939
ST. LOUIS	MO 21 S	2.44	LEFT TURN RIGHT ANGLE COLLISION	2/28/2012	0120024212	0	DAYLIGHT	DRY	CLEAR	6256 TUE	1250	0	157289365
ST. LOUIS	MO 21 S	2.441	RIGHT TURN RIGHT ANGLE COLLISION	4/25/2012	0120033372	313718	DAYLIGHT	DRY	CLEAR	6256 WED	1735	0	157348979
ST. LOUIS	MO 21 S	2.444	REAR END	12/4/2016	2160056408	0	DAYLIGHT	WET	CLOUDY	6256 SUN	1600	0	158031034
ST. LOUIS	MO 21 S	2.481	HEAD ON	9/12/2016	2160034038	0	DAYLIGHT	DRY	CLEAR	6256 THU	1531	OTHER	157987951
ST. LOUIS	MO 21 S	2.482	LEFT TURN RIGHT ANGLE COLLISION	9/2/2016	2160034139	0	DAYLIGHT	DRY	CLEAR	6256 FRI	1130	0	157991223
ST. LOUIS	MO 21 S	2.503	U-TURN	2/12/2013	0130012776	0	DAYLIGHT	DRY	CLEAR	6256 FRI	1545	0	157451315
ST. LOUIS	MO 21 S	2.529	DEER	5/25/2013	0130034939	0	DARK W/ STREET LIGHTS ON	DRY	CLOUDY	6256 SAT	210	OTHER	157492695
ST. LOUIS	MO 21 S	2.599	PASSING	11/9/2013	0130068572	313718	DAYLIGHT	DRY	CLEAR	6256 SAT	935	0	157540705
ST. LOUIS	MO 21 S	2.614	REAR END	9/9/2014	0140067399	313718	DAYLIGHT	DRY	CLEAR	6256 TUE	1110	0	157733732
ST. LOUIS	MO 21 S	2.618	REAR END	11/6/2012	0120078104	313718	DAYLIGHT	WET	CLOUDY	6256 TUE	1635	0	157384158
ST. LOUIS	MO 21 S	2.618	REAR END	12/3/2015	0150017006	313718	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256 FRI	1800	0	157815405
ST. LOUIS	MO 21 S	2.618	RIGHT ANGLE	11/29/2015	0150083999	313718	DARK W/ STREET LIGHTS OFF	WET	CLOUDY	6256 SUN	1743	0	157913685
ST. LOUIS	MO 21 S	2.618	OUT OF CONTROL	5/15/2014	0140041279	313718	DARK W/ STREET LIGHTS OFF	WET	CLOUDY	6256 THU	200	OTHER	157675348
ST. LOUIS	MO 21 S	2.618	REAR END	11/12/2012	0120079131	313718	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256 MON	2015	0	157576863
ST. LOUIS	MO 21 S	2.621	PASSING	5/23/2014	0140042553	313718	DAYLIGHT	DRY	CLEAR	6256 FRI	1843	0	157680927
ST. LOUIS	MO 21 S	2.625	REAR END	4/1/2015	0150030140	313718	DAYLIGHT	DRY	CLEAR	6256 WED	1300	0	157781821
ST. LOUIS	MO 21 S	2.627	REAR END	7/26/2012	0120054595	313718	DAYLIGHT	DRY	CLOUDY	6256 THU	9999	0	157658849
ST. LOUIS	MO 21 S	2.644	REAR END	9/13/2016	2160035935	0	DAYLIGHT	DRY	CLEAR	6256 TUE	1432	OTHER	157962268
ST. LOUIS	MO 21 S	2.666	REAR END	8/20/2016	2160031811	313879	DAYLIGHT	DRY	CLEAR	6256 SAT	1030	0	158000779
ST. LOUIS	MO 21 S	2.664	REAR END	8/11/2015	0150059296	313879	DAYLIGHT	DRY	CLEAR	6256 TUE	1825	0	157925308
ST. LOUIS	MO 21 S	2.665	HEAD ON	4/4/2014	0140028783	313879	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256 FRI	2130	0	157648895
ST. LOUIS	MO 21 S	2.667	REAR END	10/13/2016	2160043251	313879	DAYLIGHT	DRY	CLEAR	6256 THU	1230	0	158003572
ST. LOUIS	MO 21 S	2.674	REAR END	4/14/2012	0120032124	313879	DAYLIGHT	DRY	CLEAR	6256 SAT	1728	0	157929699
ST. LOUIS	MO 21 S	2.674	REAR END	7/29/2015	0150053384	313879	DAYLIGHT	DRY	CLEAR	6256 WED	1224	0	157900128
ST. LOUIS	MO 21 S	2.674	REAR END	10/15/2015	0150075796	313879	DAYLIGHT	DRY	CLEAR	6256 THU	1145	0	157921486
ST. LOUIS	MO 21 S	2.674	HEAD ON	9/20/2013	0130058517	313879	DAYLIGHT	WET	RAIN	6256 FRI	1125	0	15720581
ST. LOUIS	MO 21 S	2.674	REAR END	4/4/2012	0120029719	313879	DAYLIGHT	DRY	CLOUDY	6256 WED	1055	0	157298758
ST. LOUIS	MO 21 S	2.677	REAR END	6/23/2013	0130040575	313879	DAYLIGHT	DRY	CLEAR	6256 SUN	1400	0	157513929
ST. LOUIS	MO 21 S	2.702	REAR END	9/16/2016	2160036299	0	DAYLIGHT	WET	CLOUDY	6256 FRI	1445	0	158051025
