RCTC
Riverside County Transportation Commission

4080 Lemon Street, 3rd Floor • Riverside, CA
Mailing Address: P. O. Box 12008 • Riverside, CA 92502-2208
(951) 787-7141 • Fax (951) 787-7920 • www.rctc.org

April 9, 2015

Mr. Hasan Ikhrata
Executive Director
Southern California Association of Governments
818 W. 7th Street, 12th Floor
Los Angeles, CA 90017

Dear Mr. Ikhrata:

RCTC understands that substitution projects are required by air quality regulations if a Transportation Control Measure (TCM) is delayed or removed from the Federal Transportation Improvement Program (FTIP). As such, we have been working closely with the Riverside Transit Agency (RTA) on two of its TCM projects, the Hemet Transit Center (RIV041030) and the Temecula/Murrieta Transit Center (RIV050553). Both of which have completion dates of December 2015. In Hemet, a mutually preferred site could not be identified by the City and key stakeholders; and in Temecula, the transit center location is indefinitely delayed pending the completion of the Murrieta Creek Flood Control and Environmental Restoration project by the County Flood Control District and Army Corps of Engineers to make the site suitable for a transit center.

RCTC is requesting that the Hemet Transit Center and Temecula/Murrieta Transit Center be substituted with RTA's Express Expansion Bus project. An air quality analysis concluded that the Express Expansion Bus project will have far greater emission benefits than both transit centers combined in the short and long-term horizons. RTA is confident that it can have the express buses delivered by December 2016 in time for service to commence in early 2017.

RCTC is requesting SCAG's cooperation in recommending that these substitution projects be presented to the Transportation Conformity Working Group (TCWG). We are eager to move forward with the substitution projects and would greatly appreciate your assistance in working through the substitution process with our State and Federal partners.

If you have any questions, please do not hesitate to contact me at (951) 787-7988 or at smedina@rctc.org.

Sincerely,

Shirley Medina

Shirley Medina
Planning and Programming Director

**TCM Substitution Technical Analysis – Riverside Transit Agency**

## I.0 Introduction

The Riverside Transit Agency (RTA) is requesting to substitute two projects, the Hemet Transit Center (RIV041030) and the Temecula/Murrieta Transit Center (RIV050553), with RTA's seven (7) Express Bus Expansion Program, which will complement Riverside County Transportation Commission's (RCTC) SR-91 Corridor Improvement Program.

The Hemet Transit Center (RIV041030) proposed construction of a bus transit facility located on Kirby Street between Devonshire Avenue and W. Latham Avenue in the City of Hemet based on a comprehensive site selection study completed by RTA. The location is centrally located in the Hemet/San Jacinto Valley, next to the Hemet Valley Mall, and is near State Routes 74 and 79. The transit facility was expected to accommodate at least 4 bus bays serving nine (9) existing bus routes as well as serve as a marshaling point for local, regional, and express route connection. The estimated completion date for the Hemet Transit Center was December 2015. However, community concerns were raised suggesting that that the site was not consistent with the development strategy of the property owners and an alternative site could not be identified.

The Temecula/Murrieta Transit Center (RIV050553**)** proposed construction of a bus transit center and Park and Ride facility located at 27199 Jefferson Avenue in the City of Temecula. The transit center was planned to include up to 14 bus bays serving nine (9) existing bus routes and 100 Park and Ride facility spaces. The estimated completion date for the Temecula/Murrieta Transit Center was December 2015. The Temecula/Murrieta Transit Center is delayed due to timing issues associated with the Riverside County Flood Control District's project surrounding the project site. The Murrieta Creek Flood Control and Environmental Restoration project is currently underway to reduce and ultimately eliminate the impacts due to flooding at the transit center site and surrounding area. Because completion of the project is unknown, RTA is reevaluating its transit facility requirements with the City to determine if another location would be viable.

