

AGREEMENT
Professional Services for 2019 Missoula Travel
Demand Model Update
CFDA 20.205 HIGHWAY PLANNING AND
CONSTRUCTION (Federal-Aid Highway
Program)
Awarded by FHWA FFY 2019
FAIN 300Z4500057

This Agreement made and entered into this _____ day of _____ 2019, by and between the **City of Missoula** on behalf of the **Missoula Metropolitan Planning Organization**, 435 Ryman Street, Missoula, Montana 59802, (hereinafter called MPO) and **LSA Associates, Inc**, 1500 Iowa Avenue Suite 200, Riverside, California 92507 (herein after called LSA).

PRELIMINARY STATEMENT

The MPO desires to enter into an Agreement with LSA to update the Missoula travel demand model in preparation for the 2020 Missoula Long Range Transportation Plan Update.

- I. Independent Contractor It is understood by the parties hereto that LSA is an independent contractor and that neither its principals nor its employees are employees of MPO for purposes of income tax, retirement system, or social security (FICA) withholding.
- II. Provision of Professional Services MPO hereby agrees to retain the professional services of LSA pursuant to the terms and provisions of this Agreement, and LSA agrees to perform the professional services identified pursuant to the terms and provisions of this Agreement in a competent, professional, and acceptable manner. Services shall be as described within the letter entitled "Scope of Services and Unit Cost", attached hereto as "Exhibit A".
- III. Payment for Services Payment for services shall be cost plus fixed fee at the rates listed in Exhibit A to this Agreement. The sum of all services shall not exceed the estimated total cost of services listed on Exhibit A herein as up to seventy nine thousand nine hundred fifty seven dollars (\$79,957) with an additional 10%, or eight thousand (\$8,000), in contingency funds, for a total of eighty seven thousand nine hundred fifty seven dollars (\$87,957), without prior written approval from the MPO.
 - A. Basic Services For services listed in Exhibit A attached hereto, the MPO shall pay LSA monthly based on actual work performed and actual costs detailed within invoices in a form approved by MPO.
 - B. Contingency Services As stated in Section III, an additional 10%, or \$8,000, in contingency funds may be provided under the contract, in the event that additional resources or time are necessary to complete the services described in Exhibit A or new services are required that were not included in Exhibit A. Use of contingency funds by

LSA must be authorized in writing by MPO and the Mayor in advance of LSA incurring expenses to be paid by MPO. If authorized, written approval by MPO of such services shall detail actual services, documentation, and schedules required for work completion.

The MPO shall pay LSA for authorized contingency services based on invoices indicating hours worked pursuant to LSA's hourly rates costs listed in Exhibit A hereto and materials costs or as negotiated and mutually agreed upon in writing.

- C. Extra Services Extra services in addition to Basic Services and Contingency Services by LSA must be authorized in writing by MPO and Mayor and approved by City Council in advance of LSA incurring expenses to be paid by MPO. If authorized, written approval by MPO of such services shall detail actual services, documentation, and schedules required for work completion.

The MPO shall pay LSA for authorized extra services based on invoices indicating hours worked pursuant to LSA's costs listed in Exhibit A hereto and materials costs or as negotiated and mutually agreed upon in writing.

- IV. Liaison The MPO's designated liaison with LSA is David Gray. LSA's designated liaison with the MPO is Mike Trotta. All payments made to LSA shall be sent to:

LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, California 92614

- V. Information The MPO agrees to provide LSA with all available information pertinent to the project and to perform the following services:

- A. Give thorough consideration to all reports, estimates, exhibits, proposals, and other documents presented by LSA and shall inform LSA of all decisions within a reasonable time.
- B. Provide rooms for all of the meetings necessary as a part of the project, provide notice to TTAC/TPCC/City of Missoula and any necessary stakeholders of upcoming meetings, receive and act upon all protests and requirements in the development of the Project and pay all costs incidental thereto.

- VI. The MPO and LSA further agree to the following conditions:

- A. Conflict of Interest LSA covenants that it presently has no interest and will not acquire any interest, direct or indirect, which would conflict in any manner or degree with the performance of its services hereunder. LSA further covenants that, in performing this Agreement, it will employ no person who has any such interest during the term of this Agreement.

B. Modification and Waiver This Agreement may not be modified, altered, or changed except pursuant to a written agreement signed by the parties hereto. A waiver of any term or condition of this Agreement or of any breach of this Agreement shall not be deemed a waiver of any other term or condition of this Agreement or any part hereof or of any later breach of the Agreement. Any modification or waiver must be in writing.

C. Termination of Agreement This Agreement may be terminated as follows:

1. If, at any time before the date of completion, one of the parties determines that the other party has failed to comply with any of the terms and conditions of this Agreement, the aggrieved party may give notice, in writing, to the defaulting party of any deficiencies claimed. The notice will be sufficient for all purposes if it describes the default in general terms. If the defaulting party fails to cure and correct all defaults claimed within a reasonable period to be specified in the notice, the aggrieved may, with no further notice, declare this Agreement to be terminated in whole or in part.
2. If LSA is the defaulting party, it will thereafter be entitled to receive payment for those services satisfactorily performed to the date of termination less the amount of reasonable damages suffered by the MPO or City of Missoula by reason of LSA's failure to comply with the Agreement's terms and conditions.
3. If the MPO is the defaulting party it will pay LSA for those services performed in a satisfactory manner and accepted to the date of the termination.
4. If LSA is the defaulting party, the MPO may withhold any payments to LSA for purposes of setoff until the exact amount of damages due the MPO or City of Missoula from LSA is determined and reconciled.
5. The MPO shall be entitled to all work items performed satisfactorily or in progress pertaining to this Agreement pursuant to any termination.

D. Non-Discrimination LSA agrees that any and all hiring by them related to this Agreement shall be on the basis of merit and qualification and there shall be no discrimination in employment on the basis of race, ancestry, color, physical or mental disability, religion, national origin, sex, age, marital or familial status, creed, ex-offender status, physical condition, political belief, public assistance status or sexual orientation, gender identity or expression, except where these criteria are reasonable bona fide occupational qualifications.

Additionally, Contractors, subcontractors, sub grantees, and other firms doing business with the City of Missoula must be in compliance with the City of Missoula's Non-Discrimination Policy and Affirmative Action Plan, as well as Title 49 Montana Codes Annotated, entitled "Human Rights" or forfeit the right to continue such business A copy

of the City's and MPO's Non-Discrimination and Affirmative Action Policy is attached and incorporated hereto as "Exhibit B" and "Exhibit C", respectively.