ST. LOUIS	MO 21 S	2.711	PARKING OR PARKED CAR	3/27/2014	0140026103	0	DAYLIGHT	DRY	CLEAR	6256 THU	1545	OTHER	157647591
ST. LOUIS	MO 21 S	2.712	REAR END	10/26/2016	2160043046	0	DAYLIGHT	DRY	CLEAR	6256 WED	745	0	157981637
ST. LOUIS	MO 21 S	2.722	PARKING OR PARKED CAR	12/3/2016	0160016492	0	DARK W/ STREET LIGHTS OFF	UNKN	CLEAR	6256 SAT	48	171187	162708222
ST. LOUIS	MO 21 S	2.766	REAR END	3/2/2016	0160023951	314100	DAYLIGHT	DRY	CLEAR	6256 WED	1006	0	158018853
ST. LOUIS	MO 21 S	2.768	REAR END	12/14/2014	0140082965	314100	DARK W/ STREET LIGHTS OFF	DRY	CLEAR	6256 SUN	1916	0	157113386
ST. LOUIS	MO 21 S	2.768	REAR END	7/21/2016	2160028201	314100	DAYLIGHT	DRY	CLEAR	6256 THU	1515	0	158043067
ST. LOUIS	MO 21 S	2.768	REAR END	11/26/2014	0140082036	314100	DARK W/ STREET LIGHTS OFF	WET	CLOUDY	6256 WED	1630	0	157606966
ST. LOUIS	MO 21 S	2.768	REAR END	5/15/2015	0150038765	314100	DAYLIGHT	DRY	CLOUDY	6256 FRI	1924	0	157814928
ST. LOUIS	MO 21 S	2.768	REAR END	12/9/2012	0120084889	314100	DARK W/ STREET LIGHTS OFF	WET	CLOUDY	6256 SUN	107	OTHER	15797868
ST. LOUIS	MO 21 S	2.815	DEER	11/11/2014	0140081199	314226	DARK W/ STREET LIGHTS OFF	DRY	CLEAR	6256 SAT	2314	0	157713782
ST. LOUIS	MO 21 S	2.822	OUT OF CONTROL	3/29/2014	0140027914	314226	DAYLIGHT	DRY	CLOUDY	6256 TUE	1415	OTHER	157649873
ST. LOUIS	MO 21 S	2.824	DEER	1/24/2012	0120017852	314226	DAYLIGHT	DRY	CLEAR	6256 TUE	752	0	157266513

This report contains information that is protected from disclosure by federal law, 23 USC Section 409 and the Missouri Open Records Law (Sunshine Act), Section 610.021 RSMo. Please review MoDOT's policy and procedure manual on the Sunshine Act before releasing any of the information contained herein.

OFFSET	TRAVEL WAY ID	DESIGNATION	TRAVEL WAY NAME	DIRECTION	BEGIN LOG	END LOG	BEGIN DISTRICT	END DISTRICT	BEGIN COUNTY	END COUNTY	COUNTY BEGIN LOG	COUNTY END LOG	BEGIN DESCRIPTION	END DESCRIPTION
	6257	MO	231	N	9.376	12.231	5	5	ST. LOUIS	ST. LOUIS	7.187	10.042	.007 mile(s) after CRD FRANRU LNE	.001 mile(s) before CST BROADWAY ST S

TYPE	2012	2013	2014	2015	2016	TOTAL
FATAL	1	0	0	0	0	1
DISABLING INJURY	5	1	4	0	5	15
MINOR INJURY	11	4	18	22	16	71
PROPERTY DAMAGE ONLY	41	36	36	52	66	231
TOTAL	58	41	58	74	87	318
AADT	12132	12022	11878	11380	11449	

TYPE	2012	2013	2014	2015	2016	Rate Level
CRASH RATE	458.77	327.27	468.58	624.01	729.21	
STATE RATE-MO	220.33	215.97	213.15	204.77		ROUTE DESG
STATE RATE-TWO-LANE	181.51	180.88	176.8	178.44	0	ROADWAY TYPE

TYPE	2012	2013	2014	2015	2016	TOTAL
ANIMAL DRAWN VEH OR RIDDEN ANIMAL	0	0	0	0	0	0
ANIMAL NOT DEER/DOG/FARM ANIMAL	0	0	0	0	0	0
ANIMAL OTHER THAN DEER	0	0	0	0	0	0
AVOIDING	0	0	0	0	0	0
BACKING	0	0	0	0	0	0
CHANGING LANE	0	0	1	0	1	2
CROSS MEDIAN	0	0	0	0	0	0
DEER	1	2	2	3	5	13
DOG	0	0	0	0	0	0
DUAL LEFTS COLLIDE	0	0	1	0	0	1
DUAL RIGHTS COLLIDE	0	0	0	0	0	0
FARM ANIMAL	0	0	0	0	0	0
FIXED OBJECT	0	2	0	0	0	2
HEAD ON	5	4	5	0	5	19
JACKKNIFE	0	0	0	0	0	0
LEFT TURN	2	0	2	6	4	14
LEFT TURN RIGHT ANGLE COLLISION	2	1	2	7	7	19
OTHER	1	1	0	0	1	3
OUT OF CONTROL	12	5	7	9	6	39
PARKING OR PARKED CAR	6	0	6	7	4	23
PASSING	3	3	1	4	2	13
PEDALCYCLE	0	0	0	2	2	4
PEDESTRIAN	0	0	0	2	1	3
REAR END	20	22	25	28	41	136
RIGHT ANGLE	2	0	2	3	4	11
RIGHT TURN	0	1	1	0	0	2
RIGHT TURN RIGHT ANGLE COLLISION	0	0	1	2	1	4
SIDESWIPE	4	0	0	1	1	6
TOWED UNIT DISCONNECTS	0	0	0	0	0	0
U - TURN	0	0	2	0	2	4
WRONG WAY ON DIVIDED HIGHWAY	0	0	0	0	0	0
