

**SANTA BARBARA METROPOLITAN TRANSIT DISTRICT**  
**Request for Proposals for AVL & ITS Management Systems (AIM)**  
*Addendum 1 - Issued November 10, 2013*

The Santa Barbara Metropolitan Transit District (MTD) herewith issues this Addendum No. 1 to its *Request for Proposals for AVL & ITS Management Systems (AIM)*. Except as modified herein this addendum, including the attachments hereto, all other terms and conditions of the RFP remain unchanged.

Attached hereto this addendum are three documents:

- ◆ *AIM RFP Response to Bidder Questions* dated November 10, 2013
- ◆ *Request for Proposals for AVL & ITS Management Systems (AIM)*, revised November 10, 2013
- ◆ *Request for Proposals for AVL & ITS Management Systems (AIM)*, revised November 10, 2013, with tracking changes

Should there be any conflict between the revised RFP and the response to RFP questions, the RFP shall take precedence. Note that the responses document will not be part of any contract awarded as a result of this RFP. Also, only pages with changes are included in the tracked version of the RFP.

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
1	<b>Vendor and Credit References</b>	Section 3.4 "Prior Experience with Similar Projects" - Shall vendors insert the Credit & Work References Form here or is this an additional one page description? (Strategic Mapping)	The Credit & Work References form is limited to reference contact information and should be submitted with the other forms. As indicated in §3.4 of the Solicitation Instructions, the offeror's submittal shall include project information for the references listed on the form in the Prior Experience with Similar Projects section of its proposal.	
2	<b>Partners, Subcontractors, and Suppliers</b>	Section 3.4 "Description of Partners, Subcontractors & Suppliers" - Please clarify what "Provide the same information as that described above for the Offeror (see above)" specifically refers to. (Strategic Mapping)	It means provide the firm description, prior experience, and key personnel résumés for partners, subcontractors, and suppliers listed on the form. All information may not be applicable (e.g., résumés for a firm only supplying a manufactured product are not expected).	
3	<b>Budget and Price Sheets</b>	<ol style="list-style-type: none"> <li>1. What are the requirements for services rendered for the \$250K Prop 1B funds be? Are there any other funding requirements? (Pre-Bid Meeting)</li> <li>2. Have pricing sheets been sent out? Will they include pricing for options? (Pre-Bid Meeting)</li> <li>3. Will MTD consider publishing their budget for the AVL &amp; ITS Management Systems project in an Addendum? (Init)</li> <li>4. Will MTD provide the required price sheets in an Addendum? (Init)</li> <li>5. When will we receive the pricing sheets? (NextBus)</li> <li>6. Can you please share the total budget allotted for the project? (Avail)</li> <li>7. In the Pricing Form could you provide the number of Signs requested to help support a more apple to</li> </ol>	<p>The amount of Prop 1B funds subject to the March, 2014, deadline has been increased to \$375,000. The Contractor will only be paid for services or products provided. There will be no advance payments. There are no other funding requirements that bidders need be aware of.</p> <p>The project budget is \$3,320,747 which has been added to the Project Summary Sheet of the Solicitation Instructions. No further funding is anticipated for this project.</p> <p>The Price Proposal form has been developed and is included with the forms in the Solicitation Instructions.</p> <p>See Topic 21 - Electronic Signs , regarding the number of signs.</p>	<p>SI: §5.3, Project Summery Sheet</p> <p>SP: §1.3</p>

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		<p>apples comparison between contractors? (Avail)</p> <p>8. Please provide the budget for this project (ISR)</p> <p>9. What is the budget available for the first phase (core requirements) of this project? (Syncromatics)</p> <p>10. Are there any available funds for optional items, or will those be added only as future funds might become available? (Syncromatics)</p>		
4	<p><b>Requirement for Options and Alternative Solutions</b></p>	<p>1. Do we have to include providing some or all of the Options in our proposal? (NextBus)</p> <p>2. The RFP requires that all core systems and also the automatic announcing system be priced in the proposal as minimal requirements. Will proposers who only include pricing on these minimal requirements be penalized in the scoring if they only include these minimum elements? (Syncromatics)</p> <p>3. Many of the requirements within the scope are pretty detailed and/or specific – will proposers be allowed to describe their proposed solutions, even if they don’t satisfy the very detailed nature of a specific requirement? In other words, will proposers be penalized if they propose an alternative which MTD might, upon reflection, consider an acceptable alternative? (Syncromatics)</p> <p>4. The RFP is written with language that seems to indicate it is looking for a highly customized solution (‘design review’, ‘as-built drawings’, etc). Is it MTD’s intent to have a custom-built solution, or is MTD interested in a commercial, off-the-shelf and proven product which might nevertheless</p>	<p>As indicated in §3.1 of the Solicitation Instructions, “only proposals that address all of the mandatory systems and the optional automated bus stop announcement system, including prices, will be considered.”</p> <p>Not including the non-mandatory options in proposals may affect scoring. MTD encourages all offerors to propose all options in their proposals.</p> <p>As indicated in §3.4 of the Solicitation Instructions, “MTD will consider alternative approaches and specifications for achieving these [AIM System] goals. Proposal shall identify any such variances from the requirements set forth in the AIM Specifications and the benefits of the alternative.” Whether such variances are penalized (or scored higher) depends upon the nature of the deviation and whether or not MTD considers it beneficial.</p> <p>The Specifications are not meant to indicate a “highly customized solution.”</p>	

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		allow for MTD-specific configurations? (Syncromatics)		
5	<b>Liquidated Damages</b>	<ol style="list-style-type: none"> <li>Are there any liquidated damages? (NextBus and Pre-Bid Meeting)</li> <li>Please confirm that the Liquidated Damages Clause will be negotiated at a later time since it is not defined in the Master Agreement. If not, please provide your intent on this paragraph. (Avail)</li> </ol>	No, there are no liquidated damages. See revised Master Agreement.	MA: §21
6	<b>Warranty and Support</b>	Do you want us to include warranty and support in the pricing? For how long? (NextBus)	Yes, include warranty and ongoing maintenance in the applicable space in the Price Proposal form. See §16 of the Master Agreement and §8.7 of the Specifications, which have been modified with respect to warranty & support.	MA: §16 SP: 8.7
7	<b>DBE</b>	<ol style="list-style-type: none"> <li>Is there a DBE Goal? (NextBus)</li> <li>Is there a DBE Goal for participation in the project? (Pre-Bid Meeting)</li> </ol>	No, there are no specific DBE goals for this project.	
8	<b>Billing</b>	<ol style="list-style-type: none"> <li>Can we bill based upon milestone/progress? (NextBus)</li> <li>Can you describe your submittal process and how long it takes for bills to be paid? (NextBus)</li> </ol>	<p>Yes, there will be milestone payments, which shall be determined during the offeror interview portion of the evaluation process (see §4.6 of Solicitation Instructions).</p> <p>Payment process is addressed in the Master Agreement.</p>	SI: §4.6 MA: §8
9	<b>Software Escrow</b>	<ol style="list-style-type: none"> <li>Section 8.5.2. Can you please confirm that all source code is to only be provided in escrow? (Clever Devices)</li> <li>Page 68 discusses that software source code and documentation should be escrowed such that MTD could make modifications to the software without</li> </ol>	<p>Yes, it is only necessary to provide source code (and documentation) in escrow.</p> <p>Bidders proposing “cloud-based” solutions should provide a compelling method by which the long-term viability of their system, e.g. 7-10 years, can be ensured in the case of their company becoming financially insolvent or in some</p>	

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		support from the original vendor. Would MTD consider waiving this requirement for cloud-based solutions provided that the vendor provides a regular and recurring data archive of all system data that MTD can keep and maintain? (Syncromatics)	other unknown state in which it is unable to deliver promised cloud-based services.	
10	Taxes on Goods	Section 9 of the Master Agreement - Please confirm that the 8.00% tax rate applies to all goods provided on the project and not on the services? Is it acceptable to have a separate column on the price form to show estimated taxes? (Avail)	The current sales tax rate in the City and County of Santa Barbara is 8.00%. It is the responsibility of the offeror to determine which aspects of its proposal are subject to sales tax and to include such tax in the appropriate location on the Price Proposal form.	
11	Bonding	<ol style="list-style-type: none"> <li>1. Please confirm there is not a bond required for this procurement. (Avail)</li> <li>2. Is there a bonding requirement from for this project? (Pre-Bid Meeting)</li> </ol>	No, there is no bonding requirement. See revised Master Agreement.	MA: \$19
12	Agencies Visited	<ol style="list-style-type: none"> <li>1. Is there another agency or agencies of similar size that you've looked at as a model? (Pre-Bid Meeting)</li> <li>2. Please provide the list of agencies visited. This was mentioned during the RFP Pre-bid. (Avail)</li> </ol>	While MTD has toured other agencies, we are not looking at any specific agency as a model for deployment.	
13	Name of Consulting Firm Assisting with Procurement	Please provide the name of the consulting firm that MTD has contracted with to help prepare this procurement (ISR)	Vaquero Systems	

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14	<b>Project and Proposal Schedule</b>	<ol style="list-style-type: none"> <li>1. Please allow for follow-up question on any clarification and or answers to vendor questions. Please extend the due date by 30 days to allow for responses. We know there is a funding spending issue, but in order to get the best response from all vendors this project should be extended by thirty days. (ISR)</li> <li>2. Is November 12<sup>th</sup> the deadline for questions or for responses? (Pre-Bid Meeting)</li> <li>3. Will there be a second round of questions?</li> </ol>	<p>The proposal submission date is being extended to November 27, 2013 at 3:00 PM (note that this is the day before Thanksgiving). Note that this requires modifications to the interview and contract award dates as well as indicated on the Project Summary Sheet.</p> <p>There will be a second round of questions if needed.</p>	SI: Project Summary Sheet, §3.6, §5.1
15	<b>Contract Language</b>	Do you want proposers to suggest changes or alterations in the contract (particularly some of the optional/variable language), or will these sections be negotiated upon an award? Of particular importance would be payment milestones and/or progress payments. (Syncromatics)	It was not the intent to solicit proposer changes to the Master Agreement, which was issued with the RFP in generic form. It has now been modified specifically for this project. However, §3.4 of the Solicitation Instructions addresses the issue of bidder concerns with the terms and conditions and to include such in their proposal.	MA
16	<b>Evaluation Criteria</b>	With regard to evaluation criteria, is there a weighting scale for evaluation? (Pre-Bid Meeting)	Yes, they are weighted, but exact weights will not be given. The order of priority is a general guideline.	
17	<b>Pre-Bid Meeting Attendee List</b>	Will you be publishing a list of attendees to the pre-bid meeting? (Pre-Bid Meeting)	This has been distributed.	
18	<b>Dissemination of Answers to Questions</b>	How will responses to questions be disseminated? Will they be sent to the list? (Pre-Bid Meeting)	Responses to questions will be disseminated via this document which has been sent to those on the bid list and posted on the MTD website.	

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19	Prevailing Wages	<ol style="list-style-type: none"> <li>1. The contract states that the project will be subject to “State of California Provisions for Public Works Projects”. (Clever Devices)                             <ol style="list-style-type: none"> <li>a. Will this project be applicable to the “State of California Provisions for Public Works Projects”?</li> <li>b. If so, is this a reference to the California Public Contract Code</li> <li>c. If not, can you please provide a link to the “State of California Provisions for Public Works Projects.</li> </ol> </li> <li>2. Are Prevailing wages required for this proposal? (Clever Devices)</li> <li>3. What are the allowed working hours to install signage? (Clever Devices)</li> </ol>	<p>Only work defined as public works is subject to California prevailing wage requirements. It is not subject to federal Davis-Bacon requirements. The <i>State of California Provisions for Public Works Projects</i> have been added as Attachment 4 to the Solicitation Instructions. Such requirements apply to installation work on fixed facilities only, not buses.</p> <p>The work hours for sign installation at the Transit Center will be determined during the course of the project.</p>	<p>SI: §2.1, §3.4, §5.2, &amp; Attach. 4</p> <p>MA: §3</p>
20	Interviews	<p>When do you expect that you will be doing vendor demonstrations and interviews? (Pre-Bid Meeting)</p>	<p>Sometime between November 19th and December 5<sup>th</sup>.</p>	<p>SI: Project Summary Sht</p>
21	Electronic Signs & Permitting	<ol style="list-style-type: none"> <li>1. The proposal appears to indicate that the vendor is responsible for power and permitting of electronic display signs (Section 4.2.5). Is this the case? What about at the Transit Center? (Pre-Bid Meeting)</li> <li>2. Are there any permitting requirements for installation of electronic display signs at the Transit Center? (Pre-Bid Meeting)</li> <li>3. Is there any existing wireless infrastructure at the Transit Center? Is there existing internet</li> </ol>	<p>MTD will be responsible for permitting associated with any local agency <u>planning</u> review, which would be applicable to any Transit Center external signs. The contractor will be responsible for permits for the installation, e.g. providing electrical, for the signs.</p> <p>No static signs are required by §4.2.4 of the Specifications, although that is a potential solution for posting the required information . QR codes are desired. Please see revised §4.2.4 of specifications for further clarification.</p> <p>There is no existing wireless infrastructure at the Transit</p>	<p>SP: §4.2.4, §4.2.5</p>

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		<p>capability? If there is no existing provider, who is responsible for deployment? (Pre-Bid Meeting)</p> <p>4. Is there a specific example of a transfer stop that you can point us to that is being considered for electronic display signage? (Pre-Bid Meeting)</p> <p>5. How long do buses remain at transit center?</p> <p>6. What kinds of static signs are required, metal, etc. (Section 4.2.4) Do you want QR codes?</p> <p>7. Per Section 4.2.5 Electronic Display Signs: Can the authority provide a quantity of the electronic display signs required? (Clever Devices)</p> <p>8. Per Section 4.2.5.1 Installation: Can MTD provide an estimate of wire footages required for installing power and communications for bidding purposes? (Clever Devices)</p> <p style="padding-left: 20px;">a. Can MTD provide electrical and physical drawings for the TC</p> <p style="padding-left: 20px;">b. Will trenching be required?</p> <p>9. With respect to exterior TC electronic signs: (Trapeze)</p> <p style="padding-left: 20px;">a. How many exterior signs are likely to be needed?</p> <p style="padding-left: 20px;">b. What is the mounting height/viewing distance range for these signs?</p> <p style="padding-left: 20px;">c. How many lines of text do you envision being needed on each sign?</p> <p style="padding-left: 20px;">d. Do you require single sided or double sided signs?</p> <p style="padding-left: 20px;">e. Will a LAN connection be available for sign</p>	<p>Center. Yes there is Internet connectivity. Please propose any wireless connectivity that your system requires.</p> <p>State and La Cumbre is an example of a bus stop that is likely candidate for an electronic display sign.</p> <p>Buses remain at the TC for less than a minute and up to 10 minutes.</p> <p>Sign specifics for the Transit Center, which include but are not limited to, number of signs, number of display lines per sign, character size (meet ADA requirements as per §4.2.5), viewing angle, mounting height, double vs. single sided, LAN connection, installation wiring, etc., should be specified by the bidder based in its experience.</p> <p>Similarly, the specifics of the optional bus stop (wayside) signs beyond those delineated in §4.2.5.3 shall be determined by the bidder. As indicated in §4.2.5.3, the installation and connectivity of the signs is <b>NOT</b> part of the specifications or contract resulting therefrom.</p> <p>Transit Center plans have been added as Appendix 5 to the Specifications. While the responsibility of the bidder to determine, trenching is not anticipated.</p> <p>Alls signs should be provided with audio capabilities, but this feature shall be able to be disabled on a per-sign, per time-of-day, frequency of repetition basis, etc.</p> <p>Remote bus stop signs shall include the option for data communications via either a wired LAN connections or through a cellular service.</p>	

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		<p>data communications or should Contractors include a cellular modem in the signs?</p> <p>10. With respect to the interior TC electronic signs: (Trapeze)</p> <ul style="list-style-type: none"> <li>a. How many interior signs are likely to be needed?</li> <li>b. What is the mounting height/viewing distance range for these signs?</li> <li>c. How many lines of text do you envision being needed on each sign?</li> <li>d. Will a LAN connection be available for sign data communications or should Contractors include a cellular modem in the signs?</li> </ul> <p>11. With respect to the five (5) optional, non-TC bus stop signs (Section 4.2.5.3): (Trapeze)</p> <ul style="list-style-type: none"> <li>a. What is the mounting height/viewing distance range for these signs?</li> <li>b. How many lines of text do you envision being needed?</li> <li>c. Do you require single sided or double sided signs?</li> <li>d. Are the environmental requirements for these signs the same as specified for the outdoor transit center signs?</li> <li>e. What will be the preferred method(s) of data communications with the bus-stop signs? (i.e. Ethernet, cellular modem, etc)</li> </ul> <p>12. Section 4.2.4 "Bus Stop Codes" - Are vendors responsible for the production expense and</p>		

