

## Revised Item and Support Material Agenda Item No. 5

### Board of Directors Metro Valley Study Session

August 13, 2015

10:00 a.m.

Location:

SANBAG

First Floor Lobby

1170 W. 3<sup>rd</sup> Street, San Bernardino, California 92410

## Discussion Calendar

### Project Delivery

#### 5. Investment Grade Traffic and Revenue (T&R) Study Services for the I-10 and I-15 Corridor Projects

That the following be reviewed and recommended for final approval by the Board of Directors, acting in its capacity as the San Bernardino County Transportation Authority, at a regularly scheduled Board meeting:

A. Approve a sole source Contract 16-1001355 with CDM Smith, Inc. to complete the Investment Grade Traffic and Revenue Study Services for the I-10 and I-15 Corridor Projects and provide related support services for an amount not to exceed \$1,974,271.

B. Approve a contingency amount of \$200,000 and authorize the Executive Director, or their designee to release contingency as required for the project.

*This item was revised to include the final scope and fee for the T&R work that will be tied to three distinct financial milestones. Milestones 1 and 2 pertain to supporting the TIFIA process and financial close of I-10 Phase One, and initiating the TIFIA process on I-10 Phase Two and I-15 Phase One. These milestones would occur in 2016 and 2017 respectively, and are included in this Contract Amount. Milestone 3, which pertains to support of financial close of I-10 Phase Two and I-15 Phase One, would occur in 2019. Since the details of this work cannot be confirmed at this time, it is not included in this Contract Amount, but could be negotiated and added as an Option under this contract at a future date. The scope and fee breakdown are included as Attachment A.*

## *Minute Action*

### AGENDA ITEM: 5

**Date:** August 13, 2015

**Subject:**

Investment Grade Traffic and Revenue (T&R) Study Services for the I-10 and I-15 Corridor Projects

**Recommendation:**

That the following be reviewed and recommended for final approval by the Board of Directors, acting in its capacity as the San Bernardino County Transportation Authority, at a regularly scheduled Board meeting:

- A. Approve a sole source Contract 16-1001355 with CDM Smith, Inc. to complete the Investment Grade Traffic and Revenue Study Services for the I-10 and I-15 Corridor Projects and provide related support services for an amount not to exceed \$1,974,271.
- B. Approve a contingency amount of \$200,000 and authorize the Executive Director, or their designee to release contingency as required for the project.

**Background:**

**This is a new sole source contract.**

In August 2011, SANBAG entered into an agreement with CDM Smith, Inc. (formerly known as Wilbur Smith Associates) to complete Intermediate-Level Traffic and Revenue Studies for the proposed Express Lanes on the I-10 and I-15 Corridor Projects. After successfully completing this work in coordination with the financial consultant, SANBAG received positive results confirming financial viability for both the I-10 and I-15 Corridor Projects. Confirming financial viability was an important step in the overall project delivery process, as it enabled continued progress on the design and environmental tasks necessary for the preparation of the Draft Environmental Document on both corridors.

As the Project Approval/Environmental Document (PA/ED) activities advance, staff has continued to review and refine the financial activities needed to support the projects. Should Express Lanes be selected as the Preferred Alternative for the I-10 Corridor Project, a Transportation Infrastructure Finance and Innovation Act (TIFIA) loan would represent a significant portion of the overall funding plan. As discussed at the July 1, 2015 Board meeting, recent discussions with Federal Department of Transportation (DOT) management identified significant benefits related to accelerating the TIFIA process including (1) securing TIFIA fund commitment prior to the change in the Administration and (2) positioning SANBAG to negotiate the loan terms sooner to potentially take advantage of historically low interest rates. Since the TIFIA funds comprise approximately 33 percent of the eligible costs for the I-10 and I-15 Corridor Projects, accelerating the supporting financial activities could provide a significant overall benefit and project cost savings.

Following discussion at the July 1, 2015 meeting, the Board approved acceleration of the TIFIA schedule, which requires the acceleration of certain financial activities including development of the Investment Grade Traffic and Revenue Study (IGTR). This accelerated schedule for the

*Entity: CTA*

IGTR does not provide time to complete the open procurement process; hence, the Board directed staff to negotiate a sole source amendment to the existing Contract C11070 or develop a new contract with CDM Smith to develop the IGTR. Since the existing contract does not include the current contract language, it is recommended to develop a new contract with CDM Smith.

After several meetings with CDM Smith, a detailed scope of work and associated cost required to complete the IGTR work activities for the I-10 and I-15 Corridor Projects has been agreed upon. The scope and fee breakdown are attached as Attachment A. The not to exceed contract amount is \$1,974,271, which is in-line with the independent cost estimate. Also, it is recommended that a contingency amount of \$200,000 be approved and the Executive Director or their designee be authorized to release the contingency as required for the project.

The IGTR, which builds upon the Intermediate T&R Study, will be conducted to provide required information for three major financial milestones for the I-10 and I-15 Corridor Projects. The first milestone is the submittal of the TIFIA Letter of Interest and obtaining an executed TIFIA Term Sheet for I-10 Phase 1, which requires a complete IGTR. This work is scheduled to occur in 2016, and the scope and fee are included in the subject recommendation. The second milestone is the execution of the TIFA Credit Agreement and issuance of the toll revenue backed bonds for I-10 Phase 1, which requires an updated IGTR. This work is scheduled for 2017, and the scope and fee are included in the subject recommendation. In addition, the updated IGTR will be utilized to advance the TIFIA process for I-10 Phase 2 and I-15 Phase 1.

The final milestone is the execution of the TIFA Credit Agreement and issuance of toll revenue backed bonds for I-10 Phase 2 and I-10 Phase 1, which is scheduled to be completed in 2019. The scope and fee for this work is **not** included in the subject recommendation, but is included in the contract as an option. This final scope of work cannot be fully confirmed at this time since a number of assumptions, economic conditions and other variables are anticipated to change over the next four years. Therefore, staff recommends developing a final scope and fee when these unknown conditions and project variables are understood more fully.

The new CDM Smith contract to perform the IGTR services for the I-10 and I-15 Corridor Projects will be funded by the Measure I Valley Freeway Program. The services provided by this new CDM Smith contract will be coordinated with the development of an updated Plan of Finance, which will be procured as a separate Financial Advisor contract.

***Financial Impact:***

This item is consistent with the adopted SANBAG Fiscal year 2015/2016 budget under Task No. 0850. The funding source is Measure I Valley Freeway Funds.

***Reviewed By:***

This item is not scheduled for review by any other policy committee or technical advisory committee. SANBAG General Counsel and Procurement Manager have reviewed this item and a draft of the new contract.

***Responsible Staff:***

John Meier, Project Manager

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Approved  
Board of Directors Metro Valley Study Session  
Date: August 13, 2015

Witnessed By:

# I-10 and I-15 Express Lanes: Proposal, Investment-Grade Traffic and Revenue Study, Part 2 and Future Updates

August 11, 2015

Mr. John Meier  
Project Manager  
San Bernardino Associated Governments  
1170 W. 3rd Street, 2nd Floor  
San Bernardino, CA 92410-1715

***Re: I-10 and I-15 Express Lanes: Proposal, Investment-Grade Traffic and Revenue Study, Part 2 and Future Updates, DRAFT***

Dear Mr. Meier:

CDM Smith is pleased to submit this scope of work for an investment-grade traffic and revenue study of the proposed I-10 and I-15 Express Lanes system in San Bernardino County. This proposal provides the scope and budget to complete the initial investment-grade traffic and revenue study for the first phase of the I-10 Express Lanes, develop initial updated estimates for the remainder of the I-10 Express Lanes and a portion of the I-15 Express Lanes, and future updates to support financing of these projects. The limits of each phase are shown in Figure 1. It is our understanding that I-10 Phase 1 will be financed and constructed first, followed by the other two projects.