TOTAL	58	41	58	74	87	318

This report contains information that is protected from disclosure by federal law,

ST. LOUIS	MO 21 S	1.45H LEFT TURN	7/2/2014	0140015183	311072 DAYLIGHT	DRY	CLEAR	930	0	157686757
ST. LOUIS	CRD TELEGRAPH RDS	1.523 OUT OF CONTROL	7/10/2016	3160018674	312829 DARK W/ STREET LIGHTS ON	DRY	CLEAR	45	MODDOT	158047973
ST. LOUIS	MO 21 S	1.525 REAR END	11/2/2016	216004209	311319 DAYLIGHT	WET	CLEAR	740		15805785
ST. LOUIS	CRD TELEGRAPH RDS	1.526 PASSING	9/20/2016	2160037016	312829 DAYLIGHT	DRY	CLEAR	1630		15791981
ST. LOUIS	CRD TELEGRAPH RDS	1.527 REAR END	9/24/2016	2160037586	312829 DARK W/ STREET LIGHTS ON	DRY	CLEAR	1900	OTHER	158035343
ST. LOUIS	MO 21 S	1.54 HEAD ON	12/5/2012	0120083667	311319 DARK W/ STREET LIGHTS ON	DRY	CLEAR	1940	OTHER	157597669
ST. LOUIS	CRD TELEGRAPH RDS	1.541 REAR END	4/3/2013	0130023254	312829 DAYLIGHT	DRY	CLEAR	840		157563325
ST. LOUIS	CRD TELEGRAPH RDS	1.542 REAR END	12/25/2016	2160055911	312829 DARK W/ STREET LIGHTS ON	DRY	CLEAR	1910		15795224
ST. LOUIS	MO 21 S	1.615 PARKING OR PARKED CAR	10/24/2016	2160044198	311570 DAYLIGHT	DRY	CLEAR	1353		158005773
ST. LOUIS	MO 21 S	1.633 U-TURN	9/12/2016	2160035701	311570 DAYLIGHT	DRY	CLEAR	925		158004349
ST. LOUIS	MO 21 S	1.634 SIDESWIPE	3/10/2012	0120029970	311570 DAYLIGHT	DRY	CLEAR	1665		157301620
ST. LOUIS	MO 21 S	1.637 REAR END	1/10/2013	0130010758	311570 DARK W/ STREET LIGHTS OFF	WET	RAIN	2025		157438227
ST. LOUIS	MO 21 S	1.638 REAR END	5/4/2013	0130028580	311570 DAYLIGHT	DRY	CLEAR	1204		157495208
ST. LOUIS	MO 21 S	1.686 REAR END	7/26/2016	2160027941	311718 DAYLIGHT	DRY	CLEAR	1753		158027033
ST. LOUIS	MO 21 S	1.69 DEER	1/18/2016	0160016520	311718 DARK W/ STREET LIGHTS ON	DRY	CLEAR	600		157971914
ST. LOUIS	MO 21 S	1.734 REAR END	5/8/2013	0130028963	311847 DAYLIGHT	DRY	CLEAR	740		157491792
ST. LOUIS	MO 21 S	1.735 U-TURN	2/23/2015	0150021650	311847 DAYLIGHT	DRY	CLEAR	730		157779748
ST. LOUIS	MO 21 S	1.741 OUT OF CONTROL	9/14/2016	2160035969	311847 DAYLIGHT	DRY	CLEAR	1112		157963440
ST. LOUIS	MO 21 S	1.769 OUT OF CONTROL	10/18/2014	0130064088	311991 DARK W/ STREET LIGHTS OFF	WET	RAIN	2220		15747207
ST. LOUIS	MO 21 S	1.788 REAR END	4/18/2014	0140035895	311991 DAYLIGHT	DRY	CLEAR	1535		157666041
ST. LOUIS	MO 21 S	1.788 DEER	2/25/2015	0150021852	311991 DARK W/ STREET LIGHTS OFF	DRY	CLEAR	530		157760647
ST. LOUIS	MO 21 S	1.788 REAR END	10/7/2016	2160040491	311991 DAYLIGHT	DRY	CLEAR	1637		158055333
ST. LOUIS	MO 21 S	1.82 CHANGING LANE	7/25/2014	0140054716	312117 DAYLIGHT	DRY	CLEAR	1914		157690702
ST. LOUIS	MO 21 S	1.839 DEER	1/16/2014	0150015586	312117 DARK W/ STREET LIGHTS ON	DRY	CLEAR	1820		157790985
ST. LOUIS	MO 21 S	1.839 DEER	7/29/2016	2160028404	312117 DARK W/ STREET LIGHTS OFF	DRY	CLEAR	2131		158001720
ST. LOUIS	MO 21 S	1.859 DEER	1/23/2016	0160016493	312117 DARK W/ STREET LIGHTS OFF	WET	CLEAR	15		157927263
ST. LOUIS	MO 21 S	1.844 OUT OF CONTROL	7/9/2012	0120051953	312117 DARK W/ STREET LIGHTS ON	WET	CLOUDY	235	OTHER	157572375
ST. LOUIS	MO 21 S	1.848 REAR END	10/31/2014	0140081105	312247 DAYLIGHT	DRY	CLEAR	1205		157721249
ST. LOUIS	MO 21 S	1.887 DEER	12/29/2014	0140084614	312247 DARK W/ STREET LIGHTS ON	DRY	CLEAR	1923		157718654
ST. LOUIS	MO 21 S	1.887 DEER	2/22/2016	0160019356	312247 DARK W/ STREET LIGHTS ON	DRY	CLEAR	1520		157972110