- E. Ownership and Publication of Materials All reports, information, websites, social media content, data and other materials prepared by LSA pursuant to this Agreement are the property of the MPO and the City of Missoula which shall have the exclusive and unrestricted authority to release, publish or otherwise use, in whole or part, information relating hereto. No material produced in whole or in part under this Agreement may be copyrighted or patented in the United States or in any other country without the prior written approval of the MPO or City of Missoula. Any reuse by the MPO or the City of Missoula on other projects not contemplated under this Agreement shall be at their sole risk, without legal liability to LSA.

- F. Reports and Information LSA will maintain accounts and records, including personnel, property and financial records, adequate to identify and account for all costs pertaining to this Agreement and such other records as may be deemed necessary by the MPO to assure proper accounting for all project funds. These records will be made available for audit purposes to the MPO, the City of Missoula, and their authorized representatives, and will be retained for three years after receipt of final payment for the services rendered under this Agreement unless permission to destroy them is granted by the MPO of the City of Missoula. LSA's records relating to this Agreement will be available during normal business hours for inspection by the MPO, City of Missoula and their authorized representatives. Additionally, LSA hereby certifies that it will comply with City of Missoula, State of Montana, and MPO requirements regarding retention of and access to public records, including all information and data provided by the public through various means, including web and social media-based records.

- H. Legal Venue This Agreement will be construed under and governed by the laws of the State of Montana. In the event of litigation concerning it, venue is the Fourth Judicial District in and for the County of Missoula, State of Montana.

- I. Accreditation and Eligibility LSA hereby certifies that work on each part of the services performed pursuant to this Agreement and any Addenda or approved Extra Services shall be performed by or under the direct supervision of personnel currently accredited or licensed to perform such work in the State of Montana when a license or accreditation is necessary or appropriate.

- J. Workers Compensation Insurance LSA hereby certifies that pursuant to Section 39-71-401, MCA, LSA has obtained and will maintain at its expense for the duration of this Contract, coverage in a Workers' Compensation insurance program with either the State of Montana, a private insurance carrier, or an approved self-insurance plan in accordance with Montana State law for its principals and employees for the services to be performed hereunder and that the MPO has no liability for LSA's workers' compensation insurance claims.

- K. Liability Insurance and Errors and Omissions Insurance LSA hereby certifies that it

has and shall maintain during the time period of this Agreement, liability insurance in the minimum amount of \$750,000 per claim and \$1,500,000 aggregate/total includes liability for accidents occurring during service delivery or at the services delivery site that are attributable to LSA or its agents' conduct.

LSA shall maintain Professional Errors and Omissions Insurance in the minimum amount of \$1,000,000 per claim.

- L. Previous Agreements This Agreement constitutes the entire understanding of the parties and is intended as a final expression of their agreement and a complete statement of the terms thereof. There are no promises, terms, conditions, or obligations, other than contained herein. This Agreement shall supersede all previous communications, representations, or agreements, either oral or written, between the parties.
- M. Binding Effect This Agreement and all of the covenants hereof shall inure to the benefit of and be binding upon the MPO and LSA respectively and their partners, successors, assigns and legal representatives. Neither the MPO nor LSA shall have the right to assign, transfer or sublet his interest or obligations hereunder without written consent of the other party.
- N. Indemnification LSA shall indemnify, defend, and hold the MPO and City of Missoula and their officers and employees harmless from and shall process and defend at its own expense all claims, demands, or suits at law or equity arising in whole or in part from LSA's negligence or breach of any of its obligations under this Agreement. Nothing herein shall require LSA to indemnify the MPO against and hold harmless the MPO from claims, demands or suits based solely upon the conduct of the MPO, their agents, officers and employees and provided further that if the claims or suits are caused by or result from the concurrent negligence.
- O. Severability If a part of this Agreement is invalid, all valid parts that are severable from the invalid part remain in effect. If a part of this Agreement is invalid in one or more of its applications, the part remains in effect in all valid applications that are severable from the invalid applications.
- P. Copies of Agreement. This Agreement is executed in two original copies. Each of the parties hereto will be provided with one such original copy.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal, the day and year first above written.

(Seal)

(Signature)

(Print Name)

Notary Public for the State of California

Residing at _____, California

EXHIBIT A

Scope of Services and Unit Cost

As outlined in the RFP, LSA has prepared the following scope of work to assist the Missoula MPO with the model update.

Scope of Work

Task 1.0: Project Management

Tasks 1.1 and 1.2: Project Initiation and Meetings

LSA understands that the success of the project depends on the skill and commitment of the people working together, including the MPO staff, the member agencies, and the LSA team. Therefore, the model update will require close coordination among the MPO, its member agencies, and LSA staff. This coordination will begin with a kick-off meeting at the outset of work and will continue through regularly scheduled monthly coordination meetings (approximately 4-5 meetings).

Additional informal coordination also will occur as needed to facilitate project progress. These meetings will not only serve as a channel to update the MPO and member agencies on the progress of the project but also to jointly resolve any modeling issues that may arise during the course of the project. The MPO may cancel these meetings when they are not necessary.

LSA will schedule up to two in-person meetings for the project kick-off meeting and presentation of the final model along with a one-day training session. For the remaining coordination meetings, LSA will use web conferencing technologies and conference calls to conduct these meetings. LSA will also provide a monthly progress report, along with each invoice, that summarizes the work performed and key deliverables during the previous month. A detailed agency participation program has been included in the next section.

Task 2.0: Model Input Updates

Task 2.1: Traffic Analysis Zone (TAZ) Updates

The Missoula Model currently has 4,059 internal zones and 7 external zones. The TAZ structure for the Missoula Model is identical to the 2010 Census Blocks. Currently, LSA does not propose any TAZ splits or modifications unless desired/requested by the MPO. TAZ splits or boundary modifications may be appropriate due to proposed future developments or future roadway alignments. Zone boundaries will also be coordinated with the local jurisdictional boundaries to allow accurate subarea reporting.

Model inputs such as roadway network, socioeconomic data, and other input variables will be appropriately addressed for the zone disaggregation.



Task 2.2: Socioeconomic Data Updates

The Missoula Model uses households with household size and income to develop trip productions and six employment types to develop trip attractions. LSA proposes to retain the household attributes (income and household size) and employment types from the existing model. Existing household attributes and employment types from the existing model provide a good balance between providing sensitivity in the model for these variables and the resources that it would take to forecast these household variables and employment by type for long term.

The travel model is calibrated and validated to existing conditions; this is referred to as the base year for the model. The existing base year for the Missoula Model is 2014. Based on our recent discussions, it was decided to update the base year of the model to 2018. Socioeconomic data attributes will be developed along with the compilation of traffic counts for the base year.