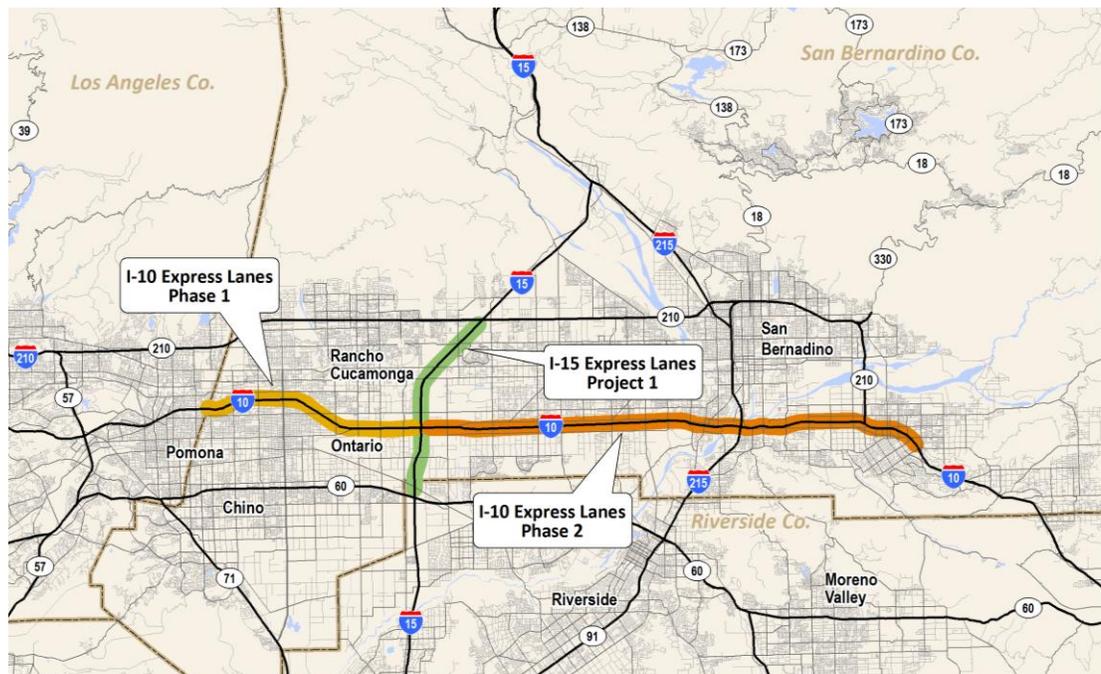


Figure 1 Location of Project Corridors



The proposed scope of work to be covered in this proposal will include work efforts to complete the data collection tasks, develop updated traffic and operations profile of the two freeway corridors, refresh the models developed for the Intermediate-Level study, update the traffic forecasts for the region, and result in a traffic and revenue report that will be suitable for project financing documents. This study will include a review of the current socio-economic trends and forecasts for the region from a variety of sources, make use of the latest regional travel demand models, and update the sub-area model developed by CDM Smith for the previous study.

## I-10 and I-15 EXPRESS LANES PROJECT

Phase 1 of the I-10 Express Lanes project proposes to widen I-10 and provide two Express Lanes in each direction from the Los Angeles County line to I-15. For I-10 Phase 2, SANBAG will add two tolled express lanes in each direction between I-15 and I-210 and one tolled express lane per direction from I-210 to Ford Street. I-15 Express Lanes Project 1 will connect seamlessly with express lanes to the south being developed by the Riverside County Transportation Commission to provide two continuous express lanes in each direction from Cantu-Galleano Ranch Road to I-210.

The facilities would operate with non-stop all-electronic tolling, meaning that all tolls will be collected electronically, with Fastrak transponders and possibly video/license-plate tolling methods. CDM Smith will coordinate with SANBAG on assumptions regarding such as minimum occupancy requirements for free usage of the lanes, specific video toll collection policies, minimum/maximum tolls, and other toll operation and toll collection parameters prior to the start of the modeling work. It is assumed that the managed lanes will be variably priced through dynamic time-of-day electronic tolling to ensure free flow speeds.

## SCOPE OF WORK

The investment-grade traffic and revenue study will make use of, to the extent possible, existing models and data from the Intermediate-Level study for these corridors. However, these models will be refreshed and updated to reflect current traffic and economic conditions. As noted earlier, Part 1 of the traffic and revenue study was begun in July 2015 through other work authorizations and initiates the work efforts for data collection. The work scope included in Part 1 of the study is summarized herein solely for the purposes of providing a complete picture of the overall study effort. It is assumed that Part 2 of the study, as described in this proposal, will continue from the efforts already underway without a break. The Part 1 work scopes and budgets have been arranged so they coincide with specific work tasks that will flow seamlessly into Part 2 of the study.

The work program developed to meet the specific requirements of express lanes studies is outlined below:

### Part 1 Tasks:

- Task 1: Project Initiation and Kickoff Meeting;
- Task 2: Data Collection;
- Task 3: Updated Stated Preference Surveys; and
- Task 4: Independent Corridor Growth Analysis.

### Part 2 Tasks:

- Task 1b: Project Management;
- Task 2b: Data Collection;
- Task 3b: Updated Stated Preference Surveys;
- Task 4b: Independent Corridor Growth Analysis;
- Task 5: Current Demand and Traffic Operations Profile;
- Task 6: Model Update and Development;
- Task 7: Traffic and Revenue Analysis;
- Task 8: Sensitivity Tests;
- Task 9: Documentation and Meetings;
- Task 10: Financing Team Support;
- Task 11: Updated Traffic and Revenue Study 2017; and

- Task 12: Updated Traffic and Revenue Study 2019.

## **Part 1 Tasks**

### **Task 1: Project Initiation and Kick-off Meeting**

The study will begin with a refinement of the study approach and a kick-off meeting in San Bernardino. CDM Smith will attend the meeting in-person. Subsequent task-specific conference calls will take place with subconsultants by phone. At that kick-off meeting, it will be important to discuss the plan to meet the financing needs of the study and what data/models need to be updated. In addition, staffing, lines of communication, and other items regarding project administration will be agreed upon.

### **Task 2: Data Collection**

An extensive data collection program is planned for this study to update the traffic operations profile of both corridors. Part 1 work efforts will include:

- 2.1. Collecting and reviewing Inrix travel time/speed data for one full year to identify the range of daily and seasonal travel patterns within the project corridors.
- 2.2. Reviewing traffic and speed data collected in the Intermediate-level studies to develop a data collection plan for this study, including locations and time periods for data collection, type of traffic data to be collected, and initiating the Caltrans permit process.
- 2.3. Development and submittal of data collection plan.

### **Task 3: Updated Stated Preference Surveys**

Stated preference (SP) surveys are an important part of a comprehensive traffic and revenue forecast that provides estimates of motorists' willingness-to-pay tolls for different segments of the driving population. Resource Systems Group (RSG) conducted a stated preference survey in 2012 to support the Intermediate Traffic and Revenue Study for these corridors. The purpose of the current work effort is to update the surveys to identify any changes in perceived willingness to pay due to (1) continuing economic recovery, (2) SANBAG's extensive public outreach program, and (3) some users becoming more familiar with the I-10 Express Lanes in Los Angeles, which were open only a short time at the time of the previous survey.

Specific Part 1 work efforts in this task include:

- 3.1. Revise the 2012 stated preference survey questionnaire;
- 3.2. Conduct a literature review;
- 3.3. Survey development; and
- 3.4. Prepare for survey administration.

#### *Task 3.1: Revise Survey Questionnaire*

The stated preference survey design will be based on the survey conducted for the I-10 and I-15 corridors by RSG in the spring of 2012. Existing survey materials will be modified and updated in coordination with SANBAG and CDM Smith. Using existing materials as a starting point will be an important part of meeting the schedule and budget estimates for this project.

The questionnaire will begin by asking respondents to describe the details of their most recent trip in the I-10 and/or I-15 corridors. These trip detail questions will be followed with stated preference experiments in which characteristics of travel alternatives – travel times, and tolls – are systematically varied. Information from the respondents' reported trip will be used to construct realistic hypothetical choice alternatives. These scenarios will be structured so that the information obtained can be used to statistically estimate coefficients for the travel choice models. To maintain consistency with the 2012 survey, the same experimental design and levels will be used to create the tradeoff scenarios in the 2016 survey.

Since tolling is generally an issue with a wide range of public opinion, especially in areas with no existing toll facilities, additional questions will be necessary to identify, and control for, strategic bias. A set of debrief and opinion questions that were used to supplement the stated preference experiments in the previous survey will be used again here. Any tolling issues or attitudinal questions that would assist SANBAG in toll policy considerations can be added to this new survey.

The questionnaire will include sufficient demographic details to allow the sample to be expanded to the full traveling population. The questionnaire will be structured so that it can be completed in approximately ten to fifteen minutes.

#### *Task 3.2: Conduct Literature Review*

A detailed literature review of other values-of-time (VOT) studies for managed lanes will be conducted. RSG will summarize results from several Express Lanes-related VOT studies RSG has conducted in other major metropolitan areas across the country. Additionally, RSG will also review publicly available research reports and academic papers related to VOT estimation for Express Lanes and how reliability factors into drivers' willingness to pay to use Express Lanes. The literature review will be summarized in a memo and will be shared with CDM Smith and the project team.

#### *Task 3.3: Survey Development*

The 2012 survey instrument will be reviewed and updated. Coding changes will be required to bring the survey into compliance with the current version of RSG's survey software platform. Any changes made to the questionnaire during Task 1 will also be addressed during this phase. The survey instrument will be programmed using RSG's rSurvey platform technology for data collection via the internet. This system provides a graphical user interface and sophisticated dynamic branching to improve the efficiency and reduce the cost of stated preference data collection. The stated preference survey instrument also supports integration of GIS data and will include an embedded Google Maps module to allow respondents a convenient way to specify trip origins and destinations. The revised survey instrument will be provided to the project team for review and comment.

#### *Task 3.4: Prepare for Survey Administration*

RSG will work closely with the project team to develop a sampling plan to ensure representation from all key segments of the traveling population in the study region while collecting the data in an efficient and cost-effective way. This includes sufficient representation from different trip purposes, household incomes, and geographies to accurately reflect any behavioral differences in the resulting discrete choice models. The sampling plan and survey recruitment approach will be consistent with the approach used in the 2012 stated preference survey.

The targeted minimum sample size for this survey is 1,600 completed surveys, with a goal of approximately 800 responses per corridor. This sample size will ensure that statistically significant coefficients can be estimated separately for each corridor in the future discrete choice modeling effort. To ensure minimum sample sizes, RSG will monitor the survey in real-time and adjust recruitment as necessary.