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		<p>physical installation of bus stop signs? (Strategic Mapping)</p> <p>13. Section 4.2.5 "Electronic Display Signs" - What is the anticipated number of signs to be installed? Does MTD prefer LCD or LED? Will these be installed inside/outside or both? (Strategic Mapping)</p> <p>14. Do the optional wayside signs require sound as well? For example, a gong notifying next bus departure and/or text-to-speech to announce the next departure? (Init)</p> <p>15. How many wayside signs is MTD expecting to procure? The optional requirements state five (5), but the main proposal simply says "signs." Please clarify. (Init)</p> <p>16. What are the size expectations and/or requirements for the wayside signs? (Init)</p> <p>17. Will SBMTD do the permitting for the signage installed? (NextBus)</p> <p>18. How many signs do you require at the Transit Center (NextBus)</p> <p>19. What types of signs do you require at the Transit Center and at the 5 non-TC bus stops, i.e. single-sided, double-sided, two-line, etc.? (NextBus)</p> <p>20. Do you know yet where you will be putting the non-Transit Center signs? (NextBus)</p> <p>21. Will SBMTD supply power to the sign locations? (NextBus)</p> <p>22. Do you require double-sided signs for the Transit</p>		

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		<p>Center or elsewhere? (NextBus)</p> <p>23. Please clarify the height of the displays at the Transit Center. The height in which the displays are mounted will dictate the character size required to meet ADA requirements. (Daktronics)</p> <p>24. Please clarify any physical size of the display cabinet or character capacity (lines of text/characters per line) required for the displays or provide a sample message. (Daktronics)</p>		
22	Transit Database (TDB)	<ol style="list-style-type: none"> <li>1. You require a TDB as part of the RFP. If it is your intent to make data openly available, would you accept alternative solutions that give MTD access to this data? (Clever Devices)</li> <li>2. Some vendor’s licenses are specific to each user and do not allow their data to be openly available in a TDB. The interface between the vendor’s system and AIM can be implemented but not through a TDB. Is this acceptable to MTD? (Clever Devices)</li> <li>3. If not, would MTD consider working with these vendors directly? (Clever Devices)</li> <li>4. Page 36, section 3.2.4.1 mentions that the proposer should “share real-time data with the applications on the MTD network via a transit database” – what applications might these be and can you explain what is meant by “sharing” data with them? (Syncromatics)</li> </ol>	<p>The TDB specification has been substantially modified and should be consulted as a response to most TDB questions and concerns.</p> <p>If there are license issues, it is the responsibility of proposers to provide a solution that satisfies the intent of the TDB: MTD access to its data on AIM.</p>	SP: §3.2.4.1

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23	<b>Integration with Trapeze</b>	<ol style="list-style-type: none"> <li>1. Section 4.9.1.1 Integration with Trapeze: Does this requirement speak to Trapeze FX Schedule Interface, to enable the import of Schedule Data, or a Trapeze OPS interface for the integration of the Operator Assignments? (Clever Devices)</li> <li>2. Trapeze requires an interface license to share fixed route schedule data. Does MTD currently own the Trapeze FX/TSDE interface license? (Clever Devices)</li> <li>3. Trapeze requires an interface license to share OPS data. Does MTD currently own the Trapeze OPS MON interface license? (Clever Devices)</li> <li>4. Are these interface licenses to be included with the proposal or will MTD obtain these interface licenses directly from Trapeze to save cost? (Clever Devices)</li> <li>5. Section 2.2.2 "Scheduling, Runcutting &amp; Operations Applications" - Trapeze charges for interfacing to their software applications. In the best interest of MTD, we suggest/request that Trapeze provides a blanket quote for all interested prime contractors a minimum of 2 weeks ahead of the RFP closing date. (Strategic Mapping)</li> <li>6. What information from Trapeze's scheduling system will be provided? Will an API be provided? (DoubleMap)</li> <li>7. Can you provide a contact person at Trapeze with whom we can discuss data exchange? (Syncromatics)</li> <li>8. Page 38, section 4.1.3, mention is made of a</li> </ol>	<p>The Trapeze Integration specification has been substantially modified and should be consulted as a response to many of these questions. In particular, MTD will provide the required licenses for integration.</p> <p>A paragraph regarding Trapeze integration has also been added to the optional bus assignments section included in the Yard Wireless System (§4.5.3)</p> <p>As indicated in §4.1.3, MTD desires a separate GIS database. This database will ensure that all applications and users have access to up-to-date GIS data at their disposal. This database will not reside within Trapeze, but will be accessible to Trapeze.</p>	<p>SP: §4.9.1.1, §4.5.3, §4.1.3</p>

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		<p>“customized GIS database” – can you provide more information as to what is desired with this? If the lat/long data is already contained within Trapeze and the proposer’s system, is a separate, custom GIS database needed? (Syncromatics)</p> <p>9. Please consider MTD negotiate interface pricing with current vendor. It is not reasonable to ask vendors to negotiate a price with other potential prime vendors (ISR).</p> <p>10. If MTD is to negotiate pricing with current vendor of Scheduling, Runcutting &amp; Operations Applications this dollar number should not be included in the vendor evaluation. If included it creates an unfair practice for the incumbent vendor (ISR)</p> <p>11. Please consider MTD negotiate interface pricing with current vendor. It is not reasonable to ask vendors to negotiate a price with other potential prime vendors (ISR).</p> <p>12. If MTD is to negotiate pricing with current vendor of Scheduling, Runcutting &amp; Operations Applications this dollar number should not be included in the vendor evaluation. If included it creates an unfair practice for the incumbent vendor (ISR)</p>		
24	<b>Scheduling and Runcutting</b>	<p>Scheduling, Runcutting &amp; Operations Applications  <i>Please consider other options from replacement of scheduling, Runcutting &amp; Operations Application</i> This not only gives MTD the flexibility on making an informed decision on this procurement by receiving competing product quotes, but also allows vendors to</p>	<p>While it is not the intent of MTD to replace such software, it would be considered if it were shown to be cost effective by reducing lifecycle costs.</p>	

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		provide these products has future product enhancements. The state of present interface pricing with current vendor should also give MTD cause to get real picture of the current market (ISR)		
25	Routes and Stops	<ol style="list-style-type: none"> <li>1. Can you please provide the quantity of routes and stops serviced by MTD? (Clever Devices)</li> <li>2. Can you please identify the quantity of routes (if more than one) and stops for the Ventura route? (Clever Devices)</li> <li>3. How does the Agency currently do rostering – via spreadsheets? (Trapeze)</li> <li>4. Who at the Agency performs the rostering role? (Trapeze)</li> <li>5. How often is the rostering done? (Trapeze)</li> </ol>	<p>As indicated in §2.1.2 of the Specifications, information on routes and schedules is found on MTD’s website where it can be determined that MTD has 28 routes, including the Coastal Express Limited that serves Ventura and one composed of various boosters. As indicated in §2.1.3 of the Specifications, MTD has approximately 750 distinct bus stops in its service area, which should be used for proposal pricing. Five additional bus stops should be added for the Ventura end of the Coastal Express Limited.</p> <p>MTD does rostering four times per year using Trapeze OPS.</p>	SP: §2.1.3
26	Submittal Requirements	<ol style="list-style-type: none"> <li>1. Section 8.4.1 requires the contractor to furnish to MTD two fully licensed copies of all software necessary for viewing and marking up submittals. Does MTD want copies of software that already exists at MTD? (Clever Devices)</li> <li>2. Could you please confirm that you have existing copies/licenses for? (Clever Devices) <ul style="list-style-type: none"> <li>– AutoCAD 2007 or later</li> <li>– Microsoft Word</li> <li>– Microsoft Excel</li> <li>– Microsoft PowerPoint</li> <li>– Microsoft Project</li> <li>– Microsoft Visio</li> </ul> </li> <li>3. To avoid the added expense to the project of</li> </ol>	<p>The software copies requirement in the last bullet of §8.4.1 only applies to AutoCAD or DXF format drawings. However, this requirement is being modified to coincide with the Avail recommendation to simply utilize Adobe PDF documents. Submittal using Microsoft Office products will also be acceptable, provided that MTD can use Microsoft Office 2003 for reviewing and commenting.</p>	SP: §8.4.1

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		<p>purchasing licenses for 3rd party software used to create source documentation, we suggest that all documents be provided in Adobe Acrobat PDF format, and the customer can use the Comments feature to provide review comments. Would this approach be acceptable? (Avail)</p>		
27	<b>Computer Aided Dispatch (CAD)</b>	<ol style="list-style-type: none"> <li>1. Section 5.2.2. Can you please identify how many dispatch center console display screens are required? (Clever Devices)</li> <li>2. Can you please provide the quantity of consoles required to have audio, speakers, microphones and headsets? (Clever Devices)</li> <li>3. CAD is listed as an option; however, does MTD want basic limited CAD functionality included in the base contract? (Init)</li> <li>4. Section 4.9.1.3. Can you please clarify what is meant by “the correction of invalid bus data at the dispatch console”? What problem are you trying to solve by correcting/changing data in the system? (NextBus)</li> <li>5. Section 4.9.1.3. Can you please clarify what is meant by “Support automatic or manual control of AIM devices from the dispatch console.”? (Clever Devices)</li> </ol>	<p>§5.2 details hardware requirements for the Computer Aided Dispatch option described in §4.9.</p> <p>Bidder shall determine the number and size of monitors based on their experience.</p> <p>Regarding §5.2.3, only the Dispatch and Transit Center supervisors shall have audio, speakers, microphones, and headsets.</p> <p>Further information is required to consider obtaining CAD with basic limited functionality.</p> <p>Regarding §4.9.1.3, it is desired for supervisors to be able to correct erroneous driver logon information, e.g. driver ID number, run number, etc.</p> <p>See revised language in §4.9.1.2 regarding the ability of the supervisors to control on-board AIM devices.</p>	<p>SP: §4.9.1.3, §5.2.2, §5.2.3</p>
28	<b>IVR System</b>	<ol style="list-style-type: none"> <li>1. Section 4.2.6. Can MTD provide vendors with a number of simultaneous calls that the IVR system should be able to field at once? (Clever Devices)</li> <li>2. Section 4.2.6. Does MTD require any additional redundancy / load balancing beyond virtualization</li> </ol>	<p>MTD currently uses a ShoreTel VoIP telephone system.</p> <p>Bidders should specify an IVR system, including number of specific number of simultaneous calls, which is suitable for the MTD operation.</p>	<p>SP: 2.2.5§</p>

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		<p>for the IVR option? (hot / cold backup, etc.) (Clever Devices)</p> <p>3. Can the TTY/TDD requirement be met using a combination of California’s TTY Relay service &amp; providing people the option to get this information using mobile devices and web sites? (Clever Devices)</p> <p>4. Interactive Voice Response (IVR) (Option) Provide users of TTY/TDD devices with automated access to time of arrival information. Can this requirement be met by relying on a combination of the website / mobile applications required as well California’s TTY Relay Service? When alternatives like these are present, the TTY IVR will not get used very much at all. (ISR)</p> <p>5. Page 41, section 4.2.6 – can you clarify that a text-to-speech based database is acceptable and that an audio-recording bases system is not required. (Syncromatics)</p>	<p>Yes, the California TTY Relay Service is acceptable. See §4.2.6 in revised specification.</p> <p>The IVR does not require any redundancy beyond that provided with the system.</p> <p>MTD will consider a voice synthesizer providing it has satisfactory voice quality. Bidders should be prepared to demonstrate using MTD locale specific words during interviews.</p>	
29	Automated Passenger Counting	<p>1. Automated Passenger Counters: Please provide details on the entry and exit doors for all vehicles that require APC equipment. The following door dimensions are requested (Trapeze):</p> <ul style="list-style-type: none"> <li>– Number of doors on each vehicle</li> <li>– Height of each door</li> <li>– Total width of each door (ignoring handrails, etc)</li> </ul> <p>2. Can you please provide the door width of each door on each bus type? (Clever Devices)</p> <p>3. For optional APC's - Could MTD kindly provide the</p>	<p>See revised Revenue Vehicle Summary table in Appendix 2 to the Specifications.</p> <p>NTD certification of the APC has been modified to be an option. Additionally, only initial, not ongoing, certification is required.</p>	TS: App. 2, §4.8.3

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		<p>front/rear door width and height for their vehicles? (Strategic Mapping)</p> <p>4. For pricing purposes of installing Automatic Passenger Counters can you please tell us how many doors each bus has and how wide each door is? (NextBus)</p> <p>5. Can you please provide the door width of each door on each bus type? (Clever Devices)</p> <p>6. Page 49, section 4.8.3 – regarding FTA certification for APC system: is it MTD’s intent that the contractor should handle ALL elements of such certification, including the maintenance requirements for the APC hardware? Might MTD consider deleting this requirement or altering it to reference the proposer “cooperating” with a certification effort? (Syncromatics)</p> <p>7. Can you provide the door counts and door widths for all buses (for calculation of APC systems). (Syncromatics)</p>		
30	<b>Bus Stop Announcements</b>	<p>1. With respect to the existing Clever Devices SpeakEasy announcement system onboard a portion of the fleet (Section 4.6.1.4), may Contractor’s assume they can replace this system when they propose their own Automatic Voice Annunciator option (Section 4.6)? (Trapeze)</p> <p>2. How important is it for the AVA system to automatically differentiate internal and external announcements? Ex: announce all major stops/transfer centers internally, but only announce externally when a bus has stopped at a</p>	<p>§4.6.1.4 indicates that “audio announcements shall be made using the existing public address (PA) system and equipment onboard each bus.” MTD is not aware of restrictions in using SpeakEasy with other AVA system. Again, proposals may include deviations from the specification, but these must be identified supported for consideration.</p> <p>Separate controls for interior and exterior speakers is what MTD desires. Again, alternatives will be considered.</p>	

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		major stop/transfer center (DoubleMap)		
31	Silent Alarm System	<ol style="list-style-type: none"> <li>1. <b>Silent Alarm System (CAD option)</b>, Section 4.9.4: Please describe and provide wiring details of any existing covert switch already in use on the buses (e.g. used with the two-way radio system?). (Trapeze)</li> <li>2. Is the SAS (emergency alarm button) an option or part of the base contract? It is listed in the RFP requirements as an option, but the camera requirement states that an SAS should tag the video feed. Please clarify (Init)</li> </ol>	The silent alarm system (SAS) in §4.9.4 of the specifications is an optional system within the optional CAD system. All buses already contain an SAS through the two-way radio system. Tagging shall be initiated in the video surveillance system by either the existing or the new CAD SAS. Clarification language has been added to the Specifications.	SP: §4.4.1.1 & 4.9.4
32	Vehicle Health Monitoring	<ol style="list-style-type: none"> <li>1. Interface with vehicle powertrain/brake/air conditioning/fire suppression and multiplex systems (Section 4.7): Please provide contact information for a technical representative at each bus manufacturer (i.e. Nova/E-Bus/Gillig/MCI) familiar with the MTD's vehicle interface requirements for the various onboard systems. (Trapeze)</li> <li>2. Please provide a photo of each vehicle type (ISR)</li> <li>3. For each vehicle, can you provide the make/model of each piece of hardware that is to be interfaced? For example: (Avail) Can you please provide the number of vehicles currently equipped with J1939 based Multiplexes for integration with the VHM option? (Avail)</li> <li>4. Can MTD provide a full listing of all equipment (headsigns, PA) for each vehicle and with contact persons for the respective companies?</li> </ol>	<p>See revised Revenue Vehicle Summary table in Appendix 2 to the Specifications for vehicle systems &amp; contact information.</p> <p>Photos will be provided in Addendum 2</p> <p>The GFI Odyssey fareboxes are presently utilizing software version 2300-328.</p>	SP: App. 2