The Missoula Model consists of two counties Missoula County and Ravalli County. Due to the differences in data availability, different approaches were used for each County to develop base and forecast model datasets during previous model updates. A similar approach will be used during this update as well.

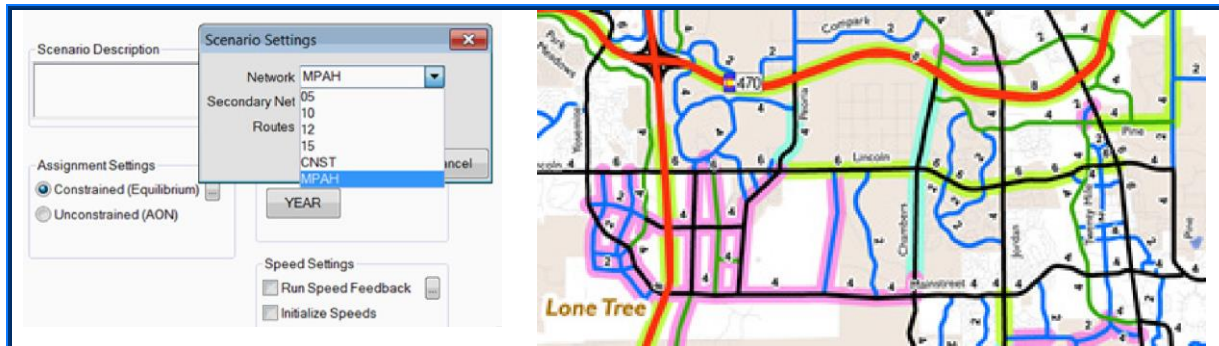
For Missoula County, LSA will develop 2018 household data by adding building permit/entitled lot information from 2014–2018 to existing 2014 households at the TAZ level. If detailed address information is available from the building permit data, it will be geocoded and aggregated to TAZs. However, if permit data are available at a more aggregate level, household growth will be allocated to appropriate TAZs based on the existing 2045 forecast trends and in consultation with MPO staff. Household growth information for Ravalli County will be based on American Community Survey (ACS) data in case building permit information is not available. Household growth for Ravalli County will be proportionally allocated to TAZs based on existing 2045 forecast information. Household data will be reviewed for reasonableness by comparing the control totals with latest ACS data, reviewing growth rates from 2014 at regional and TAZ levels, etc. In case of significant differences between the new base year model data and census data, LSA will coordinate with the MPO to resolve the differences. If the differences between the updated model data and Census are minor, then the model data may be adjusted to reflect Census data control totals at a County level. LSA will propose the appropriate methodology for the control total adjustment and will update the household data with MPO approval.

Employment data for both counties were provided by the MPO during the previous model updates (2014 and 2010). The data were provided in GIS format and contained North American Industry Classification System (NAICS) code. NAICS code was helpful in the classification of the employment into model employment categories whereas GIS format was used to aggregate the employment into the updated TAZ system. Employment data, in GIS format, for the base year (2018) will be provided by the MPO along with the NAICS codes. LSA will distribute the employment into six model employment categories using NAICS code and aggregate it to the new TAZ system. TAZs with unreasonable growth or losses in employment will be identified and reviewed closely with the help of the MPO. LSA will review the updated data for reasonableness using household/employment ratio, growth rates from 2014, and compare the data against data from Bureau of Labor Statistics (BLS).

Miscellaneous TAZ data, such as area types and jurisdictional boundary definitions, will be adjusted appropriately. The roadway network will also be updated to be consistent with the miscellaneous TAZ changes identified in the above task.

The University of Montana is identified as a special generator in the travel model. Special generator values will be adjusted to 2018 based on household growth in the region and latest student enrollment information available from the university.

Task 2.3: Roadway Network Updates



The roadway network updates will focus primarily on changes that have occurred since the previous model's base year, 2014. The network will be reviewed for accuracy, connectivity, and consistency.

LSA will obtain the list of roadway improvements constructed since 2014 and will update the network accordingly. Previous Transportation Improvement Programs (TIPs) will be reviewed and any capacity improvements will be identified and included in the updated network. Network maps identifying those improvements will be provided for the MPO's review. Capacity improvements identified in the previous fiscally constrained plan will be reviewed and included in 2018 network if any of those improvements have been constructed. Roadway network will also be kept consistent with any TAZ modifications and transit route system updates.

Updates to the roadway network will also include coding of latest 2018 traffic counts onto the network for validation purposes. LSA will obtain the traffic counts from the MPO and also gather any count data from other sources if available. Count data will be geocoded and then tagged onto the roadway network. Count data will be plotted on a network map and reviewed for consistency and reasonability. Links with 2010, 2014, and 2018 counts will be used to estimate the traffic growth rates and will be helpful in the count review process. Review of the count data will also include verification that the model network and screenlines are sufficiently covered for validation. For screen line locations where new count data are not available, growth rates from traffic counts or socioeconomic data will be used to adjust 2014 counts. A similar approach may be used to adjust counts in Ravalli County in case 2018 counts are not available.

Counts at the external stations will be reviewed and updated appropriately as well. This will also include modification of Internal/External (IE) trips and External-External (EE) trips accordingly.

Transit Network Changes. The Missoula Model is a mode-choice model and therefore requires update of the transit route system as well. Although transit network changes are assumed to be minimal, Missoula’s transit network will be reviewed for consistency with Mountain Line route information. Route headways and alignments will be updated with any changes in Mountain Line’s schedule and routes.

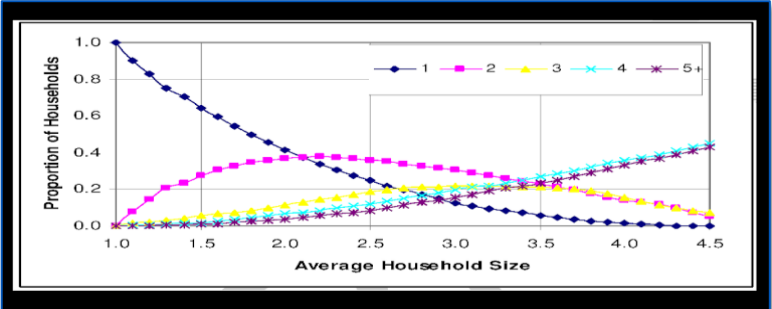
Bicycle/Pedestrian Count Data and Network Update. The Missoula MPO Model roadway network includes attributes that describe the presence and quality of non-motorized facilities on roadway links within the MPO. Bicycle and pedestrian counts will be updated based on the latest data provided by the MPO. These counts will be manually entered on the network and checks similar to traffic counts will be performed as a part of the review process. Improvements to the bicycle and pedestrian network, such as addition of new facilities and changes in alignments, will be coded in the model network. Non-motorized counts will be used in the recalibration of the mode-choice coefficients and constants. These counts and the trip information provide validation data that ensure non-motorized trips are modeled with reasonable lengths and in the correct locations.

