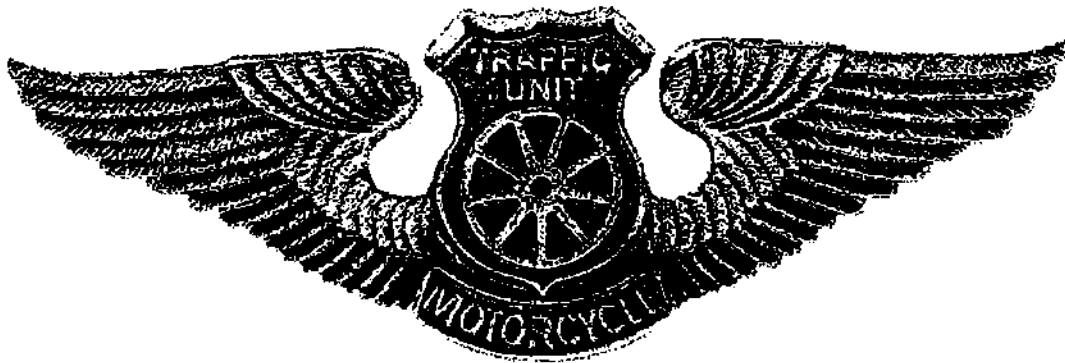


VEHICLE
ACCIDENT
REDUCTION
PLAN



BANNISTER ROAD
AND
INTERSTATE 435

MARCH, 1997

TRAFFIC ENFORCEMENT UNIT
KANSAS CITY, MISSOURI
POLICE DEPARTMENT

The Kansas City, Missouri Police

Departments

Nomination

For The

1997 Herman

Goldstein Award for

Excellence

in

Problem-Oriented

Policing

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Recommendation For the 1997 Herman Goldstein Award For Excellence

Abstract

Scanning

This project deals with an area of Kansas City, Missouri that has consistently placed in the top five of the twenty most hazardous locations within the City, for the past twelve months. Analysis found that the area experienced 688 accidents in 1996 of which five were fatalities, and 124 were injuries.

Analysis

Analysis of this project was done using computer stored data from accidents reported, physical review of reports for factors causing the accidents. Interviews were conducted with field officers, accident investigators, community groups, and a physical study of the effected area was undertaken. During the analysis phase it was found that several factors including operator error and physical roadway flaws contributed to the accident rate. Discussions concluded that to have an affect on the problem, multiple approaches would be necessary.

Response

P.O. Thomas Frisby, finding no specific models to deal with this type of traffic problem, developed what is termed Vehicle Accident Reduction System (VARS), as a model to attack this problem. Alternatives looked at were, strict enforcement, however this approach had, had little effect on the problem in the past, and a multi faceted approach of enforcement, roadway improvements, speed changes, sign upgrade, and education. The later was the selected method.

Assessment

Using an initial approach of static police presence and selected enforcement for 16 hours per day Monday through Friday, accidents were reduced in selected areas of the project area by 36.3%. This approach being used until roadway changes were in place. Initial assessment found that in a specific area where a majority of roadway improvements would be made, a 0% increase was experienced.

Recommendation For The 1997 Herman Goldstein Award For Excellence

Scanning

Bannister Road at I-435 during 1996 had a total of 317 vehicular accidents of which 2 were fatalities, 55 were injuries, and 260 resulted in property damage. In addition I-435 between 87th street and the triangle of I-435, I-470, and U.S. 71 Highway experienced a total of 531 vehicular accidents of these 5 were fatalities, 124 were injuries and 405 resulted in property damage. Further it was determined that the two mile span of I-435 mentioned and one mile of roadway on Bannister Road from the intersection of Bannister Road and I-435 experienced a total of 688 vehicular accidents.

This problem was identified by P.O. Thomas Frisby after recognizing that there were a significant number of fatal, injury, and property damage accidents in the area, even after significant enforcement action was taken throughout a twelve month period. This area both on Bannister Road and I-435 repeatedly appeared on the twenty most hazardous locations within the City of Kansas City. The initial level of diagnosis was derived from the hazardous location lists and personal observations of P.O. Frisby. At the same time the Kansas City, Missouri Police Department as a whole implemented Community Oriented Policing (COP) within the department at all levels. In the spirit of embracing this philosophy, P.O. Frisby took it upon himself to tackle this problem. Noted was a peculiar problem to the project, in that the area examined was split between the Missouri Department of Transportation and the engineering department of the City of Kansas City.

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Analysis

An analysis of the problem was done using a model developed by P.O. Frisby, and termed Vehicle Accident Reduction System (VARs) which incorporates five stages, identified as, 1) Identification and Research, 2) Plan of Action, 3) Education, 4.) Enforcement, and 5.) Assessment. The VARs study was done using vehicular accident reports statistics, contained in the department computer system, examination of each accident report, interviews with citizens, and police officers both district and accident investigation specialists, and physical observation and study of the affected roadway. The study revealed several factors that were reoccurring or a constant contributor to the accidents. The most prominent factor found was that 99% of the accidents involved a violation of the city traffic code, by one or more of the drivers involved. The four most prominent violations were, 1.) speeding, 2.) following to closely to another vehicle, 3.) violation of the sign/signal, and 4.) failing to yield the right of way. The study also revealed that the dynamics of the involved roadway contribute to the reoccurring accident problem. It was found that on the span of Bannister Road controlled by the City of Kansas City and the State of Missouri there were no posted speed limit signs. Signs that designate entrance turn lanes onto the interstate were small, posted to high for drivers to notice, and or posted in such a way that they are concealed by traffic control devices or other signs. Lane designation striping, turn arrows on the road surface, and orange warning striping were faded, or non existent. It was also determined, in the opinion of law enforcement, that the designated speed limit was to high for conditions on Bannister Road, in that not all lanes were through lanes and to negotiate the changes necessary

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to enter turn lanes or through lanes could not be done safely at existing speed limits. Found on the interstate was that signs indicating lane position, for successful negotiation of the three highway interchange were positioned in such a way that did not allow drivers sufficient time to maneuver for the proper lanes.

As stated, the identified area remained a problem area for the prior twelve month period. Examination revealed that for a number of years prior 1996 the targeted area continued to increase in the number of accidents each year.