ST. LOUIS	MO 21 S	1.887 RIGHT TURN RIGHT ANGLE COLLISION	8/10/2016	2160030244	312247 DAYLIGHT	DRY	CLEAR	1520		158015692
ST. LOUIS	MO 21 S	1.889 REAR END	8/6/2016	2160030303	312247 DARK W/ STREET LIGHTS ON	DRY	CLOUDY	445		158015709
ST. LOUIS	MO 21 S	1.936 REAR END	10/31/2012	0160074330	312359 DAYLIGHT	DRY	CLEAR	1758		157383357
ST. LOUIS	MO 21 S	1.939 REAR END	3/22/2016	0160029788	312359 DAYLIGHT	DRY	CLEAR	1533		158004586
ST. LOUIS	MO 21 S	1.951 REAR END	12/22/2016	2160054839	312359 DARK W/ STREET LIGHTS ON	DRY	CLEAR	1945		157952340
ST. LOUIS	MO 21 S	1.957 U-TURN	7/11/2014	0140052909	312359 DAYLIGHT	DRY	CLEAR	1357		157668839
ST. LOUIS	MO 21 S	2.004 PARKING OR PARKED CAR	2/4/2014	0140011371	312485 DAYLIGHT	SNOW	SNOW	1635		157608641
ST. LOUIS	MO 21 S	2.009 SIDESWIPE	1/18/2012	0120079884	312485 DARK W/ STREET LIGHTS ON	DRY	CLOUDY	2325		157578470
ST. LOUIS	MO 21 S	2.07 REAR END	8/10/2013	0130050272	312552 DAYLIGHT	DRY	CLEAR	1600		157520966
ST. LOUIS	MO 21 S	2.07 REAR END	1/9/2015	0150021699	312552 DAYLIGHT	DRY	CLEAR	1400		157764401
ST. LOUIS	MO 21 S	2.078 HEAD ON	7/26/2012	0120036539	312552 DAYLIGHT	DRY	CLEAR	810		157440169
ST. LOUIS	MO 21 S	2.152 PARKING OR PARKED CAR	5/25/2012	0120038300	312669 DARK W/ STREET LIGHTS ON	DRY	CLEAR	0		157421777
ST. LOUIS	MO 21 S	2.161 PASSING	5/7/2012	0120033474	312669 DAYLIGHT	WET	RAIN	735		157486744
ST. LOUIS	MO 21 S	2.171 REAR END	6/17/2015	0150045719	312669 DAYLIGHT	DRY	CLOUDY	1610		157919876
ST. LOUIS	MO 21 S	2.196 PARKING OR PARKED CAR	10/21/2012	0120071119	312726 DARK W/ STREET LIGHTS ON	DRY	CLEAR	1845		157576758
ST. LOUIS	MO 21 S	2.202 REAR END	5/15/2015	0150038578	312726 DAYLIGHT	DRY	CLEAR	1110		157840201
ST. LOUIS	MO 21 S	2.205 HEAD ON	1/9/2012	0120014493	312726 DAYLIGHT	DRY	CLEAR	1400		157268422
ST. LOUIS	MO 21 S	2.205 LEFT TURN RIGHT ANGLE COLLISION	10/12/2016	2160041115	312726 DAYLIGHT	DRY	CLOUDY	1400		158038239
ST. LOUIS	MO 21 S	2.205 REAR END	3/5/2016	0160028154	312726 DAYLIGHT	DRY	CLOUDY	1012		158032661
ST. LOUIS	MO 21 S	2.205 REAR END	7/7/2016	2160025185	312726 DAYLIGHT	DRY	CLEAR	930		157972790
ST. LOUIS	MO 21 S	2.205 OUT OF CONTROL	4/14/2014	0140035221	312726 DAYLIGHT	DRY	CLEAR	1620	MODDOT	157656655
ST. LOUIS	MO 21 S	2.205 LEFT TURN RIGHT ANGLE COLLISION	3/17/2014	0140025562	312726 DAYLIGHT	DRY	CLEAR	830		157642410
ST. LOUIS	MO 21 S	2.205 RIGHT ANGLE	3/12/2014	0140024678	312726 DAYLIGHT	DRY	CLOUDY	916		157644388
ST. LOUIS	MO 21 S	2.205 REAR END	2/4/2014	0140011336	312726 DAYLIGHT	DRY	CLOUDY	650		157629503
ST. LOUIS	MO 21 S	2.205 OUT OF CONTROL	11/25/2015	0150085579	312726 DARK W/ STREET LIGHTS OFF	DRY	CLEAR	205	OTHER	157908673
ST. LOUIS	MO 21 S	2.205 PASSING	1/12/2012	0120015945	312726 DARK W/ STREET LIGHTS ON	SNOW	CLOUDY	745		157230943
ST. LOUIS	MO 21 S	2.205 REAR END	4/16/2012	0120032608	312726 DAYLIGHT	DRY	CLEAR	1230		157222733
ST. LOUIS	MO 21 S	2.205 SIDESWIPE	5/24/2012	0120041404	312726 DAYLIGHT	DRY	CLEAR	2010		157574785
ST. LOUIS	MO 21 S	2.205 LEFT TURN	11/28/2012	0120081240	312726 DARK W/ STREET LIGHTS ON	DRY	CLEAR	1800		157577173
ST. LOUIS	MO 21 S	2.209 PASSING	4/2/2013	0130023241	312726 DAYLIGHT	DRY	CLEAR	1430		157479052
ST. LOUIS	MO 21 S	2.266 OUT OF CONTROL	5/25/2013	0130034944	1020471 DAYLIGHT	DRY	CLOUDY	1320	OTHER	157538471
ST. LOUIS	MO 21 S	2.275 HEAD ON	9/22/2016	2160037575	312829 DAYLIGHT	DRY	CLEAR	1500		158035332
