GENERAL MEETING OF THE BOARD OF DIRECTORS
OF THE
CENTRAL TEXAS REGIONAL MOBILITY AUTHORITY

RESOLUTION NO. 12-054

APPROVING AN AMENDMENT TO AN INTERLOCAL AGREEMENT WITH THE TEXAS TRANSPORTATION INSTITUTE RELATING TO ANALYSIS OF TRAFFIC DATA PROVIDED BY INRIX.

WHEREAS, the Texas Transportation Institute ("TTI") is providing technical and other support to the Mobility Authority in connection with development of the MoPac Improvement Project under an interlocal agreement approved by the Board by Resolution No. 11-009 enacted January 26, 2011; and

WHEREAS, the Executive Director and TTI staff have discussed and agreed to a proposed amendment to that interlocal agreement under which TTI will assess and evaluate certain traffic data acquired by the Mobility Authority from INRIX for use in performance evaluation of the Mopac Improvement Project; and

WHEREAS, the proposed amendment will also extend the term of the interlocal agreement for an additional year, until August 28, 2013; and

WHEREAS, the Executive Director recommends approval of the proposed amendment to the interlocal agreement attached as Exhibit 1.

NOW THEREFORE, BE IT RESOLVED that the proposed amendment to the interlocal agreement is hereby approved; and

BE IT FURTHER RESOLVED that the Executive Director may finalize and execute for the Mobility Authority the proposed interlocal agreement in the form or substantially the same form as Exhibit 1.

Adopted by the Board of Directors of the Central Texas Regional Mobility Authority on the 29th day of August, 2012.

Submitted and reviewed by:

Andrew Martin
General Counsel for the Central
Texas Regional Mobility Authority

Approved:

Ray A. Wilkerson
Chairman, Board of Directors
Resolution Number: 12-054
Date Passed: 08/29/2012

EXHIBIT 1 TO RESOLUTION 12-054

PROPOSED INTERLOCAL AGREEMENT WITH

THE TEXAS TRANSPORATION INSTITUTE

[on the following 12 pages]

Second Amendment To The Interlocal Cooperation Contract
Between
Central Texas Regional Mobility Authority
And
The Texas Transportation Institute

The Second Amendment ("Amendment") to the Interlocal Cooperation Contract ("Contract") by and between the Central Texas Regional Mobility Authority ("the Regional Mobility Authority") and the Texas Transportation Institute ("TTI") is made effective as of _____, 2012, and is for the purpose of amending the Contract originally dated effective February 1, 2011.

The following terms and conditions of the Interlocal Cooperation Contract are hereby amended, as follows

II. Statement of Services to be Performed is amended as follows:

See Attachment A: Scope of Work

IV. Contract Amount

In return for the performance of the foregoing obligations, the Authority authorizes to TTI an additional $37,500, based on the Attachment B – Fee Estimate. This will increase the not to exceed amount for the InterLocal Cooperation Contract from $177,000 to $214,500. Compensation shall be in accordance with the Contract.

VII. Term of Contract is amended as follows:

Payment under this contract beyond the end of the current fiscal biennium is subject to availability of appropriated funds. If funds are not appropriated, this contract shall be terminated immediately with no liability to Receiving Agency. This contract begins on February 1, 2011 and terminates on August 28, 2013.

By their signatures below, the parties to the Contract evidence their agreement to the provisions set forth in this Amendment. Except as specifically provided in this Amendment, all other provisions of the Contract are hereby acknowledged and confirmed as set forth on the original Contract.

This Amendment is made effective once executed both parties below.

CENTRAL TEXAS REGIONAL
MOBILITY AUTHORITY

_____
Mike Heiligenstein
Executive Director
Date:_____

TEXAS TRANSPORTATION
INSTITUTE

_____
Dennis L. Christiansen, PhD, P.E.
Agency Director
Date:_____

Attachment A: Scope of Work

Task 6. Performance Monitoring and Evaluation

Task 6.1. INRIX Data Processing

TTI will process one-minute disaggregated speed information using a private sector dataset purchased by CTRMA. The dataset represents travel speeds that were observed from September to November 2011 on a variety of major highways and arterials in the Austin region. Specifically, this task will incorporate the following steps for data assessment:

- Conflate and segment the network – connect the speed data to the existing established roadway network segments as defined by the TxDOT highway network and look-up tables from the Austin Traffic Management Center.
- Aggregate one-minute speed data up to 15-minute intervals for instances when statistical significance cannot be obtained.
- Link speeds to vehicular volume data using information collected from TxDOT's annual average daily traffic (AADT) counts, the local ITS infrastructure, and other sources.
- Derive distributions of travel speeds using VMT-weighted data.