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		(Syncromatics)		
33	Headsigns	<ol style="list-style-type: none"> <li>1. Interface with Existing Headsigns: (Trapeze)                             <ol style="list-style-type: none"> <li>a. Provide make and model information for all headsign types on the vehicles.</li> <li>b. Provide contact information at Nova for someone familiar with the MTD's headsign equipment and the ODK J1708 upgrade requirements.</li> <li>c. Please confirm that all other existing destination sign controllers onboard the vehicles are already capable of J1708 communication with 3rd party devices.</li> </ol> </li> <li>2. Section 3.2.4.2 "Vehicle Equipment" - Regarding headsign integration, can MTD kindly provide a list of the makes and models of headsigns that are currently installed? Please provide the company contacts for the headsign equipment. Can MTD please indicate if their headsigns currently support single sign and AVL integration or if they require additional licenses/capabilities from the manufacturer to enable this? (Strategic Mapping)</li> <li>3. Section 4.6.1.1. Is displaying Operator badge number an acceptable alternative to displaying Operator name on the inside sign? (Clever Devices)</li> <li>4. The RFP requires the vendor to "modify Nova fleets headsign ODK's to include a J1708 interface." Can you elaborate on this requirement and would this potentially void the Nova fleet ODK warranty? (DoubleMap)</li> <li>5. Please provide the headsign manufacturer make and model per vehicle including the ODK version?</li> </ol>	<p>See revised Revenue Vehicle Summary table in Appendix 2 to the Specifications for headsign makes, models, communications protocol, and contact. See Appendix 6 for photos of Nova ODK and Gillig/MCD ODK. Bidders should check with Luminator regarding AVL integration and the need for additional licenses capabilities.</p> <p>As indicated in the Specifications, MTD desires the ability to show driver name on the inside signage.</p> <p>See Topic #38 (In-Vehicle Systems MDTs) below regarding interface between MDT and headsigns (and other on-board equipment).</p>	SP: App. 2, App. 6

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		<p>(Avail)</p> <p>6. Page 47, section 4.6.2 – mention is made of ‘modifying’ the Nova bus fleet headsigns to be J1708 compatible – can you provide information on the current headsign that is there? Also, if replacement is necessary to achieve J1708 compatibility, can you provide the dimensions of the headsign compartment? (Syncromatics)</p>		
34	<b>Vehicle Installation</b>	<p>1. With respect to the vehicle installations: (Trapeze)</p> <ul style="list-style-type: none"> <li>a. What is the minimum and maximum number of vehicles available for installations per day?</li> <li>b. What is the location where installations will take place?</li> <li>c. During what hours will the vehicles be available for installations (i.e. weekdays or evenings/weekends)?</li> <li>d. Will a driver be provided to move vehicles for installation and testing purposes?</li> </ul>	See §5.4.3.2 of the Specifications.	
35	<b>GPS and Navigation</b>	<p>Is Dead Reckoning GPS desired or a requirement? This enables tracking in urban canyon environments. (Strategic Mapping)</p>	Dead Reckoning processing is not explicitly required, but may be used to ensure satisfactory service area coverage if deemed necessary.	
36	<b>Video Surveillance System</b>	<ul style="list-style-type: none"> <li>1. Will all onboard cameras need to be 720p or greater resolution? (Pre-Bid Meeting)</li> <li>2. Would the substitution of analog cameras be considered? (Pre-Bid Meeting)</li> <li>3. Are sample video surveillance clips or images required for proposal submission? Would they be helpful in your decision?</li> </ul>	<p>The system described in §4.4 of the specifications is that which MTD desires. Again, alternatives will be considered. Such requests should provide necessary background and support material to facilitate making a decision to use alternate approach.</p> <p>If the specs are contradictory, please indicate specifically how so and MTD will consider revisions.</p>	

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		<p>4. Has MTD piloted any camera systems in the past? If yes, kindly provide the company and the pilot results. (Strategic Mapping)</p> <p>5. "720p" is an HD or IP specification. The remainder of the requirements infer an analog system is preferred. Please clarify this requirement for 720p. (Clever Devices)</p> <p>6. Section 4.4.2.1 Camera Specifications: (Seon)</p> <p>a. Seon respectfully requests that Santa Barbara MTD accepts a combination of analog and digital cameras, instead of all cameras being digital [720P]. The Seon system currently offers up to 12 analog cameras [interior Dome Cameras @ 600TVL; Exterior Wedge Cameras @ 650TVL] as well as one Digital Wedge Camera @ 720P. The resolution offered by our analog cameras is of very high quality, providing detailed images both inside and outside the bus. With a variety of lens options available, these cameras can be positioned such that the ability to identify an object or a person based on individual characteristics, colors and other details is unquestionably accurate.</p> <p>b. All Seon cameras are designed for a Transit Bus environment, with rugged vandal resistance, with integrated adjustable microphones, Day/Night functionality, automatically adjusting electronic iris, with lens choices from 2.5mm to 25mm.</p> <p>c. Additional features on each camera include an RCA jack inside each camera for the convenience of aiming the camera without having to connect via the DVR, as well as a modular [plug &amp; play]</p>	<p>Sample video clips are not required for initial proposal submission. MTD may request such information during interviews.</p>	

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		<p>design with a single cable [containing wires to power the camera as well as record both audio and video] with a single quick positive &amp; secure connection.</p> <p>d. Since digital camera images cannot be highly compressed without losing clarity on playback, they require a much larger storage capacity on-board, limiting the storage capacity of the system.</p> <p>e. We would be very happy to demonstrate these cameras using both live and recorded images, at your convenience, to provide proof of performance. References are also available.</p>		
37	Site Visits	Has MTD piloted any AVL systems in the past? If yes, kindly provide the company and the pilot results. (Strategic Mapping)	Yes. NextBus in the early 2000s. Results are not relevant.	
38	Single Login, Fareboxes, MDT	<ol style="list-style-type: none"> <li>1. Single Point Log on - Is there a requirement to provide a single point log-on for the base line core solution listed on page 1 of the scope of work within items 1-5? (Avail)</li> <li>2. Please provide the GFI software version installed for each vehicle and whether they are equipped with the J1708 interface and cable.</li> <li>3. Is a single point of logon required to be included in baseline features? (Pre-Bid Meeting)</li> <li>4. In section 3.2.6 – for clarification purposes: if a proposer suggests using their own MDT to handle the single-sign on functions, MTD’s goal is that the GFI mobile terminal should be completely</li> </ol>	<p>As indicated in §2.2.3 and §3.26, it is MTD’s desire that onboard logon for both the AIM system and the farebox system be accomplished through a single sign-in by the driver. As used herein, “the AIM system” refers to all onboard AIM systems acquired.</p> <p>MTD has determined that the requirement to carry out manual farebox entries <u>beyond</u> logon (e.g., input of passenger type) through an MDT will not be cost effective and it is thus being eliminated. Will GFI allow automatic trip updates via AIM?</p> <p>The GFI Odyssey fareboxes are presently utilizing software version 2300-328.</p> <p>The fareboxes do not currently support single sign-in and</p>	SP: §2.2.3, §3.2.6, §4.9.1.3

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		<p>deprecated? (in other words not used at all by the driver, and ALL functions to be handled by the proposers MDT)? (Syncromatics)</p> <p>5. Has MTD secured the license rights from GFI to allow single sign on functions with the Odyssey fareboxes? (Syncromatics)</p> <p>6. Section 2.2.3 "Fare Collection &amp; Passenger Counting Systems" - Can MTD please indicate if their Odyssey fareboxes currently support single sign and AVL integration or if they require additional licenses/capabilities from GFI to enable this? (Strategic Mapping)</p>	<p>AVL integration. MTD has requested and is awaiting information regarding licenses and capabilities.</p>	
40	<b>Cellular Communications</b>	<p>1. Does SBMTD have a preferred cellular vendor? (Trapeze)</p> <p>2. Does MTD currently work with a specific cellular provider? If yes, which provider? (Strategic Mapping)</p>	<p>No, MTD does not have a preferred cellular provider.</p> <p>MTD currently uses Verizon Wireless for employee cell phone service and internet access on the Coastal Limited Express route under a government contract.</p>	
41	<b>Voice Radio System</b>	<p>1. Please provide contact information for the company that currently supports and/or provides maintenance for the existing in-vehicle electronic and radio equipment. (Trapeze)</p> <p>2. Section 2.2.4 "Voice Radio System" - Can MTD kindly provide their contact for the MOTOTRBO radios? Please provide the estimated bandwidth available per vehicle when all vehicles are on. This will help us confirm if sufficient bandwidth is available to support MTD's desired scope. (Strategic Mapping)</p> <p>3. Can you share with us whether the MotoTRBO</p>	<p>See revised Revenue Vehicle Summary table in Appendix 2 to the Specifications for radio system contact information.</p> <p>See added Appendix 7, which is the specification for the MTD radio system, including cut sheets for major components. MTD is not aware of the available bandwidth. The radio system is currently only used for voice communications. MTD expects proposers to determine if there is sufficient bandwidth taking using the information provided. If further information is required, please submit a question addressing this topic.</p> <p>MTD did not purchase MOTOTRBO features beyond those indicated in the Specifications. This includes not having</p>	<p>SP: §2.2.4, App. 2, App.7,</p>

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		<p>system infrastructure components (i.e. base stations, channels, back-hauls, links, etc, ) procured by MTD take into account the required data needs for a Real Time system (i.e. messages per minute per vehicle...) (Avail)</p> <p>4. Did MTD purchasing all of the software / interfaces / hardware / computers that make up the MotoTRBO system such that the system is data capable and able to accommodate the data amount of data needed to meet the reporting frequency specified for the system? (Avail)</p> <p>5. If the answer to above two questions is “no” is it understood correctly that the contractor is to provide pricing to cover all HW, SW, Integration, and implementation in order to provide this capability? (Avail)</p>	<p>Motorola IP Site Connect.</p>	
<p>42</p>	<p><b>Yard Location And Status Option</b></p>	<p>1. Is there any existing wireless infrastructure in the vehicle yard? If so is there existing Internet capability? If there is no existing provider, who is responsible for deployment? (Pre-Bid Meeting)</p> <p>2. Is wireless infrastructure desired in just the vehicle yard, or the maintenance shop as well? (Pre-Bid Meeting)</p> <p>3. Provide detailed drawings and/or photographs of the yard/parking areas where the fixed route buses are parked. The following details are needed in order to make a reasonable estimate of costs to implement a yard management system: (Trapeze)</p>	<p>There is no existing wireless infrastructure in the yard that will be available for this project.</p> <p>This wireless network should cover the shop bays as well.</p> <p>Drawings, photos, and plans of the yard shall be provided in Addendum 2 next week. In the interim, Google maps provides excellent over and street views. All street lengths in the block that Terminal 1 resides are 450 feet.</p> <p>MTD uses COX Communications for Internet connectivity and MTD network access points will be made available to the system supplier. The system supplier will have Internet access via the MTD COX Communications connection.</p>	<p>SP: §4.5, §</p>

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		<ol style="list-style-type: none"> <li>4. Dimensions of the yard and bus parking areas.</li> <li>5. Height and dimensions of all buildings and significant structures on the property</li> <li>6. If buses are parked indoors, please provide architectural drawings of the indoor spaces where buses would need to be located.</li> <li>7. Does the Yard location currently have Internet? If not, will MTD be implementing this at their expense? (Strategic Mapping)</li> <li>8. Could MTD kindly provide schematics of the Yards requiring Wi-Fi coverage? (Strategic Mapping)</li> <li>9. For the Depot Management option, what is the square footage of the yard? (Init)</li> <li>10. Here is some sample language for a previous Yard Management system. If you are not more specific on how precise you need the system will never work. I will also be submitting question. I recommend you contact Ubisense for more feedback on the requirements for this system. This cannot be accomplish in your wireless infrastructure. A complete site assessment needs to be made (ISR Transit – Gave detailed requirements for a Yard Management System in email)</li> <li>11. Yard Wireless System Please allow for a site assessment for sub-contractors to determine needs of the wireless network? (ISR)</li> <li>12. Please provide drawings or layout of the desired area to be covered. (ISR)</li> </ol>		

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		<p>13. What type of accuracy does MTD expect (ISR) An aerial view of the SBMTD yard was sent as part of these questions from Seon:</p> <p>14. Is the location sent in the .jpg the correct location?</p> <p>15. Where on the image would the video viewing location be?</p> <p>16. I understand buses are parked under the center canopy, but are they also parked under the red roof on the right (east) side of the image?</p> <p>17. Could you indicate where on the image the video viewing location/office would be?</p> <p>18. Are there any existing network connection between buildings on the property? (ie between the shop/center canopy/office?)</p> <p>19. Do you have any restrictions on installing antennas and other wireless equipment on the outside walls or roof of your buildings?</p>		
43	<b>Network-Based or Cloud-Hosted Solution</b>	<ol style="list-style-type: none"> <li>1. Section 2.2.1 "Network Environment" - is MTD open to a vendor hosted solution as an option? (Strategic Mapping)</li> <li>2. Can we bid as a Software as a Service instead of escrowing the source code? (NextBus)</li> <li>3. Several requirements discuss the use of servers on site, but will MTD consider a cloud-hosted solution? (Syncromatics)</li> </ol>	<p>As indicated in §3.4 of the Solicitation Instructions, MTD will consider alternative solutions, including a hosted or "cloud-based" solution. Bidders proposing such a system should demonstrate in their proposal how the network-based solution would meet the operational requirements in the Specification. Any additional ongoing costs for such services should be included in the proposal. Recurring costs should be presented both in an aggregated system basis and on a per vehicle, per sign, etc. basis.</p> <p>For any cloud-based or hosted system, MTD would require translators and/or conversion processes that ensure that all data collected by the cloud-based AIM system may be seamlessly exported back to the TDB.</p>	

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
44	<b>Second Language</b>	Is a second language required for any core or optional module? If yes, kindly detail. (Strategic Mapping)	The time of arrival information, webpage, e-mail and wireless messaging, bus stop codes, and electronic display signs specifications has been modified to include a Spanish language requirement. The IVR and AVA sections already require Spanish language versions.	SP: §4.2.2 – 4.2.5
45	<b>Installation Support</b>	Will MTD bus drivers be available to shuffle buses during installation? (Strategic Mapping)	See §5.4.3.2 of the specifications.	SP: §5.4.3.2
46	<b>Training</b>	<ol style="list-style-type: none"> <li>1. Training - Kindly provide a breakdown of the number of users and their role that will require system training. (Strategic Mapping)</li> <li>2. Section 6.1.1 Can you please provide the “MTD-specific policies” related to training? (Clever Devices)</li> <li>3. Section 6.1.1. Would MTD allow any IT/Admin type courses to be delivered via WebEx or eLearning with quizzes if available? (Clever Devices)</li> </ol>	<p>As indicated in §6.1.3 of the specifications, the types of courses and number of attendees are based on the manual types table in §6.2.2.</p> <p>“MTD-specific policies” represents how the AIM system will be configured for MTD preferences; the Contractor will become familiar with such policies as part of system design.</p> <p>MTD would consider such training delivery if it can be determined that it would be as effective.</p>	SP: §6.1.3, 6.2.2
47	<b>Servers and Computational Hardware</b>	<ol style="list-style-type: none"> <li>1. Can you please provide detailed information on your current server hardware configuration including the mfg of the servers, # CPUs, CPU make and model and speed, # cores, total RAM, amount of storage in server environment if applicable, IOPs to storage, NIC speed, quantity of NICS per server, network throughput to server. (NextBus)</li> <li>2. Can you please provide the quantity of free cores, free RAM, and free storage (if applicable)</li> </ol>	The Network Environment section specification has been substantially modified and should be consulted as a response to most questions and concerns. In particular, MTD has changed the preference for the contractor to use the MTD network to the allowing the contractor to use the network for cost efficiency if it so desires.	SP: §2.2.1

	TOPIC AREA	BIDDER QUESTION	MTD RESPONSE	CHANGES
		<p>(NextBus)</p> <p>3. Can you please provide your configuration for high availability such as but not limited to server configuration, CPU redundancy, disk drive redundancy, UPS, and how applications are currently configured in the current server environment? (NextBus)</p> <p>4. Can you please identify any system monitoring software you may currently have? (NextBus)</p> <p>5. Section 3.2.2. Can you please provide detailed information on the SAN including: connection bandwidth to servers, storage amount, make and model, hard disk drive models, available free hard disk drive bays, What type of expansion bay can be added, and how many expansion bays can be added. (NextBus)</p> <p>6. Section 3.2.2. Is a disaster recover sight required? (NextBus)</p>		

## Request for Proposals for AVL & ITS Management Systems (AIM) **SOLICITATION INSTRUCTIONS**

### Project Summary Sheet

**Project Name:** AVL & ITS Management Systems (AIM)

**Solicitation Issuance Date:** Wednesday, October 2, 2013 (revised November 10, 2013)

**Project Description:** MTD, a public transit operator, is requesting proposals for various Intelligent Transportation Systems (ITS) with many based on the use of automated vehicle location (AVL) technology on its transit buses. Mandatory systems include AVL and the related communications network, estimated time of arrival passenger information, route and schedule adherence database, onboard video surveillance, and a yard wireless network. Optional features include automated bus stop announcements, vehicle health monitoring, automatic passenger counting, yard location and status, computer aided dispatch (CAD), and road supervisor CAD.