RSG envisions recruiting respondents into the stated preference survey through four methods:

1. Through in-person intercepts at sites within or near the study corridors;
2. Through a postcard distribution to residents of San Bernardino County;
3. Through an online market research panel; and
4. Through email outreach to businesses within or near the study corridors.

The actual geographic region(s) that will be targeted in all recruitment methods will need to be refined with the project team during the development of the sampling plan.

#### **Task 4: Independent Corridor Growth Analysis**

Due to its place in the critical path of the study, Task 4, Independent Corridor Growth Analysis, is a key element that should advance as far as possible in Part 1. The data collection, research, and review of current and forecasted data from multiple sources will be included in Part 1, along with dataset development. The socioeconomic datasets to be used to develop alternative trip tables from the SBTAM model will be delivered in Part 2 of the overall study, along with draft and final memos.

CDM Smith will work with an independent economics subconsultant, Economic & Planning Systems (EPS), in this task. The CDM Smith team will meet with SANBAG's land use and modeling staff to identify updates and changes to the San Bernardino Transportation Analysis Model (SBTAM) since the work performed for the Intermediate-Level study. We will obtain and review San Bernardino's latest small-area forecast and SCAG's recently released 2016 Draft Growth Forecast by Jurisdiction. Based on SCAG's schedule for development of the 2016 RTP, it is likely that the new small area forecasts will not be adopted by SCAG before the traffic and revenue study is due, and well after the socio-economic input is complete. Therefore, the CDM Smith team will work with SANBAG to identify a reasonable approach to disaggregate adopted current city- and town-level forecasts to the smaller Tier 2 and 3 zones used in the SBTAM model using the current dataset for guidance.

EPS will compare the existing model dataset against previous forecasts, as well as data from other national, regional, and private sources (e.g., Moody's Analytics) to evaluate the consensus view of local and regional growth. To the extent that the existing model represents growth patterns that are inconsistent with past trends or consensus projections (e.g., too much or too little growth overall, major shifts in local preferences, etc.), the economics subconsultant will suggest modeling alternatives that may be more supportable (e.g., accelerating or "lagging" growth projections or redistributing growth among counties or Tier 1 zones).

In addition to this high-level review at the regional level, more fine-grained factors affecting residential and commercial growth in the immediate project area will be reviewed, including local plans for development and zoning restrictions. A selected list of local planning agencies and developers/business groups will be contacted to assess the scale and schedule for growth within the project corridors. Potential changes in location and intensity of development resulting from express lanes construction will also be considered. As necessary for this study, the economics subconsultant will recommend adjustments to the SBTAM model to disaggregate and/or refine estimates and projections.

The economics review will focus on the areas along I-10 and I-15 where the express lanes are being developed. While growth in the High Desert portion of San Bernardino County will be included in a county-level review of growth potential, a detailed review by zone in the High Desert area will not be conducted as part of this study since the I-15 Express Lanes will end at I-215 for purposes of this study.

To assist in the regional modeling effort, the CDM Smith team will review the travel market for the warehousing industries along the I-10 and I-15 corridors, considering their roles in interregional travel, and review factors that may affect growth in this industry.

Following review of the data, and in consideration of local and regional trends, the team will develop a revised forecast that will form the baseline for this traffic and revenue study that can be used to generate refined/updated trip tables using the SBTAM model.

#### **Part 2 Tasks**

Most of the analysis and modeling work will be conducted in Phase 2.

#### **Task 1b: Kick-off Meeting and Project Management**

A kick-off meeting will be held in September 2015 to kick-off Part 2 of the study. CDM Smith will update SANBAG on the status of Phase 1, as well as identify project assumptions that need to be coordinated among all consultants. In conjunction with this meeting, CDM Smith will facilitate a short Project Quality Management (PQM) discussion with SANBAG. The PQM discussion, a key component of CDM Smith's quality management program, invites the consultant team and key stakeholders (SANBAG staff and financial consultants) to

participate in a consensus-building exercise to confirm the project goals and define the critical success factors; the processes, activities, and tasks needed to achieve success; and, to assign responsibilities for carrying out the tasks. The PQM discussion has three desired primary outcomes: (1) a clear understanding of the purpose, objectives and expectations for the project; (2) a consensus of project stakeholders about the most important factors necessary to ensure a successful project; and (3) a plan of action with assignments and schedules that will help the project team meet their objectives.

At our July 27 meeting, questions related to project assumptions for traffic and revenue analysis were discussed, and it was agreed that a joint meeting with Parsons Brinkerhoff staff involved with the development of the concept of operations plan and operating cost assumptions would be useful. It was determined that this coordination meeting could be made in conjunction with the kick-off meeting.

This task also includes project management activities for the life of the project, including regular status updates by conference call, monthly progress reports, and internal project management, quality management, and other internal administrative activities.

**Task 1 Deliverables:**

- Summary of Project Quality Management workshop;
- QA/QC Plan; and
- Detailed deliverables schedule.

**Task 2b: Data Collection**

The planning for data collection was included in Part 1/Task 2, but the costs for the actual data collection efforts is included in Part 2/Task 2b. An extensive data collection program is planned for this study to update the traffic operations profile of both corridors. In this task, the following data elements will be collected:

- 2b.1. Traffic counts;
- 2b.2. Travel time/speed runs;
- 2b.3. Inrix speed data;
- 2b.4. Bluetooth origin-destination surveys; and
- 2b.5. Review of current operating experience on SR-91 and I-10 Express Lanes.

*Task 2b.1: Traffic Counts*

An up-to-date current year traffic count profile is a key input in the calibration process for both the global demand and sub-area express lanes modeling efforts. We propose the following data collection efforts:

- 7-day traffic counts at every interchange ramp from Towne Avenue to Ford Street along I-10;
- 7-day traffic counts at every interchange ramp from Cantu-Galleano Ranch Road to Beech/Summit Avenues;
- Screenline traffic counts at two locations for each corridor, including freeway mainline and parallel arterials, up to 20 arterial locations;
- 7-day mainline traffic counts at a total of eight locations (three on I-10, two on I-15, one each on I-210, I-215, and SR-60);
- Manual vehicle classification counts and vehicle occupancy counts at one location for AM and PM peak periods on a typical weekday on I-10 and I-15, and also for the PM peak period on a Friday afternoon and a Sunday afternoon condition on I-15; and
- Manual counts of vehicles with green or white clean air vehicle (CAV) decals that are currently allowed to use HOV lanes.

The budget assumed a total of \$15,000 in fees for Caltrans permits.

*Task 2b.2: Travel Time/Speed Runs*

Conduct travel time/speed runs, using vehicles spaced 30 minutes apart, as follows:

- I-10: 6:00 AM-10:00 AM and 2:30 PM-8:00 PM for a typical interior weekday;
- I-15: 6:00 AM-10:00 AM and 2:30 PM-8:00 PM for a typical interior weekday;
- I-15: 2:30 PM-8:00 PM for a Friday; and
- I-15: 2:30 PM-8:30 PM for a Sunday.

Travel time and speed data will be collected using GPS devices, and will be matched to physical geometry of the freeway to identify the potential sources of capacity constraints and bottlenecks. Weekday travel conditions on parallel arterials such as East 4th Street, SR66, and Sierra Avenue will also be assessed to assist with validation of the regional travel demand model.

*Task 2b.3: Inrix Speed Data*

This task will be initiated in August as an early action item to assist in developing the traffic data collection plan. One full year of speed data on I-10, I-15, SR 60, and I-210 will be collected from Inrix. This data will be used to confirm that the GPS travel time runs are representative of typical weekday conditions, and to estimate the range and frequency of variations in congestion in the I-10 and I-15 corridors.

*Task 2b.4: Bluetooth Origin-Destination Surveys*

The I-10 and I-15 corridors serve as commuter routes for the cities located along these corridors and as interregional routes between California and the interior of the US. CDM Smith proposes to collect travel patterns and confirm trip length distribution patterns within the corridor via a Bluetooth O-D study. This approach will minimize disruption to freeway traffic flow. The technology utilizes the unique Media Access Control (MAC) address of Bluetooth-enabled devices such as smart phones, to determine the progression of vehicles through the corridor. By strategically locating Bluetooth sensors installed on the roadway mainline, cross-streets and frontage roads, the path of unique MAC addresses can be tracked, providing a rich and statistically valid sample of vehicle trips in the corridor. O-D data obtained for the study corridor through this method can be extracted for user-specified time periods such as AM Peak vs. PM Peak, and weekday vs. weekend day, to derive O-D matrices for the corridor. The budget presented herein assumes the Bluetooth readers will be in place for a total of 10 days, to capture multiple interior weekdays, and 2 consecutive Fridays, Saturdays, and Sundays, which will provide a larger sample for detecting O-D patterns.

Analysis to obtain O-D matrices is performed in the following stages:

1. The Bluetooth MAC ID's are first matched between each sensor pair creating a database of traversals from which O-D patterns are assessed. Filters are then applied to isolate the trips that reflect direct travel from the origin sensor to the destination sensor.
2. The trip matrix is adjusted to account for sensor layout issues, such as complicated intersections, inclusion/exclusion filters and corrections for directional bias. This step produces the adjusted O-D matrix.
3. The adjusted O-D matrix is factored to reflect actual volumes. A series of vehicle counts taken concurrently with the project will be used to determine the sampling rate, and in turn factor matched pairs to estimated trip volumes.
4. Matrix summaries are prepared for day and time aggregations to support the study objective.