The processing of speed data will support the evaluation of the MoPac Improvement Project and the HERO program.

Deliverable: Technical memorandum assessing the applicability of private sector data to performance measurement data requirements, and providing recommendations for additional acquisition of data for evaluations of the Mopac Improvement Project and HERO.

Task 6.2. MoPac Improvement Project Evaluation

TTI will provide technical expertise in the application of INRIX data to performance measures for the MoPac Improvement Project in order to evaluate corridor performance before, during and after construction. Using the January 2012 Performance Measures Primer (attached) as the basis, TTI will assess the applicability of September to November 2011 INRIX data to the performance measures defined in the Primer. The assessment will address the following:

- For each performance measure described in the primer, assess the feasibility of INRIX data to calculate the measure, including an identification of any issues related to data collection frequency (continuous or periodic sampling), coverage, granularity, and data reporting frequency.
- Identification of supplemental data needs to calculate performance measures identified in the primer.
- Identification of new measures not currently captured in the primer, specifically those related to performance of parallel arterials and Cesar Chavez/5th Street operations.

Deliverable: Technical memorandum documenting applicability of INRIX data to performance evaluation of the MoPac Improvement Project, including additional data needs and measures.

Texas Transportation Institute

Performance Measures for the MoPac Improvement Project

Primer of Performance Measures and Related Data Elements

The scope of this primer is to outline the potential data elements that may be necessary to assess the performance of the MoPac Improvement Project in meeting the stated goals of the facility. Each goal is broken down into suggested performance measures with defined data elements required to conduct an evaluation. Most of the performance measures use inputs that are derivatives of basic data elements, such as speed, volume, and travel time. Within the description of each performance measure is a discussion on the possible data collection methodologies, the infrastructure necessary to collect data, and the analysis procedures to assess the performance. The level of involvement – rated as low, medium, or high involvement – is interpreted as the general level of resources necessary to provide specific measures.

In summary, the goals and performance measures for the MoPac Improvement Project are:

Goal #1: The MoPac Improvement Project (MIP) needs to improve travel reliability in the Express Lanes, especially for transit and emergency vehicles.

Performance Measures:
1. **Transit Schedule Reliability**
2. **Emergency Vehicle Response**
3. **Buffer Index (BI)**
4. **Planning Time Index (PTI)**
5. **Days per Month Below Speed Threshold**

Goal #2: The MoPac Improvement Project needs to be financially sustainable, by covering debt service and operations and maintenance costs.

Performance Measures:
1. **Monthly Revenue**
2. **Ratio of Actual to Forecast Revenue**
3. **Violation Rate**
4. **Cost of Operation**

Goal #3: The MoPac Improvement Project should maximize person throughput throughout the corridor.

Performance Measure:
1. **Person Throughput**

Goal #4: The operation of the MoPac Improvement Project needs to be understood and accepted by the public, including frequent and infrequent users from surrounding communities.

Performance Measures:
1. **Customer Satisfaction Rating**
2. **Number of Complaints**

Goal #5: The MoPac Improvement Project should have improved and reliable incident management response times for both the express and general purpose lanes.

Performance Measure:
1. **Incident Clearance Time**

Where applicable, the MoPac Improvement Project will be evaluated by tolling zone for the subject areas that can be properly assessed using data derived from the infrastructure. If the infrastructure is not capable of providing reliable data on a zone-specific level, the entire corridor will be assessed instead. The ITS infrastructure will have to be reviewed separately to examine whether sufficient

coverage exists to support the use of operational performance measures to automatically trigger changes (TxDOT Research 0-6396 http://tti.tamu.edu/publications/catalog/record/?id=34982).

The two tolling zones for the MoPac corridor are logical starting points for analysis sections:

- Parmer Lane to RM 2222
- RM 2222 to Cesar Chavez Street

However, the northern section may require further segmentation to isolate the effects of traffic loading and off-loading at US 183N.

Goal #1: The MoPac Improvement Project (MIP) needs to improve travel reliability in the Express Lanes, especially for transit and emergency vehicles.

The performance measures under this goal are:

1. Transit Schedule Reliability
2. Emergency Vehicle Response
3. Buffer Index (BI)
4. Planning Time Index (PTI)
5. Days per Month Below Speed Threshold

Transit Schedule Reliability

Target: Transit routes that operate on the MoPac corridor should have an on-time schedule performance, or schedule adherence, of 95% or greater.