## 2.0 Substitute Project Description

Considering the obstacles the committed TCMs, Hemet Transit Center and the Temecula/Murrieta Transit Center, continue to encounter with their implementation, RCTC proposes to substitute these two projects with RTA's new Express Bus Expansion Service. RTA will purchase seven (7) additional express buses (Gillig 40-ft. buses with 38-seated capacity) to accommodate increased demand for longer-distance commuters, creating two new routes, 200 and 205. These expansion buses are expected to support increased commuter transit, which will utilize the new SR91 Express Lanes from north Riverside County to Orange County. Both routes will provide peak hour express service to major transfer hubs and multi-modal stations including park-and-rides, employment centers, and retail destinations in Riverside and Orange Counties. Route 200 will begin in downtown Riverside and travel to the Galleria Mall at Tyler in the City of Riverside, the Corona Transit Center/North Main Corona Metrolink Station and Park and Ride, the Anaheim Canyon Metrolink Station and end service at major

destinations in the City of Anaheim. Route 205 will begin service in Temecula at the Promenade Mall and stop at retail destinations in Murrieta and Lake Elsinore, then travel to the Corona Transit Center/North Main Corona Metrolink Station, and terminate at the Village in Orange. The estimated implementation date for the RTA Express Bus Expansion is December 2016.

## 3.0 Compliance with Substitution Requirements

- Equivalent Emissions Reduction: RCTC has analyzed the countywide emissions impacts of the substitute TCM (Express Bus Expansion Program) and concluded that it provides equal or greater emission reductions to the original TCMs. See the Air Quality Analysis Methodology below;
- Similar Geographic Area: The Hemet Transit Center/Temecula/Murrieta Transit Center TCMs and the RTA Express Bus Expansion Program are located in the Western Riverside portion of the South Coast Air Basin.
- Full Funding: RTA will utilize local funds for capital and operating expenses.
- Similar Time Frame: The proposed Express Bus Expansion TCM will be operational by December 2016, approximately one (1) year following the original schedule for the Hemet and Temecula/Murrieta Transit Center TCMs.
- Timely Implementation: The proposed substitution is the means by which the obstacle to implementation of the Transit Center TCMs is being overcome.
- Legal Authority: The Riverside Transit Agency (RTA) has legal authority and personnel to implement and operate the substitute Express Bus Expansion Program TCM.

## 4.0 Air Quality Analysis Methodology

In order to verify that the project recommended for substitution achieves equal or greater air quality benefits relative to the project no longer moving forward, an air quality benefits assessment was conducted. The methodologies used in the analyses are including in the California Air Resources Board (CARB)/California Department of Transportation (Caltrans) publication "Methods to Find the Cost-Effectiveness of Air Quality Projects" and the associated Emissions Factors. The most current versions of these documents were utilized; the emission factor tables were updated as of May 2013[1].

The analysis entails quantifying the air quality benefits that would have been realized had the two Transit Center projects, the Hemet Transit Center, and the Temecula/Murrieta Transit Center, moved forward as originally proposed. These quantified air quality benefits are then compared to the projected emission reductions attributable to the RTA express bus service proposed as the substitute project.

[1] http://www.arb.ca.gov/planning/tsaq/eval/eval.htm

The originally estimated completion date for the Hemet and Temecula/Murrieta Transit Centers was to be December 2015. RTA's Express Bus service will be implemented by December 2016.

Air quality benefits are quantified for three project horizon years: 2016, 2023, and 2035. It must be stressed, however, that it is exceedingly difficult for RTA to project transit routes, technology and ridership values twenty years into the future. Thus, extremely conservative data values were used in the quantitative analyses; the actual air quality benefits attributable to the substitute projects are likely to be greater than the emission reduction presented herein.