Task 3.0: Model Update

Task 3.1: Trip Generation

The household variables (household size and income) used in the current model provide sufficient detail to capture the trip-making differences among different types of households. Similarly, the six employment categories in the model provide ample sensitivity to the model trip generation.

Bivariate household variables, household size, and household income used in the existing model were based on the 2010 Census. LSA will explore the latest



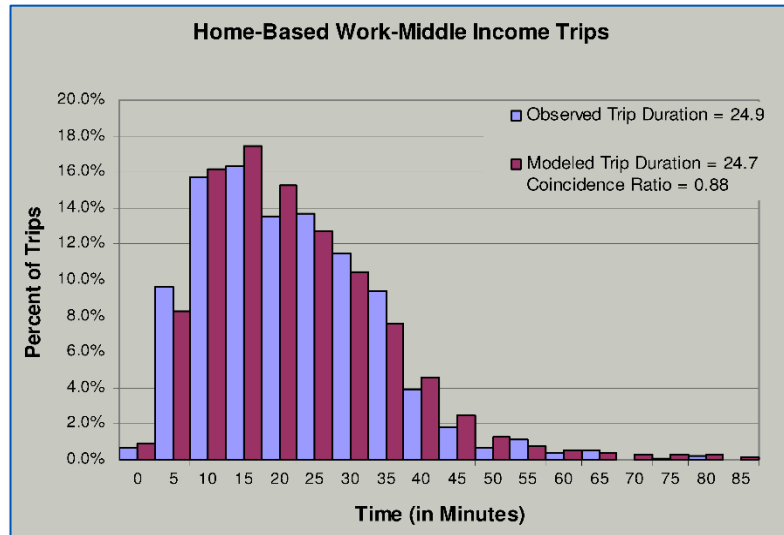
available ACS data and will consider update of the bivariate variables, if the data are deemed sufficient to do so. Regional bivariate distributions by household size and income will also be considered for update using latest available Public Use Microdata Sample (PUMS) data.

The 2017 National Household Travel Survey (NHTS) was recently released and LSA has experience in the analysis of previous NHTS datasets and household travel surveys for multiple travel model updates. Trip rates from the existing model will be compared with the latest datasets available and any necessary changes will be included in the update after the MPO’s review.

External station traffic counts will be updated to the new base year. No changes are proposed to methodology for external trips other than a simple update of the counts. IE trip splits and EE trip interchanges between external stations are not proposed for any modification.

Task 3.2: Trip Distribution

Generally, trip distribution tends to be among the weaker components in a travel demand model system. Household travel surveys are invaluable for understanding individual and sub-group travel behaviors. However, due to lack of regional household travel surveys, previous model development and update efforts relied heavily on Census Transportation Planning Package (CTPP) data for trip



distribution calibration. CTPP data are invaluable in the regions where household travel data are unavailable but are limited in the amount of detail. With the latest technological advancements, various other sources of data, such as cell phone triangulation data and mobile app-based GPS data, is commercially available and can provide valuable insights into trip distribution patterns for the region.

For this project, LSA strongly recommends obtaining new GPS-based Origin-Destination (O-D) data for calibration of trip distribution. LSA understands that this is an expensive endeavor, but lack of regional household travel survey data limits the number of region-specific data sources that can be used in the travel model calibration and validation. The O-D data will provide detailed trip information specific to the Missoula region, which will help in a better calibration and validation of a travel model. Since these are commercially available data, there is a cost associated with the purchase of these data, which has been included as additional cost in this proposal.

The cost of this dataset depends on the number of TAZs in the model and amount of detail needed in terms of time periods of the day, trip purpose, etc. The Missoula Travel Model has 4,059 zones, which would increase the cost significantly; therefore, LSA proposes to obtain the data for an aggregated zone structure/district level. LSA will work with the MPO in defining the zone aggregations that would sufficiently capture the trip patterns in the region. The trip distribution calibration will be conducted at an aggregate zonal/district level. However, the updated zonal structure of approximately 4,000 zones will still be retained in the travel model.

The dataset will include a 24-hour trip table by trip purpose, at a minimum, for the modeling region. LSA will identify the time period to pull the O-D trips (either spring or fall 2018) for the model base year. Midweek data will be pulled to represent the typical travel conditions. LSA will review the data for reasonableness at an aggregate level and compare with Census data. An initial cost range to obtain these data is included in the cost proposal as an optional line item.

Trip length distributions will be calibrated using observed trip table (O-D data) and model skims. Friction

factors from the existing model will be used as a starting point and modified to match the new observed trip length distribution targets from the O-D data. Since CTPP data were only available for the home-base work trips, friction factors for other trip purposes were calibrated using a pivot point analysis during previous model calibrations. However, with the availability of observed spatially located GPS trip data by purpose, other trip purposes can be calibrated directly to the observed data.

Task 3.3: Mode Choice

The Missoula Model includes a mode choice component that separates the person trip tables into the drive alone, shared ride (i.e., carpool), transit (walk access and drive access), and non-motorized (bicycle and walk) modes. Information about transit routes and the quality of bicycle and pedestrian facilities provides important input to the mode choice model. The mode choice model also considers trip lengths produced by the gravity model, resulting in sensitivity to higher density and mixed-use areas. Such areas will produce shorter trips that are more likely to be made using non-motorized modes.

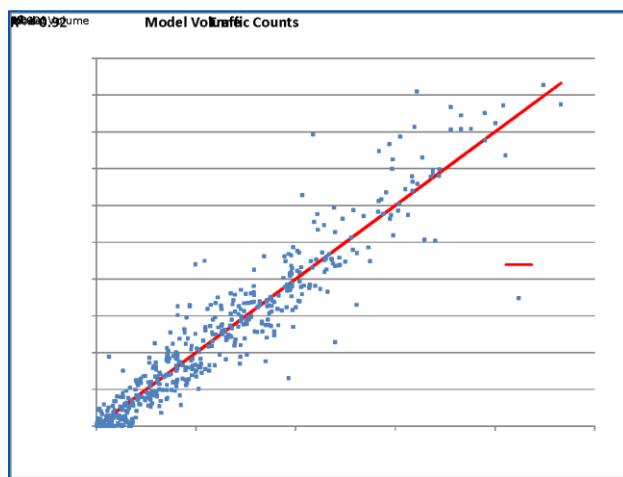
The Missoula Model mode choice is a nested logit model and no modifications will be conducted to the structure of this model. The 2010 Missoula mode choice component was calibrated to reproduce observed mode shares. The observed mode share for transit is based on the number of boardings from Mountain Line’s Automatic Passenger Counts (APC) data whereas the non-motorized shares were obtained from the 2000 CTPP. No observed data or data from the Census were available during the 2014 model update; however, 2010 CTPP data are available now and the CTPP data for 2012–2016 was released toward the end of 2018. LSA will review these two CTPP datasets to develop the mode share targets for the home-based work trips in the model as CTPP data are only available for work trips. Pivot point analysis similar to previous model updates will be conducted to develop mode share targets for the other trip purposes in the model.