ST. LOUIS	MO 21 S	2.28 LEFT TURN RIGHT ANGLE COLLISION	5/5/2012	0120034986	312829 DARK W/ STREET LIGHTS ON	DRY	CLEAR	2034		157373333
ST. LOUIS	MO 21 S	2.28 PEDESTRIAN	8/7/2016	2160029793	312829 DAYLIGHT	DRY	CLOUDY	1950		157940539
ST. LOUIS	MO 21 S	2.28 REAR END	4/25/2016	2160013048	312829 DAYLIGHT	DRY	CLEAR	1800		157935726
ST. LOUIS	MO 21 S	2.28 LEFT TURN	4/27/2016	2160013637	312829 DAYLIGHT	DRY	CLOUDY	1020		157935554
ST. LOUIS	MO 21 S	2.28 REAR END	8/26/2016	0140083684	312829 DAYLIGHT	DRY	CLOUDY	1715		157942871
ST. LOUIS	MO 21 S	2.28 REAR END	12/29/2014	0140085438	312829 DAYLIGHT	DRY	CLEAR	1145		157724077
ST. LOUIS	MO 21 S	2.28 LEFT TURN RIGHT ANGLE COLLISION	12/31/2015	0150091559	312829 DAYLIGHT	DRY	CLOUDY	1404		157900088
ST. LOUIS	MO 21 S	2.28 REAR END	6/30/2015	0150045651	312829 DAYLIGHT	DRY	CLEAR	1653		157865579
ST. LOUIS	MO 21 S	2.28 PASSING	7/9/2015	0150052543	312829 DAYLIGHT	DRY	CLEAR	1145		157872771
ST. LOUIS	MO 21 S	2.28 LEFT TURN RIGHT ANGLE COLLISION	4/26/2015	0150032125	312829 DARK W/ STREET LIGHTS ON	DRY	CLEAR	2035		157805319
ST. LOUIS	MO 21 S	2.28 REAR END	12/11/2014	0140083403	312829 DAYLIGHT	DRY	CLEAR	835		157719489

ST. LOUIS	MO 21 S	2.28	DUAL LEFTS COLLIDE	10/16/2014	MINOR INJURY	0140078725	312829 DAYLIGHT	DRY	1100	0	157723074
ST. LOUIS	MO 21 S	2.28	REAR END	12/11/2013	PROPERTY DAMAGE ONLY	0130075894	312829 DARK W/ STREET LIGHTS ON	DRY	1815	0	157538586
ST. LOUIS	MO 21 S	2.28	REAR END	9/20/2013	PROPERTY DAMAGE ONLY	0130058339	312829 DAYLIGHT	WET	1430	0	157538469
ST. LOUIS	MO 21 S	2.28	OTHER	3/12/2013	PROPERTY DAMAGE ONLY	0130018161	312829 DAYLIGHT	SLUSH	1151	OTHER	0
ST. LOUIS	MO 21 S	2.28	HEAD ON	12/15/2013	MINOR INJURY	0120066671	312829 DARK W/ STREET LIGHTS ON	ICE	1800	0	157538629
ST. LOUIS	MO 21 S	2.28	REAR END	9/25/2012	PROPERTY DAMAGE ONLY	0120066671	312829 DAYLIGHT	DRY	1330	0	157398108
ST. LOUIS	MO 21 S	2.28	REAR END	9/12/2012	PROPERTY DAMAGE ONLY	0120064300	312829 DAYLIGHT	DRY	805	0	157373335
ST. LOUIS	MO 21 S	2.28	HEAD ON	6/9/2012	PROPERTY DAMAGE ONLY	0120045162	312829 DAYLIGHT	DRY	1355	0	157599436
ST. LOUIS	MO 21 S	2.28	HEAD ON	2/29/2012	PROPERTY DAMAGE ONLY	0120024238	312829 DARK W/ STREET LIGHTS ON	DRY	1840	0	157291701
ST. LOUIS	MO 21 S	2.28	REAR END	6/4/2012	MINOR INJURY	0120044520	312829 DAYLIGHT	DRY	1230	0	157466265
ST. LOUIS	MO 21 S	2.28	REAR END	10/31/2016	MINOR INJURY	2160044202	312829 DAYLIGHT	DRY	1045	0	158005776
ST. LOUIS	MO 21 S	2.28	LEFT TURN RIGHT ANGLE COLLISION	6/20/2016	MINOR INJURY	2160022460	312829 DAYLIGHT	DRY	745	0	158011293
ST. LOUIS	MO 21 S	2.295	REAR END	12/30/2016	PROPERTY DAMAGE ONLY	0120090093	312829 DARK W/ STREET LIGHTS ON	DRY	1718	0	157389532
ST. LOUIS	MO 21 S	2.295	REAR END	7/29/2016	MINOR INJURY	2160028453	312829 DAYLIGHT	DRY	1021	0	158011295
ST. LOUIS	MO 21 S	2.298	PASSING	2/6/2015	PROPERTY DAMAGE ONLY	0150019800	312965 DAYLIGHT	DRY	1558	0	157845664
ST. LOUIS	MO 21 S	2.301	REAR END	11/4/2016	PROPERTY DAMAGE ONLY	2160044367	312965 DAYLIGHT	DRY	1430	0	157981511
ST. LOUIS	MO 21 S	2.313	LEFT TURN RIGHT ANGLE COLLISION	10/14/2016	DISABLING INJURY	2160040854	312965 DAYLIGHT	DRY	1150	0	158025551
ST. LOUIS	MO 21 S	2.314	REAR END	4/7/2012	MINOR INJURY	0120029988	312965 DAYLIGHT	DRY	1235	0	157298282
ST. LOUIS	MO 21 S	2.314	REAR END	10/28/2016	PROPERTY DAMAGE ONLY	2160043181	312965 DAYLIGHT	DRY	1400	0	157985622