Involved in this problem were the innocent families of the 7 fatality victims, and the 179 injury victims. Additionally, affected are the law enforcement resources expended to handle the 688 total accidents for 1996, the loss of property and life that will without doubt effect the auto insurance and health insurance industry, and the citizens of Kansas City, and State of Missouri who bear the financial burden for property loss to those entities. In Addition the citizens of the city who lose the service of their police officer while attending to this preventable problem.

Prior to this study the problem was being dealt with through enforcement action only. The results were significant numbers of citations being issued with little change in the number of accidents. The analysis revealed that the problem existed due to not only violations of the traffic code, but engineering problems. The information needed for this project was, 1.) what traffic violation contributed to the accidents, 2.) what were the predominate time of the occurrences, and 3.) what physical conditions contributed to the accident occurrence. Discussions were held with the community groups in the effected area, and due to a large portion of the targeted area being around the largest retail

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shopping mall in the city, meetings were held with the operational staff of the mall and the merchants association.

Response

Possible response alternatives considered to deal with the problem were to continue with 1.) just traffic enforcement, 2.) traffic enforcement and speed changes, and the program selected 3.) enforcement, speed limit, roadway , sign, and signal timing changes, coupled with education of the motoring public. In addition the concept of an Accident Reduction Zone was developed by P.O. Frisby. Whereby the targeted area can be labeled through signs which remind drivers they are entering a high accident area and extra caution should be exercised. The response that was selected was done so after careful consideration of all factors. Believed by all participants in the analysis, the only true way to reduce accidents in the targeted area and maintain a reduction, was to approach the problem from all contributing factors. The most important criteria to the police department, before implementation of response alternatives, was the reduction of accidents in this area, which in turn would bring about a greater level of safety and satisfaction to the citizens of the city. Resources made available from the police department in the accomplishment of the project was unlimited use of computer resources, all necessary manpower and equipment, graphic arts, and printing and publication. The intended goal after full implementation of the plan is to reduce total accidents 75%, reduce fatal accidents by 90% and raise the level of confidence and safety to citizens who use these roadways, that they can safely traverse the area without fear of becoming involved in a traffic accident. These goals would be measured by

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comparison of prior year statistics of accidents, meeting with community groups, merchants, and conducting random sampling of motorists who use the targeted roadways. Prior to implementation of the plan, static display of marked police vehicles were introduced into selected areas of the targeted zone. Selected enforcement activities were also conducted. Levels of marked police units passing through the area were increased as much as possible. It should be stated, that during prior enforcement action, officers were in the area for short periods of time, under one hour, and would patrol the area in a random manner. Static displays were placed in the area as an initial presence for 16 hours per day, Monday through Fridays. The greatest difficulty encountered during the implementation phase of the plan was funding for the changes that were recommended, and agreed upon to the physical roadway, also, visual sign changes and placement. Necessary funding would come from the operating budget of the State Transportation Department, and the Engineering Department of the City of Kansas City. In addition, to affect a change in speed limits in the city controlled portion of the project area, it would be necessary to seek a change in the traffic ordinance from the City Council. Further, due to traffic control signals in the area being operated by electronic programming it would necessitate a programming change on the part of the city. With summer being a high demand time for transportation workers it was recognized and accepted that delays would come about. Those involved in the response to this plan were the State of Missouri, Department of Transportation, Mr. Steve Worley, P.E., Traffic Engineer, Mr Garland K. Wong, P.E., District Traffic Studies Engineer, and Mr. Hank Kruli, P.E., Field Liaison Engineer, the City of Kansas City, Public Works Department, Street and Traffic

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Division, Mr. Jerry Nelson, P.E., Traffic Engineer, Mr. Kerri Kanatzer, P.E., Traffic Engineer and, those in the police department from the Board of Police Commissioners to the police officer on the street, community groups, merchants, and the news media.

Assessment

Due to ongoing implementation of agreed upon changes in the plan, an assessment was done to evaluate the effect of the static display of marked police vehicles, selective enforcement, and increased presence of police vehicles in the area, prior to the beginning of changes. It was thought that during this change an overall reduction of 10% in accidents would be realized in the target area. Using accidents reported for the first five months of 1997 compared to the same period in 1996, it was found that our initial approach, reduced accidents in selected area of the target zone by 36.3%. Fatal accidents were reduced by 100%. Of particular note however, was an area of the targeted zone that would encompass the most significant changes to the roadway. This area was found to have a 0% change in that accidents were exactly the same for both years. Involved in the evaluation was law enforcement compiling the data, with findings disseminated to prior participants. Problems implementing the response plan as were previously stated, delays in engineering work scheduling, traffic control programming, new speed ordinance, and procurement of signs, were and are being experienced. Initial response goals were exceeded for the initial phase of the project. The response could have been more effective if three or more of the recommended changes could have been accomplished prior to initial assessment. No concern was made about displacement due to the uniqueness of this problem. The response will

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require continued monitoring after all responses are in place. Recognized by all participants that adjustments may be necessary to the response to achieve the desired goals and to maintain or increase result. It is firmly believed after review of initial analysis that original program goals are attainable.

Agency and Officer Information

This project has been adopted by all levels of the Kansas City, Missouri Police Department. Prior to implementation of this plan participants had received in prior years introductory training in problem oriented policing. No formal training has been conducted, to this point, during the plans execution. No additional incentives have been given to officers that are involved in this plan. To the contrary, this plan began as an initial response to the concept of Community Oriented Policing (COP) which was adopted by the Kansas City, Missouri Police Department and it's Commissioners in January 1997. The written SARA model was used to initiate the problem solving in this plan, and was enhanced by P.O Frisby into the Vehicle Accident Reduction (VARs) model. No existing information was found to address this type of traffic problem that the VARs plan confronts. No problems were found with the basic problem-oriented policing, or problem-solving model. What was difficult was defining how the basic models could be adapted to accomplish a traffic related problem of reducing accidents. Resources used by the department was the expenditure of approximately 1,200 man hours for static presence, data collecting and analysis, planning sessions with outside agencies, computer time for data collection, and graphic design for project area warning signs. Resource areas

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outside the department are being expended by the State of Missouri, and the City of Kansas City. These include speed limit sign changes, directional sign changes, roadway enhancement markings, and programming of traffic signals.