The CARB/Caltrans methodology applicable to this technical assessment is that associated with new transit bus service, as follows:

**Operation of New Bus Service**

| Inputs | Default | Units | Comments |
|---|---|---|---|
| ***For the Bus Service*** | | | |
| Effectiveness Period (**Life**) | 1 | Years | Years project is funded. |
| Days (**D**) | 260 | Days<br>(of operation)/year | Suggested defaults are<br>weekday services - 260 days, daily services - 365 days,<br>school bus services - 180 to 200 days |
| Ridership ( **R** ) | | total trips<br>(bus rider trips)/day | If 50 bus riders make a commute round trip each day, that's 100 bus rider trips per day. (50 bus riders x 2 trips) |
| Annual Bus VMT (**Bus VMT**) | | annual miles traveled | |
| ***For Auto Travel Reduced*** | | | Auto travel defaults are based on local information. |
| Adjustment (**A**) on Auto Trips for transit dependent | 0.50 | | This default factor equals the portion of transit riders who reduce a vehicle trip. The default for commuter bus service is 0.83 |

| Inputs | Default | Units | Comments |
|---|---|---|---|
| Auto Trip Length (**L**) | 9 | miles one direction/trip | Length of average auto trips reduced. Other suggested defaults are work trip bus services - 16 mi., school bus - 3 mi. |
| ***For Auto Travel Added to Access Bus Service*** | | | |
| Adjustment (**AA**) on Auto Trips for Auto Access to and from transit service | 0.1 | | This default factor equals the portion of riders who drive to the transit service. The default factor for long-distance commuter service is 0.8. |
| Trip Length (**LL**) for Auto Access to and from transit | 2 | miles one direction/trip | The default for long-distance bus service is 5 miles. |

| Formulas | Units |
|---|---|
| Annual Auto Trips Reduced = [(D)*(R)*(A)]*[1 - (AA)] | trips/year |
| Annual Auto VMT Reduced = [(D)*(R)*(A)]*[(L) - (AA)*(LL)] | miles/year |
| Annual Emission Reductions (ROG, NOx, and PM2.5) = | lbs/year |

[(Annual Auto Trips Reduced)*(Auto Trip End Factor) + (Annual Auto VMT Reduced)*(Auto VMT Factor) - (Bus VMT)*(Bus VMT factor)]/454

It is important to note that wherever possible, RTA projected data was used in lieu of CARB defaults. The input values for each variable will be discussed in Section III: Quantification of Air Quality Benefits, below.

In addition, the Temecula/Murrieta Transit Center includes construction of a 100-space Park and Ride facility. The CARB/Caltrans methodology used to quantify air quality benefits of park and ride facilities is shown below:

| **Park and Ride Lots** | | | |
|---|---|---|---|
| Days (**D**) | 250 | Effective days per year | |
| Ridership (**R**) | | Total trips (riders)/day | One-way trips by riders (or number of boardings) per day |
| ***For Auto Travel Reduced*** | | | |
| Adjustment (**A**) on Auto Trips | 0.83 | | This factor equals the portion of riders who did NOT previously use transit, vanpools, or carpools. The default (0.83) is the adjustment for long-distance, commuter vanpool service. For new rail feeders, use 0.3 for the |

| | | | |
|---|---|---|---|
| | | | adjustment factor A. |
| Auto Trip Length (**L**) | 16 | Miles one direction/trip | This is the assumed trip length on Transit. |

| | | | |
|---|---|---|---|
| **For Auto Travel Added to Access Transit Center** | | | |
| Adjustment (**AA**) for Auto Access to and from Transit Center | 0.9 | Park and Ride Lot | |
| Trip Length (**LL**) for Auto Access to and from Transit Center | 5 | Miles one direction/trip | The default (5 mi) is for bus riders. |

Formulas:

Annual Auto Trip Reduced = [(D) * (R) * ( A )]*[1-(AA)] trips/year

Annual Auto VMT Reduced = [(D) * (R) * ( A )]* [(L) - (AA)*(LL)] miles/year

Annual Emission Reductions (ROG, NOx, and PM2.5) = lbs/year [(Annual Auto Trips Reduced)*(Auto Trip End Factor) + (Annual Auto VMT Reduced)*(Auto VMT Factor)]/454

Ridership (R) = (Parking Spaces)*(Lot Utilization)*(2 commute trips/day)

Where

- Parking is the number of parking spaces for a new parking lot or the number of added spaces to an existing lot.
- Lot Utilization is the estimated lot utilization rate from monitored data OR use 0.75 as a default. The default value was used for 2015; a factor of 0.85 was used for year 2020.
- The default for Adjustment (AA) for Auto Access to and from transit center is 0.9.