ST. LOUIS	MO 21 S	2.314	REAR END	8/13/2015	MINOR INJURY	0150059378	312965 DAYLIGHT	DRY	1845	0	157896229
ST. LOUIS	MO 21 S	2.314	REAR END	9/16/2012	PROPERTY DAMAGE ONLY	0120065781	312965 DAYLIGHT	DRY	1153	0	157398111
ST. LOUIS	MO 21 S	2.319	REAR END	9/22/2012	PROPERTY DAMAGE ONLY	0120066617	312965 DAYLIGHT	DRY	1430	0	157369475
ST. LOUIS	MO 21 S	2.329	REAR END	10/27/2016	PROPERTY DAMAGE ONLY	2160043180	312965 DAYLIGHT	DRY	1310	0	157985660
ST. LOUIS	MO 21 S	2.379	PEDAL CYCLE	11/17/2016	DISABLING INJURY	2160051149	313165 DAYLIGHT	DRY	1443	0	158046299
ST. LOUIS	MO 21 S	2.384	OUT OF CONTROL	12/4/2012	PROPERTY DAMAGE ONLY	0120062150	313165 DARK W/ STREET LIGHTS ON	WET	2155	0	157469556
ST. LOUIS	MO 21 S	2.384	REAR END	5/7/2014	PROPERTY DAMAGE ONLY	0140038065	313165 DAYLIGHT	DRY	752	0	157663996
ST. LOUIS	MO 21 S	2.384	OUT OF CONTROL	11/29/2012	PROPERTY DAMAGE ONLY	0120081269	313165 DAYLIGHT	DRY	1520	OTHER	0
ST. LOUIS	MO 21 S	2.388	REAR END	8/11/2012	PROPERTY DAMAGE ONLY	0120058296	313165 DAYLIGHT	DRY	1913	0	157550589
ST. LOUIS	MO 21 S	2.388	HEAD ON	5/15/2014	PROPERTY DAMAGE ONLY	0140041297	313165 DAYLIGHT	WET	1800	0	157674770
ST. LOUIS	MO 21 S	2.391	REAR END	11/4/2016	PROPERTY DAMAGE ONLY	2160044541	313165 DARK W/ STREET LIGHTS ON	DRY	2250	0	157987693
ST. LOUIS	MO 21 S	2.394	REAR END	9/24/2015	PROPERTY DAMAGE ONLY	0150067442	313165 DAYLIGHT	DRY	1840	0	157824654
ST. LOUIS	MO 21 S	2.394	PEDISTRAN	8/19/2015	MINOR INJURY	0150059608	313165 DARK W/ STREET LIGHTS OFF	DRY	2150	0	157959229
ST. LOUIS	MO 21 S	2.397	PASSING	9/15/2012	PROPERTY DAMAGE ONLY	0120064384	313165 DAYLIGHT	DRY	1520	0	157469745
ST. LOUIS	MO 21 S	2.398	OTHER	2/23/2012	PROPERTY DAMAGE ONLY	0120023253	313165 DAYLIGHT	DRY	950	0	157282950
ST. LOUIS	MO 21 S	2.399	REAR END	11/24/2013	PROPERTY DAMAGE ONLY	0130070803	313165 DAYLIGHT	DRY	1210	0	157559986
ST. LOUIS	MO 21 S	2.403	LEFT TURN	5/17/2012	MINOR INJURY	0120037449	313165 DAYLIGHT	DRY	1515	0	157342306
ST. LOUIS	MO 21 S	2.403	PASSING	6/15/2016	PROPERTY DAMAGE ONLY	2160021478	313165 DAYLIGHT	DRY	2000	0	157982746
ST. LOUIS	MO 21 S	2.403	REAR END	11/6/2016	PROPERTY DAMAGE ONLY	0140044365	313165 DARK W/ STREET LIGHTS ON	DRY	1700	0	157981510
ST. LOUIS	MO 21 S	2.403	RIGHT ANGLE	10/13/2016	PROPERTY DAMAGE ONLY	2160040852	313165 DAYLIGHT	DRY	1639	0	158025550
ST. LOUIS	MO 21 S	2.403	LEFT TURN	8/19/2016	PROPERTY DAMAGE ONLY	2160031751	313165 DAYLIGHT	DRY	1420	0	158001374
ST. LOUIS	MO 21 S	2.403	REAR END	6/29/2016	MINOR INJURY	2160023474	313165 DARK W/ STREET LIGHTS ON	DRY	420	0	158004865
ST. LOUIS	MO 21 S	2.403	REAR END	5/3/2016	PROPERTY DAMAGE ONLY	2160014660	313165 DAYLIGHT	DRY	953	1713506	162710470
ST. LOUIS	MO 21 S	2.403	REAR END	12/18/2014	PROPERTY DAMAGE ONLY	0140083198	313165 DARK W/ STREET LIGHTS ON	DRY	1735	0	157708334
ST. LOUIS	MO 21 S	2.403	REAR END	12/1/2014	PROPERTY DAMAGE ONLY	0140082498	313165 DAYLIGHT	ICE	730	0	157710106
ST. LOUIS	MO 21 S	2.403	REAR END	9/22/2014	PROPERTY DAMAGE ONLY	0140069576	313165 DAYLIGHT	DRY	755	0	157720770
ST. LOUIS	MO 21 S	2.403	LEFT TURN	5/4/2014	PROPERTY DAMAGE ONLY	0140038008	313165 DAYLIGHT	DRY	1700	0	157663394
ST. LOUIS	MO 21 S	2.403	REAR END	11/23/2015	MINOR INJURY	0150085369	313165 DAYLIGHT	DRY	723	0	157907999
ST. LOUIS	MO 21 S	2.403	PEDAL CYCLE	11/17/2015	MINOR INJURY	0150084129	313165 DARK W/ STREET LIGHTS ON	WET	1650	0	157892422