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The Problem

EXECUTIVE SUMMARY

Accident Reduction - interstate 435 and Bannister Road

02-26-97

Problem

The intersection of Interstate 435 and Bannister Road has been at the top of the high accident location list for the past several years. In 1996 alone there were 160 accident reports generated from this intersection. A study revealed that within a one and half mile radius the number of accidents more than doubles. (Annex One) The sheer amount of man-hours expended by emergency response personnel responding to these locations, because of recurring accidents, is astonishing. This does not include the time and resources lost by the State Highway Department and the City Public Works Department who must respond and repair damaged property caused by these recurring accidents. The funds spent on continuous repairs there could be better spent on new construction or general roadway maintenance. The amount of personal injury, death and property inflicted at this one location is unacceptable and unnecessary. The thought of an incident occurring at this location, which have resulted in death, injuries and damaged property, which is currently at a rate of approximately one per day should be reason enough to address the problem. If the amount of economic development that has been occurring in this area is to continue, then citizens should have a reasonable expectation that a safe passage through the area is not only possible but probable.

Factors Bearing on the Problem

An extensive study utilizing the "Vehicular Accident Reduction System", V.A.R.S., (Annex 2), was conducted on Bannister Road from Hillcrest Road to Marion Park Drive. Also involved in the study was Interstate 435 from 87th Street to Hickman Mills Drive. The V.A.R.S. study revealed numerous factors which either keep reoccurring or are a constant contributor to these accidents. The most prominent contributing factor revealed, was that ninety-nine percent (99%) of the accidents involved a violation of the city traffic code, by one or more of the operators involved. The four most prominent violations rated were: 1) speeding, 2) following to closely to another vehicle, 3) violation of the sign/signal, and 4) failing to yield the right-of-way. The V.A.R.S. study also revealed that the dynamics of the involved roadways contribute to the recurring accident problem. (Annex 3)

When traveling westbound on Bannister Road, beginning at Hillcrest Road, the street widens from two (2) traffic lanes to four (4) and sometimes five (5) traffic lanes. At various locations throughout this stretch of road, through traffic lanes suddenly become turn only lanes. This forces traffic to make rash and sudden stops and or sudden lane changes. The same type of incidents occur while traveling eastbound on Bannister Road from Marion Park Drive.. The study found that signs which would properly warn motorist about these changes in the traffic flow are lacking or inadequate. This factor results in irrational and unsafe operation of vehicles. Next, the study revealed the posted speed limit of forty-five (45)MPH through this stretch of Bannister Road is unreasonably high and unsafe. Between Hillcrest Road and Marion Park Drive, there exists eighteen (18) private business drives, city streets and interstate ramps which access Bannister Road, two of which are major exiting points for Bannister Mali. When you couple this with the sixteen (16) traffic signal controlled intersections, including ten (10) for left turns only, you have created an unreasonable challenge for the driving public to safely negotiate this at forty-five (45)mph. With regard to speed in general, several studies have been conducted which reveal that normal, safe drivers comfortably drive five (5) to seven (7)mph over the posted speed limit and expect to do so without repercussions. In reality then, this is a fifty (50) to fifty-five (55)mph zone through this heavily utilized stretch of road.

The stretch of Interstate 435 from 87th Street to the Grand view triangle intersection of 1-435, 1-470 and 71 Hwy is a major contributor to the recurring accident problem in this area. The change in the state law in April of 1996 allowing the speed limit to be raised to sixty-five (65)mph from fifty-five (55)mph has had a major impact on this stretch of road. In reality, motorist are driving seventy (70) to seventy-five (75) mph while attempting to position themselves to negotiate the upcoming triangle. This, coupled with inadequate signage indicating upcoming traffic flow directions, and increased speed results in even more drastic and irrational driving behavior, when motorist realize they are not in the lane they need to be in. Adding to this problem is traffic entering onto Interstate 435 from Bannister Road. This traffic is traveling at a reduced speed and attempting to position themselves to also negotiate the triangle, this mix of high and low speed vehicles converging in this location to accomplish the same thing is extremely dangerous and contributes to ninety-nine percent (99%) of the accidents occurring on this stretch of Interstate 435.

Discussion

Interviews were conducted with several officers who are familiar with the problem location. These included District officers who have worked primarily in this area, Traffic Enforcement officers who work this area on a regular basis and Accident Investigation officers who have worked numerous accidents at locations within this area. Each of these officers acknowledged the inherent dangers of traveling through this location. They have cited the problems of excessive speed, improper lane usage and vehicles following to closely as contributing factors.

They also pointed out that the lack of signage, ill-timed signal lights and the sheer density of traffic through the area contribute to the recurring traffic accident problem in the area.

As a result of these interviews, a comprehensive analysis of the roadways in question was conducted as outlined in the V.A.R.S. system, stage one, part two (Annex 2), the detailed conclusions of this study are included in Annex 3.

Conclusion

The overwhelming conclusion derived from the discussions and studies conducted on the area of concern, is that driving habits through the area and certain aspects of the roadways themselves, need to be changed. These recommended changes are outlined in Annex 4.

The practice of throwing more traffic enforcement resources at the problem has failed to work in the past as a long term solution to this problem. High visibility enforcement has an affect only as long as it is happening. Once the enforcement stops, the problem returns.

Recommendation

The final course of action should be to forge a working partnership with the State Highway Department and the City Public Works Department to implement where feasible, the recommended changes as outlined in Annex 4. Where the recommended changes are found not to be viable, other solutions can be found by working closely with these Departments. Once the changes that can be made, are made, the area will be designated as an "Accident Reduction Zone", as outlined in the second stage of the V.A.R.S. system (Annex 2). Once the "Accident Reduction Zone" (Annex 5) is in place, the most important phase in the whole process will begin. This will involve a heavy media campaign publicizing the creation of the "Accident Reduction Zone" and the reasons behind it. This is outlined in the V.A.R.S. system, stage three (Annex 2). Once the media blitz has commenced and the public becomes aware and familiar with the "Accident Reduction Zone" concept, then stage four of the V.A.R.S. system (Annex 2) will commence. This is the enforcement stage. The phrase "zero tolerance" would be utilized when conducting enforcement within the "Accident Reduction Zone", with the most attention being focused on those violations identified as prominent contributing factors causing the recurring accidents.

A well organized media campaign and highly visible enforcement activity in this area should make a lasting impression upon the driving public that a reduction in vehicular accidents at this location is a very high priority and their compliance will be expected.