The 2018 average daily transit boarding will be obtained from Mountain Line and will be used for the transit mode share calibration. The percentage distribution of transit trips by trip purpose will be based on latest CTPP data and distributions in the 2014 and 2010 models.

LSA anticipates modifications to alternative specific constants during the mode choice calibration. Other attributes such as mode choice coefficients, value of times, and any of the cost variables will be reviewed and updated accordingly during the calibration effort.

Task 3.4: Time of Day

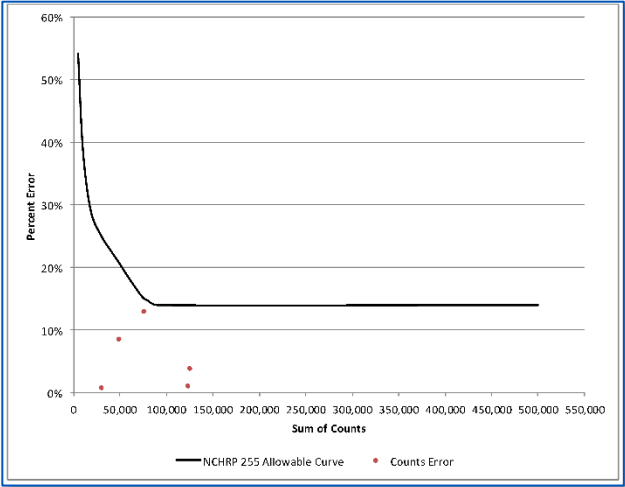
The Missoula Model includes a time of day component where the vehicle trip tables are distributed into a.m. peak, p.m. peak, and off-peak periods. The time of day factors, during 2010 model development, were developed using the traffic count that was available at that time. No changes to the time



of day factors were deemed necessary during the 2014 model update. LSA will review the available count data and will develop time of day factors if sufficient hourly traffic counts are available. In case detailed count data are unavailable, LSA will keep the time of day factors consistent with the existing model.

Task 3.5: Validation

Model validation occurs throughout the model update process. It begins with the verification of the trip rates and continues forward to trip length analysis, mode analysis, and traffic assignment. LSA will monitor model calibration and reasonableness measures throughout the model update process and include such measures in the documentation. Model validation will focus primarily on the model’s ability to match observed traffic count data but also will include comparisons of model parameters and statistics to generally accepted guidelines (*Travel Model Validation & Reasonableness Checking Manual, 2nd Edition*). Several validation metrics used to quantify differences between modeled and observed volumes include volume-to-count ratio, the correlation coefficient, percent root mean square error, etc.



During the model validation process, LSA expects to make changes to any of the four individual model steps (trip generation, trip distribution, mode split, and assignment) as needed to better model existing conditions. In doing so, LSA will monitor calibration of each step to ensure that metrics such as average trip rates, trip lengths, and mode shares remain within adopted thresholds.

Task 3.6: Validation Workshops

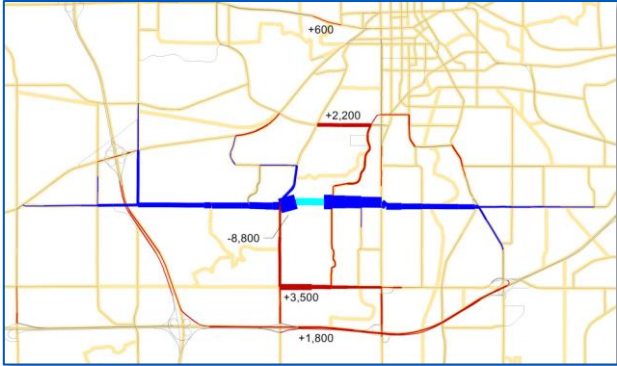
LSA proposes a validation workshop for the MPO during the model validation task to increase MPO staff involvement with the process and also to improve its confidence in using the model. The workshop will be combined with the last monthly coordination meeting with MPO staff.

In this workshop, MPO staff will work directly with LSA to review the model results and investigate issue areas. Adjustments will be made in real time to determine the most appropriate changes. The workshop serves an important purpose in learning from local experts who can provide valuable insight into the validation process. In addition, the validation workshop helps participants vested in model’s success, improving confidence in the model’s ability to provide useful information. The workshop will be conducted using web-based technology like WebEx.

Task 3.7: Sensitivity Tests

A key component of the validation process is sensitivity testing. Sensitivity testing will be applied to both base year and future year scenarios. Sensitivity testing can be performed by applying the model using

alternative demographic, socioeconomic, or transportation supply to determine the plausibility of the resulting travel forecasts. The sensitivity of the model to the specific variable being manipulated can therefore be estimated by comparing the results of the alternative run to the base run. The types of model inputs that might be manipulated during sensitivity testing could include the following:



- Land Use/Socioeconomic Inputs: Examples (which may be region-wide or area-specific) might include increases in population or employment or changes in income levels.
- Highway Network: Examples may include changes to travel times or speeds or activation of roadway alternatives.

Sensitivity testing is a valuable tool for confirming that future changes to model input variables and assumptions result in predictable changes to future travel behavior. These variables include socioeconomic growth, land use policy, and planned changes to transportation facilities. This important step can also draw out any problems or inconsistencies in the model dataset and algorithms prior to application of the model for planning purposes. For purposes of this model update, up to seven sensitivity tests will be performed for each scenario.

Task 4.0: System Update

Task 4.1: Modeling System Update

LSA will update the model macros to use the latest scenario management system and to run in the current version of TransCAD 8.0, which now is in full release. As part of the model system update, LSA will work with the MPO to identify any specific changes that should be made to the model system and summary report.