On-time reliability for transit services, from a user perspective, can be measured best by evaluating the percentages of on-time arrivals and departures by transit stop. On-time performance can be evaluated by individual routes or by considering an entire system, however, considering reliability by route is preferred to assess what specific routes in a system are the most degraded in terms of service quality. The definition of an on-time arrival is when the actual occurrence of a transit stop is within the range of 2 minutes early to 5 minutes late compared to the time announced on the transit schedule. The extent of the range may vary by transit agency and mode of service. According to the latest data provided for October 2011 service, Capital Metro reported a system-wide on-time performance average of roughly 90%.

- **Data Collection (Low Involvement):** Capital Metro currently collects and publically reports on-time performance measures on a monthly basis by service provider (e.g. Star Transit, Veolia, First Transit, MetroAccess). Specific data by routes and stops is not publically available, likely because the sample size is too low to report statistically significant values. At least 100 observations are needed per route per month to make a valid statistic.
- **Infrastructure (Medium Involvement):** Reliability can be measured either by having fleet supervisors conduct random checks at bus stops throughout the operating day, having observers sit and record arrival times at select stops, or using GPS technology to map position and time data.
- **Analysis (Low Involvement):** The data analysis process is not intensive beyond compiling recorded observations or assessing GPS data. GPS data can be reviewed by considering heading (traveling in a specific direction for a route), location (latitude and longitude), and time. The values for latitude and longitude can be used to create a buffer to select the records for analysis that are near or at a bus stop.

Emergency Vehicle Response

Target: The percent of emergency vehicle trips responding to an incident that arrive within a 10-minute interval is greater than 90% of all trips using the MoPac corridor.

The City of Austin assesses the performance of their emergency medical services, in part, by calculating the response time of vehicles that are traveling to an incident. A 90% threshold for trips responding within a 10-minute window was established by the City of Austin when undergoing the budgeting process for fiscal year 2012.

- **Data Collection (Medium Involvement)**: Data collection is primarily dependent upon cataloguing the incident and vehicle travel record logs. The incident logs should indicate as variables the time of the original call to the service center and the time that the vehicle arrived at the scene. Reporting accuracy by officials may be prone to error due to a tendency to mistake actual times. Another potential methodology may be to incorporate GPS devices to record start and end times for each trip, and to define the difference between times as the response time. In GPS instrumentation is used, additional consideration should be taken to create a process that will properly determine the correct start and end times for each trip.
- **Infrastructure (Low Involvement):** Infrastructure is minimal unless advanced GPS equipment is used to monitor vehicle movement in detail, which would include personnel and instrumentation costs.
- **Analysis (Medium Involvement):** The analysis is limited if the data collection methodology is primarily dependent upon incident logs, but additional scrutiny may be required to ensure data accuracy. A GPS-based approach may require the segmentation of trip data within a GIS-based environment to quantify response times.

Buffer Index

Target: The managed lanes need to have a buffer index of 10% or less.

The buffer index (BI) is a measure of travel reliability that can account for the variations with the distribution of travel times due to non-recurrent congestion. Traffic incidents, crashes, and the weather all account as causes of non-recurrent congestion. The BI is equivalent to the extra time travelers must add to their average travel time when planning trips. Specifically, the BI is defined as the ratio of the difference between the 95th percentile and average travel times to the average travel time. In summary, the computation of the BI can be explained in the following equation:

For a specific road section and time period :

$$\text{Buffer Index (\%)} = \frac{95^{th}\text{ percentile travel time (minutes)} - \text{average travel time (minutes)}}{\text{average travel time (minutes)}}$$

- **Data Collection (Medium Involvement, depending on method)**: The BI is primarily reliant on the travel time data element as an input parameter. Data for reliability measures can be captured through four primary techniques:
  - direct observations from continuous vehicle probes,
  - estimation from point-based detectors,
  - conducting floating car runs, or
  - using estimated computer simulation.

To interpret BI as a corridor-based measure, volume data should be incorporated to weight the travel times by frequency of use. A continuous dataset is preferential to gather a large enough sample size, transcending time periods, to produce statistically valid measures. For example, gathering data from a continuously-operated TMC with embedded sensors would be preferential to conducting numerous floating vehicle travel time runs to establish a large, significantly valid dataset for analysis.