## 4.1. Emission Reductions Associated with Original Transit Center Projects

In discussions with RTA, the additional clarifying information was obtained regarding the potential of the Hemet and Temecula/Murrieta Transit Centers to reduce additional automobile trips and automobile vehicle miles above and beyond what is currently accomplished by their existing transit services.

According to RTA, there were no plans that the Hemet Transit Center would provide any additional transit services - the new transit center would only serve as an alternate location for existing transit routes. No additional routes or transit vehicles were proposed.

The new Hemet Transit Center would provide a bus shelter and a real-time passenger information sign; however, RTA does not have any data that would suggest that these transit amenities, in and of themselves, would result in an increase in transit ridership and any corresponding reduction in automobile trips or vehicle miles traveled (VMT).

Similarly, the Temecula/Murrieta Transit Center did not propose any new routes or the addition of any new transit buses for a period spanning the next 15 years. Thus, between years 2015 and 2030, no additional reductions in automobile trips or automobile VMT we anticipated. It is not known with any reasonable certainty if additional routes or additional service frequency would be added post 2030.

The Temecula/Murrieta Transit Center also includes a 100 space park and ride facility. The Park and Ride Methodology discussed in Section 4.0, above uses the following information as input data:

Table 4.1-1: Temecula/Murrieta Park and Ride Facility Assessment Input Data

| Park and Ride Facility | 100 Spaces | Eff. Spaces | Ridership | Adj. Trips | Adj. VMT |
|---|---|---|---|---|---|
| 2016 Utilization | 75% | 75 | 150 | 12 | 1,431.75 |
| 2023 Utilization | 80% | 80 | 160 | 13 | 1,527.20 |
| 2035 Utilization | 90% | 90 | 180 | 15 | 1,718.10 |
| Default Adjustment Factor (AA) | 0.90 | | | | |
| Default Auto Trip Adjustment Factor (A) | 0.83 | | | | |
| Auto Trip Length (L) | 16 | | | | |
| Trip Length for Auto Access (LL) | 5 | | | | |

As shown above, the park and ride facility utilization rate was expected to grow as a function time, with initial utilization estimated to be 75% in year 2016 and 90% in year 2035; i.e., 95% of available parking spots would be filled with a potential transit center user. It is possible that carpools or vanpools would also use the park and ride facility as the commute point of origin.

The air quality benefits attributable to a park and ride facility are the commuters who substitute transit or ridesharing in lieu of a single occupant automobile trip or a portion of a single occupant automobile trip. Thus, the air quality benefits accrue from the displacement of automobile trips and VMT. The air quality benefits associated with the automobile trips eliminated are quantified using emission factors

provided by CARB. These factors are shown below in Table 4.1-2. These are shown as a function of three project evaluation periods 2016, 2023, and 2035 for the primary criteria air pollutants, reactive organic gases (ROG), oxides of nitrogen (NOx), and 2.5 micron particulate matter. Note that 10-micron particulate matter (PM10) is derived from the PM2.5 values for reporting purposes.

Table 4.1-2: Emission Factors Associated with Automobile Trips Reduced

**Automobile Emission Factors**

| **ROG** | **2011-2015** | **2011-2020** | **2011-2025** | **2011-2030** | **2011-2035** |
|---|---|---|---|---|---|
| VMT (g/mile) | 0.191 | 0.153 | 0.132 | 0.119 | 0.113 |
| commute trip ends (g/trip end) | 0.764 | 0.614 | 0.521 | 0.462 | 0.353 |
| **NOx** | | | | | |
| VMT (g/mile) | 0.217 | 0.172 | 0.146 | 0.130 | 0.124 |
| commute trip ends (g/trip end) | 0.303 | 0.233 | 0.189 | 0.162 | 0.162 |
| **PM2.5** | | | | | |
| VMT (g/mile) | 0.087 | 0.087 | 0.087 | 0.087 | 0.087 |
| commute trip ends (g/trip end) | 0.006 | 0.004 | 0.004 | 0.004 | 0.004 |