**Project Location:** 550 Olive Street & 1020 Chapala Street, Santa Barbara, CA 93101

**Pre-Proposal Meeting Date/Time:** Friday, October 18, 2013 at 9:30 AM (**MANDATORY**)

**Pre-Proposal Meeting Location:** 550 Olive Street, Santa Barbara, CA 93101

**Clarification & Change Request Deadline:** Thursday, October 24, 2013

**Proposal Due Date/Time:** Wednesday, November 27, 2013 at 3:00 PM (local time)

**Proposal Submittal Location:** 550 Olive Street, 2<sup>nd</sup> Floor Reception Desk Santa Barbara, CA 93101

**Proposal Evaluation & Interview Period:** December 2 – December 31, 2013 (projected)

**Board Award Consideration Date:** Tuesday, January 7, 2014 (projected)

**Project Implementation Period:** January 21, 2014 – January 21, 2015 (projected)

**Project Contact:** Brad Davis, Assistant Controller, (805) 883-4201, [bdavis@sbmtd.gov](mailto:bdavis@sbmtd.gov)

**Type of Contract:** Firm Fixed Price

**Project Budget:** \$3,320,747

**Bonding Required:** None

Check MTD's website at <http://www.sbmtd.gov/business-and-employment/active.html> for updates

**SANTA BARBARA METROPOLITAN TRANSIT DISTRICT**  
**Request for Proposals for AVL & ITS Management Systems (AIM)**  
**SOLICITATION INSTRUCTIONS**

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Attachment 1: Forms & Certifications

Attachment 2: MTD Master Agreement

Attachment 3: AIM Specifications

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**SANTA BARBARA METROPOLITAN TRANSIT DISTRICT**  
**Request for Proposals for AVL & ITS Management Systems (AIM)**  
**SOLICITATION INSTRUCTIONS**

**1. PROJECT DESCRIPTION**

The Santa Barbara Metropolitan Transit District (MTD), a public transit operator, is requesting proposals for various Intelligent Transportation Systems (ITS) with many based on the use of automated vehicle location (AVL) technology on its transit buses. The project is collectively referred to as the AVL & ITS Management System, the AIM system or AIM. Mandatory systems include the vehicle AVL technology and related communications network, estimated time of arrival information, route and schedule adherence data, onboard video surveillance, and a yard wireless network. Optional features include automated bus stop announcements, vehicle health monitoring, automatic passenger counting, yard location and status, computer aided dispatch (CAD), and road supervisor CAD. Full requirements are contained in the *AIM Specifications*.

**2. PRE-SUBMITTAL ACTIVITIES**

**2.1 RFP PACKAGE CONTENTS**

These *AIM Solicitation Instructions* provide direction on preparing proposals and describe the evaluation, review, and contract award processes. Failure of an offeror to follow instructions may result in rejection or disqualification of its proposal. Attached are required forms and certifications to be completed and included as part of the proposal. The attached *AIM Specifications* describe the project requirements and deliverables. Additional terms and conditions are included in the *MTD Master Agreement* and the *State of California Provisions for Public Works Projects*, also attached hereto.

**2.2 PRE-PROPOSAL MEETING (MANDATORY)**

There is a **MANDATORY** pre-proposal meeting at MTD's administrative offices at 550 Olive Street in Santa Barbara on Friday, October 18, 2013 at 9:30 AM. **MTD will not consider proposals from parties not attending the pre-proposal meeting.** Attendance at the meeting is defined as arriving and signing in at the meeting no later than **9:50 AM**. The mandatory attendance is limited to those business entities that would enter into the contract with MTD if a contract is awarded. Potential key partners, subcontractors, and suppliers are strongly encouraged to attend the meeting as well. The purpose of the meeting is to review, discuss and answer questions regarding the RFP process, proposal preparation, and the project; and to inspect the facilities and a sample of vehicles subject to the project. The meeting will also include visiting the MTD Transit Center at 1020 Chapala Street, Santa Barbara, CA. Parties are strongly encouraged to submit any questions or requests in advance of the pre-proposal meeting. MTD may address questions during the meeting however **any oral response by MTD at the pre-proposal conference not confirmed by a written addendum shall not be official or binding on MTD.**

**2.3 REQUESTS FOR CHANGES OR CLARIFICATIONS**

All communications concerning this RFP and the project shall be directed to the Brad Davis, the project manager, via e-mail to [bdavis@sbmtd.gov](mailto:bdavis@sbmtd.gov). Unless authorized by the project manager, offerors and their representatives shall not communicate or make contact with other MTD employees or consultants in regard to any aspect of this solicitation. Offerors may request a clarification or change to any aspect or requirement of the RFP or any addenda thereto. Such requests must be received by MTD by Thursday, October 24, 2013. To be considered, change requests must be supported with pertinent data evidencing that it is in the best interests of MTD.

## 2.4 RFP MODIFICATIONS & ADDENDA

MTD reserves the right to amend this RFP through written addenda. **Other than written addenda, no other form of communication with any officer, employee or agent of MTD shall be binding upon MTD.** Addenda will be posted to MTD's website and concurrently sent via e-mail to all parties known to have received the RFQ. However, MTD's e-mailing of addenda does not relieve the submitter of its responsibility to ensure that it has obtained any issued addenda by checking the MTD website. Additionally, failure of an offeror to receive an addendum shall not relieve it from any obligation under its proposal or under the RFP as clarified or modified.

## 3. PROPOSAL PREPARATION & SUBMITTAL

### 3.1 MANDATORY SYSTEMS PROPOSED

**Only proposals that address all of the mandatory systems and the optional automated bus stop announcement system, including pricing, will be considered and evaluated by MTD. Proposals that do not address at least these systems will be rejected.** However, the inclusion of all optional systems is strongly encouraged and may be considered in the evaluation of proposals.

### 3.2 PRIME OFFEROR/CONTRACTOR

MTD will enter into a contractual relationship with only one party for this project. If parties plan to partner or subcontract with one another to carry out the project, one party must act as the lead in submitting the proposal. Such party shall be the prime contractor in the event that they are awarded the contract for the project.

### 3.3 PROPOSAL CONTENTS

The proposal to be provided under this RFP is generally composed of two types of information: offeror-completed forms provided by MTD; and offeror-prepared documents. Offeror-prepared documents to be included in proposals shall include:

- ◆ Cover Letter
- ◆ Description of the Firm
- ◆ Prior Experience with Similar Projects
- ◆ Key Project Personnel Résumés
- ◆ Description of Key Partners, Subs & Suppliers
- ◆ Technical Proposal
- ◆ Maintenance Agreement(s)

Forms provided as part of this RFP that must be completed and submitted by the Offeror as part of its proposal include:

- ◆ Acknowledgement of Addenda
- ◆ Price Proposal
- ◆ Bidder Information
- ◆ Credit & Work References
- ◆ Partner, Joint Venture, Subcontractor Listing
- ◆ Noncollusion/Compensation Certification

### 3.4 OFFEROR-PREPARED DOCUMENTS

**Cover Letter**—Letter shall be signed by an officer authorized to bind the offeror contractually and shall address the below matters (**Review of contract documents by legal counsel is strongly advised**).

- ◆ Offeror's interest and willingness to enter into a contract with MTD to carry out the project as described in the attached AIM Specifications.
- ◆ Offeror's willingness to accept the contract terms and conditions included in the MTD Master Agreement, the State of California Provisions for Public Works Projects, and the AIM

Specifications. If there are any contract terms that the offeror will not accept or proposes modifications to, the specifics of such should be addressed in the cover letter or an attachment thereto. MTD is limited in its ability to alter the terms and will assess during the evaluation and interview process whether it would be able to contract with the offeror under the offeror's proposed contract revisions. **MTD will not negotiate contractual terms and conditions once the contract is executed unless it is in its best interest to do so.**

- ◆ Offeror's ability and willingness to obtain insurance meeting the requirements indicated in the *Master Agreement*. An insurance certificate meeting the requirements will be required prior to execution of the contract.

Description of the Firm—Proposal shall include a description of the proposing firm including its line(s) of business, size, location(s), years in business, and any other information deemed appropriate for providing a general overall picture of the firm. If a large entity, information on the division of the firm that would be responsible for the project should be emphasized. Please limit such information to a maximum of two pages.

Prior Experience with Similar Projects—Proposal shall include a description of five similar projects carried out by the offeror and three similar projects carried out by each significant subcontractor. Offeror projects shall be for those work references listed on the *Credit & Work References* form. Please limit each project description to a maximum of one page.

Key Project Personnel Résumés—Proposal shall include résumés of key project personnel with an emphasis on education and experience relevant to the project. Résumés shall be included for at least the project manager (primary MTD contact), the senior technical/design engineer, and the lead onsite installation field person. As appropriate, résumés of a similar nature shall be provided for partners and subcontractors. Please limit each résumé to a maximum of two pages.

Description of Partners, Subcontractors & Suppliers—Proposal shall include a description of all partners or joint venturers; and any significant subcontractors or suppliers that would be participating in the project. The descriptions must include all parties that would be supplying the major mandatory and optional systems. Such firms shall be included on the *Partner, Subcontractor & Supplier Listing* form discussed below. Provide the same information as that described above for the Offeror (see above) but limit information to a maximum of one page for each entity.

Technical Proposal—Proposal shall include a comprehensive Technical Proposal that describes how the offeror would meet the requirements of the *AIM Specifications* (see Section 3.1 above for information on AIM systems that **must** be included in the Technical Proposal). The Technical Proposal should use narrative descriptions, data sheets, cut sheets, catalogs, brochures, illustrations, diagrams, tables, charts, photos, etc. as necessary to enable MTD to evaluate compliance with the *AIM Specifications*. The *AIM Specifications* describe MTD's understanding of current methods, designs, technologies, or features available to meet various ITS goals for improvements to passenger service and operational efficiencies. **MTD will consider alternative approaches and specifications for achieving these goals. The Technical Proposal shall identify any such variances from the requirements set forth in the AIM Specifications and the benefits of the alternative.** To the extent feasible, Technical Proposals shall be organized to match the sequence of the *AIM Specifications*. Following are certain items that shall be addressed in the Technical Proposal. It is **not** a complete listing of Technical Proposal contents but simply a description of some items MTD deems significant for properly evaluating proposals.

- ◆ Description of systems and features that are not part of the offeror, partner, subcontractor, or supplier standard offerings and would need to be developed to meet the *AIM Specifications* (e.g., functions, hardware, software applications, databases, interfaces, reports).
- ◆ Listing, data sheets, and pictures for all significant equipment included in the proposal.
- ◆ Description of onboard equipment interface types and standards to be used. If open standards are not used, provide the rationale for the use of proprietary decision.
- ◆ If proposing a data radio system, a calculation showing the expected and worst case percent utilization for the data channel to be used for the data radio system including a narrative explaining the calculation and assumptions made.
- ◆ If proposing a cellular data service, the proposed wireless data service and a coverage map.
- ◆ Description of any proposed encryption for the data radio or cellular data service, including type of encryption used, key size and if the encryption is always active.
- ◆ Description of the algorithm for time of arrival predictions and report of the accuracy of the time of arrival predictions for previously implemented systems
- ◆ Information on Time of Arrival webpage including whether separately hosted or part of MTD website.
- ◆ Description of power and communications link with remote bus stop electronic display signs
- ◆ Analysis and calculation of the APC system accuracy from APC verification tests.
- ◆ Listing of onboard equipment to be monitored by Vehicle Health Monitoring system and specific information being monitored.
- ◆ Samples of offeror's standard reports for all relevant AIM systems. Listing of reports that must be custom developed.
- ◆ List of recommended spares and test equipment. This list shall include the equipment specified in Chapter 7 of the *AIM Specifications*.

Maintenance Agreement—Proposal shall include all maintenance, license, or other proposed agreements, including all terms and conditions, for providing the service and maintenance for the three-year period stipulated in Section 8.7.2 of the *AIM Specifications*.

### **3.5 MTD FORMS**

Price Proposal—Proposal shall include the fully completed and signed *Price Proposal* form included in this RFP package showing the total compensation for carrying out the project under the terms of the Agreement. Failure to include a completed and signed price proposal using the provided form will render a proposal non-responsive and it will be rejected. Offerors may provide additional and/or more detailed price or cost schedules at their own discretion. The offeror's proposal, including the Price Proposal, will be valid for ninety (90) days following the proposal due date in order to provide for the proposal evaluation and contract award process.

Acknowledgement of Addenda—Offeror shall acknowledge the receipt of any addenda by including the fully completed and signed *Acknowledgement of Addenda* form with their proposal. Failure of an offeror to receive an addendum shall not relieve it from any obligation under its proposal or the RFP as clarified or modified. Failure to acknowledge receipt of addenda may disqualify a proposal.

Bidder Information—Proposal shall include the fully completed *Bidder Information* form included in this RFP package.

Credit & Work References—Proposal shall include the fully completed *Credit & Work References* form included in this RFP package. Please be certain to list appropriate and current contact names, phone numbers, and e-mails for all parties. For the five work references listed, please include the same parties as those listed in the *Prior Experience with Similar Projects* element of your proposal.

Partner, Subcontractor & Supplier Listing—Proposal shall include the fully completed *Partner, Supplier, Subcontractor Listing* form included in this RFP package. The form shall list all partners or joint venturers; and any significant subcontractors or suppliers that would be participating in the project. The listing must include all parties that would be supplying the major mandatory and optional systems.

Noncollusion Declaration/Compensation Certification—Proposal shall include the signed and dated *Noncollusion Declaration* and *Compensation Certification* forms included as a single page in this RFP package. The declaration and certification are required on the basis of the usage of California state funding for the project.

### 3.6 PROPOSAL SUBMISSION

One original and four complete copies of offeror's proposal shall be submitted in a non-transparent, sealed envelope or other appropriate packaging plainly marked on the exterior with the name of the offeror and the following: "AIM System Proposal." Proposals must be delivered to:

Santa Barbara Metropolitan Transit District  
2<sup>nd</sup> Floor Reception Desk  
550 Olive Street  
Santa Barbara, CA 93101

If using a delivery service, proposals must be enclosed in the specified envelope packaging within the delivery service packaging. Fax or e-mail submittals will not be considered. **Proposals will be accepted by MTD until Wednesday, November 27, 2013, at 3:00 PM (local time)**. Unless due to the fault of MTD, submittals received after such time cannot be considered and will be returned to the offeror unopened. There will be no public opening of submittals at the deadline or otherwise.

### 3.7 WITHDRAWAL OF PROPOSAL

A bidder may withdraw a submittal any time prior to the submittal deadline by submitting a written request executed by the bidder's authorized representative. Any such withdrawal does not prejudice the right to resubmit a submittal by the submittal deadline.

### 3.8 PROPOSAL SUBMITTAL STIPULATIONS

Submittals submitted as a result of this solicitation become the property of MTD. MTD will not pay any cost incurred by a bidder resulting from preparation or delivery of its submittal. MTD reserves the sole right to review, accept, or reject submittals; or to cancel this solicitation in whole or in part if it is in MTD's best interest to do so.

## 4. PROPOSAL EVALUATION

### 4.1 EVALUATION PROCESS OVERVIEW

Proposals will be evaluated, negotiated, selected and any award made in accordance with procedures applicable to a competitive negotiated procurement using the "best value" selection process. All proposals found to be "responsive" received from offerors determined to be "responsible" (see §4.3 and §4.4 below) will be evaluated to determine which proposals fall within a competitive range. Discussions,

demonstrations, and negotiations may then be carried out with offerors within the competitive range, after which a Best and Final Offer (BAFO) may be requested. MTD reserves the right to select a proposal, with or without a BAFO, for award without any discussions or negotiations. Subject to MTD's right to reject all proposals, the offeror whose proposal is found to provide MTD with the most value subject to the established evaluation criteria (see §4.5 below) will be recommended to the MTD General Manager for contract award. MTD may reject any proposal that includes unacceptable deviations or is not prepared in accordance with the instructions and requirements of this RFP. MTD reserves the right to waive any defects, or minor informalities or irregularities in any proposal which do not materially affect the proposal or prejudice other offerors. If there is any evidence indicating that two or more offerors are in collusion to restrict competition or otherwise engaged in anti-competitive practices, the proposals of all such offerors shall be rejected and such evidence may be a cause for disqualification of the participants in future MTD solicitations.

#### **4.2 PROPOSAL OPENING & CONFIDENTIALITY**

Proposals will not be publicly opened. All proposals will be kept strictly confidential throughout the evaluation, negotiation and selection process. Only members of the Evaluation Committee and other MTD officials, employees and agents having a legitimate interest will be provided access to the proposals and evaluation results during this period. Except as otherwise required by law, MTD will exempt from disclosure proprietary information, trade secrets and confidential commercial and financial information (hereinafter "confidential data") submitted and identified as such in proposals. Any confidential data which an offeror believes should be exempted from disclosure shall be specifically and clearly identified and marked as such. Blanket-type confidential designations of whole pages or sections, where such areas clearly contain non-confidential data, will invalidate such designation.