The O-D matrices will be developed for typical weekdays and weekend days to compare and confirm travel patterns in the regional model, and validate VISSIM model inputs.

*Task 2b.5: Review of Current Operating Experience on SR-91 and I-10 Express Lanes*

With SANBAG's assistance, actual traffic and toll rate data will be gathered from the Orange County Transportation Authority, operator of the 91 Express Lanes, and Los Angeles Metro, operator of the I-10 Express Lanes, to provide insight into peaking patterns of traffic demand, toll-free HOV demand, and toll rates needed to manage demand. Traffic volumes in the tolled express lanes will be compared to adjacent general purpose lane volumes at two or three selected locations in the corridor, depending on data availability. These comparisons will be used to provide a reasonableness check against the forecasts from this study. In addition, toll policy guidelines for these facilities will be reviewed for applicability to the SANBAG projects.

**Task 2 Deliverables:**

- Origin-destination of I-10 and I-15 corridor vehicles; and
- Summary of existing Express Lanes operating experience (91 Express Lanes and I-10 Express Lanes).

Note: The post-processing of the rest of the data and analysis of these results will be summarized as part of Task 5, Current Demand and Operations Profile.

**Task 3b: Updated Stated Preference Surveys**

The stated preference surveys will be ready for field in September/October.

The work efforts to be conducted in Part 2 of the study program include:

- 3b.1. Administer the survey;
- 3b.2. Analyze and model the results; and
- 3b.3. Prepare draft and final report.

*Task 3b.1 – Administer the Survey*

The survey will be administered according to the final sampling plan that is developed as part of Phase 1 of this study with a target sample size of 1,600 responses. Respondents will complete the survey online using RSG's custom survey software. RSG will monitor the survey responses in real-time to ensure data quality and the fulfillment of administration targets. RSG will also monitor the survey e-mail inbox daily to respond to questions or issues related to completing the online survey. An initial pre-test will be conducted to provide field input on the questionnaire design. The survey questionnaire will be modified based on the pre-test results and the revised survey will be sent to field.

*Task 3b.2 – Analyze and Model the Results*

After the data collection is completed, the data will be checked for consistency and cleaned. Descriptive tabulations of the final, cleaned dataset will be developed. Tabulations will be prepared for responses to each question and selected cross-tabulations will be prepared to evaluate relationships among key variables. These tabulations will include general information about the characteristics of the sample and of their responses to the stated preference experiments.

The stated preference data will also be compiled into a dataset suitable for statistical choice model estimation. Logit-based route choice models will be developed to estimate overall values-of-time for incorporation in the travel demand model. Choice models will be developed and tested for relevant traveler market segments based on trip purpose and trip departure time. The segmentation and model specification will be consistent with the choice models developed as part of the 2012 stated preference survey:

- Peak work trips;
- Peak non-work trips;
- Off-peak work trips;
- Off-peak non-work trips; and
- Weekend trips.

Advanced statistical methods, including mixed multinomial logit models, will be used to identify non-systematic (random) heterogeneity in the data and provide a distribution of values-of-time for each traveler segment. These distributions of values-of-time will support estimates of toll diversion rates in the travel demand model.

**Task 3b.2 – Analyze and Model the Results**

A draft report will be prepared documenting the project approach, data and findings. The draft report will include details of methods used for the survey, the survey data that were collected, the discrete choice models that were developed, and comparison of these results against other similar projects, in consideration of the literature review results. A draft report will be submitted for review and comments. A final report, modified to address comments, will be prepared.

**Task 3 Deliverables:**

- Draft and Final Stated preference survey report.

**Task 4b: Independent Corridor Growth Analysis**

It is proposed that most of the economic review will take place as part of Part 1 and will culminate in a revised dataset that can be used within the SBTAM regional travel demand model to develop an alternative set of trip tables that can be used to forecast traffic growth for the project corridor.

During Part 2, EPS will prepare two alternative forecasts as potential sensitivity test cases, which will be used in Task 8 to test the sensitivity of toll revenues to changes in forecast inputs and assumptions. These alternative forecasts may reflect slower or more rapid overall regional growth, and/or potential re-distribution of growth within San Bernardino County based on local factors discovered during the study review process. EPS will work with SANBAG and CDM Smith to define reasonable parameters for these alternative projections. EPS will deliver two alternative SEDs with pro-rated adjustments by TAZ at the County level for counties other than San Bernardino, but may provide more detailed (i.e., not simply pro-rated) adjustments to TAZs within San Bernardino County, depending on the nature of the alternative forecast scenario.

EPS will also issue draft and final project reports in Task 4b. These documents will provide detail regarding our evaluation of:

- The current SBTAM model's consistency with other sources regarding base year conditions;
- The current SBTAM model's regional growth projections vis-à-vis other forecasting sources and current and historical data;
- The findings of interviews with selected jurisdictions regarding local development policies and planned projects or development capacity; and
- A summary of recommended adjustments to the Baseline SED as well as a description of the alternative growth forecasts and corresponding SEDs.

**Task 4 Deliverables:**

- Draft and final independent economics review report, suitable and intended for use to support a bond rating and TIFIA application.

**Task 5: Current Demand and Traffic Operations Profile**

Using trip pattern information, traffic counts, and speed and delay information collected as part of Task 2b, a current demand and traffic operations profile of I-10 and I-15 and its major feeding and competing routes will be developed. This will include the refinement of the balanced hourly demand profile by direction for the entire project area, including at least one interchange beyond the envisioned termini of the projects; detailed documentation of current delay and congestion patterns by direction for peak, shoulder and off-peak periods; origin-destination patterns and trip length distribution of corridor users; and average volumes and speeds on parallel routes.

**Task 5 Deliverables:**

- Existing Conditions and Traffic Operations Profile report of the I-10 and I-15 corridors.

**Task 6: Model Update and Development**

In this task, three separate models will be used: the SBTAM regional travel demand model, a VISSIM microsimulation model, and a sub-area window model of the study area. These same models were developed and used for the Intermediate-Level study for I-10 and I-15, but will need to be updated to reflect the new socio-economic forecasts and new traffic data. Model development is divided into three subtasks:

- 6.1. Update SBTAM regional travel demand model;
- 6.2. Update and apply microsimulation model; and
- 6.3. Refine tolling sub-area model.

*Task 6.1 – Update SBTAM Regional Travel Demand Model*

The SBTAM regional travel demand model will be run using the revised socioeconomic forecast developed in Task 4 to identify growth in demand for the study corridors. This subtask will include the following steps:

- Assemble, review, and summarize the regional transportation improvement program based on 2016 RTP inputs provided to SCAG to date.
- Identify roadway improvements that would have major impacts on traffic usage of I-10 and I-15 and determine the likelihood of these improvements occurring within the timeframe indicated in the RTP. For conservatism, improvements that provide additional competing capacity parallel to the I-10 and I-15 corridors will be considered for inclusion while improvements that bring traffic to the study corridors will be considered for exclusion. The list of improvements and assumptions of opening dates will be reviewed with SANBAG prior to network modifications. Ultimately, projects that are funded and committed will be included in the highway network. The impacts of other transportation projects can be tested as part of Task 10, if needed.
- Provide updated network and socio-economic inputs to SANBAG modeling staff to develop alternative trip tables using the alternative assumptions for base year 2012 (or 2015), 2020, 2030, 2040, and 2050. These trip tables will be interpolated to develop any intermediate year trip table that may be needed for the traffic and revenue study.
- Review resulting changes in trip tables for reasonableness.
- Validate base year model in the I-10 and I-15 corridors against traffic count and travel time data collected in Task 2.
- Run and review traffic assignments for opening year and for other future years to provide a measure of long-term traffic growth.
- Extract travel patterns within the proposed sub-area for more detailed modeling in Task 6.3.

*Task 6.2: Update and Application of Microsimulation Model*

The primary purpose of the simulation model will be to identify areas of congestion and bottlenecks under future conditions and test the sensitivity of travel time/delay to varying levels of express lanes usage. Information from the microsimulation model will be used to refine the volume-delay functions in the sub-area express lanes market share/toll model.

Since a well-calibrated existing conditions model was developed for I-10 as part of the Intermediate-Level study, we propose that the VISSIM modeling effort in this study focus on the future-year analysis. The existing conditions model will be reviewed and compared to the updated traffic and speed data, but it is assumed that the existing model will reasonably reflect current traffic conditions. The future-year VISSIM model for I-10 will

be updated to reflect current plans for highway improvement assumptions, interchanges, and express lanes intermediate access points. The traffic demand will be updated to reflect the current growth forecasts from Task 6a for 2025 and 2040 levels. The volume-delay functions on I-10 network links in the sub-area model will be updated to reflect this updated analysis.

At this stage of the study program, the VISSIM analysis and resulting speed-flow curves for I-15 developed in the Intermediate-Level study will be used for I-15 links. Updated microsimulation analysis for I-15 is not included in the budget for this task but will be included in the 2017 round of studies.