The locations to install infrastructure supporting time-based performance measures can be tiered into the following three approaches, ordered by level of investment:

- Minimum: Short-term corridor studies performed
- Preferred: Corridor studies done with added intermediate waypoints. For the MoPac corridor, this could potentially be at the termini of the tolling zones (as indicated in the introduction).
- Optimum: Studies performed by corridor, but multiple start and endpoints are added to correspond directly to ingress/egress points.

- **Infrastructure (Medium Involvement, depending on method):** There are tradeoffs associated with the various data collection techniques. Using a floating car methodology with manual counts (recording the start and stop times of a vehicle passing through a corridor) does not require the use of extensive technology, but can be intensive in manpower to achieve the statistical coverage. Field technology can achieve greater coverage (automatic license plate readers and Bluetooth sensors) but require capital expenses for equipment and ongoing operations costs. Private sector data may be able to offer aggregate values for the corridor and avoids capital and operating expenses to the agency, but the data do not have the granularity to assess lane-level operations (important for distinctions between express and general purpose lanes) due to GPS data accuracy.
- **Analysis (Medium Involvement):** Calculating the BI will require some intermediate data analysis because the format of the data will likely be more detailed than what is needed for calculation. Probe data will need to be associated with roadway links and aggregated by specified time periods. Point-based detector data requires link-based travel times to be estimated for each time period of analysis. Quality assurance is also an important step to ensure data validity. The buffer index can be measured by length of the entire corridor to capture trip-based characteristics.

Planning Time Index

Target: The managed lanes need to have a planning time index of 1.05 or less.

The planning time index (PTI) represents how much total time a traveler should allow for ensuring on-time arrival, as opposed to additional time represented from the BI. PTI is useful because it can be compared to the travel time index. The difference between the PTI and the travel time index is the use of the 95th percentile travel as opposed to the average travel time. The PTI is usually greater than the BI because the PTI is influenced more by non-recurrent congestion. Data can be aggregated by peak hour, peak time period, and daily time periods. The formal equation to compute the PTI is:

$$\text{For a specific route/trip and time period:}$$

$$\underset{\text{(no units)}}{\text{Planning time index}} = \frac{95^{th}\ \text{percentile travel time}}{\text{free-flow travel time}}$$

- **Data Collection (Medium Involvement)**: Data collection procedures are similar to those used for the buffer index.
- **Infrastructure (Medium Involvement):** Infrastructure requirements are similar to those used for the buffer index.
- **Analysis (Medium Involvement):** Analysis procedures are similar to the buffer index. Once the distribution of travel times is established for a segment, corridor, or system, the PTI equation can be applied. The planning time index can be measured by length of the entire corridor to capture trip-based characteristics.

Days per Month below Speed Threshold

Target: The speed in the managed lanes should not fall below 50 mph for a time period of greater than 15 minutes. The speed threshold should not be breached for more than one day during a month of operation.

The concept of assessing the number of days per month operating below a set speed threshold is meant to capture a measure of travel reliability that is more readily understood by the traveling public. It can be easier to grasp the notion of days of unsatisfactory performance, as opposed to a dimensionless buffer or planning time index. This measure can be best captured through aggregating data by tolling zone to evaluate where degradation exists in the corridor.

Required Basic Data Elements: Speed

- **Data Collection (Medium Involvement)**: The data collection effort would require collecting a series of travel speeds for a longitudinal time period.
- **Infrastructure (Medium Involvement):** The use of spot speed studies may not require intensive infrastructure, but the approach may not yield a large dataset that can have observations during all time periods. Preferably, embedded sensors in the facility can continuously capture and catalog speed data.
- **Analysis (Low Involvement):** The analysis of data would necessitate the averaging of speed by 5 or 15-minute intervals for all the days of operation in a month.

Goal #2: The MoPac Improvement Project needs to be financially sustainable, by covering debt service and operations and maintenance costs.

The performance measures under this goal are:

1. Monthly Revenue
2. Ratio of actual to forecast revenue
3. Violation Rate
4. Cost of Operation

Monthly Revenue

Target: The monthly revenue for the MoPac Improvement Project should be greater than the total costs on a monthly basis.

Monthly revenue is a basic performance measure that can be used in an assessment of financial sustainability. Revenue reports can be used over time to evaluate the utilization of a tolled facility as well as the functionality a of toll collection system.

- **Data Collection (Low Involvement)**: The data collection process used to determine monthly revenue is relatively simple and is usually based on the output of a standard back office for a tolling operation. Data can be aggregated by month, day, week, time period, and direction of travel.