#### **4.3 RESPONSIVENESS**

MTD shall examine all proposals for the purpose of ascertaining their completeness and responsiveness to the provisions of this RFP. Such process may involve requesting additional or clarifying information from an offeror. Proposals that do not contain all required materials, information or forms; or where such materials, information or forms are substantially incomplete may be considered non-responsive and rejected by MTD. In such case, MTD shall notify the offeror of it's rejection and the basis thereof.

#### **4.4 RESPONSIBILITY**

For all proposals found to be responsive, MTD shall make an initial assessment of the offeror's "responsibility." It is "initial" in that the offeror's responsibility will be further assessed as part of the proposal evaluation. For purposes of this RFP, responsibility is defined as evidence of adequate financial and technical capacity to undertake the project; and satisfactory performance in previous contracts. MTD shall use the references and insurance information included in the proposal for this initial determination. However, MTD may at it's own discretion seek and utilize other information within and outside of the proposal to assist in the determination. Such process may involve requesting additional or clarifying information from an offeror. The proposal of any offeror not found to be responsible shall be rejected. In such case, MTD shall notify the offeror of it's rejection and the basis thereof.

#### **4.5 COMPETITIVE RANGE EVALUATION**

Responsive proposals from offerors found responsible shall be subject to review by an evaluation committee composed of MTD staff members and/or agents. The ultimate purpose of such evaluation is to establish the firm that the committee believes will provide MTD with the best "value." Value, in this instance, is determined by the following factors in descending order of importance:

- ◆ Technical Proposal
- ◆ Proposal Price
- ◆ Prior Experience

Proposals will be evaluated using the above criteria to determine a relative ranking in order to ascertain those proposals which fall within the competitive range, or may reasonably be made to fall within it. Such process may involve requesting additional information from an offeror. Once the competitive range is established, MTD shall notify all offerors in writing that either: their proposal falls within or can reasonably be made to fall within the competitive range and that they are proceeding to the discussion, demonstration, and negotiation stage of the process; or their proposal does not or cannot reasonably be made to fall within the competitive range and its proposal is therefore being rejected. MTD reserves the right to select a proposal for award at this point or to request Best & Final Offer(s).

#### **4.6 OFFEROR INTERVIEW**

Upon determination of the competitive range parties, the parties will be invited to MTD for interviews. Such interviews will provide MTD an opportunity to ask offerors questions and request clarifications about their proposal; provide offerors an occasion to demonstrate, promote and explain their proposal; and allow the discussion and negotiation of technical and pricing terms and conditions.

#### **4.7 BAFO & FINAL EVALUATION**

Dependent upon what is considered in its best interest, following initial interviews MTD may attempt to negotiate further or request a Best & Final Offer from one or more of the competitive range firms; or recommend award of a contract without further discussion. Once the Evaluation Committee reaches a decision as to that proposal that provides MTD with the best value, a recommendation will be forwarded to the MTD General Manager.

#### **4.8 SINGLE PROPOSAL ANALYSIS**

If only one proposal is received in response to this RFP and it is found acceptable to MTD—either initially or after discussions and negotiations with the offeror—detailed price and/or cost analysis of the proposal may be required in order to determine if the price is fair and reasonable. A price analysis involves comparison to other similar procurements with similar quantities, specifications and time frames. Where it is impossible to determine price reasonableness through price analysis, it may be necessary to conduct a cost analysis of the proposed price, which is a more detailed evaluation of the cost elements in the offeror's proposal. It is conducted to form an opinion as to the degree to which the proposed costs represent what the offeror's performance should cost; whether the offeror is applying sound management in proposing the application of resources to the contracted effort; and whether costs are allowable, allocable and reasonable. Any such analyses shall not obligate MTD to accept such a single proposal, which may be rejected at MTD's sole discretion.

### **5. CONTRACT AWARD**

#### **5.1 AWARD PROCESS**

If considered in MTD's best interest, the MTD General Manager will recommend to the MTD Board of Directors that a contract be awarded to the offeror that has submitted the proposal that is most advantageous to MTD. Accordingly, MTD may not necessarily make an award to the offeror with the highest technical ranking nor award to the offeror with the lowest price proposal if doing so would not be in the overall best interest of MTD. It is anticipated that such recommendation shall be considered by the Board at its regular meeting of Tuesday, January 7, 2014.

## 5.2 CONTRACT EXECUTION

The contract will be executed, as signified by the signature of all parties to the contract, as soon as practical after contract award and receipt of a certificate of insurance meeting the requirements of the MTD Master Agreement and naming MTD as an additionally insured; a copy of City of Santa Barbara business license; or any other deliverables determined during the solicitation process. The contract shall be composed of the *MTD Master Agreement*, the *State of California Provisions for Public Works Projects*, the *AIM System Specifications*, and relevant portions of the Contractor's proposal. In all cases, the most recent versions of the preceding documents—including any addenda thereto, as modified through negotiations, and/or submittal of a Best and Final Offer—shall be used in the final and binding agreement.

## 5.3 FUNDING EXPENDITURE DEADLINE

This project is funded in part from State of California Proposition 1B bonds. **\$375,000 of such Prop 1B funding has an expenditure deadline of March 31, 2014. Once the contract is awarded, timing is of the essence such that sufficient project work is completed to the meet the required expenditure deadline.**

## 6. PROTEST PROCEDURES

MTD has established procurement protest procedures to ensure uniform, timely, and fair consideration of complaints received by MTD concerning its procurement activities. Such procedures are available on MTD's website at: <http://www.sbmtd.gov/business-and-employment/purchasing.html>

**SANTA BARBARA METROPOLITAN TRANSIT DISTRICT**  
**Request for Proposals for AVL & ITS Management Systems (AIM)**  
***PRICE PROPOSAL***

**Price Form is under development and will be  
provided as part of Addendum 2 to the RFP.**

**SANTA BARBARA METROPOLITAN TRANSIT DISTRICT**  
**Request for Proposals for AVL & ITS Management Systems (AIM)**  
***ACKNOWLEDGEMENT OF ADDENDA***

The undersigned acknowledges the Bidder's receipt of the following addenda to this RFP and has incorporated information or changes in said addenda within its proposal (if no addenda were received, write "None" in the first blank):

Addendum No. \_\_\_\_\_ dated \_\_\_\_\_

Note: It is the Bidder's responsibility to ensure it receives all addenda which are posted on the MTD website at <http://www.sbmtd.gov/business-and-employment/active.html>.

\_\_\_\_\_  
Authorized Official Signature

\_\_\_\_\_  
Date of Signature

\_\_\_\_\_  
Authorized Official Name

\_\_\_\_\_  
Authorized Official Title

\_\_\_\_\_  
Business Name of Bidder

**(Signer must match authorized official shown on Bidder Information form)**



**SANTA BARBARA METROPOLITAN TRANSIT DISTRICT**  
**Request for Proposals for AVL & ITS Management Systems (AIM)**  
***CREDIT & WORK REFERENCES***

Business Name of Bidder: \_\_\_\_\_

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***Credit References***

Include your primary bank and two firms that you **currently** purchase materials or services from on credit:

Bank Name: \_\_\_\_\_ Contact Name: \_\_\_\_\_

Contact Phone: \_\_\_\_\_ Contact E-Mail: \_\_\_\_\_

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Vendor Name: \_\_\_\_\_ Contact Name: \_\_\_\_\_

Contact Phone: \_\_\_\_\_ Contact E-Mail: \_\_\_\_\_

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Vendor Name: \_\_\_\_\_ Contact Name: \_\_\_\_\_

Contact Phone: \_\_\_\_\_ Contact E-Mail: \_\_\_\_\_

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***Work References***

Include five recent clients for which you have provided **similar services** to the project work:

Client Name: \_\_\_\_\_ Contact Name: \_\_\_\_\_

Contact Phone: \_\_\_\_\_ Contact E-Mail: \_\_\_\_\_

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Client Name: \_\_\_\_\_ Contact Name: \_\_\_\_\_

Contact Phone: \_\_\_\_\_ Contact E-Mail: \_\_\_\_\_

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Client Name: \_\_\_\_\_ Contact Name: \_\_\_\_\_

Contact Phone: \_\_\_\_\_ Contact E-Mail: \_\_\_\_\_

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Client Name: \_\_\_\_\_ Contact Name: \_\_\_\_\_

Contact Phone: \_\_\_\_\_ Contact E-Mail: \_\_\_\_\_

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Client Name: \_\_\_\_\_ Contact Name: \_\_\_\_\_

Contact Phone: \_\_\_\_\_ Contact E-Mail: \_\_\_\_\_

**SANTA BARBARA METROPOLITAN TRANSIT DISTRICT**  
**Request for Proposals for AVL & ITS Management Systems (AIM)**  
***PARTNER, SUBCONTRACTOR & SUPPLIER LISTING***

Business Name of Bidder: \_\_\_\_\_

List all partners or joint venturers; and any significant subcontractors or suppliers that would be participating in the project. Include all parties that would be supplying the major mandatory and optional AIM systems.

Company Name: \_\_\_\_\_ Nature of Relationship: \_\_\_\_\_

Description of Supplies/Services: \_\_\_\_\_

Contact: \_\_\_\_\_ Phone: \_\_\_\_\_ E-Mail: \_\_\_\_\_

-----  
Company Name: \_\_\_\_\_ Nature of Relationship: \_\_\_\_\_

Description of Supplies/Services: \_\_\_\_\_

Contact: \_\_\_\_\_ Phone: \_\_\_\_\_ E-Mail: \_\_\_\_\_

-----  
Company Name: \_\_\_\_\_ Nature of Relationship: \_\_\_\_\_

Description of Supplies/Services: \_\_\_\_\_

Contact: \_\_\_\_\_ Phone: \_\_\_\_\_ E-Mail: \_\_\_\_\_

-----  
Company Name: \_\_\_\_\_ Nature of Relationship: \_\_\_\_\_

Description of Supplies/Services: \_\_\_\_\_

Contact: \_\_\_\_\_ Phone: \_\_\_\_\_ E-Mail: \_\_\_\_\_

-----  
Company Name: \_\_\_\_\_ Nature of Relationship: \_\_\_\_\_

Description of Supplies/Services: \_\_\_\_\_

Contact: \_\_\_\_\_ Phone: \_\_\_\_\_ E-Mail: \_\_\_\_\_

-----  
Company Name: \_\_\_\_\_ Nature of Relationship: \_\_\_\_\_

Description of Supplies/Services: \_\_\_\_\_

Contact: \_\_\_\_\_ Phone: \_\_\_\_\_ E-Mail: \_\_\_\_\_

-----  
Company Name: \_\_\_\_\_ Nature of Relationship: \_\_\_\_\_

Description of Supplies/Services: \_\_\_\_\_

Contact: \_\_\_\_\_ Phone: \_\_\_\_\_ E-Mail: \_\_\_\_\_

*(Use additional sheets as necessary)*

**SANTA BARBARA METROPOLITAN TRANSIT DISTRICT**  
**Request for Proposals for AVL & ITS Management Systems (AIM)**  
***NONCOLLUSION DECLARATION***

The undersigned declares:

I am the \_\_\_\_\_ of \_\_\_\_\_,  
(title) (business name of bidder)

the party making the included bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on \_\_\_\_\_, at \_\_\_\_\_, \_\_\_\_\_.  
(date) (city) (state)

\_\_\_\_\_  
Authorized Official Signature

\_\_\_\_\_  
Authorized Official Name (printed)

***COMPENSATION CERTIFICATION***

I am aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

\_\_\_\_\_  
Authorized Official Signature

\_\_\_\_\_  
Date of Signature

\_\_\_\_\_  
Authorized Official Name

\_\_\_\_\_  
Authorized Official Title

## **Santa Barbara Metropolitan Transit District**

### **MASTER AGREEMENT with [insert contractor name in caps]**

THIS AGREEMENT is entered into by and between Santa Barbara Metropolitan Transit District, an incorporated transit district under Sections 95000, et seq. of the California Public Utilities Code ("MTD"), and [insert contractor name], a [insert state name] [insert business type] ("Contractor"), at Santa Barbara, California, as of the later date set forth below the signatures executing this Agreement.

#### WHEREAS:

A. MTD desires to engage Contractor for the design, provision, implementation, and maintenance of various intelligent transportation systems for enhancing the efficiency of the delivery of public transit in the South Coast of Santa Barbara County (the "Project");

B. Contractor represents that it has the knowledge and experience to carry out the Project, and desires to carry out the Project pursuant to the terms and conditions hereof, and;

C. Based upon the representations made by Contractor, MTD desires to retain the services of Contractor to carry out the aforesaid Project, upon the within terms and conditions.

NOW, THEREFORE, for valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties do hereby agree as follows:

1. Effect of Recitals. The foregoing recitals are hereby made express provisions of this Agreement.
2. FTA Provisions. Not applicable to this agreement.
3. Public Works Provisions. This Project is subject to the *State of California Provisions for Public Works Projects*, which is attached hereto as Exhibit "A" and incorporated herein by this reference.
4. Specifications. MTD has heretofore issued on November 10, 2013, the revised AVL & ITS Management (AIM) System Specifications, a true copy of which is attached hereto as Exhibit "B" and incorporated herein by this reference. [modify clause as necessary]
5. Proposal. Contractor has heretofore submitted on November 12, 2013 a proposal to carry out the Project, true copies of relevant parts that are attached hereto as Exhibit "C" and incorporated herein by this reference. [modify clause if multiple contractor proposals, BAFO, etc.]
6. Order of Control. Contractor shall carry out the Project described in Exhibit "B" to this Agreement for the price quoted in Exhibit "C". All work and services shall be performed according to and controlled by the terms and provisions of this Agreement and the exhibits attached hereto. In the event of any conflict between the contract documents, the following order of control shall prevail: MTD Master Agreement, Exhibit "A", Exhibit "B", Exhibit "C". [modify order & add or delete exhibits as needed]
7. Contract Price. Contractor shall carry out the Project for a fixed price of [insert price] which is in accordance with Exhibit "C". [if pricing is more complicated, may be necessary to modify language and/or refer to bid or proposal pricing documents or exhibits]
8. Payment. Contractor shall submit invoices to MTD in accordance with the milestone payment schedule agreed upon between the parties and incorporated herein by this reference. Milestone payments shall be made by MTD no later than thirty (30) days following receipt of a valid Contractor invoice, a Contractor-signed release of title certification, and MTD written acceptance of the items, services, work or systems associated with the milestone. Final payment shall require full acceptance by MTD (see paragraph 15 herein and Chapter 10 of the specifications). Invoices shall be sent to: Santa Barbara MTD, Attn: Brad Davis, 550 Olive Street, Santa Barbara, CA 93101.
9. Taxes. MTD is exempt from the payment of Federal Excise and Transportation taxes. Unless specified otherwise in the Agreement, MTD is subject to applicable California Sales Tax for Santa Barbara County which shall have been included in the Contractor's proposal price and shall be included on the Contractor's invoice.

10. Project Schedule. [replace clause with “Not applicable to this agreement.” if appropriate; otherwise, describe the schedule or refer to an exhibit]

11. Delivery & Freight. Unless specified otherwise in the specifications, any item provided under this Agreement shall be delivered FOB Santa Barbara to 550 Olive Street, Santa Barbara, CA 93101. Any Project freight and delivery charges shall have been already included in the Contractor’s proposal price and shall not be paid otherwise by MTD.

12. Title & Risk of Loss. The Contractor shall have title to and bear the risk of any loss of or damage to any item provided hereunder until delivered and, if applicable pursuant to this Agreement or standard industry practice, installed or otherwise set up for usage. Upon such delivery and applicable installation and setup, title shall pass from the Contractor to MTD, and the Contractor's responsibility for loss or damage shall cease, except for loss or damage resulting from the Contractor's negligence. Such passing of title shall not constitute acceptance of an item by MTD. The Contractor shall further warrant that the title to any item provided hereunder is free from all claims, encumbrances and liens.

13. Damages. All losses or damages arising from any unforeseen circumstances, either natural or artificial, which may be encountered by the Contractor during the performance of the Project under this Agreement shall be sustained solely by the Contractor. This provision shall also apply to losses or damages resulting from any act or omission not authorized by this Agreement on the part of the Contractor or any agent or person employed by the Contractor.

14. Defective, Damaged or Noncompliant Work. Any items, services, work or systems acquired pursuant to this Agreement found to be defective, damaged or non-compliant with the specifications at the time of delivery or installation shall be replaced by the Contractor without additional cost to MTD. If the Contractor should fail to promptly comply with any order to replace or repair any defective items, services, work or systems, MTD shall have the authority to deduct the cost of such replacement or repair from any compensation due or to become due to the Contractor. Nothing in this section shall limit or restrict any warranty provisions of this Agreement or any exhibits hereto.