### *Task 6.3: Refinement of Tolling Sub-Area Express Lanes Model*

As with the Intermediate-Level study, the sub-area model used for forecasting the traffic and toll revenue for the express lanes projects will be extracted from the SBTAM regional model. This sub-area model will form the platform against which the traffic and revenue forecasts will be conducted, merging travel time/speed output from the microsimulation model (from Task 6.2) with corridor travel demand (from Task 6.1), and a market share/ toll-diversion model developed using the results from the stated preference surveys (Task 3). This sub-area model will be similar in extent to the model used for the Intermediate-Level study, covering parallel roads and freeways approximately 4-5 miles on either side of the project corridors, and will be sufficient to cover future phases of the express lanes.

The sub-area model trip tables that are extracted from the regional model will be sliced into smaller time intervals, resulting in 8 to 10 time slices that represent the entire weekday. For this study, it is envisioned that Friday PM Peak and Sunday PM Peak travel will also be modeled since they are peak travel periods for I-15. These will be developed by factoring the trip tables to represent these different periods based on traffic volumes collected on the study freeways and screenline locations. Each time slice will be calibrated to match the existing traffic profile, vehicle occupancy shares, and truck percentages developed in Task 5.

Information from the traffic operations model will be incorporated into the sub-area model in the form of modified speed-flow or volume-delay functions. The functions would better represent the elasticity of congestion to changes in demand on the freeway. The reduced speeds will be the basis of the travel time savings that will be used to estimate the amount of traffic that would use the express lanes. As noted earlier, the modified speed-flow curves for I-15 used in the model will be based primarily on the microsimulation modeling performed during the Intermediate-Level study. These will be updated as part of a later study as the financing for the I-15 Express Lanes draw near.

CDM Smith will utilize the enhanced sub-area managed lanes model to estimate future-year traffic and revenue for an assumed opening year, and seven forecast years through 2045. Traffic and revenue will be estimated for multiple time periods of the day for each forecast year and annualized to reflect estimated gross toll revenue. A 50-year stream of transactions and toll revenue will be extrapolated based on the modeled forecasts.

## **Task 7: Traffic and Revenue Analysis**

To provide sufficient time to setup highway networks, the traffic assignments for the study base case and alternatives, key inputs and assumptions will be reviewed with SANBAG by early November 2015. These inputs and assumptions relate to toll policy and system design decisions that are within SANBAG's control and other decisions that are outside of SANBAG's control. These assumptions would include, at a minimum, the following:

- Toll policy decisions such as minimum and maximum tolls, which vehicles will be priced, and which vehicles will receive discounts;
- Tolling segments and tolling configuration (zone vs. mileage-based);
- Toll setting policy (consistent with findings from the Intermediate-Level study);
- Assumptions related to video/license plate tolling and fees associated with this option;
- Assumptions of system leakage for transponder transactions and video transactions;

- Assumptions related to increases in the share of CAV on each project corridor, and toll policies for pricing CAV;
- Highway network assumptions, vetted initially as part of Task 6.1 but finalized in Task 7; and
- Opening year of I-10 Phase 1 and Phase 2, and I-15 Project 1.

CDM Smith will use the sub-area managed lanes model and perform a detailed evaluation of traffic and revenue potential for up to three alternatives and for up to five forecast years of operation. The anticipated combinations of assignments are shown in Table 1.

Table 1- Alternatives to be Analyzed, by Forecast Year

| Alternative Case | Year |       |       |      |      |      |      |      |  |
|------------------|------|-------|-------|------|------|------|------|------|--|
|                  | 2022 | 2024A | 2024B | 2027 | 2030 | 2035 | 2040 | 2045 |  |
| 1 I-10 Phase 1   | X    | X     | --    | X    | X    | X    | X    | X    |  |
| I-10 Phase 2     | --   | --    | --    | --   | --   | --   | --   | --   |  |
| I-15 Project 1   | --   | --    | --    | --   | --   | --   | --   | --   |  |
| 2 I-10 Phase 1   | X    | X     | X     | X    | X    | X    | X    | X    |  |
| I-10 Phase 2     | --   | --    | --    | --   | --   | --   | --   | --   |  |
| I-15 Project 1   | --   | --    | X     | X    | X    | X    | X    | X    |  |
| 3 I-10 Phase 1   | X    | X     | X     | X    | X    | X    | X    | X    |  |
| I-10 Phase 2     | --   | --    | X     | X    | X    | X    | X    | X    |  |
| I-15 Project 1   | --   | --    | X     | X    | X    | X    | X    | X    |  |

While the base case for the financing of I-10 Phase 1 typically includes the portion of the project that is being financed, the impact of the I-10 Phase 2 and I-15 Project 1 on Phase 1 revenues will need to be evaluated to confirm there is no negative revenue impact resulting from these extensions of the system. Additionally, SANBAG has indicated interest in presenting the resulting future phases to the TIFIA review committee with the intent to potentially secure loan terms for all three phases based on this initial traffic and revenue forecast. As a result, the completion of the next phases of the system will need to be evaluated as full alternatives.

Key outputs from the sub-area model at each toll level for each project alternative in each analysis year include:

- Toll revenue;
- Traffic usage in the toll lanes and general purpose lanes;
- Total corridor traffic throughput; and
- Average travel speeds on the general purpose and express lanes.

Annual revenue forecasts will be developed by interpolating between the various modeled years and adjusting for any future toll rate changes. The forecast will then be extended beyond 2045 based on nominal assumed rates of traffic growth and inflationary or “real” increases in toll rates subsequent to 2045. Gross collectible revenue estimates will be established based on assumptions regarding leakage levels. These assumptions will be based on industry standards coordinated with SANBAG’s toll system consultant to confirm that the system design will satisfy the assumptions.

The goal is to provide traffic and revenue forecasts for the base case, Alternative 1, by mid-February 2016. Forecasts for Alternatives 2 and 3 will be available by the end of February.

**Task 7 Deliverables:**

- Updated traffic and revenue forecasts for Alternative 1; and
- Updated traffic and revenue forecasts for Alternatives 2 and 3.

## Task 8: Sensitivity Tests

There is considerable uncertainty in any forecast of the future, and in particular traffic and revenue forecasts on new facilities. The Base Case forecast will be predicated upon the most reasonable assumptions of future economic growth, values of time and willingness-to-pay, competing and complementary highway improvements and more.

However, given the uncertainties and inherent risks in financing a new toll facility, it is now standard practice in investment-grade traffic and revenue studies to include extensive sensitivity testing. The purpose of this is to help financial analysts assess risk potential and the potential range of possible outcomes once the project is built. In essence, the sensitivity analysis helps test the robustness of the base case forecasts to changes in critical assumptions or other independent forecasts such as socioeconomic growth. These individual tests will also provide information to bond rating agencies and TIFIA reviewers to aid in their development of combinations of assumptions to create different scenarios.

Sensitivity tests differ from full alternatives in that a sensitivity test is typically run at two forecast years to identify the range of possible revenue impacts of a change. Some changes have more impact in early years, such as a recession-type test, while other changes have more impact in later years, such as reduced regional growth. A list of anticipated sensitivity test subject areas is shown in Table 2. It should be noted that the base case, Alternative 1, I-10 Phase 1 only, will be subject to all tests except for a test of direct connectors, which would

Table 2- Anticipated Sensitivity Tests

| Sensitivity Test                                    | Alternative 1: | Alternative 2:                 |
|---|----------------|--------------------------------|
|   | I-10 Phase 1   | I-15 Project 1<br>I-10 Phase 1 |
| 1 No Express Lanes in Riverside County              | X              | X                              |
| 2 I-10 HOV Lane Conversion to HOT Lane in LA County | X              | --                             |
| 3 No Traffic Growth First 5 Years                   | X              | X                              |
| 4 Slow/Reduced Growth                               | X              | X                              |
| 5 Value of Time +25%                                | X              | --                             |
| 6 Value of Time -25%                                | X              | --                             |
| 7 Clean Air Vehicle Discounted Toll                 | X              | --                             |
| 8 Charging HOV3+ in Superpeak                       | X              | --                             |
| 9 Direct Connectors between Phase 1 and Project 1   | --             | X                              |
| 10 Construction of I-15 Project 2                   | X              | X                              |

only be applicable if I-15 Project 1 links were also open.

For budgetary purposes, a single sensitivity test alternative run for a single year will be considered one sensitivity test. The list of 9 alternative tests for the base case, Alternative 1, would yield a total of 18 tests (9 tests x 2 years), and the sensitivity tests suggested for Alternative 2 would add 10 (5 tests x 2 years), for a total of 28 tests. For purposes of this analysis, it has been assumed that a total of 30 sensitivity tests will be conducted.

### Task 8 Deliverables:

- Results of Sensitivity Test Cases, documented in a memo that can be inserted into the final report

### **Task 9: Documentation and Meetings**

This task will include all efforts related to external coordination, documentation and meetings to support this investment-grade study from Task 2, Data Collection, through Task 10, Financing Team Inputs. In addition to the kick-off meeting in September 2015, up to two in-person meetings will be scheduled during the study to coordinate with the project team, present key findings of data collection and survey efforts, and/or present the traffic and revenue results. These in-person meetings would take place in about mid-November 2015 and February 2016. It is also assumed that one presentation to the SANBAG Board may be required in either February or March. The in-person meetings may include the CDM Smith project principal and possibly others for technical discussions. Bi-weekly progress meetings via phone/web-conference/email with SANBAG will be scheduled for the first few months. Key subconsultants will be invited to participate in the status meetings while their work is active.