- **Infrastructure (Low Involvement):** No additional infrastructure is needed beyond what is already in place to principally collect toll revenue.
- **Analysis (Low Involvement):** The costs to support data analysis are dependent upon the time for manpower to extract and compile the appropriate records. Monthly revenue can either be reported as a representative figure for the entire corridor or by tolling segment, which in the case of MoPac can be the two tolling segments that are delineated by RM 2222.

Ratio of Actual to Forecast Revenue

Target: The ratio of actual to forecast revenue for the MoPac Improvement Project should be greater than 1.0.

A measure of financial forecast accuracy can be captured by evaluating the ratio of actual to forecast revenue. If a project exceeds revenue projections, the value of the ratio will be higher than 1.0 and a project that does not meet expectations will have a ratio of less than 1.0.

- **Data Collection (Low Involvement)**: The data collection process for actual to forecast revenue ratios is essentially the same as collecting revenue data, in addition to incorporating revenue forecasts for future fiscal years.
- **Infrastructure (Low Involvement):** No additional infrastructure is needed beyond what is already in place to principally collect toll revenue.
- **Analysis (Low Involvement):** The costs to support data analysis are dependent upon the time for manpower to extract and compile the appropriate records.

Violation Rate

Target: The toll violation rate for the MoPac Improvement Project should be less than 10%.

The toll violation rate is one measure that assesses the effectiveness of a tolled facility to collect revenue. A facility that has a high compliance rate amongst users will tend to have a lower violation rate because users would be more apt to equip their vehicles with transponders and follow toll regulations. The lower the violation rate, the higher the probability that the tolled facility will be financially sustainable and be able to meet its debt service requirements along with operations and maintenance costs.

- **Data Collection (Low Involvement)**: The data collection process used to determine the violation rate is relatively simple and is usually based on the output of a standard back office for a tolling operation. Data can be aggregated by month, day, week, time period, and direction of travel.
- **Infrastructure (Low Involvement):** No additional infrastructure is needed beyond what is already in place to collect toll revenue. Since the MoPac Express Lanes are expected to be separated from the general purpose lanes with a physical pylon buffer, the access between the express and general purpose lanes will be fairly limited. Therefore, violation can either be reported by tolling segment (which would result in two values for each direction of travel) or for the entire length of the corridor.
- **Analysis (Low Involvement):** The costs to support data analysis are dependent upon the time for manpower to extract and compile the appropriate records.

Cost of Operation

Target: The annual operation and maintenance costs to support the MoPac improvement project should not be greater than annual revenue.

The operation cost for a tolled facility is a component measure that can be used to assess financial feasibility for a project. Operation costs are typically inclusive of the maintenance and operations costs, outside of debt service, used to support a facility.

- **Data Collection (Low Involvement)**: Information on the cost of operations can be retrieved from the receipts of services paid and rendered from the comptroller's office.
- **Infrastructure (Low Involvement):** No infrastructure is needed for this measure, beyond what capability exists in the comptroller's office.
- **Analysis (Low Involvement):** No detailed analysis is needed beyond typical quarterly or annual reports as required by a board of directors from an authority.

Goal #3: The MoPac Improvement Project should maximize person throughput throughout the corridor.

The performance measure under this goal is person throughput.

Person Throughput

Target: The person throughput in the managed lanes needs to be less than an average of 5,700 per day.

Person throughput is a measure of performance that assesses, as a whole, the number of people served by a facility or a system regardless of particular travel mode used. The measure is commonly calculated by conducting vehicle occupancy counts to gather a sample of the number of passengers per vehicle per mode (since knowing the number of all the passengers within a vehicle is limited by currently applied technology) and multiplying that figure by the number of vehicles by detected mode. People riding transit are usually counted by factoring the number of detected transit vehicles by the average ridership per route, typically given in an operations report.

- **Data Collection (Medium Involvement)**: Data collection is dependent upon the ability to count the number of people and vehicles traveling through a corridor. The only common source to collect vehicle person occupancy data is from manual observation, no commercially available equipment or third parties currently provide data. Factors that can complicate the collection of vehicle occupancy data include window tinting, sun angles, vehicle height, vehicle speed, and ability to see passengers in the back seat.
- **Infrastructure (High Involvement):** Vehicle occupancy counts are necessary to measure person throughput for a facility, which would include program support of time for physical observers to record observations. Periodic observations can be made during peak time periods of different days within the same week or month (a minimal approach). Additional data collection can be done to capture a 24-hour continuous operation cycle (an optimum approach). The preferred timeframe to collect vehicle occupancy data would be to conduct visual counts for multiple time periods. Information on vanpools can be summated from operation reports, whether using either monthly or quarterly aggregated data. Gathering basic vehicle detection information would be the same as collecting other vehicle occupancy-based data elements. In the case of MoPac, only two locations for vehicle occupancy counts are needed because movement between the express and general purpose lanes is fairly restrictive, except for an ingress/egress point at RM 2222. The two locations should include one that is south of RM 2222 and one that is north of RM 2222 – to capture the two different toll segments.
- **Analysis (Medium Involvement):** The analysis to compute a person throughput measure would be centered on the process of factoring vehicle occupancy counts by designated mode (e.g. SOV, HOV, vanpool, transit) by the volume detected for each mode. This measure can be assessed by length of the entire corridor to capture macro-level traveler characteristics.