15. Acceptance. All items, services, work or systems to be furnished by the Contractor pursuant to this Agreement shall be subject to acceptance by MTD. MTD shall inspect such deliverables to determine acceptability no later than ten (10) calendar days after said deliverables are received and, if applicable under the Agreement or standard industry practice, installed or otherwise set up for usage. Final acceptance shall occur when it is determined by MTD that all items, services, work or systems provided pursuant to this Agreement are in compliance with the specifications or any other applicable contract documents. Upon final acceptance, formal notification thereof shall be made by MTD via notice to the Contractor.

16. Warranty. The Contractor shall warrant to MTD that for one (1) year after MTD's full acceptance of items, services, work or systems, each shall conform with the requirements hereof and be free of defects. In addition to other remedies which may be available, MTD may at its option return any non-conforming or defective items to the Contractor and/or require correction or replacement of said item when the defect is discovered, all at the Contractor's risk and expense. If MTD does not require such correction or replacement of non-conforming or defective items, the Contractor shall repay such portion of the payment specified herein or such additional amount as is equitable under the circumstances. The rights of MTD hereunder are in addition to, and not limited by, the Contractor's standard warranties. Acceptance of items, services, work or systems by MTD, or payment therefor, shall not relieve the Contractor of its obligations thereunder.

17. Changes. Any changes or modifications to this Agreement must be in writing, and agreed to by both parties.

18. Insurance.

a. Contractor’s Insurance Representations to MTD.

i. It is expressly understood and agreed that the insurance coverages required herein:

A. represent MTD’s minimum requirements and are not to be construed to void or limit Contractor’s indemnity obligations as contained in this Agreement nor represent in any manner a determination of the insurance coverages Contractor should or should not maintain for its own protection; and

- B. are being, or have been, obtained by Contractor in support of Contractor's liability and indemnity obligations under this Agreement. Irrespective of the requirements as to insurance to be carried as provided for herein, the insolvency, bankruptcy, or failure of any insurance company carrying insurance of Contractor, or the failure of any insurance company to pay claims accruing, shall not be held to affect, negate, or waive any of the provisions of this Agreement.
- ii. Failure to obtain and maintain the required insurance shall constitute a material breach of, and default under this Contract. If Contractor shall fail to remedy such breach within five (5) business days after written notice by MTD, Contractor will be liable for any and all costs, liabilities, damages and penalties resulting to MTD from such breach, unless a written waiver of the specific insurance requirement(s) is provided to Contractor by MTD. In the event of any failure to Contractor to comply with the provisions of this portion of the Agreement, MTD may, without in any way compromising or waiving any right or remedy at law or in equity, on notice to Contractor, purchase such insurance, at Contractor's expense, provided that MTD shall have no obligation to do so and if MTD shall do so, Contractor shall not be relieved of or excused from the obligation to obtain and maintain such insurance amounts and coverages.
- b. Conditions Affecting All Insurance Required Herein.
- i. Cost of Insurance. All insurance coverage shall be provided at Contractor's sole expense.
- ii. Maintenance of Insurance. All insurance coverage shall be maintained in effect with limits not less than those set forth below at all times during the term of this Agreement.
- iii. Status and Rating of Insurance Company. All insurance coverage shall be written through insurance companies admitted to do business in California and with a Best's Financial Strength Rating of A- or better, as shown in the on-line version of Best's Rating & Criteria Center.
- iv. Restrictive, Limiting, or Exclusionary Endorsements. All insurance coverage shall be provided to Contractor Parties in compliance with the requirements herein and shall contain no endorsements that restrict, limit, or exclude coverage in any manner without the prior express written approval of MTD.
- v. Limits of Liability. The limits of liability may be provided by a single policy of insurance or by a combination of primary and umbrella policies, but in no event shall the total limits of liability available for any one occurrence or accident be less than the amount required herein.
- vi. Notice of Cancellation, Nonrenewal, or Material Reduction in Coverage. In the event of cancellation, nonrenewal, or material reduction in coverage affecting the certificate holder, thirty (30) days prior written notice shall be given to the certificate holder by certified mail, return receipt requested, except in the event of cancellation for nonpayment, in which event fifteen (15) days prior written notice shall be given. If insurer will not include in its coverage such written notifications, it shall be incumbent upon Contractor to comply with such written notification requirements.
- vii. Additional Insured Status. Additional insured status shall be provided in favor of MTD and its officers, employees and agents, including consultants, on all liability insurance required herein except workers' compensation/employer's liability and the certificate of insurance shall reflect same. Such additional insured coverage shall be primary to and shall seek no contribution from all insurance available to MTD, with MTD's insurance being excess, secondary, and noncontributing.
- viii. Waiver of Subrogation. All insurance coverage carried by Contractor required herein shall provide a waiver of subrogation in favor of MTD for all loss covered by such insurance, and Contractor waives all rights of action against MTD for such loss.
- ix. Primary Liability. All insurance coverage required herein shall be primary to and shall seek no contribution from all insurance available to MTD, with MTD's insurance being excess, secondary, and noncontributing. Where necessary, coverage shall be endorsed to provide such primary liability, and the certificate of insurance shall reflect same.
- x. Deductible/Retention. All insurance required for this project shall have a maximum deductible or self-insured retention of \$10,000 per policy.

xi. Claims Against Aggregate. MTD must be notified in writing by Contractor at MTD’s address set forth herein immediately upon knowledge of possible claims against Contractor that might cause a reduction below seventy-five (75%) of any aggregate limit of any primary policy.

c. Commercial General Liability Insurance.

i. Coverage. Such insurance shall cover liability arising out of all locations and operations of Contractor, including but not limited to liability assumed under this Agreement (including the tort liability of another assumed in a business contract). Defense shall be provided as an additional benefit and not included within the limit of liability.

ii. Form. Commercial General Liability Occurrence form, at least as broad as an unmodified ISO CG 00 01 10 93 or its equivalent.

iii. Amount of Insurance. Coverage shall be provided with limits of not less than:

A. Each Occurrence Limit	\$1,000,000
B. General Aggregate Limit	\$2,000,000
C. Product-Completed Operations Aggregate Limit	\$2,000,000
D. Personal and Advertising Injury Limits	\$1,000,000
E. Fire Damage (any one fire)	\$50,000
F. Medical Expense (any one person)	\$5,000

iv. Required Endorsements.

- A. Additional Insured status as required in 18(b)(vii), above.
- B. Notice of Cancellation, Nonrenewal, or Material Reduction in Coverage, as required in 18(b)(vi), above.
- C. Personal Injury Liability: The personal injury contractual liability exclusion shall be deleted.
- D. Primary Liability, as required in 18(b)(ix), above.
- E. Waiver of Subrogation, as required in 18(b)(viii), above.
- F. Continuing Commercial General Liability Insurance: Contractor shall maintain such insurance in identical coverage, form, and amount, including required endorsements, for at least three (3) years following the date of acceptance by MTD of the last bus built pursuant to this Agreement.

d. Auto Liability Insurance.

i. Coverage. Such insurance shall cover liability arising out of any auto (including owned, hired, and non-owned).

ii. Form. Business Auto Form (at least as broad as an unmodified ISO CA 0001 or its equivalent).

iii. Amount of Insurance. Coverage shall be provided with a limit of not less than \$1,000,000, combined single limit.

iv. Required Endorsements.

- A. Additional Insured status as required in 18(b)(vii), above.
- B. Notice of Cancellation, Nonrenewal, or Material Reduction in Coverage, as required in 18(b)(vi), above.
- C. Waiver of Subrogation, as required in 18(b)(viii), above.

e. Workers’ Compensation/Employer’s Liability Insurance.

i. Coverage. Such insurance shall cover liability arising out of Contractor’s employment of workers and anyone for whom Contractor may be liable for workers’ compensation claims. Workers’ compensation insurance is required, and no “alternative” forms of insurance shall be permitted.

ii. Amount of Insurance. Coverage shall be provided with a limit of not less than:

A. Workers’ Compensation:	Statutory limits
B. Employer’s Liability:	\$1,000,000 each accident and disease.

iii. Required Endorsements.

A. Notice of Cancellation, Nonrenewal, or Material Reduction in Coverage, as required in 18(b)(vi), above.

B. Waiver of Subrogation, as required in 18(b)(viii), above.

f. Professional Errors & Omissions Liability Insurance.

i. Coverage. Such insurance shall cover claims alleged to arise out of the negligent performance of Contractor's professional services.

ii. Amount of Insurance. Coverage shall be provided with a limit of not less than \$1,000,000 annual aggregate.

19. Bonding. Not applicable to this agreement.

20. Termination. Termination for Convenience. MTD may terminate this Agreement, in whole or in part, upon ten (10) calendar days written notice to the Contractor when it is in MTD's best interest, at MTD's sole discretion. Upon the effective date of the written notice of termination, the Contractor shall cease performance of the Project or the applicable portion thereof to the extent specified in the notice. MTD shall pay the Contractor allowable costs and applicable profit thereon incurred to the specified date of termination, plus any costs deemed reasonably necessary to effectuate such termination. The Contractor shall promptly submit to MTD its termination claim for such costs. Termination for Default. If the Contractor shall breach any covenant, term or condition of this Agreement, MTD may, by written notice, notify the Contractor setting forth the manner in which the Contractor is in default. MTD's right to terminate this Agreement, in whole or in part, for default may be exercised if the Contractor does not cure the condition(s) constituting the breach within ten (10) calendar days after receipt of such written notice. In such case, the Contractor shall cease performance of the Project or the applicable portion thereof to the extent specified in the notice, and MTD shall pay the Contractor allowable costs and applicable profit thereon incurred to the specified date of termination. The Contractor shall promptly submit to MTD its termination claim for such costs. If it is later determined by MTD that the Contractor did not breach the Agreement and had an excusable reason for not performing, MTD may at its sole discretion set up a revised delivery or performance schedule for the Agreement or applicable portion thereof and allow the Contractor to continue work, or treat the termination as a termination for convenience. Excess Costs. MTD may acquire, under terms and in the manner MTD considers appropriate, equivalent Project services and, if the Agreement or an applicable portion thereof was terminated for default, the Contractor shall be liable to MTD for any excess costs for such Project services. Waiver of Remedies for any Breach. In the event that MTD elects to waive its remedies for any breach by Contractor of any covenant, term or condition of this Agreement, such waiver by MTD shall not limit MTD's remedies for any succeeding breach of that or of any other term, covenant, or condition of this Agreement. MTD Property. If, at termination, the Contractor has in its possession any property, whether completed or in progress, associated with the Project belonging to MTD, the Contractor shall return such property to MTD or otherwise dispense with in the manner MTD directs.

21. Liquidated Damages. Not applicable to this agreement.

22. Infringement of Patents. The Contractor agrees that it will, at its own expense, defend all suits and proceedings instituted against MTD and pay any award of damages assessed against MTD in such suits or proceedings, insofar as the same are based upon any claim that the items, services, work, systems, or any part thereof, or any tool, or process used in or for the Project, constitutes an infringement of any legal United States copyright or patent. MTD agrees that it will give the Contractor prompt notice in writing of the institution of the suit or proceeding and permits the Contractor through its counsel to defend the same and gives the Contractor all information, assistance and authority necessary for the Contractor to do so. In case said items, services, work, systems, or any part thereof, or any tool, or process used in or for the Project, is in such suit held to constitute infringement and use of same is enjoined, the Contractor shall, at its own expense and at its option, either procure for the MTD the right to continue using said items, services, work, systems, or any part thereof, or any tool, or process used in or for the Project, or replace same with non-infringing equipment, or modify it so it becomes non-infringing.

23. Rights in Data. Definitions. The term "subject data" used in this clause means recorded information, whether or not copyrighted, that is delivered or specified to be delivered under this Agreement. Subject data includes graphic or pictorial delineation in media such as drawings or photographs; text in specifications or related

performance or design-type documents; machine forms such as punched cards, magnetic tape, or computer memory printouts; and information retained in computer memory. Examples include, but are not limited to: computer software (including, but not limited to, source codes), engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identifications, and related information. The term "subject data" does not include financial reports, cost analyses, and similar information incidental to contract administration. *MTD Rights.* MTD reserves a royalty-free, non-exclusive and irrevocable license to reproduce, publish, or otherwise use, and to authorize others to use, for MTD purposes, any subject data or copyright. As used in the previous sentence, "for MTD purposes," means use only for the direct purposes of MTD. Without the copyright owner's consent, MTD may not extend its license to any other party. *Public Information.* When MTD awards a contract for experimental, developmental, or research work, it is MTD's general intention to increase transportation knowledge available to the public, rather than to restrict the benefits resulting from the work to participants in that work. Therefore, unless MTD determines otherwise, MTD and the Contractor performing experimental, developmental, or research work required by the contract agrees to permit MTD to make available to the public, either MTD's license in the copyright to any subject data developed in the course of that contract, or a copy of the subject data first produced under the contract for which a copyright has not been obtained. If the experimental, developmental, or research work, which is the subject of the underlying contract, is not completed for any reason whatsoever, all data developed under that contract shall become subject data and shall be delivered as MTD may direct.

24. Indemnification. The Contractor shall, to the extent permitted by law protect, indemnify, defend, and hold MTD and its officers, employees and agents, including consultants, harmless from and against any and all liabilities, damages, claims, demands, liens, encumbrances, judgments, awards, losses, costs, expenses, and suits or actions or proceedings, including reasonable expenses, costs and attorneys' fees incurred by MTD and its officers, employees and agents, including consultants, in the defense, settlement or satisfaction thereof, for any injury, death, loss or damage to persons or property of any kind whatsoever, arising out of, or resulting from, the acts, errors or omissions of the Contractor, including acts, errors or omissions of its officers, employees, servants, agents, subcontractors and suppliers; and upon receipt of notice and if given authority, shall settle at its own expense or undertake at its own expense the defense of any such suit, action or proceeding, including appeals, against the MTD and its officers, employees and agents, including consultants, relating to such injury, death, loss or damage. Each party shall promptly notify the other in writing of the notice or assertion of any claim, demand, lien, encumbrance, judgment, award, suit, action or other proceeding hereunder. The Contractor shall have sole charge and direction of the defense of such suit, action or proceeding. The MTD shall not make any admission which might be materially prejudicial to the Contractor unless the Contractor has failed to take over the conduct of any negotiations or defense within a reasonable time after receipt of the notice and authority above provided. The MTD shall at the request of the Contractor furnish to the Contractor all reasonable assistance that may be necessary for the purpose of defending such suit, action or proceeding, and shall be repaid all reasonable costs incurred in doing so. The MTD shall have the right to be represented therein by advisory counsel of its own selection at its own expense. The obligations of the Contractor under this clause shall not extend to circumstances where the injury, or death, or damages is caused solely by the negligent acts, errors or omissions of the MTD, its officers, employees, agents or consultants, including negligence in the preparation of the Contract documents, or the giving of directions or instructions with respect to the requirements of the Contract by written order.

25. Notice. Notices in connection with this Agreement shall be made in writing and may be delivered either personally, by governmental postal service (regular, certified or registered), by private delivery service, or by electronic facsimile. Receipt shall be deemed to have occurred when actually made to the party or its designated agent. Such notices shall be properly addressed to the intended party as follows:

MTD:  
 Sherrie Fisher, General Manager  
 Santa Barbara Metropolitan Transit District  
 550 Olive Street  
 Santa Barbara, CA 93101  
 E-Mail: [sfisher@sbmtd.gov](mailto:sfisher@sbmtd.gov)

CONTRACTOR:  
 [insert authorized official name & title]  
 [insert contractor name]  
 [insert contractor street address]  
 [insert contractor city, state & zip]  
 [insert contractor e-mail]

26. Attorneys' Fees and Costs. In the event of a controversy (including, but not limited to arbitration or an criminal or civil filing in a Federal Court or a court of any of the United States) between the parties with respect to the enforcement or interpretation of this Agreement, the prevailing party in such controversy shall be entitled to receive, in addition to such other award as the court may deem appropriate, full reimbursement for its court costs and reasonable attorneys' fees incurred therein.

27. Negation of Partnership. This Agreement creates a relationship between two independent contractors and does not, nor may it be interpreted to, create the relationship of joint venturers, partners, employee/employer, or any other business relationship.

28. No Assignment. This Agreement is not assignable by either party, and any attempt by either party to assign its obligations hereunder shall be void ab initio at the election of the other party, which election may be made by written notice within ten (10) days of the non-assigning party's receipt of actual knowledge of such attempted assignment. Notwithstanding the foregoing, however, at the election of the other party, the obligations and burdens of a party shall bind and apply to any permitted successor in interest or assignee of the business and/or operations of a party.

29. Partial Invalidity. In the event that any portion of this Agreement or any provision hereof shall be deemed as invalid as contrary to applicable law, the balance of this Agreement shall be enforced according to its term, and that portion found unenforceable shall be interpreted and enforced to the extent that it may be within said applicable laws.