No amount of education or changes will effect the driver who willfully fails to obey traffic laws. The best that we can expect is that by making the necessary roadway changes and providing a better opportunity for safe passage through the area, it will be incumbent on the driving publics part to abide by the posted limits and heed the additional warnings to reduce the accidents throughout the area.

Statistical Analysis

ANNEX 1

Accident Reduction - Interstate 435 and Bannister Road

Accidents that required police response or were handled by walk-in report method on Bannister Road, including I-435, between Hillcrest Road and Marion Park Drive in 1996:

317 Total

2 Fatalities

55 Injury

260 Property Damage

Accidents that required police response or were handled by walk-in report method on Interstate 435 from and including 87th Street through the Grandview triangle intersection of I-435, I-470 and 71 HWY in 1996:

531 Total

5 Fatalities

124 injury

405 Property Damage

A two mile stretch of Interstate 435 from 87th Street through the triangle and a one mile stretch of Bannister Road from Hillcrest Road to Marion Park Drive produced the following number of accidents in 1996:

688 Total

Vehicular Accident Reduction System
V.A.R.S.

ANNEX 2

Accident Reduction - Interstate 435 and Bannister Road

VEHICULAR ACCIDENT REDUCTION SYSTEM

The "Vehicular Accident Reduction System" incorporates five different stages.

The stages are:

- 1) Identification and Research
- 2) Plan of action
- 3) Education
- 4) Enforcement
- 5) Assessment

The first part of stage one of this system is to identify hazardous locations and contributing factors. This includes the use of already available statistical data and an actual physical study of the area in question. The statistical data study would identify hazardous locations based on the number of reported accidents, both property and injury, including fatalities that occurred at the location. This study would also reflect the past enforcement activity at the location. The vehicular reports for the previous twelve months for the location would be reviewed to identify any pattern of contributing circumstances causing recurring accidents.

The second part of stage one is an actual physical study of the hazardous location. This would be an attempt to identify contributing factors to the accidents caused by the roadway itself. Some examples are, speed limit problems - too high or too low, engineering problems - area designed for the volume of traffic, new construction or development in the area adding unexpected additional traffic, vision obstruction problems, poorly or unmarked lane changes, and exit only or turn only lanes. Identification and correction of these types of problems would be necessary to achieve the goal of reducing or eliminating accidents in the area.

The second stage of this system is to develop and implement a plan of action. After studying an area as described in stage one, and determining that hazards contributing to accident problems do exist, solutions need to be found. This could include but not be limited to, changing speed limit signs and adding reduce speed ahead signs, speed zone signs, additional warning signs, exit only

signs, merge signs, and lane ends or through lanes signs. Some problems, such as an outdated engineering problem, where the traffic density and volume have outgrown the original roadway design, would be nearly impossible to solve at our department level. However, a complete analytical study of a hazardous location, as done in stage one, showing the inherent dangers caused by a flawed or overtaxed roadway design could be forwarded to the appropriate departments. In order to accomplish any changes deemed necessary, the assistance and cooperation of the Missouri State Highway Department and the Kansas City Public Works Department would be required. Once the necessary changes are made, the entire area would be designated an "Accident Reduction Zone". The zone would encompass an adequate stretch of roadway leading into the hazardous location to allow drivers the time to make necessary adjustments to any changed or added roadway signs. A sign marked "Accident Reduction Zone" would be placed at the beginning of each entrance into the affected area, thus notifying motorists that additional caution should be used on this portion of the roadway. This would be most important on interstate locations due to the high number of out-of-town travelers utilizing these roadways while passing through our city.

The first part of the third stage of this system is to educate the general public about the established "Accident Reduction Zones". This could include but not be limited to, using the local news media, newsprint, radio and TV, the city government cable channel, public service announcements and state or city recorded information stations. In addition, brochures could be developed and placed at tourist information centers and rest areas leading into the city. It would be important to highly publicize the locations and the reasons for the hazardous designation. Hopefully, by educating motorists about the reasons for the hazardous location designation, they will voluntarily comply with any changes made there. Education should also minimize any inconvenience perceived by the motorists because of the changes.

The second phase of stage three is to educate city and state prosecutors and the Municipal and Circuit Court Judiciary. It will be necessary to have the cooperation of these offices when the enforcement stage begins. When a Uniform Traffic Ticket that has been marked as issued to a motorist within an "Accident Reduction Zone", comes before them, they will have knowledge of the program and the reasons behind it. They can then take this into consideration when passing judgement on cases. An additional educational and enforcement tool would be to create a system like that of the Kansas State Highway Department, "Give Yourself a Brake" campaign, designed to slow motorist down through construction zones. Any citation received in a construction zone should be subject to fines double the original amount. Legislation would need to be passed by the Missouri Legislature and the Kansas City, City Council authorizing the same latitude within a clearly marked "Accident Reduction Zone".

The fourth stage of this system is the enforcement stage. After the initial changes to a location have been made and publicized for an adequate amount of time, strict enforcement should be conducted within the "Accident Reduction Zone". All traffic violations observed should be addressed with special emphasis being placed on those identified as prominent contributing factor violations. Enforcement tolerance of each officer should be reduced while working within an "Accident Reduction Zone". For example, if an officer normally allows ten (10) to twelve (12)mph over the posted speed limit before he initiates enforcement action, this tolerance should be lowered to a seven (7) to nine (9)mph range within the "Accident Reduction Zone". Any and all types of enforcement activities should be conducted within the "Accident Reduction Zone". This could include but not be limited to, stationary and moving radar, flagging and call-downs, and roving patrols. After an initial phase of highly visible, highly publicized enforcement actions within an "Accident Reduction Zone", it should become clear to the driving public that a very serious attempt is being made to curb violations and accidents in the area and hopefully they will drive accordingly.

The fifth and final stage of this system is the assessment stage. In this stage implemented changes will be assessed for their effectiveness. Depending on the desired result that was sought, this will be accomplished in numerous ways. If the original analysis was based on statistical data only, then a simple re-counting of the numbers at the same location, using the same time frame, would suffice, if the analysis recommended actual physical changes to the dynamics of the roadway, other means in addition to the number counting will need to be employed to realize the impact made. These will include, but not be limited to, re-interviewing the original people involved in the initial study, contacting victims involved in accidents after the changes have been made, and studying the new accident reports generated at the location. From the final assessment, a determination can be made as to the effectiveness of the implemented solutions. If the desired objective has not been achieved, then the additional information gathered during the assessment stage, can be applied towards the development of alternative solutions.