Using the CARB/Caltrans methodology for park and ride facilities, the air quality benefits associated with the park and ride lot that was planned for the Temecula/Murrieta Transit Center are shown below in Table 4.1-3:

Table 4.1-3: Air Quality Benefits that would have accrued had the Temecula/Murrieta Park and Ride Facility been Constructed, "kg per day of emissions reduced":

**Air Quality Benefits, Temecula/Murrieta Park and Ride Facility (kg/day)**

| | **ROG** | **NOx** | **PM10** | **PM2.5** |
|---|---|---|---|---|
| 2016 | 0.227 | 0.249 | 0.135 | 0.125 |
| 2023 | 0.209 | 0.225 | 0.144 | 0.133 |
| 2035 | 0.199 | 0.215 | 0.163 | 0.150 |

Thus, the total air quality benefits associated with the two Transit Center that are no longer planned for construction are as shown in Table 4.1-4, below:

Table 4.1-4: Air Quality Benefits Associated with Transit Centers, kg per day of Emissions Reduced:

| Center | Year | ROG | NOx | PM10 | PM2.5 |
|---|---|---|---|---|---|
| Hemet | 2016 | 0 | 0 | 0 | 0 |
| Temecula/Murrieta | 2016 | 0.227 | 0.249 | 0.135 | 0.125 |
| Hemet | 2023 | 0 | 0 | 0 | 0 |
| Temecula/Murrieta | 2023 | 0.209 | 0.225 | 0.144 | 0.133 |
| Hemet | 2035 | 0 | 0 | 0 | 0 |
| Temecula/Murrieta | 2035 | 0.199 | 0.215 | 0.163 | 0.150 |

It should be noted that although the park and ride facility lot utilization increases as a function of time, the tailpipe exhaust pollutants associated with automobiles is expected to decrease over time, i.e., cars of the future will be less polluting. Thus, emissions for ROG and NOx tend to decrease over time.

However, since a large component of particulate matter emissions (PM) are associated with tire and brake wear, as well as entrained road dust, these emission benefits tend to increase as more automobiles utilize the park and ride facility and more trips are avoided or shortened in distance.

## 4.2 Emission Reductions Associated with Substitute Project

The expansion of RTA express bus service, with the addition of seven new express buses, is proposed as the substitute project. Table 4.2-1, below, shows input data used in quantifying the air quality benefits associated with the addition of seven express buses:

Table 4.2-1: Input Data Associated with Express Bus Service

**Expansion Buses: Express Bus Service**

| Route | # Buses | Year | Pass/Year | Adj Pass | Ave Trip | Dependency | Bus Miles |
|---|---|---|---|---|---|---|---|
| 200 - Express | 4 | 2016 | 77,010 | 64,688 | 25.8 | 16% | 143,820 |
| 205 - Express | 3 | 2016 | 21,930 | 18,421 | 40.1 | 16% | 195,840 |

As shown in the above table, the input data includes the year the expansion buses enter service, the estimated number of passengers per year associated with each route, the average trip length per passenger, as well as the annual mileage accrued by each bus. Note that "Adj Pass" equals the adjusted number of new riders who are not transit dependent and thus have the potential to eliminate an automobile trip.

The air quality benefits associated with the automobile trips eliminated are quantified using emission factors are shown below in Table 4.2-2.