Disputes. This Agreement shall be construed and all disputes arising therefrom shall be settled in accordance with the laws of the State of California. Venue for any dispute arising under this Agreement shall be in Santa Barbara, California. Any controversy or claim arising out of or relating to this Agreement shall be resolved by binding arbitration before a single arbitrator in accordance with the Commercial Arbitration Rules of the American Arbitration Association ("AAA") then pertaining (available at [www.adr.org](http://www.adr.org)), except where those rules conflict with this provision, in which case this provision controls. Any court with jurisdiction shall enforce this clause and enter judgment on any award. The arbitrator shall be selected within twenty business days from commencement of the arbitration from the AAA's National Roster of Arbitrators pursuant to agreement or through selection procedures administered by the AAA. Within 45 days of initiation of arbitration, the Parties shall reach agreement upon and thereafter follow procedures, including reasonable limits on discovery, assuring that the arbitration will be concluded and the award rendered within no more than eight months from selection of the arbitrator or, failing agreement, procedures meeting such time limits will be designed by the AAA and adhered to by the Parties. The arbitration shall be held in Santa Barbara, California and the arbitrator shall apply the substantive law of California, except that the interpretation and enforcement of this arbitration provision shall be governed by the Federal Arbitration Act. Prior to commencement of arbitration, emergency relief is available from any court to avoid irreparable harm. **THE ARBITRATOR SHALL NOT AWARD EITHER PARTY PUNITIVE, EXEMPLARY, MULTIPLIED OR CONSEQUENTIAL DAMAGES.** Prior to commencement of arbitration, however, the Parties must attempt to mediate their dispute using a professional mediator from AAA, the CPR Institute for Dispute Resolution, or like organization selected by agreement or, absent agreement, through selection procedures administered by the AAA. Within a period of 45 days after the request for mediation, the Parties agree to convene with the mediator, with business representatives present, for at least one session to attempt to resolve the matter. In no event will mediation delay commencement of the arbitration for more than 45 days absent agreement of the Parties or interfere with the availability of emergency relief.

30. Prohibited Interest. The parties hereto covenant and agree that to their knowledge no board member, officer, or employee of MTD, during his/her tenure or for one year thereafter, has any interest, whether contractual, non contractual, financial or otherwise, in this transaction, or in the business of a contracting party other than MTD. If any such interest comes to the knowledge of either party at any time, a full and complete disclosure of all such information will be made in writing to the other parties, even if such interest would not be considered a conflict of interest under Article 4, Chapter 1, Divisions 4 and 4.5, Title I of the Government Code of the State of California.

31. Compliance with Laws and Regulations. Contractor shall warrant that in the performance of work under contract to MTD that they shall comply with all applicable federal, state and local laws and ordinances, and all lawful orders, rules, and regulations thereunder.

32. Audit and Inspection of Records. The Contractor shall agree that all materials supplied and services performed under the Project, facilities used in connection therewith, and records and documentation thereunto appertaining shall be subject to inspection, test, or audit by duly authorized representatives of MTD and the State of California. The Contractor agrees to maintain all required records relating to the Project for at least three years after MTD makes final payment and all other pending matters are closed.

33. Equal Employment Opportunity. The Contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during their employment, without regard to their race, religion, color, sex, or national origin. Such actions shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation, and; selection for training, including apprenticeship. The Contractor shall agree to post in conspicuous places available to employees and applicants for employment notices setting forth the provisions of the above paragraph. The Contractor shall insert a similar article to the above in all subcontracts entered into in connection with the contract governing this project, except subcontracts for standard commercial supplies or raw materials.

34. Entire Agreement. This Agreement and its attached exhibits constitute the entire agreement between the parties and shall be deemed to supersede and cancel any and all previous representations, understandings, or agreements between MTD and Contractor as to the subject matter hereof. This Agreement may only be amended by an instrument in writing signed by the parties.

No Waiver. The failure of either party at any time to require performance by the other party of any provision of this Agreement shall in no way affect that party's right to enforce such provisions, nor shall the waiver by either party of any breach of any provision of this Agreement be taken or held to be a waiver of any further breach of the same provision.

Counterparts: Facsimile/E-mail. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same Agreement. The parties agree that a facsimile or scanned and e-mailed signature may substitute for and have the same legal effect as the original signature.

IN WITNESS WHEREOF, the undersigned have caused this Agreement to be executed.

SANTA BARBARA MTD

[insert contractor name in caps]

\_\_\_\_\_  
Sherrie Fisher, General Manager

\_\_\_\_\_  
[insert authorized official name & title]

\_\_\_\_\_  
Date

\_\_\_\_\_  
Date



**AVL & ITS Management (AIM) System**  
***SPECIFICATIONS***

*Revised November 10, 2013*

**Santa Barbara Metropolitan Transit District**  
**550 Olive Street**  
**Santa Barbara, CA 93101**  
**[www.sbmtd.gov](http://www.sbmtd.gov)**

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**SANTA BARBARA METROPOLITAN TRANSIT DISTRICT**  
**AVL & ITS Management (AIM) System**  
***SPECIFICATIONS***

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# 1 SCOPE OF WORK

## 1.1 INTRODUCTION

The Santa Barbara Metropolitan Transit District (MTD), a public transit provider, has developed these specifications for the procurement of a number of Intelligent Transportation Systems (ITS) which are collectively referred to as the *AVL & ITS Management System*. In these specifications, the *AVL & ITS Management System* project shall be referred to as the “AIM System” or “AIM.” The mission of MTD is to enhance the personal mobility of South Coast residents and visitors by offering safe, clean, reliable, courteous, accessible, environmentally responsible, and cost-effective transit service throughout the service area. The AIM system is being implemented to aid MTD in fulfilling this mission. AIM shall be designed to be an efficient, effective, reliable, flexible, and expandable bus fleet management system that meets the needs of the MTD bus operators, supervisors, management, and public ridership. In an era of rapid technology advances and increasing interoperability requirements, AIM must be designed to allow it to be easily maintained, upgraded, and expanded.

## 1.2 SCOPE OF WORK

Contractor shall design, furnish, install, test, and make operational the AIM System for MTD. Contractor shall also provide supporting documentation, training, and technical support, as specified herein. Contractor shall be responsible for all acts, tasks, equipment, system components, and services required to provide MTD with a turnkey AIM System that is fully functional in accordance with the Contract and these specifications whether or not it is specifically identified within this Contract and these specifications. The five primary ITS enhancements or systems that AIM shall provide for MTD and its passengers are:

1. Automatic Vehicle Location
2. Time of Arrival Information
3. Route & Schedule Adherence
4. Onboard Video Surveillance
5. Yard Wireless Network

In addition to the above mandatory systems, the following additional systems or functions, in descending order of priority, will be considered as options to the core AIM System:

- Bus Stop Announcement
- Vehicle Health Monitoring
- Automatic Passenger Counter
- Yard Location/Assignment
- Computer-Aided Dispatch
- Road Supervisor CAD

## 1.3 SCHEDULE

The AIM System project duration from Notice to Proceed to System Acceptance shall not exceed one year. Contractor shall make all reasonable efforts to provide goods and services with a minimum contract value of \$375,000 by March 31, 2014, to enable MTD meet a California Prop 1B funding expenditure deadline.

## 2 MTD OVERVIEW

The following sections provide an overview of MTD's existing transit service, equipment, facilities, data network, and software systems. The provision of this information by MTD does not relieve Contractor of its own information gathering and investigatory obligations. Contractor is responsible for obtaining all necessary information regarding MTD's existing systems required to perform the work.

### 2.1 TRANSIT SERVICE DESCRIPTION

#### 2.1.1 Geographic Area

MTD was formed in 1968 as a California special district. The MTD service area of 52 square miles covers the populated South Coast of Santa Barbara County including the cities or unincorporated regions of Carpinteria, Goleta, Montecito, Santa Barbara, and Summerland. See *Attachment 1* for a map of the service area. Bus service is also provided to the City of Ventura via the Coastal Express Limited route.

#### 2.1.2 Service Level & Equipment

MTD operates fixed-route transit service on 28 lines that, on an annual basis, carry 7.7 million riders while providing 200,000 hours and 2.7 million miles of revenue service. For specific route and schedule information, refer to MTD's website at <http://www.sbmtd.gov/maps-and-schedules/index.html>. Service is provided with a fleet of 106 revenue vehicles with a peak service requirement of 82 buses. See *Attachment 2* for a summary listing of MTD's revenue vehicle fleet including key vehicle information (e.g., number of doors, communication protocol) and manufacturer contacts; and *Attachment 3* for a detailed listing. MTD has 23 service vehicles including 10 driver relief cars, 2 road supervisor SUVs, 7 shop trucks, and 43 staff cars. See *Attachment 4* for a detailed listing of MTD's service vehicles, including which will be equipped with AIM systems. MTD currently employs 208 individuals including 144 bus operators, 13 mechanics, 12 service workers, 8 supervisors, and 31 administrative staff members.

#### 2.1.3 Facilities

MTD's combined administrative, operations, dispatch, and maintenance facility, referred to as Olive Terminal or Terminal 1, is located at 550 Olive Street in Santa Barbara. MTD facility hours of operation are from 4AM to 1 AM Monday through Friday, 5AM to midnight on Saturdays, and 5AM to 11PM on Sundays. MTD's Transit Center is the hub of the MTD system and is located at 1020 Chapala Street in downtown Santa Barbara. More than 10,000 passengers use this facility every day. MTD has approximately 750 distinct physical bus stop locations throughout the service area plus five additional bus stops on the Ventura end of the Coastal Express Limited route.

### 2.2 EXISTING SYSTEMS

#### 2.2.1 Network Environment

For cost effectiveness, Contractor may propose using MTD's existing IT systems for the AIM data network system. Such usage would be contingent upon not negatively impacting the performance or functionality of either the existing MTD or the AIM System.

MTD's existing server technologies are Windows DataCenter Server 2008 and Windows DataCenter Server 2012. The virtual server technology used is Microsoft HyperV. There are two physical servers running about 8 guests each. These are Supermicro 7046A-3 4U system with 2 E5520 Xeon processors. These provide 16 CPUs each which typically run at about 10% utilization under normal loads. Each

system has 48GB of memory with a little over half of that used under normal loads. Each server has a 3TB array of 6Gb/sec SAS storage. Each server has two Gigabit network cards.

MTD is using 10% to 20% of the cores on a normal basis. Utilization moves up to 50% during some tasks. About 20GB of RAM is typically available for use. Available disk space is approx 1.5TB. We do not use redundant cores, drives, etc. Our systems currently do not require 24/7 uptime. The servers are redundant. If one fails, we can move guests to the other using our continuous backup. We have replacement parts on hand. No specialized system monitoring software. One of our consultants uses Kayseya agents to monitor our systems.

The SAN is a Hitachi AMS 2500 with 1TB of SATA storage and 3TB of SAS storage. This system is expandable. Contractor would need to provide additional storage for their applications. An expansion unit would be required.

### 2.2.2 Scheduling, Runcutting & Operations Applications

The software in use at MTD that is of primary relevance to AIM are the following Trapeze applications:

- FX 10.0.7.0 for scheduling
- OPS 10.0.24.0 for transit operations management
- Blockbuster 10.0.7.0 for runcutting.

It is not the intent of MTD to replace these Trapeze applications within the next several years.

### 2.2.3 Fare Collection & Passenger Counting Systems

MTD utilizes the GFI GenFare Odyssey electronic validating farebox on all revenue vehicles for collecting fare revenue and recording passenger counts. The system was implemented in 2000 and most equipment dates to that time. The software version is 2300-328. MTD will not be replacing the farebox system for at least several years. **As indicated later in these specifications, MTD's preference is that driver's utilize a single in-vehicle sign-on for both the AIM System and the Odyssey farebox system.**

### 2.2.4 Voice Radio System

To meet FCC narrowbanding requirements, MTD upgraded its two-way radio communications system in late 2012 with Motorola MOTOTRBO digital technology. See Appendix 7 for the radio system specifications and cut sheets. Physical equipment in use is composed of:

- Two MTR3000 repeaters (one each on Gibraltar Peak and Santa Ynez Peak)
- One bi-directional repeater composed of two XPR 5550 mobile radios (in Oxnard)
- Two XPR 5550 control base stations (one each at Olive Terminal and the Transit Center)
- 129 XPR 5550 mobile radios (one each in 106 buses and 23 service vehicles)
- 15 XPR 7550 portable radios (used by operations management and supervisors)
- Five XPR 3300 non-display portable radios (used by staff)

The radio system utilizes a UHF wideband channel pair at 453.750 MHz for transmission and 458.750 MHz for reception in MTD's primary service area using the Gibraltar Peak repeater. MTD has a backup repeater on Santa Ynez Peak using 453.2375 MHz for transmission and 458.2375 MHz for reception. A simplex channel at 453.075 MHz is used to extend the coverage for buses on routes in the Ventura area using the bi-directional repeater located in Oxnard to relay transmissions onto the main MTD channels.

All three repeater locations have access to internet connectivity through the site owner, but MTD is not currently utilizing this service.

MTD does not presently utilize the data capabilities (e.g., messaging, GPS) of the MOTOTRBO system. **For cost effectiveness and space utilization issues, it is the preference of MTD that, if possible, onboard AIM systems utilize the data communications capabilities of the MOTOTRBO system.**

### **2.2.5 Telephone System**

MTD uses a ShoreTel VoIP telephone system purchased in 2008. The ShoreGear 120/24 is the primary PBX for voice switching, which is housed in the MTD server room.

## 3 AIM DESIGN & COMMUNICATIONS

### 3.1 DESIGN REQUIREMENTS

#### 3.1.1 Capacities & Expandability

AIM shall be designed to facilitate future expansion in functionality and transit operating conditions through the use of open, fully documented interfaces. Compliance shall be demonstrated as part of the Acceptance Testing included in these specifications. AIM shall permit expansion without upgrading initial hardware or software systems provided for the project and with no more than 5% degradation in the latency of data to support the following:

- 1,000 driver operators identified by up to 5 alphanumeric characters (currently 200)
- 200 buses in operation identified by up to 5 alphanumeric characters (currently 106)
- 200 lines/routes identified with up to 5 alphanumeric characters (currently 50)
- 2,000 runs (daily driver assignments) using up to 6 alphanumeric characters (currently ??)
- 2,000 bus stops using up to 4 alphanumeric characters (currently approximately 750)
- 10 Road Supervisor Subsystems in simultaneous operation (currently 2 road cars)
- 8 CAD consoles in simultaneous operation (currently 2 dispatch consoles)
- 4 management consoles in simultaneous operation
- A scheduled operating day that extends beyond 24 hours

AIM shall be designed to permit the addition of new functional capabilities over its lifetime without significant replacement of existing components. In particular, functions designated in these specifications as future or options shall be readily added to the system during its lifetime without costly rework or replacement of existing system components.

#### 3.1.2 Nomenclature & Familiar Terms

Text for labeling, messages, etc., shall use terminology that is consistent with existing MTD terminology. Contractor shall verify such terms with MTD during system setup.

### 3.2 OPEN SYSTEM ARCHITECTURE

AIM shall be designed using off-the-shelf hardware and software to the maximum extent feasible and shall be designed using open system architectures. Open systems architectures, as used in the context of AIM, means the use of:

- Components with interfaces that are fully documented, non-proprietary, and based on a standard recognized by a standards-making body, such as IEEE, ANSI, SAE, and CCITT.
- Components manufactured by several sources or are readily commercially available.
- Components whose internal workings are fully documented and understood by a significant user and support community.
- Custom components that were developed and documented in accordance with recognized programming architecture and standards and quality assurance procedures.

#### 3.2.1.1 Software

All software, including firmware, (other than off-the-shelf operating system software from third parties) furnished as part of AIM shall be developed in accordance with IEEE software quality assurance procedures and shall utilize modern software engineering techniques, such as client-server and object-

oriented software architecture. Current standard operating systems such as Windows 7 and 2008 Server, or later, shall be utilized. Microsoft operating systems are preferred. A common high-level language, such as ANSI Standard C++, shall be utilized.

Complete tools and all necessary files for managing, building, and testing software shall be included. Facilities shall be provided to support building and testing without impacting MTD operations. Installation tools shall be provided to enable coordinated, rapid, and secure updates at all sites and vehicles as further defined in these specifications.

### **3.2.1.2 Data Protocols**

Data communications shall be based on standard, open protocols that conform to the Open Systems Interconnection (OSI) seven-layer model. These protocols shall include the following:

- The use of 802.3 - 2008 IEEE Standards for Local and Metropolitan area networks and IEEE Wireless LAN 802.11n-2009 or later
- The use of IP for wide area network communications.
- The use of TCIP, SAE, and EIA protocols for vehicle area network communications.

Protocols used for data radio communications, if used, may be implemented in the radio or an external modem. Open protocols are preferred. Documentation of the protocol shall be provided.