ST. LOUIS	MO 21 S	2.403	REAR END	12/11/2015	PROPERTY DAMAGE ONLY	0150090995	313165 DARK W/ STREET LIGHTS ON	DRY	415	0	157870803
ST. LOUIS	MO 21 S	2.403	LEFT TURN RIGHT ANGLE COLLISION	12/2/2015	PROPERTY DAMAGE ONLY	0150090392	313165 DAYLIGHT	DRY	1300	0	157887909
ST. LOUIS	MO 21 S	2.403	REAR END	9/15/2015	PROPERTY DAMAGE ONLY	0150070745	313165 DAYLIGHT	DRY	1720	0	157902910
ST. LOUIS	MO 21 S	2.403	LEFT TURN RIGHT ANGLE COLLISION	6/19/2015	PROPERTY DAMAGE ONLY	0150045414	313165 DAYLIGHT	WET	1158	0	157918523
ST. LOUIS	MO 21 S	2.403	LEFT TURN	6/4/2015	PROPERTY DAMAGE ONLY	0150044103	313165 DAYLIGHT	WET	1345	0	157866083
ST. LOUIS	MO 21 S	2.403	LEFT TURN	5/5/2015	PROPERTY DAMAGE ONLY	0150034664	313165 DAYLIGHT	DRY	1310	0	157951652
ST. LOUIS	MO 21 S	2.403	LEFT TURN	4/30/2015	PROPERTY DAMAGE ONLY	0150032331	313165 DAYLIGHT	DRY	738	0	157827192
ST. LOUIS	MO 21 S	2.403	RIGHT ANGLE	2/9/2015	PROPERTY DAMAGE ONLY	0150019833	313165 DARK W/ STREET LIGHTS ON	DRY	2150	0	157855478
ST. LOUIS	MO 21 S	2.403	HEAD ON	3/12/2014	MINOR INJURY	0140024691	313165 DAYLIGHT	DRY	1750	0	157644393
ST. LOUIS	MO 21 S	2.403	REAR END	6/29/2013	PROPERTY DAMAGE ONLY	0130075923	313165 DARK W/ STREET LIGHTS ON	SNOW	2205	0	157538632
ST. LOUIS	MO 21 S	2.403	REAR END	12/13/2013	PROPERTY DAMAGE ONLY	0130042448	313165 DAYLIGHT	DRY	1320	0	157506675
ST. LOUIS	MO 21 S	2.403	REAR END	6/19/2013	PROPERTY DAMAGE ONLY	0130039432	313165 DAYLIGHT	DRY	1530	0	157868229
ST. LOUIS	MO 21 S	2.403	REAR END	4/6/2013	PROPERTY DAMAGE ONLY	0130023311	313165 DAYLIGHT	DRY	1130	0	157537691
ST. LOUIS	MO 21 S	2.403	REAR END	1/19/2013	PROPERTY DAMAGE ONLY	0130011064	313165 DAYLIGHT	DRY	1554	0	157451523
ST. LOUIS	MO 21 S	2.403	PASSING	1/18/2013	PROPERTY DAMAGE ONLY	0130011034	313165 DAYLIGHT	DRY	1240	0	157451311
ST. LOUIS	MO 21 S	2.403	SIDESWIPE	11/11/2012	PROPERTY DAMAGE ONLY	0120079110	313165 DARK W/ STREET LIGHTS ON	WET	1915	0	157176855
ST. LOUIS	MO 21 S	2.403	OUT OF CONTROL	10/31/2012	PROPERTY DAMAGE ONLY	0120074313	313165 DAYLIGHT	RAIN	740	MOODOT	0
ST. LOUIS	MO 21 S	2.403	OUT OF CONTROL	6/10/2012	PROPERTY DAMAGE ONLY	0120043175	313165 DAYLIGHT	DRY	1430	0	157467042
ST. LOUIS	MO 21 S	2.404	REAR END	3/19/2012	PROPERTY DAMAGE ONLY	0120026728	313165 DAYLIGHT	DRY	1540	0	157948885
ST. LOUIS	MO 21 S	2.412	OUT OF CONTROL	8/26/2012	MINOR INJURY	0120062887	313165 DAYLIGHT	DRY	1540	0	157948885
ST. LOUIS	MO 21 S	2.412	PASSING	6/30/2015	PROPERTY DAMAGE ONLY	0150049656	313165 DAYLIGHT	DRY	1845	0	157666824
ST. LOUIS	MO 21 S	2.422	LEFT TURN	11/6/2015	PROPERTY DAMAGE ONLY	0150011422	313165 DAYLIGHT	DRY	1609	0	157846182
ST. LOUIS	MO 21 S	2.427	LEFT TURN RIGHT ANGLE COLLISION	5/6/2013	MINOR INJURY	0130028927	313165 DAYLIGHT	DRY	735	0	157495539
ST. LOUIS	MO 21 S	2.599	PASSING	11/9/2013	PROPERTY DAMAGE ONLY	0130068572	313718 DAYLIGHT	DRY	935	0	157540705
ST. LOUIS	MO 21 S	2.614	REAR END	9/9/2014	PROPERTY DAMAGE ONLY	0140067399	313718 DAYLIGHT	DRY	1110	0	157733732

ST. LOUIS	MO 231 S	2.618	REAR END	11/6/2012	PROPERTY DAMAGE ONLY	0120078104	313718	DAYLIGHT	WET	CLOUDY	6256	TUE	1635	0	15784158
ST. LOUIS	MO 231 S	2.618	REAR END	12/3/2015	MINOR INJURY	0150017006	313718	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256	FRI	1800	0	157815405