This system is designed to be flexible and has the ability to be tailored to any given circumstance. It also relies on the cooperation of various departments and agencies both inside and outside the police department. Various methods have been utilized in the past in an attempt to curb vehiculars including, heavy enforcement, zero tolerance enforcement and no enforcement, all with minimal success. This approach of reactive enforcement, of saturating an area with enforcement after it appears on the monthly hazardous location report, has not provided a long term solution to accidents in the affected area. This "Vehicular Accident Reduction System" is a proactive approach with the emphasis on education and change not enforcement.

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Although enforcement action will be needed in order to maintain compliance, it should be at a reduced level in both intensity and man-hours once needed changes are made to the area. In regard to accident reduction, the "Vehicular Accident Reduction System" is a drastic departure from anything previously implemented by the police department. The goal of the system is to provide a safe and expedient trip to the driving public through the most hazardous locations within our city.

Physical Analysis

ANNEX 3

Accident Reduction - Interstate 435 and Bannister Road

Physical Analysis of Bannister Road from Hillcrest Road to Marion Park Drive

This section is divided into three parts:

- 1) westbound Bannister Road
- 2) eastbound Bannister Road
- 3) common factors pertaining to both directions

I. Deficiencies observed with westbound Bannister Road

- 1) No posted speed limit signs between Hillcrest and Marion Park Drive.
- 2) First sign indicating that #1 and #2 driving lanes become dedicated lanes for [-435 southbound entrance ramp is too small and located too close to the bridge. The second sign indicating same is on the bridge, and is hidden between the light signals, which makes it impossible to notice.
- 3) There are no signs prior to reaching the bridge which indicate which traffic lanes become turn-only lanes and which lanes continue westbound on Bannister Road.
- 4) As approach is made to the intersection on the east side of the bridge, the traffic control signals for the #1 and #2 traffic lanes are located too far west of the intersection.
- 5) Only a painted barrier line, on the road surface, exists to prevent vehicles from jumping from the turn-only lanes into the through traffic lanes.
- 6) No sign exists west of the bridge indicating which lanes are turn-only lanes and which continue westbound on Bannister Road.

II. Deficiencies observed with eastbound Bannister Road

- 1) As approach is made to the intersection on the west side of the bridge, the traffic control signal for the #1 and #2 traffic lanes are located too far east of the intersection.
- 2) There are no signs prior to the bridge that indicate both through and turn-only lanes.
- 3) Only a painted barrier line, on the road surface, exists to prevent vehicles from jumping from the turn-only lanes into the through traffic lanes.

- 4) No posted speed limit signs between Marion Park Drive and Hillcrest Road.

III. Deficiencies observed that apply to both directions

- 1) Posted speed limit of forty-five (45)mph to high.
- 2) Timing of left turn arrows, throughout entire stretch, are too short.
- 3) Not enough delay in timing of the signal turning green for through traffic after turn arrow turns red.

Physical Analysis of Interstate 435 from 87th Street to the triangle intersection of I-435, I-470, and 71 Hwy

This section is divided into two parts:

- 1) northbound Interstate 435
- 2) southbound Interstate 435

I. Deficiencies observed with northbound I-435

- 1) Posted speed limit of sixty-five (65)mph to high.

II. Deficiencies observed with southbound I-435

- 1) Posted speed limit of sixty-five (65)mph to high.
- 2) No early warning signs indicating which lanes lead to the three different exit ramps for 71 HWY, I-470 and I-435 triangle.

Recommended Improvements

ANNEX 4

Accident Reduction - Interstate 435 and Bannister Road

Recommended road improvements resulting from analysis

This section is divided into two parts:

- 1) recommendations for Bannister Road
- 2) recommendations for Interstate 435

I. Recommended road improvements for Bannister Road

This subsection is divided into three parts

- A) recommendations for westbound Bannister Road
- B) recommendations for eastbound Bannister Road
- C) recommendations pertaining to both directions

A. Recommended road improvements for westbound Bannister Road

- 1) On Bannister Road, west side of Marion Ridge intersection, place larger reflective lane direction indicator sign showing that #1 and #2 driving lanes become dedicated lanes for southbound entrance ramp for I-435, that #3 and #4 driving lanes are through driving lanes for westbound Bannister Road and that the #5 driving lane is a dedicated lane for the entrance ramp to northbound I-435.

Reasoning: As approach is made to the I-435 overpass, it is nearly impossible to distinguish what direction the lanes continue to allow traffic to flow. The signs that are now posted lack definition, size, readability, and are posted too late. Motorist are driving in the #1 and #2 driving lanes onto the overpass, then after realizing that they are in a turn-only lane, they are making sudden and erratic lane changes into the #3 and #4 driving lanes to continue westbound on Bannister Road. This causes numerous accidents to occur.

- 2) Post new speed zone signs every two blocks between Hillcrest Road and Elmwood Avenue.

Reasoning: With eight (8) city streets or private business drives accessing Bannister Road through this location,

motorist might be more inclined to drive the posted speed limit if they saw it more often .

- 3) Add highly reflective painted left turn arrows on the road surface in the #1 and #2 driving lanes from Marion Ridge to the overpass.

Reasoning: Would serve as another reminder to motorist that the #1 and #2 driving lanes become designated left turn lanes.

- 4) Replace small sign that is located on the center median post, hanging between the traffic signal lights, that indicates the #1 and #2 driving lanes are designated to the entrance ramp for southbound [-435, with a larger model utilizing yellow warning markings.

Reasoning: This would signal to the motorist that they are now dedicated to the turn lanes and must turn onto 1-435.

- 5) Add large reflective overhead lane direction indicator sign just west of overpass.

Reasoning: This would allow motorist ample opportunity to make safe lane changes if they wished to exit on Bannister Road.

B. Recommended road improvements for eastbound Bannister Road

- 1) Add a lane direction indicator signs that show through traffic lanes for Bannister Road to compliment already posted signs which show lane dedicated to Bannister Mall entrance, west side of overpass.

Reasoning: To reduce confusion of motorist wishing to continue eastbound on Bannister Road.

- 2) Post new speed zone signs every two blocks from Marion Park Drive to Hillcrest Road.