Task 4.2: Automated Land Use Importer

One of the current difficulties that MPO staff is trying to resolve is keeping the social economic data (SED) and land use data updated simultaneously when land use changes occur within the MPO. When land use changes are made by other departments, they do not get reflected in the model SED and a discrepancy develops between model results and actual land use changes in the plan. It is a time-consuming and laborious process each time the MPO has to reflect those land use changes into appropriate model datasets. In order to address this issue, LSA proposes to develop an automated Excel-based land use importer for the travel model. This Excel spreadsheet will be a standalone utility that can assist the MPO in handling the conversion process seamlessly and with minimal effort. LSA envisions this utility to contain forecast land uses by TAZ, land use to socioeconomic data conversion factors, and model socioeconomic data outputs by TAZ. The user of the utility will be able to make changes to the TAZ land use quantities or land use types. The utility will also be flexible enough to handle any zone splits/TAZ changes. Updated socioeconomic datasets for the model will be automatically generated with the changes and can be imported into a user-specified model database.

As noted before, the land use from the MPO will be converted into model socioeconomic inputs. LSA will use generic conversion rates and conversion rates from other similar areas to convert the land use changes into socioeconomic datasets. The conversion factors will be included in the spreadsheet so that MPO staff can change the conversion factors easily, if needed. The changes to conversion rates might include modifications to existing conversion factors and addition of new categories, etc. However, LSA suggests standardizing these conversion factors for the MPO area.

Task 5.0: Forecast Data

Task 5.1: Forecast Socioeconomic Data

LSA has developed the 2045 forecast socioeconomic data set as part of previous LRTP update. LSA will update the previous analysis to develop the datasets for the horizon year (2050). LSA will review the historical growth rates to develop annual growth rates for households and employment separately for both the counties in the model. The annual growth rates will be used to estimate growth control totals by each county. Once the countywide control totals are developed, the growth will be allocated to the model TAZs. The household and employment growth will be allocated to TAZs using the same process that was used during previous updates.

Development of previous forecast socioeconomic datasets involved sophisticated land use capacity analysis for Missoula County and a simpler linear growth approach for Ravalli County. For Missoula County, LSA will conduct an update to the land use capacity analysis by district to develop horizon year households and employment by TAZ. However, for Ravalli County, the simple linear growth approach will be conducted for this update as well.

Growth rates, forecast jobs/housing ratio, and average household size etc., for the updated forecast year will be compared with the forecast data from the current model and also with areas of similar size and trip making characteristics. Any potential problems will be identified for discussion with the MPO. Once the socioeconomic data have been finalized, LSA will incorporate the new data into the travel model database. The assumptions and input data used for the process will be available for review by the MPO before its use in the model.

Task 5.2: Horizon Year Roadway Network

The input roadway network for the Missoula Model is a legacy format network, which allows multiple years and alternatives to be coded in one roadway network. As the roadway improvements from the current LRTP are included in the current legacy network, LSA will review the current Transportation Improvement Program (TIP) and any other studies available to identify roadway improvement projects to include in the forecast network. Improvements identified from this process will be coded onto the roadway network.

Task 6.0: Documentation

Throughout the course of the update, LSA will document the model update process as work is performed in a detailed manner. Documentation will be developed as brief technical memorandums for each step of the model component updates such as trip generation, trip distribution, mode choice, system update and development of forecast data. Therefore, LSA anticipates preparing 5 technical

memorandums documenting the progress during the model update process. The technical memorandums/sections will be provided to the MPO for review and individual sections will be integrated into a complete document. This document will be provided with the intention that a person with good understanding of the travel modeling process would be able to understand the model development and validation process. LSA will update the existing user's guide with any changes that are included in the updated user interface or with any changes in processes required to prepare and run the travel model scenarios.

Task 7.0: Training

LSA has provided a variety of modeling training sessions for different audiences, including modelers and non-modelers interested in using model data. However, given MPO's extensive experience with the model usage and processing the required outputs, LSA can conduct model training if the MPO desires to do so. LSA has included one full day of training as an optional task. If the MPO wants to conduct training for more than one day, the budget can be adjusted accordingly.

Task 8.0: On-Call Consultation and Support

Upon completion of the model update and training, LSA will provide MPO staff with on-call consultation and support on an as needed basis.

Budget

Even though most of the tasks are similar to a model development project, this update does not include the upfront setup and conversion costs for the model inputs, such as developing a legacy network, TAZ layer, and input database, as the core essence of the model created during the model development project will remain intact. Familiarity with TransCAD and especially with the MPO's modeling system also helps LSA to be efficient and effective by avoiding system learning time for this update.

LSA has included a line item in the budget for obtaining regional O-D data. LSA has adjusted its labor costs for the tasks to share some of the burden of the data costs and to make the overall budget within the available MPO budget. A detailed budget spreadsheet is included as Table A.

Schedule

As the model update has been divided into multiple tasks, the schedule for completion of each task will be finalized during the project initiation. Some of the tasks can only be completed upon availability of up-to-date input data (e.g., household and employment and traffic counts). LSA understands that the MPO desires to complete the model update by December 31, 2019. With project initiation in September 2019, the total project duration will be approximately 4 months. Project duration of 4 months is very compact. However, LSA developed a 4-month schedule with the hope that all data requests from the MPO and project partner agencies will be fulfilled with a quick turnaround. Similarly all the review and comment windows for the project deliverables will be very compact/narrow. A detailed project schedule is included as Table B.

AGENCY PARTICIPATION PROGRAM

Travel model development/update requires multiple data sources and close cooperation from various agencies. LSA will update and enhance the model in coordination with the MPO, MDT, the City and County of Missoula, and MUTD as requested in the RFP.

LSA will schedule and attend an in-person project kickoff meeting upon receiving the Notice to Proceed, which will include representatives from the above listed member agencies, and any additional members from the Transportation Technical Advisory Committee (TTAC) and Transportation Policy Coordinating Committee (TPCC). This will help establish an efficient and clear communication channels at the very outset of the project.

The purpose of the kickoff meeting with the MPO staff and the member agency representatives will be to review and confirm the work plan, schedule, and cost allocations; review the work plan elements; and to confirm the chain of communication and reporting. Data requests for the model update will also be made to appropriate agencies during this kickoff.

Subsequent to the kickoff meeting, LSA will schedule interim project update meetings to discuss about progress and obtain agency input. LSA will use the web conferencing technologies and conference calls to conduct these meetings. LSA will circulate proposed agendas and will record actions in subsequent minutes. Action items will be carried forward in an ongoing matrix of activity to chart and to monitor project development and delivery. The matrix will be updated after each meeting and submitted to the MPO Project Manager for review.

While these meetings will serve as a venue for LSA to solicit input/comments, they will also provide the project participants with an opportunity to present their feedback. LSA will factor participant concerns into the development of the model and provide documentation of input received and how that input was utilized in the model development.