Goal #4: The operation of the MoPac Improvement Project needs to be understood and accepted by the public, including frequent and infrequent users from surrounding communities.

The performance measures under this goal are:

1. Customer Satisfaction Rating
2. Number of Complaints

Customer Satisfaction Rating

Target: The customer satisfaction rating from users of the MoPac Improvement Project should have an 85% or higher approval rating.

The satisfaction rating as deemed from users of the facility is a good measure of assessing public acceptance. The rating enables agencies to effectively evaluate the degree of acceptance from the public, which can often be hard to quantitate personal opinion into a value.

- **Data Collection (Medium Involvement)**: The data collection method most commonly applied to measure customer satisfaction is the survey. In the case of the MoPac Improvement Project, a survey may either be mailed directly to user addresses (either to all or some individuals in a location, or using the toll transaction registry) or advertised and posted on an internet address.
- **Infrastructure (Medium Involvement):** The infrastructure required to support the measure has to either be suitable to handle either large volumes of mail (if the survey is physical and returned), or electronic server space (if the survey is web-based).
- **Analysis (Medium Involvement):** The level of analysis is dependent upon the capability to enter survey responses either by hand or through an electronic system.

Number of Complaints

Target: The number of complaints for the MoPac Improvement Project should not come from more than 10% of the total users of the project.

The number of complaints registered with the operator of the MoPac Improvement Project is a fairly broad measure of assessing customer satisfaction, which compares the number of discontented users to total users.

- **Data Collection (Low Involvement)**: The data collection techniques used to measure the number of complaints may include either issuing a paper-based or web-based survey. The survey would be available to the public as a means to allow users to voice their concerns to the operator.
- **Infrastructure (Low Involvement):** The infrastructure to support the measure has to either be suitable to handle either large volumes of mail (if the survey is physical and returned), or electronic server space (if the survey is web-based).
- **Analysis (Low Involvement):** The level of analysis is minimal, and only the raw number of complaints needs to be counted and reported.

Goal #5: The MoPac Improvement Project should have improved and reliable incident management response times for both the express and general purpose lanes.

The performance measure under this goal is incident clearance time.

Incident Clearance Time

Target: The average incident clearance time in the corridor needs to be less than 20 minutes for property damage only incidents and 40 minutes for incidents with reported injuries (excluding fatalities).

The incident clearance time is defined as the amount of time from when an incident for an inoperable vehicle (or debris) is first reported until the vehicle is removed from the scene and traffic is permitted to flow freely.

- **Data Collection (Medium Involvement)**: Sources of data to determine the incident clearance time include: manual aggregation of incident records (for start and end time variables), reporting from an automated function of a TMC, and purchased reports from a third party vendor. The costs to collect and validate data are dependent upon the amount of manpower used to determine the appropriate records for analysis and to extract information. Certain incident records may be erroneous or lacking significant detail, potentially requiring more time for validation. Data can be aggregated by specific timeframe; potentially bounded by peak time period (minimal approach), multiple time periods (preferred approach), or on a continuous 24-hour cycle (optimum approach).
- **Infrastructure (Low Involvement):** No major physical infrastructure is required.
- **Analysis (Medium Involvement):** Analysis is primarily dependent upon the ability to quantify key variables (the start and end time per individual incident) from the incident reports into a single dataset. If the information is missing or deficient from the records, additional manpower and resources may be required to compute the incident response times. The time to check for data quality may be considerable. Crash rates can also be shown by vehicle class and time period. Special data aggregation can be done to show performance under certain operating rules (e.g. time period for 50% discount for HOV-2).

ATTACHMENT B: Fee Estimate

Task Description	Fee
INRIX Data Processing	$20,500
MoPac Improvement Project Evaluation	$17,000
TOTAL	**$37,500**