Reasoning: With nine (9) city streets and private drives accessing Bannister Road through this location, motorists might be more inclined to drive the posted speed limit if they were reminded more often.

C. Recommended road improvements that apply to both directions

1) Post new speed zone of thirty-five (35)mph

Reasoning: With the sheer density of traffic volume, large number of intersecting private drives and city streets, and the number of turn and exit only lanes located within this one (1) mile stretch of roadway, it is an impossibility to travel it safely at forty-five (45)mph. Speed is the number one contributing factor to accidents within this stretch of road. The following is an illustration of the difference a ten (10) mph difference in the speed limit can make when trying to avoid an accident.

| | | |
|----------------------|--------------------------------|-------------------|
| Dry pavement: | | |
| 45mph | Total Stopping Distance | 35mph |
| 139.4 feet | | 92.8 feet |
| Wet pavement: | | |
| 45mph | Total Stopping Distance | 35mph |
| 184.4 feet | | 120.0 feet |

As you can see, a ten (10)mph reduction in speed reduces your total stopping distance on dry pavement by over forty-six (46) feet. On wet pavement by over sixty-four (64) feet. These factors can increase drastically depending on driver skill and vehicle condition. That means you would have an additional two and a half car links space in which to get your vehicle stopped to avoid an accident, on dry pavement.

Reasoning: A speed reduction alone would allow safer lane changes and prevent numerous rear-end collisions due to the increased reaction time allotted each motorist.

2) Lengthen the amount of time allotted to green left turn arrows at signal controlled intersections.

Reasoning: Lengthening the green arrow by a few seconds would allow a few additional vehicles to proceed on their way and reduce the frustration level. This should reduce the amount of signal violations and eliminate their attempting to justify this violation with the reasoning of "the light is to short".

- 3) Add an additional one to two seconds delay to the beginning of the green light cycle, at signal controlled intersections which include a left turn signal, for east and west bound traffic once the left turn signal turns to red.

Reasoning: This delay would allow motorists driving in the #3 and #4 traffic lanes the opportunity to ensure the left turn traffic had cleared the intersection before proceeding through.

- 4) On overpass, install concrete lane dividers isolating the #1 and #2 turn only lanes from the through traffic lanes.

Reasoning: This would serve two purposes:

- a) It would prevent motorists from exiting these lanes into the flow of oncoming traffic.
- b) It would ensure that traffic accessing Bannister Road from I-435 would make the turn into the proper lane to continue on Bannister Road.

- 5) On overpass, re-paint and re-mark all traffic lane markings.

Reasoning: This would reinforce proper lane selection and increase motorist visibility of the lanes at night.

- 6) On overpass, re-paint and add reflectors to the curbing and median islands.

Reasoning: This would increase motorist awareness that the islands exist and help prevent them from hitting them.

- 7) Move traffic control signals, that regulate traffic entering the overpass, from the center median on the overpass, to the center median on either side of the overpass.

Reasoning: With the positioning of the signals the way they currently are, this requires the motorist to assess not only the timing of the signal but also the required place to stop, in a fraction of a second. With the distance between the painted stop block and the actual signal placement. This assessment is virtually impossible to make causing the motorist to either stop in the intersection or continue through the intersection against the red signal. If the choice is to continue through the

intersection, this causes the motorist to increase his speed "to beat the red light". This increase in speed throws the vehicle on the overpass, which is full of traffic, stopped for the traffic signals at the opposite end, causing numerous rear-end collisions. By moving the signals off the overpass and onto the adjacent island, and moving the painted stopping blocks back accordingly, you will have created a mental barrier for the motorist, reinforcing that the intention of the traffic signal is for them to stop when it is red. It would also reduce the number of rear-end collisions.

II. Recommended road improvements for Interstate 435

This section is divided into two part:

- 1) northbound Interstate 435
- 2) southbound Interstate 435

A) Recommended road improvements for northbound Interstate 435

- 1) Reduce speed to fifty-five (55)mph at Hickman Mills Road.

Reasoning: With the density and volume of traffic attempting to exit onto Bannister Road and attempting to enter I-435 form Bannister Road, sixty-five (65)mph is too fast. A reduced speed allows for greater stopping distance if needed and allows better control of the vehicle. When traffic attempting to enter I-435 northbound from Bannister Road, which is traveling at a reduced speed, attempts to merge with traffic that is traveling in excess of seventy (70) mph, already on I-435, erratic and irrational driving occurs, resulting in serious accidents.

B) Recommended road improvements for southbound Interstate 435

- 1) Reduce speed limit to fifty-five (55)mph at a point between 87th Street and Bannister Road. Post on both sides of roadway.

Reasoning: A posted speed limit of sixty-five (65)mph, in reality, allows a seventy (70) to seventy-five (75)mph run down the hill from 87th Street through the Bannister Road interchange, and into the triangle intersection of [-435,1-470 and 71 Hwy. Speed is a contributing factor to all of the accidents which occur on this stretch of interstate.

A reduced speed zone to fifty-five (55)mph would allow safer merging of traffic from Bannister Road and a safer opportunity for motorists to change lanes to position themselves for entry into the triangle. A slower speed would also give the motorist a better opportunity to stop their vehicle in the event traffic stops suddenly in front of them, which occurs frequently during rush hours.

- 2) Post flashing "You Are Driving To Fast" signs (like on 1-70 at Jackson Avenue) on the Bannister Road overpass.

Reasoning: This type of sign is a real attention getter and reinforces the need for the reduced speed.

- 3) Post an additional warning signs indication lane selection for the triangle prior to Bannister Road.

Reasoning: The sooner motorists realize that they must make a lane selection up ahead, the sooner and safer they can make that decision and complete the change.

Accident Reduction Zone
A.R.Z.

ANNEX 5

ACCIDENT REDUCTION- Interstate 435 and Bannister Road

Creating the Accident Reduction Zone(A.R.Z.)