ST. LOUIS	MO 231 S	2.618	RIGHT ANGLE	11/29/2015	PROPERTY DAMAGE ONLY	0150085999	313718	DARK W/ STREET LIGHTS OFF	WET	CLOUDY	6256	SUN	1743	0	157913685
ST. LOUIS	MO 231 S	2.618	OUT OF CONTROL	5/15/2014	MINOR INJURY	0140041279	313718	DARK W/ STREET LIGHTS ON	WET	CLOUDY	6256	THU	200	OTHER	157675348
ST. LOUIS	MO 231 S	2.618	REAR END	11/12/2012	PROPERTY DAMAGE ONLY	0120079131	313718	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256	MON	2015	0	157768653
ST. LOUIS	MO 231 S	2.621	PASSING	5/23/2014	PROPERTY DAMAGE ONLY	0140042553	313718	DAYLIGHT	DRY	CLEAR	6256	FRI	1843	0	157680997
ST. LOUIS	MO 231 S	2.625	REAR END	4/12/2015	PROPERTY DAMAGE ONLY	0150030140	313718	DAYLIGHT	DRY	CLEAR	6256	WED	1300	0	157781821
ST. LOUIS	MO 231 S	2.627	REAR END	7/26/2012	PROPERTY DAMAGE ONLY	0120054595	313718	DAYLIGHT	DRY	CLOUDY	6256	THU	9999	0	15705849
ST. LOUIS	MO 231 S	2.664	REAR END	8/20/2016	DISABLING INJURY	2160031811	313879	DAYLIGHT	DRY	CLEAR	6256	SAT	1030	0	158000779
ST. LOUIS	MO 231 S	2.665	HEAD ON	8/11/2015	MINOR INJURY	0150059296	313879	DAYLIGHT	DRY	CLEAR	6256	TUE	1825	0	157925308
ST. LOUIS	MO 231 S	2.667	REAR END	4/4/2014	PROPERTY DAMAGE ONLY	0140025783	313879	DARK W/ STREET LIGHTS ON	DRY	CLEAR	6256	FRI	2130	0	157648895
ST. LOUIS	MO 231 S	2.674	REAR END	10/13/2016	PROPERTY DAMAGE ONLY	2160042521	313879	DAYLIGHT	DRY	CLEAR	6256	THU	1230	0	158003572
ST. LOUIS	MO 231 S	2.674	REAR END	4/14/2012	MINOR INJURY	0120032124	313879	DAYLIGHT	DRY	CLEAR	6256	THU	1728	0	157292699
ST. LOUIS	MO 231 S	2.674	REAR END	7/29/2015	MINOR INJURY	0150053384	313879	DAYLIGHT	DRY	CLEAR	6256	WED	1224	0	157900128
ST. LOUIS	MO 231 S	2.674	REAR END	10/15/2015	PROPERTY DAMAGE ONLY	0150075796	313879	DAYLIGHT	DRY	CLEAR	6256	THU	1145	0	157921486
ST. LOUIS	MO 231 S	2.674	HEAD ON	9/20/2013	PROPERTY DAMAGE ONLY	0130058517	313879	DAYLIGHT	WET	RAIN	6256	FRI	1125	0	157520581
ST. LOUIS	MO 231 S	2.674	REAR END	4/4/2012	PROPERTY DAMAGE ONLY	0120029719	313879	DAYLIGHT	DRY	CLOUDY	6256	WED	1055	0	157298758
ST. LOUIS	MO 231 S	2.677	REAR END	6/23/2013	PROPERTY DAMAGE ONLY	0130040575	313879	DAYLIGHT	DRY	CLEAR	6256	SUN	1400	0	157133929
ST. LOUIS	MO 231 S	2.766	REAR END	3/2/2016	PROPERTY DAMAGE ONLY	0160023951	314100	DAYLIGHT	DRY	CLEAR	6256	WED	1006	0	158018853
ST. LOUIS	MO 231 S	2.768	REAR END	12/14/2014	MINOR INJURY	0140082965	314100	DARK W/ STREET LIGHTS OFF	DRY	CLEAR	6256	SUN	1916	0	157713386
ST. LOUIS	MO 231 S	2.768	REAR END	7/21/2016	DISABLING INJURY	2160028201	314100	DAYLIGHT	DRY	CLEAR	6256	THU	1515	0	158043067
ST. LOUIS	MO 231 S	2.768	REAR END	11/26/2014	PROPERTY DAMAGE ONLY	0140082036	314100	DARK W/ STREET LIGHTS OFF	WET	CLOUDY	6256	WED	1630	0	157706966
ST. LOUIS	MO 231 S	2.768	REAR END	5/15/2015	MINOR INJURY	0150038765	314100	DAYLIGHT	DRY	CLOUDY	6256	FRI	1924	0	157814928
ST. LOUIS	MO 231 S	2.777	OUT OF CONTROL	12/9/2012	DISABLING INJURY	0120084899	314100	DARK W/ STREET LIGHTS OFF	WET	CLOUDY	6256	SUN	107	OTHER	157397868
ST. LOUIS	MO 231 S	2.815	DEER	11/11/2014	PROPERTY DAMAGE ONLY	0140081199	314226	DARK W/ STREET LIGHTS OFF	DRY	CLEAR	6256	TUE	2314	0	157713782
ST. LOUIS	MO 231 S	2.822	OUT OF CONTROL	3/29/2014	MINOR INJURY	0140027914	314226	DAYLIGHT	DRY	CLOUDY	6256	SAT	1415	OTHER	157649873
ST. LOUIS	MO 231 S	2.824	DEER	1/24/2012	MINOR INJURY	0120017852	314226	DAYLIGHT	DRY	CLEAR	6256	TUE	752	0	157266513

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