A draft report will be submitted at the end of February 2016. Up to 5 hard copies of the draft report will be submitted for review and comment. After receipt of comments, CDM Smith will provide 10 hard copies of the final report and an electronic original for use in printing additional copies.

While it is not envisioned to be used to issue bonds at this time, the report will be designed to be suitable for possible inclusion in financing documents and will be consistent with rating agency and TIFIA expectations. Separate reports provided by the stated preference survey subconsultant and economist will be included in the appendix.

Monthly written progress reports will be submitted during the course of the work. These reports will discuss work completed in each month, anticipated efforts in the succeeding month and any areas of concern or scheduled revisions which may have arisen.

### **Task 10: Financing Team Support**

Task 10 encompasses all costs associated with meetings and presentations, as well as assisting the project financial team with additional information to address questions raised by rating agencies or the TIFIA review team. Based on past experience, we may be asked for additional sensitivity tests, or combinations of sensitivities to create possible alternative scenarios, which will be run as part of the rating agency and/or TIFIA risk analysis. More recently, we have been asked to conduct runs systematically to help identify the potential range and probability of revenue. This type of request and the Monte Carlo risk analysis to assess the probabilities typically will require between 10 and 30 different combinations of assumptions.

In addition, based on experience on other recent investment-grade studies, there may well be additional minor refinements in study findings requested during the course of the financing process, such as modified assumptions on the timing of toll increases, small changes in toll collection processes, etc. These minor refinements will also be handled under this task. However, if such refinement represents a significant change in project assumptions and requires extensive additional modeling and wholesale revision of revenue estimates and reissuance of the report, a separate scope and budget for the additional work will be submitted in advance.

For budgetary purposes, the following have been assumed:

- Three presentations to ratings agencies and the TIFIA team, along with four total days of preparation in advance of the presentations, and travel costs to New York and/or Washington, D.C.;
- Three additional in-person meetings to present results of additional requested runs, with travel to Washington, D.C.;
- 120 person-hours to address initial list of questions and provide written materials in response to questions;
- 160 person-hours to conduct up to 20 sensitivity tests.

## **Task 11: Updated Traffic and Revenue Study 2017**

As shown in Figure 2, the overall study program assumes an updated traffic and revenue study for I-10 Phase 1 will be conducted in 2017 to support bond issuance envisioned in early 2018. At that time, the following tasks from the initial investment-grade traffic and revenue study, which have been described in detail in this proposal, will be updated/refreshed based on information available at that time. The 2017 study will both provide the initial set of investment grade forecasts for I-15 project 1 and I-10 Phase 2 portions of the express lanes network, and well as update and refresh the previously developed estimates for the I-10 Phase 1 project. This update will be timed to provide recent “current” estimates for the actual financing of phase 1 of I-10, as well as initial forecasts for use in TIFIA review for the remaining two project segments. Where the work effort differs significantly from the initial study, the differences will be highlighted below.

### *Task 11.1 Project Management and Kickoff Meeting*

This task involves internal project management and planning, technical reviews, internal status meetings, and development and adherence to quality management guidelines. Internal CDM Smith quality management policies require at least three technical review committee sessions for investment-grade traffic and revenue studies.

### *Task 11.2 Data Collection*

Assuming no changes that would significantly affect travel in the region such as dramatic changes in gas prices over what has been experienced in the past decade, a limited data collection effort is planned for the 2017 update. To understand any changes that may have taken place since the initial study, the 2017 update will include gathering the following data:

- Updated travel time/speed data on I-10 and I-15 from both Inrix and actual field observations runs;
- Updated traffic counts at 4 mainline locations;
- Updated manual traffic counts at two mainline locations;
- Updated traffic counts at 18 interchanges (approximately 30 percent); and
- Updated operating experience on SR-91 and I-10 Express Lanes.

The updated data will be reviewed and compared to the 2015 counts to develop growth factors that can be applied to the rest of the system to develop an updated traffic profile for both corridors.

### *Task 11.3 Stated Preference Surveys*

These surveys will not be repeated in the 2017 update, although RSG will be consulted to provide an assessment of any changes to the previous analysis that may be warranted based on new travel conditions.

### *Task 11.4 Independent Economics Review*

The 2017 update will need to consider SCAG’s final adopted 2016 RTP/SCS Integrated Growth Forecast, which will not be fully available at the Tier 2 or Tier 3 TAZ levels by the scheduled end of the 2015 study. As economic subconsultant, EPS will examine adjustments or updates to the adopted 2016 RTP/SCS growth forecasts that have been made by SCAG between 2016 and 2017, as well as new alternate regional and local forecasts that have been released during the interval. EPS will also review the evidence for actual construction and/or changes in local growth policies and major proposed development projects that have occurred subsequent to the completion of the 2015 report.

It is proposed that most of the economic review will take place as part of the 2015 study, and that the 2017 update will provide the final investment-grade forecasts required to support bond issuance in 2018. To the extent possible, relevant analysis and model components from the 2015 and 2016 work will be retained; it is specifically assumed that the 2017 update will continue to use a model platform consistent with SBTAM’s 2012 model as the Base Year for traffic model runs, and retain (with adjustments if needed) the SED from the 2015 modeling.

EPS will review the then-current growth forecasts and traffic model SED, and evaluate their reasonableness in light of updated Census or other data sources, observable trends and forecasts from other sources, and local policies and projects as discussed through another set of interviews with 8 to 12 selected jurisdictions in San Bernardino and Riverside Counties. Following review of the data, and in consideration of local and regional trends, EPS will develop an updated or adjusted forecast that will form the baseline for the 2017 update of the traffic and revenue study. In addition, up to two alternative forecasts will be developed, potential downside and potential upside cases, which will be used to test the sensitivity of revenues to changes in forecast inputs and assumptions.

At the end of this task, a revised and updated version of the EPS report from 2015 will be attached to the traffic and revenue study as an appendix, suitable and intended for use to support bond issuance in 2018. In addition and if needed, an updated Baseline SED and two alternative SEDs for sensitivity analysis will be delivered as active databases for incorporation into traffic and revenue modeling.

#### *Task 11.6 Model Update and Development*

The modeling efforts previously described in Task 6 will be updated using the most recent traffic data in this task. The SBTAM regional model highway network will be reviewed and adjusted to reflect agree-upon project assumptions. The updated socioeconomic data will be used to generate new trip tables, which again will be used to extract a sub-area model of travel within the study area. It is again assumed the SANBAG will be able to run the SBTAM model and provide the updated regional trip tables for use in the global travel demand forecasting.

In 2017, it is assumed that the VISSIM model for I-15 being refined as part of the environmental studies for that project will be available for use in this study. The model will be requested and updated to reflect the forecast volumes developed earlier in this subtask for 2025 and 2040 levels. The model will be run under a range of loading conditions to test the sensitivity of travel time and delay to traffic shifting into the express lanes. Modified speed-flow curves representing congestion patterns in the corridor will be developed and applied to the I-15 network links in the sub-area model. The VISSIM analysis for I-10 will not be repeated in 2017, but will rely on the updated work performed in 2015.

The sub-area model will be recalibrated to reflect the latest traffic volumes and speed profile for study corridors. Trip tables will be developed to allow analysis of weekday peak and off-peak, Friday PM peak, and Sunday PM peak travel for each of eight analysis years. The exact years will be determined following review of the updated project development schedules.

#### *Task 11.7 Traffic and Revenue Analysis*

The traffic and revenue analysis for the 2017 update will continue to assume I-10 Phase 1 is the base case. For budgetary purposes, the list of runs presented in Table 3 has been assumed to be conducted in this task. These are the same combinations as shown for Task 7. In practice, either Alternative 2 or 3 will be t for inclusion in two separate reports. The first report will consider the I-10 Phase 1 project financing requirements while the second report will provide sufficient level of detail for SANBAG to present findings to rating agencies with the intent to secure TIFIA loan terms while waiting for the environmental clearance of I-15 Express Lanes.

Table 3 - Alternatives to be Analyzed, by Forecast Year, 2017 Update

| Alternative Case | Year |       |       |      |       |       |      |      |      |  |
|------------------|------|-------|-------|------|-------|-------|------|------|------|--|
|                  | 2022 | 2024A | 2024B | 2027 | 2030A | 2030B | 2035 | 2040 | 2045 |  |
| 1 I-10 Phase 1   | X    | X     | --    | X    | X     | --    | X    | X    | X    |  |
| I-10 Phase 2     | --   | --    | --    | --   | --    | --    | --   | --   | --   |  |
| I-15 Project 1   | --   | --    | --    | --   | --    | --    | --   | --   | --   |  |
| 3 I-10 Phase 1   | X    | X     | X     | X    | X     | --    | X    | X    | X    |  |
| I-10 Phase 2     | --   | --    | X     | X    | X     | --    | X    | X    | X    |  |
| I-15 Project 1   | --   | --    | X     | X    | X     | --    | X    | X    | X    |  |
| 4 I-10 Phase 1   | X    | X     | X     | X    | X     | X     | X    | X    | X    |  |
| I-10 Phase 2     | --   | --    | X     | X    | X     | X     | X    | X    | X    |  |
| I-15 Project 1   | --   | --    | X     | X    | X     | X     | X    | X    | X    |  |
| I-15 Project 2   | --   | --    | --    | --   | --    | X     | X    | X    | X    |  |

#### Task 11.8 Sensitivity Tests

A total of 30 sensitivity test runs have been budgeted for the 2017 update, which are expected to be similar to the list presented in Table 2, with refinements based on questions or comments received from rating agencies and the TIFIA team from the 2015 reviews.