I. Boundaries of the A.R.Z.

- 1. Bannister Road- westbound at Hillcrest Road**
- 2. Bannister Road - eastbound at Marion Park Drive**
- 3. Interstate 435 - northbound at Hickman Mills Drive**
- 4. Interstate 435 - southbound in the 9000 block**

II. Marking of the A.R.Z.

A. Bannister Road - westbound at Hillcrest

- 1. On the eastside of Hillcrest place a large reflective sign indicating the beginning of the A.R.Z.**
- 2. At various intervals through-out the established A.R.Z., place signs with the initials A.R.Z. that have been designed to match the original entry signs, only on a smaller scale.**
- 3. At the exiting point of the established A.R.Z., place small sign stating " Exiting A.R.Z., Please Drive Safely".**

B. Bannister Road - eastbound at Marion Park Drive

- 1. On the westside of Marion Park Drive, place a large, reflective sign indicating the beginning of the A.R.Z.**
- 2. At various intervals through-out the established A.R.Z., place signs with the initials A.R.Z. that have been designed to match the original entry signs, only on a smaller scale.**
- 3. At the exiting point of the established A.R.Z., place a small sign stating "Exiting A.R.Z., Please Drive Safely".**

C. Interstate 435 - northbound at Hickman Mills Drive

- 1. On the south end of the Hickman Mills Drive overpass, place a large, reflective sign indicating the beginning of the A.R.Z.**
- 2. At various intervals through-out the established A.R.Z., place signs with the initials A.R.Z. that have been designed to match the original entry signs, only on a smaller scale.**
- 3. At the exiting point of the established A.R.Z., place a small sign stating " Exiting A.R.Z., Please Drive Safely".**

D. Interstate 435 - southbound in the 9000 Block

- 1. In the 9000 block of Interstate 435, on both sides of the interstate, place large, reflective signs indicating the beginning of the A.R.Z.**
- 2. At various intervals through-out the established A.R.Z., place small signs, on both sides of the interstate, with the initials A.R.Z. that have been designed to match the original entry signs, only on a smaller scale.**
- 3. At the exiting point of the established A.R.Z., place a small sign stating " Exiting A.R.Z., Please Drive Safely".**

The concept of a working " Accident Reduction Zone"

The advantages of creating a designated A.R.Z., are numerous. The special markings associated with an A.R.Z. serve as a reminder to the public that this stretch of road requires their un-divided attention while operating a motor vehicle through it. It also allows enforcement activity to be focused in a certain area for a specific purpose. The specifically defined parameters associated with the A.R.Z., will expand the possibility of creating an awareness with the judicial body whose jurisdiction the A.R.Z. falls under. With the cooperation of the judicial body, ie; strict judgement on citations received with-in A.R.Z., the focus of pro-active enforcement, and the awareness campaign, the A.R.Z. will serve the purpose for which it was designed, Accident Reduction.

The following sign is the proto-type copy from which the actual roadside signs for the Accident Reduction Zone designation were manufactured. Once the V.A.R.S. system is utilized on a specific space of roadway, and it is designated an Accident Reduction Zone, signs matching this design will be placed in the proper locations to serve as a permanent reminder to the driving public.



ACCIDENT REDUCTION ZONE



Photographs of Project Area



Presented

to

the

KANSAS CITY POLICE DEPARTMENT

Interstate 1-435 at Route W

On April 30, 1997, the MoDOT Traffic staff evaluated the interchange of I-435 and Bannister Road (Route W). The following is a list of the potential or proposed improvements that will be made on this stretch of road as a result of the concerns addressed by the Kansas City Police Department.

Most of the comments addressed were in

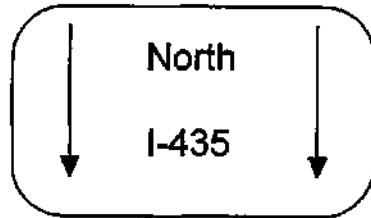
~~ANNEX 3 - Physical Analysis of Bannister Road from Hillcrest Road to Elmwood Avenue.~~

1. Reference 2.3 - Rather than using a concrete median, which would require making the entire width of the roadway wider - Long Life pavement markings would be placed on the bridge with an 8 inch separation (painted barrier) between the through and left turn lanes. Normally widths are 4 inches. The long life pavement markings (3M Tape) are warranted for 4 years provided they are not damaged by snow plows.

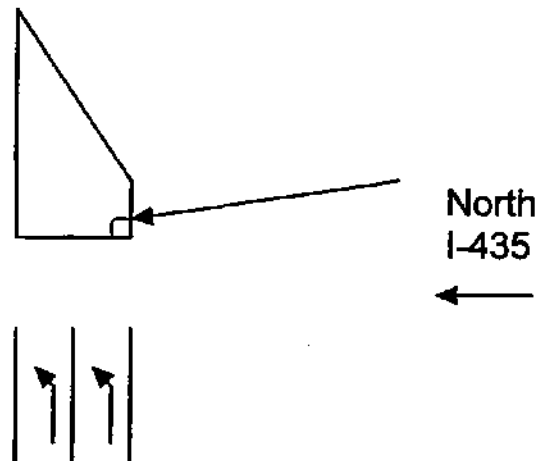
Another possibility is the use of a double white line to designate that this lane you are not to pass. This gives more emphasis on the specific goal of the traffic control device, specifically "do not pass".

2. Reference 3.1 - A speed study was conducted on the west side between the Venture entrance and the west signal of the interchange. The speed study was shown to have an 85th percentile of 40 mph. As a result MoDOT will post the speed 40 mph from 1000 foot west of the 71 interchange. The City of Kansas City may consider changing the speed limit to 40 mph to allow for consistency on their jurisdiction. In addition, the city will have to pass an ordinance for us to change the speed limit.

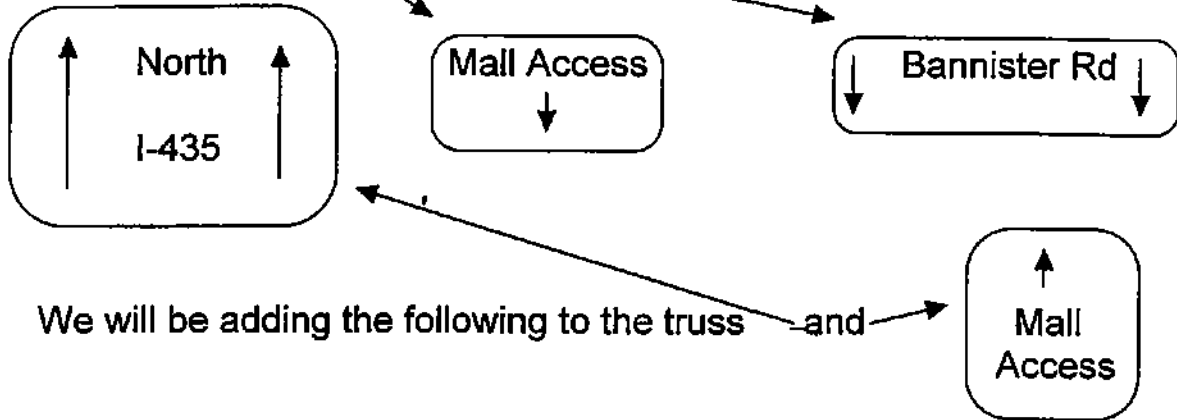
3. We will be adding a North 1-435 double arrow down between the signal heads on the west side of the bridge for eastbound traffic for the dual left turns. This will mirror the other side in order to provide consistency and uniformity.