Table 4.2-2: Emission Factors Associated with Automobile Trips Reduced

**Automobile Emission Factors**

| **ROG** | **2011-2015** | **2011-2020** | **2011-2025** | **2011-2030** | **2011-2035** |
|---|---|---|---|---|---|
| VMT (g/mile) | 0.191 | 0.153 | 0.132 | 0.119 | 0.113 |
| commute trip ends (g/trip end) | 0.764 | 0.614 | 0.521 | 0.462 | 0.353 |
| **NOx** | | | | | |
| VMT (g/mile) | 0.217 | 0.172 | 0.146 | 0.130 | 0.124 |
| commute trip ends (g/trip end) | 0.303 | 0.233 | 0.189 | 0.162 | 0.162 |
| **PM2.5** | | | | | |
| VMT (g/mile) | 0.087 | 0.087 | 0.087 | 0.087 | 0.087 |
| Commute trip ends (g/trip end) | 0.006 | 0.004 | 0.004 | 0.004 | 0.004 |

The buses proposed for use in the Express Bus service are model year 2013 and 2014 Gillig transit buses equipped with the model year 2013 or 2014 Cummins ISL G 280 compressed natural gas (CNG) engine. The emission factors associated with the Cummins ISL G 280 CNG engine are shown below in Table 4.2-3. Note that the emission factors are common to both the model year 2013 and 2014 engines:

Table 4.2-3: Emission Factors Associated with the 2013/2014 Cummins ISL-G 280 CNG Engine

**Transit Bus Emission Factors (g/mile)**

| | |
|---|---|
| **ROG** | 0.240 |
| **NOx** | 0.520 |
| **PM2.5** | 0.008 |

Using the methodology discussed in Section II for Transit Bus Service, the following air quality benefits are calculated for the express bus service. These are shown as a function of project assessment year in Table 4.2-4:

Table 4.2-4: Air Quality Benefits for the Transit Expansion Projects, "kg per day of emissions reduced":

**Air Quality Benefits - 2016 (kg per day)**

| **Route** | **ROG** | **NOx** | **PM10** | **PM2.5** |
|---|---|---|---|---|
| 200 - Express | 0.714 | 0.623 | 0.430 | 0.395 |
| 205 - Express | 0.212 | 0.081 | 0.187 | 0.172 |
| **Total Daily Emission Reductions** | **0.926** | **0.704** | **0.617** | **0.567** |

**Air Quality Benefits - 2023 (kg per day)**

| Route | ROG | NOx | PM10 | PM2.5 |
|---|---|---|---|---|
| 200 - Express | 0.601 | 0.496 | 0.430 | 0.395 |
| 205 - Express | 0.165 | 0.026 | 0.187 | 0.172 |
| **Total Daily Emission Reductions** | **0.766** | **0.522** | **0.617** | **0.567** |

**Air Quality Benefits - 2035 (kg per day)**

| Route | ROG | NOx | PM10 | PM2.5 |
|---|---|---|---|---|
| 200 - Express | 0.485 | 0.391 | 0.430 | 0.395 |
| 205 - Express | 0.118 | -0.020 | 0.187 | 0.172 |
| **Total Daily Emission Reductions** | **0.602** | **0.371** | **0.617** | **0.567** |

## 5.0 Air Quality Benefits Equivalency – Findings of the Technical Assessment

The quantified emission reductions clearly demonstrate that the proposed RTA express bus service project will most likely yield greater quantifiable emission reductions as compared to the transit center/park and ride facility projects originally proposed for construction. The comparison is shown below in Table IV-1:

Table 5-1: Comparison of Emission Reduction Air Quality Benefits, "kg of air pollution reduced per day":

| | Assessment Year | ROG | NOx | PM10 | PM2.5 |
|---|---|---|---|---|---|
| Original Transit Centers | 2016 | 0.227 | 0.249 | 0.135 | 0.125 |
| Substitute Transit Expansion | | **0.926** | **0.704** | **0.617** | **0.567** |
| Original Transit Centers | 2023 | 0.209 | 0.225 | 0.144 | 0.133 |
| Substitute Transit Expansion | | **0.766** | **0.522** | **0.617** | **0.567** |
| Original Transit Centers | 2035 | 0.199 | 0.215 | 0.163 | 0.150 |
| Substitute Transit Expansion | | **0.602** | **0.371** | **0.617** | **0.567** |

As shown in the above Table, for each project assessment year, the emission reductions associated with the substitute Express Bus project is greater than the reductions that would have been realized by the Transit Center and Park and Ride facility construction. Thus, the substitute project has a more favorable impact on regional air quality improvement as compared to the original projects.