#### Task 11.9 Documentation and Meetings

A total of 2 meetings in addition to the kickoff meeting have been budgeted to discuss study progress and findings. For budgeting purposes, it is assumed that two separate reports will be generated; a final comprehensive traffic and revenue study to support the financing of I-10 Phase 1, and an initial traffic and revenue study to support initial ratings and TIFIA review of I-10 Phase 2 and I-15 Project 1.

#### Task 11.10 Financing Team Support

The work effort anticipated for this task is assumed to be the same as in Task 10. The final report for I-10 Phase 1 will be presented to rating agencies and TIFIA team. The initial results for I-10 Phase 2 and I-15 Project 1 will be presented to secure a TIFIA loan term sheet in advance of environmental clearance.

For budgetary purposes, the following have been assumed:

- Three presentations to ratings agencies and the TIFIA team, along with four total days of preparation in advance of the presentations, and travel costs to New York and/or Washington, D.C.;
- Three additional in-person meetings to present results of additional requested runs, with travel to Washington, D.C.;
- 120 person-hours to address initial list of questions and provide written materials in response to questions; and
- 160 person-hours to conduct up to 20 sensitivity tests.

### Task 12: Updated Traffic and Revenue Study 2019 (OPTION WORK- For informational purposes only)

**\*\*\* The scope of work for Task 12, representing a final traffic and revenue study for the I-10 Phase 2 and I-15 Project 1 segments, is presented here for informational purposes only. The budget for this task is not included in the budget for this contract. It is anticipated that a refined scope and budget will be prepared for SANBAG approval prior to commencement of the traffic and revenue study.\*\*\***

Task 12 provides an anticipated scope for the work effort envisioned in 2019 to update the 2017 study with the intent to use the 2019 study to support bond issuance envisioned in early 2020 for the I-10 Phase 2 and I-15 Project 1 projects. At that time, the following tasks from the initial investment-grade traffic and revenue study, which have been described in detail in this proposal, will be updated and refreshed based on information available at that time. Where the work effort differs significantly from the initial study, the differences will be highlighted below.

The level of update of input data is assumed to be of a similar level of effort as described for Task 11, with the exception of the independent socioeconomic review. The economics review will parallel the original Task 4 work efforts, which were also undertaken before final adoption and release of the latest model datasets used for RTP update. Areas of uncertainty include any major model revisions, including conversion to an activity-based model similar to SCAG's, that may add detail to model inputs that will need to be reviewed and adjusted prior to use in developing the alternative forecasts. For the budget estimate, we have assumed that there will be no significant changes to the SBTAM model input needs or format.

#### *Task 12.1 Project Management and Kickoff Meeting*

This task involves internal project management and planning, technical reviews, internal status meetings, and development and adherence to quality management guidelines. Internal CDM Smith quality management policies require at least three technical review committee sessions for investment-grade traffic and revenue studies.

#### *Task 12.2 Data Collection*

Assuming no changes that would significantly affect travel in the region such as dramatic changes in gas prices over what has been experienced in the past decade, a limited data collection effort is planned for the 2019 update. To understand any changes that may have taken place since the initial study, the 2019 update will include gathering the following data:

- Updated travel time/speed data on I-15 from both Inrix and actual field observations runs;
- Updated traffic counts at 4 mainline locations;
- Updated manual traffic counts at two mainline locations; and
- Updated traffic counts at 18 interchanges (35 percent).

The updated data will be reviewed and compared to the 2017 count profile to develop growth factors that can be applied to the rest of the system to develop an updated traffic profile for both corridors.

#### *Task 12.3 Stated Preference Surveys*

These surveys will not be repeated in the 2019 update, although RSG will be consulted to provide an assessment of any changes to the previous analysis that may be warranted based on new travel conditions.

#### *Task 12.4 Independent Economics Review*

If the 2020 RTP/SCS update follows established practice, the Base Year for the regional Integrated Growth Forecast will be moved from 2012 to 2016. If the traffic model used for the 2019 update is also updated to a 2016 base year, the base year SED will also need to be reviewed and, as necessary, adjusted to reflect development and demographic and socioeconomic changes from 2012 to 2016, and the future-year SEDs will also need to reflect actual development and demographic and socioeconomic changes from 2016 to 2019.

The CDM Smith team, including economic subconsultant EPS, will meet with SANBAG's land use and modeling staff to identify updates and changes to the SBTAM model since the work performed for the 2015 and 2017 updates. We will obtain and review San Bernardino's latest SBTAM small-area forecasts and SCAG's most-up-to-date Integrated Growth Forecast by Jurisdiction and, if available, by Tier 2 TAZ. To the extent the SCAG Scenario

Planning Model (SPM) is functioning and relevant datasets are available, EPS will also obtain and review Scenario Planning Zone (SPZ) or other small-area data for the I-10 and I-15 corridors from the SPM.

Based on SCAG's schedule for development during prior RTP/SCS cycles, it is likely that new small area forecasts for SCAG's 2020 RTP/SCS may not be adopted by SCAG before the 2019 traffic and revenue study is due, and well after the socio-economic inputs to the 2019 update will need to be completed. Therefore, the CDM Smith team will work with SANBAG to identify a reasonable approach to disaggregate adopted (circa 2019) city- and town-level forecasts to the smaller Tier 2 and 3 zones used in the SBTAM model using the 2015 and/or 2017 updated dataset for guidance.

EPS will compare the 2019 existing SBTAM model dataset against previous forecasts, as well as updated data from other national, regional, and private sources (e.g., Moody's Analytics) to evaluate the consensus view of local and regional growth. To the extent that the existing SBTAM model represents growth patterns that are inconsistent with past trends or 2019 consensus projections (e.g., too much or too little growth overall, major shifts in local preferences, etc.), the economics subconsultant will suggest modeling alternatives that may be more supportable (e.g., accelerating or "lagging" growth projections or redistributing growth among counties or Tier 1 zones).

In addition to a refreshed high-level review at the regional level, the more fine-grained factors affecting residential and commercial growth in the immediate I-10 and I-15 project area will be reviewed, including the amended local plans for development and zoning restrictions.

A selected list of local planning agencies and developers/business groups will again be contacted to reassess the scale and schedule for growth within the project corridors. Potential changes in location and intensity of development resulting from express lanes construction will also be considered. As necessary for the update, EPS will recommend adjustments to the SBTAM model to disaggregate and/or refine estimates and projections.

The economics review will focus on the areas along I-10 and I-15 where the express lanes are being developed. Growth in the High Desert portion of San Bernardino County will be included in a county-level review of growth potential, and a detailed review by zone in the High Desert area will be conducted as part of this 2019 update.

Following review of the data, and in consideration of local and regional trends, the team will develop a revised forecast that will form the baseline for the 2019 traffic and revenue study. In addition, up to two alternative forecasts will be developed, potential downside and potential upside cases, which will be used to test the sensitivity of revenues to changes in forecast inputs and assumptions. At the end of this task, a draft report for SANBAG comment will be generated. The final report will be attached to the traffic and revenue study as an appendix, suitable and intended for use to support finance modeling for the I-10 Phase 2 and I-15 improvement projects.

#### *Task 12.6 Model Update and Development*

In this task, the modeling efforts previously described in Task 6 will be updated using the most recent traffic data. The SBTAM regional model highway network will be reviewed and adjusted to reflect agree-upon project assumptions. The updated socioeconomic data will be used to generate new trip tables, which again will be used to extract a sub-area model of travel within the study area. It is again assumed SANBAG will be able to run the SBTAM model and provide the updated regional trip tables for use in the global travel demand forecasting.

In 2019, it is assumed that no new VISSIM analysis will be performed but will rely on the information developed in the previous studies. This assumes future traffic growth patterns are similar to what was forecasted in the 2017 update and the modified speed-flow curves representing congestion patterns in the corridor being developed will remain appropriate.

The sub-area model will be recalibrated to reflect the latest traffic volumes and speed profile for study corridors. Trip tables will be developed to allow analysis of weekday peak and off-peak, Friday PM peak, and Sunday PM

peak travel for each of eight analysis years. The exact years will be determined following review of updated project development schedules.

*Task 12.7 Traffic and Revenue Analysis*

The traffic and revenue analysis for the 2019 update will assume that all three sections of express lanes in San Bernardino County are open to traffic. New forecasts for I-10 Phase 1 are not considered part of the update for 2019, which will focus on the Phase 2 and Project 1 segments. Potential analysis scenarios and years are shown in Table 5.