4. Remove the post that remained from the arm that had failed for the west side of the interchange. Its sight is competing with the existing signal posts. Add left turn signs to the left turn indications at Route W and 1-435 for eastbound and westbound traffic. Presently we have a single sign mounted between left-turn signal heads and their positioning is somewhat confusing to the public.
5. Place a North 1-435 and South 1-435 for eastbound and westbound number two left turn lane. Currently, there are Keep Right signs placed in front for the number 1 left-turn lane and this appears to serve no purpose. This route assembly will give the appearance that there is a raised median and when motorist are in the number two left turn lane will tell them what they need to do.



6. Eastbound direction there is a spanning truss that indicates the following:

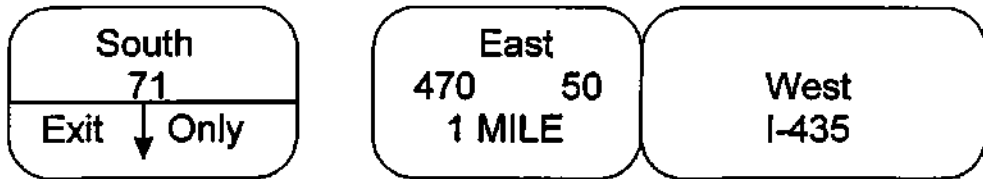


We will be adding the following to the truss and

The up arrow signifies that there will be an exit and the down arrow symbolizes that the roadway goes all the way through.

In addition, the signs on this truss as well as the remaining portion of the cantilever trusses will indeed be enlarged.

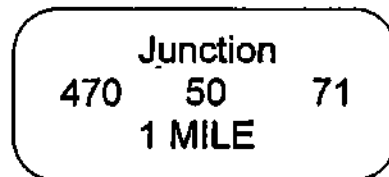
Alternative 1.



Alternative 2.

If budget problems exist relocate the gore point diagrammatic to the 1 mile location of the sign and relocate 1 MILE sign to a 2 MILE sign back at 87th street.

Existing 1 MILE sign



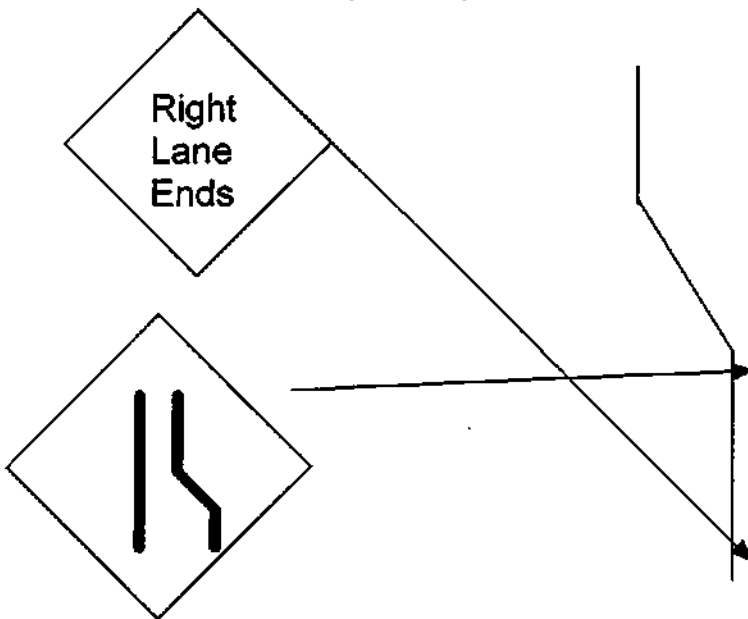
Alternative 3.

No budgetary constraints add additional diagrammatic to the existing 1 MILE location and relocate the existing 1 MILE sign to the 2 MILE location at 87th Street.

This should give more than adequate time for motorists to make a decision on the exit at Southbound I-435 to Route 71.

Provided that these changes do not prove to be completely ineffective the possibility of adding a "congestion ahead" or similar worded sign may be available with semi low technology equipment. Loops could be placed on the pavement to detect congestion and the signs could begin flashing dependent on the amount of traffic.

8. For the northbound entrance ramp to I-435 from Route W, we will be adding a "Right Lane Ends" sign and a "Lane Transition" sign




9. Miscellaneous Items - Speed Limit on I-435 cannot be modified as discussed in the last meeting. Signs on Bannister Road designating the A/B Entrance near the eastbound cantilever sign will be removed. By the time motorist see this sign it is already too late for them to make a maneuver. Also competing with other more important signage. MoDOT supports the ACCIDENT REDUCTION ZONE upon further discussion and additional specifics.



Public Works Street and Traffic

DATE: July 2, 1997

TO: Captain McHale, KCPD

FROM: Kerry Kanatzar, District Traffic Engineer-Street & Traffic 

SUBJECT: KCPD Vehicle Accident Reduction Plan; Bannister Road & I-435

The Division has received and reviewed the subject study dated March 1997, and in conjunction with the Missouri Department of Transportation, will implement the following items in support of the subject plan. As these items are implemented, the plan will be referred to for consistency and coordination.

- Install backplates on all mast arm signal heads
- Reduce the existing 45mph speed limit, from Bales Drive to Stark Avenue, to 40mph
- Additional speed limit signing will be installed when the new limit has been established
- Modeling has been completed to optimize the pm routine bandwidth for eastbound progression. Additional time-based coordination with MoDOT signals at the I-435 interchange will also be implemented. Further modeling to optimize the am routine will proceed. *Left-turn, all red clearance intervals will be incorporated into the signal phasing*
- Appropriate and effective lane use signing and/or marking will be installed, contingent upon available funding.