During the project conclusion, LSA will provide a presentation of the model update to the project participants. LSA recommends that this presentation be scheduled at the same time the one-day model training session is conducted. This interactive session will help the project participants understand the final results in the model as well as receive hand-on training at the same time. Additionally, the simultaneous scheduling of both final model presentation and the hands-on training will be a cost saver for the project.

Table A - Budget

MMP1902.P Missoula Metropolitan Planning Division 2019 Missoula MPO Travel Demand Model Update		LSA						Total LSA Hours	Total LSA Fees
		Principal	Project Manager	Senior Transportation Engineer/Technical Specialist	Transportation Planner/Technical Staff	Transportation Engineer/Technical Specialist	Document Management		
7/30/2019		Anthony L. Petros	Ambarish Mukherjee	Ravi Palakurthy	Debmalya Sinha	Kenneth Tan			
Employee Name		Anthony L. Petros	Ambarish Mukherjee	Ravi Palakurthy	Debmalya Sinha	Kenneth Tan			
Hourly Rate (\$/hour)		\$74.08	\$59.50	\$50.00	\$31.35	\$30.06	\$35.10		
Overhead		196.98%							
Profit		10.00%							
Multiplier		3.2668							
100%	Weighted Average	\$253.20	\$203.37	\$170.90	\$107.15	\$102.74	\$119.97		
Task 1.0 Project Management									
1.1 and 1.2 Project Initiation and Meetings		2.00	10.00	9.00				21.00	
Task 1.0 Project Management Subtotal		2.00	10.00	9.00	0.00	0.00	0.00	21.00	
Task 2.0 Model Input Updates									
2.1 Traffic Analysis Zone (TAZ) Updates			1.00	2.00	4.00			7.00	
2.2 Socioeconomic Data Updates			1.00	4.00	16.00	12.00		33.00	
2.3 Roadway Network Updates			1.00	2.00	2.00	12.00		17.00	
Task 2.0 Model Input Updates Subtotal		0.00	3.00	8.00	22.00	24.00	0.00	57.00	
Task 3.0 Model Update									
3.1 Trip Generation				2.00	10.00	8.00		20.00	
3.2 Trip Distribution			2.00	4.00	12.00	16.00		34.00	
3.3 Mode Choice				2.00	10.00			12.00	
3.4 Time of Day				1.00	1.00	4.00		6.00	
3.5 Validation			2.00	2.00	18.00	16.00		38.00	
3.6 Validation Workshops			4.00	2.00	10.00			16.00	
3.7 Sensitivity Tests		2.00	2.00	4.00	24.00	16.00		48.00	
Task 3.0 Model Update Subtotal		2.00	10.00	17.00	85.00	60.00	0.00	174.00	
Task 4.0 System Update									
4.1 Modeling System Update			2.00	14.00				16.00	
4.2 Automated Land Use Importer		2.00	2.00	32.00	24.00	12.00		72.00	
Task 4.0 System Update Subtotal		2.00	4.00	46.00	24.00	12.00	0.00	88.00	
Task 5.0 Forecast Data									
5.1 Forecast Socioeconomic Data		1.00	1.00	2.00	2.00	24.00		30.00	
5.2 Horizon Year Roadway Network				2.00	18.00			21.00	
Task 5.0 Forecast Data Subtotal		1.00	2.00	4.00	20.00	24.00	0.00	51.00	
Task 6.0 Documentation									
6.0 Documentation		2.00	2.00	4.00	16.00	4.00	6.00	34.00	
Task 6.0 Documentation Subtotal		2.00	2.00	4.00	16.00	4.00	6.00	34.00	
Task 7.0 Training									
7.0 Training			8.00	2.00				10.00	
Task 7.0 Training Subtotal		0.00	8.00	2.00	0.00	0.00	0.00	10.00	
Task 8.0 On-Call Consultation and Support									
8.0 On-Call Consultation and Support			6.00	8.00				14.00	
Task 8.0 On-Call Consultation and Support Subtotal		0.00	6.00	8.00	0.00	0.00	0.00	14.00	
Subtotal Labor:		9.00	45.00	98.00	167.00	124.00	6.00	449.00	
Sub Consultants (each Sub Consultant will be a separate Phase)								Total With Markup	
(1) GPS based Origin-Destination Data								\$18,000.00	
Subtotal Sub Consultants								\$18,000.00	
Reimbursable Expenses									
Lodging/Meals								\$800.00	
Mileage/Airfare								\$1,624.00	
Subtotal Reimbursable Expenses								\$2,424.00	
Total								\$79,956.15	

Table B - Schedule

Tasks	Year	2019																	
	Month	September					October				November				December				
	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Tasks 1.1 and 1.2 <i>Project Initiation and Meetings</i>		★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★	★
Task 2.1 <i>Traffic Analysis Zone (TAZ) Updates</i>		■	■	■															
Task 2.2 <i>Socioeconomic Data Updates</i>		■	■	■	■	■	■	■	■										
Task 2.3 <i>Roadway Network Updates</i>		■	■	■	■	■													
Task 3.1 <i>Trip Generation</i>							■	■	■	■	■	■	■						
Task 3.2 <i>Trip Distribution</i>											■	■	■	■	■	■	■		
Task 3.3 <i>Mode Choice</i>															■	■	■	■	
Task 3.4 <i>Time of Day</i>																			■
Task 3.5 <i>Validation</i>							■	■	■	■	■	■	■	■	■	■	■	■	■
Task 3.6 <i>Validation Workshops</i>																			★
Task 3.7 <i>Sensitivity Tests</i>																			■
Task 4.1 <i>Modeling System Update</i>							■	■	■	■	■	■	■	■	■	■	■	■	■
Task 4.2 <i>Automated Land Use Importer</i>																			■
Task 5.1 <i>Forecast Socioeconomic Data</i>		■	■	■	■	■	■	■	■										
Task 5.2 <i>Horizon Year Roadway Network</i>		■	■	■	■	■													
Task 6.0 <i>Documentation</i>							■	■	■	■	■	■	■	■	■	■	■	■	■
Task 7.0 <i>Training</i>																			★
Task 8.0 <i>On-Call Consultation and Support</i>		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

- ★ Kick-Off Meeting (In Person)
- ★ Web-Conference
- ★ In-Person Training Session
- ★ Presentation (In-Person alongwith Model Training)

Note: Total project duration of 4 months is very compact. It is assumed that data requests, review, and comment periods will be narrow.

EXHIBIT B
City of Missoula Non-Discrimination and
Affirmative Action Policy

NON-DISCRIMINATION. All hiring shall be on the basis of merit and qualification and there shall be no discrimination in employment on the basis race, ancestry, color, physical or mental disability, religion, national origin, sex, age, marital or familial status, creed, ex-offender status, physical condition, political belief, public assistance status or sexual orientation, gender identity or expression, except where these criteria are reasonable bona fide occupational qualifications.