*Table 4 - Alternatives to be Analyzed, by Forecast Year, 2019 Update*

| Alternative Case |                | 2024 | 2027 | 2030A | 2030B | 2035 | 2040 | 2045 | 2055 |
|------------------|----------------|------|------|-------|-------|------|------|------|------|
| 4                | I-10 Phase 1   | X    | X    | X     | --    | X    | X    | X    | X    |
|                  | I-10 Phase 2   | X    | X    | X     | --    | X    | X    | X    | X    |
|                  | I-15 Project 1 | X    | X    | X     | --    | X    | X    | X    | X    |
|                  | I-15 Project 2 | --   | --   | --    | --    | --   | --   | --   | --   |
| Year             |                |      |      |       |       |      |      |      |      |
| Alternative Case |                | 2024 | 2027 | 2030A | 2030B | 2035 | 2040 | 2045 | 2055 |
| 5                | I-10 Phase 1   | X    | X    | X     | X     | X    | X    | X    | X    |
|                  | I-10 Phase 2   | X    | X    | X     | X     | X    | X    | X    | X    |
|                  | I-15 Project 1 | X    | X    | X     | X     | X    | X    | X    | X    |
|                  | I-15 Project 2 | --   | --   | --    | X     | X    | X    | X    | X    |

*Task 12.8 Sensitivity Tests*

A total of 20 (10 tests x 2 years) sensitivity tests are assumed to be conducted. The sensitivity tests from Table 2 in Task 8 relevant to I-10 Phase 2 and I-15 Project 1 will be performed for the 2019 update, unless previous comments from rating agencies and TIFIA team indicate a need to test other inputs or assumptions.

*Task 12.9 Documentation and Meetings*

A total of 2 meetings in addition to the kickoff meeting are assumed to be needed, to discuss study progress and findings.

*Task 12.10 Financing Team Support*

The work effort anticipated for this task is assumed to be the same as in Task 10. The final report for I-10 Phase 2 and I-15 Project 1 will be presented to support project financing needs. The following are assumed:

- Three presentations to ratings agencies and the TIFIA team, along with four total days of preparation in advance of the presentations, and travel costs to New York and/or Washington, D.C.;
- Three additional in-person meetings to present results of additional requested runs, with travel to Washington, D.C.;
- 120 person-hours to address initial list of questions and provide written materials in response to questions; and
- 160 person-hours to conduct up to 20 sensitivity tests.

## SCHEDULE AND FEE

As requested, an estimated budget by task on SANBAG’s preferred form, is attached. The study fee assumes that CDM Smith and our subconsultants can obtain prior reports; any available traffic and speed data information from SANBAG, its consultants, and Caltrans; model inputs from SANBAG and SCAG; and permission to operate SP surveys without cost to CDM Smith or the subconsultants. Our budget does include permit fees associated with traffic count data collection.

Figure 3 shows the schedule for completion of Tasks 1 through 10, which will culminate in an initial investment-grade traffic and revenue study and presentation and meetings with rating agencies and TIFIA to support confirmation of a TIFIA loan for the I-10 Phase 1 project. Schedules for continuing portions of the work, beyond June, 2016, will be provided before efforts on those subsequent task commence.

| PROPOSED SCHEDULE   |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
|---|---------|-----|-----|---------|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Tasks   | Phase 1 |     |     | Phase 2 |     |     |     |     |     |     |     |     |  |  |
|   | Jul     | Aug | Sep | Oct     | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |  |  |
| 1 Project management, initiation, kickoff                       |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
| 2 Data Collection   |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
| 3 Updated SP Surveys  |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
| 4 Independent Corridor Growth Analysis                          |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
| 5 Current Demand and Speed Profile Model Update and Development |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
| 6.1 Update SBTAM Regional Model                                 |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
| 6.2 Update and Apply Microsimulation Model                      |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
| 6.3 Refine Tolling Sub-area Model                               |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
| 7 Traffic and Revenue Analysis                                  |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
| 8 Sensitivity Tests   |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
| 9 Documentation and Meetings                                    |         |     |     |         |     |     |     |     |     |     |     |     |  |  |
| 10 Financing Team Support                                       |         |     |     |         |     |     |     |     |     |     |     |     |  |  |

Figure 3-Proposed Schedule for Initial Investment-Grade Traffic and Revenue Study, Tasks 1b-10

\* \* \*

We sincerely appreciate the opportunity to submit this proposal for professional services and thank you for considering CDM Smith for this important assignment. We hope the proposed work program, as documented herein, meets your requirements. If not, CDM Smith will be pleased to discuss ways in which it could be made more responsive.

Respectfully submitted,

Robert J. Close, P.E.  
 CDM Smith  
 Associate

Consultant CDM Smith

Contract No. \_\_\_\_\_

Date 08/07/2015

| Direct Labor<br>Classification/Title | Key Personnel | Hours | Labor Rate Range |        | Average Hourly Rate | Total Direct Labor |
|--------------------------------------|---------------|-------|------------------|--------|---------------------|--------------------|
|                                      |               |       | Low              | High   |                     |                    |
| Project Principal/QM                 |               | 354   | 87.00            | 107.00 | \$97.00             | \$34,338.00        |
| Project Director                     |               | 280   | 130.00           | 130.00 | \$130.00            | \$36,400.00        |
| Project Manager                      |               | 1,384 | 76.00            | 76.00  | \$76.00             | \$105,184.00       |
| Senior Analyst                       |               | 882   | 51.00            | 51.00  | \$51.00             | \$44,982.00        |
| Analyst                              |               | 891   | 40.00            | 40.00  | \$40.00             | \$35,640.00        |
| Senior Analyst                       |               | 260   | 45.00            | 45.00  | \$45.00             | \$11,700.00        |
| Senior Economist                     |               | 122   | 62.00            | 62.00  | \$62.00             | \$7,564.00         |
| Project Administrator                |               | 48    | 44.00            | 44.00  | \$44.00             | \$2,112.00         |
| Analyst                              |               | 3,576 | 32.00            | 36.00  | \$34.00             | \$121,584.00       |
| Graphics/Secretarial Support         |               | 982   | 34.50            | 36.50  | \$35.50             | \$34,861.00        |
|                                      |               | 0     |                  |        | \$0.00              | \$0.00             |

**Labor Costs**

|   |  |    |                   |
|---|--|----|-------------------|
| a) Subtotal Direct Labor Costs                          |  | \$ | <u>434,365.00</u> |
| b) Anticipated Salary Increases (see page 2 for sample) |  | \$ | <u>11,059.60</u>  |
| <b>c) TOTAL DIRECT LABOR COSTS [(a)+(b)]</b>            |  | \$ | <u>445,424.60</u> |

**Fringe Benefits**

|   |                                    |    |                   |
|---|------------------------------------|----|-------------------|
| d) Fringe Benefits (Rate <u>172.290%</u> %) | e) Total Fringe Benefits [(c)x(d)] | \$ | <u>767,422.04</u> |
|---|------------------------------------|----|-------------------|

**Indirect Costs**

|  |                            |    |          |
|--|----------------------------|----|----------|
| f) Overhead (Rate _____ %)                   | g) Overhead [(c)x (f)]     | \$ | <u>-</u> |
| h) General and Administrative (Rate _____ %) | i) Gen & Admin [(c) x (h)] | \$ | <u>-</u> |
| <b>j) Total Indirect Costs [(g)+(f)]</b>     |                            | \$ | <u>-</u> |

**Fixed Fee (Profit)**

|                           |                                      |    |                   |
|---------------------------|--------------------------------------|----|-------------------|
| n) (Rate <u>10.00%</u> %) | k) Fixed fee [(c) + (e) + (j)] x (n) | \$ | <u>121,284.66</u> |
|---------------------------|--------------------------------------|----|-------------------|

**Total Loaded Labor Costs**

1,334,131.30

**Other Direct Costs (ODC)**

|   |    |                   |                     |
|---|----|-------------------|---------------------|
| l) Airfare (12 person-trips @\$1,000, 18 person-trips @\$300)   | \$ | <u>17,400.00</u>  |                     |
| Food & Lodging (\$230/day * 1.7 days/person-trip * 30 person-trips)   |    | <u>11,730.00</u>  |                     |
| Auto rental, gas, parking, mileage (\$100/day * 1.7 days/person-trip * 30 person-trips)                                   |    | <u>5,100.00</u>   |                     |
| Mileage (\$.575 * 2800 miles)   |    | <u>1,610.00</u>   |                     |
| Postage/Express Mail/Conference call hosting  |    | <u>1,800.00</u>   |                     |
| Copies (\$0.50/page * 15,000 pages)   |    | <u>7,500.00</u>   |                     |
| Inrix Data  |    | <u>4,000.00</u>   |                     |
| m) Equipment Rental and Supplies (itemize)  | \$ | <u>_____</u>      |                     |
| n) Permit Fees (estimated)  | \$ | <u>20,250.00</u>  |                     |
| o) Subconsultant Costs (attach detailed cost proposal in same format as prime consultant estimate for each subconsultant) | \$ | <u>570,750.00</u> |                     |
| <b>p) Total Other Direct Costs [(l) + (m) + (n) + (o)]</b>  |    | \$                | <u>640,140.00</u>   |
| <b>Total cost [(c) + (e) + (j) + (k) + (p)]</b>   |    | \$                | <u>1,974,271.30</u> |

Notes:

- Employees subject to prevailing wage requirements to be marked with an \*.