AFFIRMATIVE ACTION POLICY. Contractors, subcontractors, sub grantees, and other firms doing business with the City of Missoula must be in compliance with the City of Missoula's Affirmative Action Plan, and Title 49 Montana Codes Annotated, entitled "Human Rights" or forfeit the right to continue such business dealings.

The City's Affirmative Action Policy Statement is:

The Mayor of the City of Missoula or the Mayor's designee may adopt an affirmative action plan to provide all persons equal opportunity for employment without regard to race, ancestry, color, handicap, religion, creed, national origin, sex, age, marital status. In keeping with this commitment, we are assigning to all department heads and their staff the responsibility to actively facilitate equal employment opportunity for all present employees, applicants, and trainees. This responsibility shall include assurance that employment decisions are based on furthering the principle of equal employment opportunity by imposing only valid requirements for employment and assuring that all human resource actions are administered on the basis of job necessity.

Specific responsibility for developing, implementing, monitoring and reporting are assigned to the City Personnel staff under the supervision and direction of the Chief Administrative Officer and the Mayor.

It is the policy of the City of Missoula to eliminate any practice or procedure that discriminates illegally or has an adverse impact on an "affected" class. Equal opportunity shall be provided for all City employees during their terms of employment. All applicants for City employment shall be employed on the basis of their qualifications and abilities.

The City of Missoula, where practical, shall utilize minority owned enterprises and shall ensure that subcontractors and vendors comply with this policy. Failure of subcontractors and vendors to comply with this policy statement shall jeopardize initial, continued, or renewed funds.

Our commitment is intended to promote equal opportunity in all employment practices and provide a positive program of affirmative action for the City of Missoula, its employees, program participants, trainees and applicants.

EXHIBIT C
MPO Non-Discrimination and Affirmative Action Policy

The Missoula Metropolitan Planning Organization (MPO) is committed to conducting all of its business in an environment free of discrimination, harassment, and retaliation. In accordance with State and Federal law MPO prohibits any and all discrimination on the grounds of race, color, national origin, sex, age, physical or mental disability, parental/marital status, pregnancy, religion/creed/culture; political belief, genetic material, veteran status, or social origin/ancestry (hereafter “protected classes”) by its employees or anyone with whom MPO chooses to do business.

For the duration of this contract/agreement, the SUBRECIPIENT agrees as follows:

(1) Compliance with Regulations: The SUBRECIPIENT (hereinafter includes consultant) will comply with all Acts and Regulations of the United States and the State of Montana relative to Non-Discrimination in Federally and State-assisted programs of the U.S. Department of Transportation and the State of Montana, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

(2) Non-discrimination:

a. The SUBRECIPIENT, with regard to the work performed by it during the contract, will not discriminate, directly or indirectly, on the grounds of any of the protected classes in the selection and retention of subcontractors, including procurements of materials and leases of equipment, employment, and all other activities being performed under this contract/agreement.

b. SUBRECIPIENT will provide notice to its employees and the members of the public that it serves that will include the following:

i. Statement that SUBRECIPIENT does not discriminate on the grounds of any protected classes.

ii. Statement that SUBRECIPIENT will provide employees and members of the public that it serves with reasonable accommodations for any known disability, upon request, pursuant to the Americans with Disabilities Act as Amended (ADA).

iii. Contact information for SUBRECIPIENT’s representative tasked with handling non-discrimination complaints and providing reasonable accommodations under the ADA.

iv. Information on how to request information in alternative accessible formats.

(3) In accordance with Mont. Code Ann. § 49-3-207, SUBRECIPIENT will include a provision, in all of its hiring/subcontracting notices, that all hiring/subcontracting will be on the basis of merit and qualifications and that SUBRECIPIENT does not discriminate on the grounds of any protected class.

(4) Participation by Disadvantaged Business Enterprises (DBEs):

a. If the SUBRECIPIENT receives federal financial assistance as part of this contract/agreement, the SUBRECIPIENT will make all reasonable efforts to utilize DBE firms certified by MDT for its subcontracting services. The list of all currently certified DBE firms is located on the MDT website at mdt.mt.gov/business/contracting/civil/dbe.shtml

b. By signing this agreement the SUBRECIPIENT assures that:

The contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate.

c. SUBRECIPIENT must include the above assurance in each contract/agreement the SUBRECIPIENT enters.

(5) Solicitation for Subcontracts, Including Procurement of Materials and Equipment: In all solicitations, either by competitive bidding, or negotiation, made by the SUBRECIPIENT for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the SUBRECIPIENT of the SUBRECIPIENT's obligation under this contract/agreement and all Acts and Regulations of the United States and the State of Montana related to Non-Discrimination.

(6) Information and Reports: The SUBRECIPIENT will provide all information and reports required by the Acts, Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information and its facilities as may be determined by MPO or relevant US DOT Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the SUBRECIPIENT will so certify to MPO or relevant US DOT Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

(7) Sanctions for Noncompliance: In the event of a SUBRECIPIENT's noncompliance with the Non-discrimination provisions of this contract/agreement, MPO will impose such sanctions as it or the relevant US DOT Administration may determine to be appropriate, including, but not limited to:

- a. Withholding payments to the SUBRECIPIENT under the contract/agreement until the SUBRECIPIENT complies; and/or
- b. Cancelling, terminating, or suspending the contract/agreement, in whole or in part.

Pertinent Non-Discrimination Authorities:

During the performance of this contract/agreement, the SUBRECIPIENT, for itself, its assignees, and successor in interest, agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

Federal

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 200d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21;
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
- Airport and Airways Improvement Act of 1982, (49 U.S.C. § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (broadened the scope, coverage, and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975, and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms “programs or activities” to include all of the programs or activities of the Federal-aid recipients, sub-recipients, and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibits discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration’s Non-Discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority

Populations and Low-Income Populations, which prevents discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;

- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of Limited English Proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. § 1681 et seq.).

State

- Mont. Code Ann. § 49-3-205 Governmental services;
- Mont. Code Ann. § 49-3-206 Distribution of governmental funds;
- Mont. Code Ann. § 49-3-207 Nondiscrimination provision in all public contracts.

(8) Incorporation of Provisions: The SUBRECIPIENT will include the provisions of paragraph one through seven in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The SUBRECIPIENT will take action with respect to any subcontract or procurement as MPO or the relevant US DOT Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the SUBRECIPIENT becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the SUBRECIPIENT may request MPO to enter into any litigation to protect the interests of MPO. In addition, the SUBRECIPIENT may request the United States to enter into the litigation to protect the interests of the United States.