### **3.2.1.3 Databases**

AIM shall retain and manipulate data as relational files using common database routines for definition and access. All parameters needed for administration shall be available through system administrator console operation. Contractor shall provide tools for performance measurement and analysis. Databases shall be ODBC compliant and allow multiple users to access data without significant impact on performance. Microsoft SQL databases are preferred.

### **3.2.1.4 National ITS Architecture**

AIM shall comply with the intent of the National ITS architecture. Use of NTCIP framework and data dictionaries as per TCIP Standards 1400 through 1408 and SAE J2496, inclusive, is desired for open standards compatibility. For onboard equipment, use of SAE Standards J1708, J1939, and J1587 shall also be acceptable for open systems, particularly for interfaces to existing onboard equipment that are compatible with these standards. New data elements not covered by these standards shall be compatible within the framework of these protocols.

## **3.2.2 Reliability & Maintainability**

AIM shall include provisions to achieve high availability for critical functions through reliability of systems and system components, elimination of single points of failure, self-diagnostics, and reporting of failures, and maintainability of AIM. Such provisions shall include but not be limited to:

- No single point of failure shall disable data communications between a Dispatch Center and the bus fleet, other than failure of Onboard AIM equipment on a single bus or the data link with the radio site or internet site for the cellular carrier, whichever is relevant.
- No single point of failure shall disable radio communications at more than one dispatch console.
- AIM shall include self-diagnostics and shall automatically report and log failures for each onboard subsystem.
- Console equipment shall be replaceable without disruption to other consoles or AIM as a whole.

### 3.2.3 Response Times

**AIM shall be designed and utilize systems and components that, operating under full design capacity, minimize response times such that system users may continue their work in normal continuous progression without excessive delays.**

### 3.2.4 AIM Interfaces

AIM shall interface with existing MTD systems, applications, software, hardware, and vehicle systems as necessary to meet these specifications. Integration, coordination, scheduling, and communications for such interfaces shall be managed by Contractor.

#### 3.2.4.1 MTD Network & Transit Database

AIM shall include a Transit Database (TDB) to allow MTD to have on-demand access to all data created by the AIM system, including both real time and historical data. The TDB shall be ODBC-compliant and provide for the export of such data to non-AIM datastores. The TDB shall provide for bi-directional data transfer as necessary to meet these specifications (e.g., route, schedule and bus stop data within Trapeze). Contractor shall furnish to MTD the definitions of and a data dictionary for AIM data on the TDB. Contractor shall be responsible for any necessary conversion utilities to provide data to the TDB. Interfaces shall be configured such that AIM automatically initiates requests for information and completes data transfers without manual intervention. Contractor shall utilize a firewall to protect against unauthorized access to or modification of the MTD network from AIM or the TDB. The firewall shall be based on current technology and accommodate AIM under full design capacity.

#### 3.2.4.2 Vehicle Equipment

AIM shall interface to multiple existing equipment onboard MTD buses as required to meet these specifications. These include, but are not limited to, fareboxes, public address equipment, headsigns, engine control computers, transmission control computer, driver interface computers, and odometers. Contractor shall develop, document, and implement such interfaces and be responsible for all work necessary for seamless interface with existing bus equipment.

### 3.2.5 Utilities & Third Party Services

Contractor shall be responsible for coordinating any utility or other third party services required for the implementation and operation of AIM. Such services may be related but are not limited to telephone lines; wireless, cellular or radio communications; and provision of electrical power. Any third-party agreements for such ongoing services must be approved by MTD (the costs of such services—whether fixed or estimated, one time or monthly—and the party responsible for payment thereof shall have been determined as part of the review and negotiation process resulting in the contract for this project).

### 3.2.6 Log-in Device

**It is MTD's strong preference that operator onboard sign-in be through a single input device for both AIM and the GFI farebox.** This may be accomplished through either the farebox or a separate mobile data terminal (MDT). If through an MDT, manual farebox entries, including login, shall remain available through the farebox regardless of the status of AIM. See related requirements in Sections 4.9.1.3 and 5.3.1.2.

### 3.3 VEHICLE DATA COMMUNICATIONS

#### 3.3.1 General

As necessary for AIM systems provided by Contractor to meet these specifications, Contractor shall implement a wireless data communications system between MTD vehicles in the field and MTD fixed facilities systems (the requirements and specifications for wireless communications within the MTD yard are contained in Section 4.5). **It is MTD's strong preference that the method of such data communications minimize ongoing operating costs for the provision of such communications.**

**AIM shall communicate with each active (powered-up) vehicle at least once every thirty seconds.**

AIM shall have the ability to enable fast polling for selected vehicles. AIM shall use an efficient means of controlling this periodic reporting such as group or synchronized polling. Traditional single vehicle poll-respond cycles are not efficient and shall not be acceptable. The time period for reporting shall be adjustable by the system administrator.

#### 3.3.2 Onboard Equipment

Onboard data communications equipment including, but not limited to, radio or cellular transceivers, modems, and antennae shall be of rugged construction suitable for the public transit environment. Vehicle modems may be integrated with the onboard AIM processor, integrated within the data radio or cellular device, or as a physically separate device.

#### 3.3.3 Data Radio System

If a data radio system is implemented for AIM, the requirements in this section shall apply. **To the extent feasible, Contractor shall utilize MTD's existing frequencies and Motorola MOTOTRBO radio system for the data radio system.** The existing system is described in Section 2.2.4. The data radio system shall use protocols optimized for the short message length typical of this type of system. Long modem training times and extensive pre-ambls shall be avoided. The protocol shall provide for efficient reporting of changes of state in real time and shall also provide for regular status checks of all mobile units to verify that data communications is functioning properly. Allocation of the data channel utilization shall be dynamic so as to maximize throughput under the actual current conditions. Allocation of the data channel utilization shall provide sufficient message slots for real-time messages to support all operator messages during pullout of the maximum design fleet, while continuing to support specified response times for all other functions. The data radio system shall utilize a bit rate sufficient to fulfill the needs of the AIM systems under the anticipated maximum communications level.

#### 3.3.4 Cellular Service System

If a cellular system is implemented for communications, upon approval by MTD, Contractor shall arrange and implement the necessary cellular data service. Contractor's price shall have included any setup, installation or other cellular service provider one-time fees. MTD shall be fully responsible for paying any ongoing data communications service fees charged by the cellular service provider.

## 4 AIM SYSTEMS

This chapter describes the functions and features of the differing AIM systems. The Automatic Vehicle Location system is not a feature per se, but is critical to the functionality of most AIM systems. The time of arrival, route and schedule adherence, onboard video surveillance, and yard wireless network systems are mandatory features of AIM. The automatic voice annunciator, vehicle health monitoring, automatic passenger counter, yard location/assignment, computer-aided dispatch, and road supervisor CAD systems are considered options to the AIM System. Their ultimate inclusion as part of the Work shall primarily be dependent upon budgetary constraints.

### 4.1 AUTOMATIC VEHICLE LOCATION

#### 4.1.1 General

MTD bus location information is integral to several AIM systems and hence critical to the overall success of the AIM project. Contractor shall provide an Automatic Vehicle Location (AVL) system that will determine, store, and regularly update real-time vehicle location information of MTD buses and other selected service vehicles. The AVL system shall utilize GPS technology and have the location accuracy necessary to meet the requirements of these specifications. The mobile AVL system shall be installed in all 106 MTD buses and two road supervisor vehicles. The mobile AVL system shall be considered **optional** for 16 of the remaining 21 service vehicles (see *Attachment 4* for optional vehicles).

#### 4.1.2 AVL Database

AIM shall provide, maintain, and update a database of the real-time vehicle location information determined by the AVL system. Such database shall be sufficiently detailed to meet the requirements of these specifications including for use by both onboard and facility AIM systems; for real-time AIM applications; and for later analysis and reporting by AIM. Contractor shall determine the most efficient means and timing of storing and communicating the AVL data between mobile and fixed systems. The fixed AVL database shall be considered part of the TDB, which shall maintain at least six months of historical date, time, and location data for each AVL equipped vehicle.

#### 4.1.3 GIS & Geocoding

Contractor shall provide and customize a geographic information system (GIS) database of the MTD service area as necessary to meet the requirements of the AVL system and these specifications. Any required geocoding of MTD bus stops, routes, and yard locations for the GIS and AIM shall be the responsibility of Contractor. MTD maintains geocoding information in Trapeze for MTD bus stops which is available for use by Contractor for AIM systems. However, MTD shall not guarantee the suitability or usability of the existing bus stop data for AIM. **MTD shall be required to maintain only one bus stop geocoding database for usage by both Trapeze and AIM.** Contractor shall provide the software applications, licenses, etc. necessary to enable MTD to use the customized GIS database for non-AIM systems and applications.

#### 4.1.4 GPS Receiver

A GPS receiver and antenna suitable for meeting AIM system requirements shall be provided, configured, and installed in MTD buses and applicable service vehicles. It shall be designed for use with AVL applications and be of rugged design suitable for a transit environment. The GPS receiver shall be the time source for all onboard AIM systems and devices, and for time-tagging all recorded events. Data output format shall use a documented, non-proprietary protocol. The GPS receiver shall meet or exceed the following standards:

- GPS Data Update Frequency: once per second
- Location Accuracy: 5 meters
- Velocity Accuracy: 0.1 meter per second
- Time: 1.5 microseconds
- Cold Start Acquisition Time: 4 minutes
- Warm Start Acquisition Time: 30 seconds
- Reacquisition Time: 2 seconds

#### **4.1.5 Ventura Route AVL (option)**

As an option, AVL shall be expanded to cover the geographic area traveled by the Coastal Express Limited bus route, which includes downtown Ventura. Such option shall address and accommodate usage of applicable AIM systems (e.g., time of arrival information, bus stop announcements, etc.).

## **4.2 TIME OF ARRIVAL INFORMATION**

### **4.2.1 General**

AIM shall determine dynamic estimated time of arrival to the next bus stop for each bus based on data from the AIM AVL system. The time of arrival information shall be available for electronic display signs and monitors, internet access including MTD's public website, the computer-aided dispatch (CAD) and telephone interactive voice response (IVR) systems (options), the TDB, and the MTD network. AIM shall be capable of providing AVL and time of arrival information for all buses in XML format for a future interface to a regional 511 system.

#### **4.2.1.1 Algorithm**

The time of arrival information shall be determined using a predictive algorithm that utilizes the current AVL information for the approaching buses to a bus stop. AIM shall calculate the arrival times for the next three buses that will arrive at each stop for all routes and directions serving that stop. The time of arrival information shall be updated at least every thirty seconds and made available to the systems using such information within one second after the AIM server receives a location update. AIM shall also calculate time of departure information and provide MTD the option to display time of arrival or departure information or both. The accuracy of the predictive algorithm shall be such that the average predicted error shall be less than two minutes 90% of the time when a bus is between five to eight minutes or less from a stop; and less than one minute 90% of the time when a bus is five minutes or less from a stop. The AIM predictive algorithm shall be a learning algorithm that is based on historical data for the stop location, route, and the time of day, day of week, and week of year.

#### **4.2.1.2 Source Information**

MTD maintains its bus stop and schedule databases in applicable Trapeze applications, which shall be the source of data used for time of arrival calculations. **MTD shall be required to maintain only one bus stop and schedule database for usage by both Trapeze and AIM.**

### **4.2.2 Webpage**

Contractor shall develop a webpage, including a Spanish language option, accessible from MTD's public website for accessing estimated time of arrival information. The website shall provide a real time map display of all current MTD lines and bus stops with vehicle locations updated at least every 30 seconds. If the computer-aided dispatch (CAD) system is obtained as part of AIM, there shall be a single map database to maintain for both the webpage and CAD. The dynamic time of arrival information shall

be accessible directly from the map display when a user clicks or mouses over a bus stop icon or by user entry or selection of pertinent data (i.e., bus stop ID, line number, etc.). If a dynamic time of arrival prediction is not available for a stop, the website shall display the Trapeze schedule data with a note indicating that the information is not dynamic. Other map display features and requirements include:

- Clearly visible street names, bus stop icons, vehicle icons, and local landmarks
- Ability for user to zoom in and out and pan the map display
- Allow MTD posting of real time messages for public service announcements, detours, etc.
- Ability for user to select a single line to be displayed
- Development of mobile device-optimized webpage version for smartphones, tablets, etc.
- Webpage management tools to edit, add, or delete lines, bus stops, landmarks, etc.

### **4.2.3 E-Mail & Wireless Messaging**

The Time of Arrival Information system shall enable MTD to manage and send announcements and alerts to the public through e-mail, wireless text messaging, and social media applications (e.g., Facebook and Twitter). Such messages may be developed and sent automatically by AIM or manually by MTD. The emphasis of such messages shall be on estimated time of arrival information and alerts, including late arrivals. The system shall also enable the sending of public service announcements, newsletters, or other information of MTD's choice, which shall have the capability for including Spanish language versions. The Time of Arrival Information webpage shall enable users to sign up to receive such messages for the topic and via the medium of their choice.

### **4.2.4 Bus Stop Codes**

AIM shall include the means for both smartphones and non-smartphones to easily obtain dynamic time of arrival predictions at all MTD bus stops. This may include, for instance, listing an e-mail address, content of a text message, or providing a QR code to be scanned for accessing the information. MTD will consider alternatives to these methods. Contractor shall establish a database for the e-mail address, text message content, QR codes, etc. and their associated bus stops and bus service, and post such information in both English and Spanish at the bus stops along with instructions on how to use it to obtain time of arrival information.

### **4.2.5 Electronic Display Signs**

Contractor shall provide and install electronic display signs showing estimated time of arrival information at the MTD Transit Center (TC). Such information shall be visible in both the interior and exterior passenger waiting areas of the TC and shall include the ability for audio announcements. Signage shall include the ability to display public service or other static or video announcements of MTD's choosing. Standard default public service announcements shall include a Spanish language version as well. The time of arrival information displayed shall be of sufficient size, sharpness, contrast, color, and brightness to provide ease of visibility and meet any applicable ADA requirements. Contractor shall provide software on the AIM network and any equipment necessary to configure the display signs.

#### **4.2.5.1 Installation**

Contractor shall work with MTD to determine the location and quantity of the TC electronic display signs during the Design Review. Any exterior signage at the TC is subject to review by the City of Santa Barbara Historical Landmarks Commission, which process shall be the full responsibility of MTD. Otherwise, Contractor shall perform all tasks necessary for sign implementation including obtaining

typical building permits; provision of power to the displays from the existing TC building electrical system; and the necessary data communications link between AIM and the electronic display signs. There is an existing LAN and internet service at the TC, but no present wireless capability. Electrical plans from a recent TC project are included as Attachment 5.

#### 4.2.5.2 Physical & Environmental Requirements

The displays shall be of rugged construction, reliable, maintainable, and suitable for the designated installation location. Contractor shall utilize vandal resistant enclosures and the faceplate shall be scratch resistant. Cable connections to the signs shall be concealed to the extent feasible. All exposed surfaces of the system components shall be unaffected by brushes, detergents, and cleaning solvents normally used by maintenance crews. All exposed surfaces shall also be resistant to ultraviolet radiation and air contaminants. Electronic displays signs and monitors shall be certified to function in the given environment and shall not be affected by the following environmental conditions:

- Temperature: 20°F to 120°F for outdoor displays, 50°F to 100°F for indoor displays
- Relative humidity (non-condensing): 15% - 95% for outdoor displays; 20% - 80% for indoor
- Rainfall: up to 6 inches per hour, for outdoor displays
- Freezing precipitation: up to 1 inch per hour, for outdoor displays
- Wind speed: up to 80 mph, any direction, for outdoor displays
- Sunlight: None to full, direct, for outdoor displays
- Pollutants: Characteristic of the area, including salt, dust and corrosive or base chemicals.

#### 4.2.5.3 Remote Bus Stop Displays (OPTION)

Contractor shall provide signs for five non-TC bus stops. Such signage shall be suitable for remote, outside locations; have audio capabilities; include communications via wired LAN or cellular service, and meet the requirements of the TC exterior displays. The inbound bus stop at State St. and La Cumbre Road (closest to southeast corner) shall be used as a model for determining signage. **Contractor shall not be responsible for the installation, permitting, power, or communications of the remote displays, which shall not be considered part of these specifications** (such services may be added to the Contract later through a change order or through a separate competitive solicitation).

#### 4.2.6 Interactive Voice Response (IVR) (Option)

The AIM Interactive Voice Response system shall receive telephone calls from MTD clients and provide them with dynamic time of arrival information for the bus stop ID entered. The IVR subsystem shall provide dynamic time of arrival predictions for the next three buses for each route that is serving the bus stop location, including direction of travel and destination.

Management tools shall enable MTD staff to create, edit, or delete audio files for bus stop names and locations, public service announcements, menu items, and real time messages, and to schedule when the messages shall be displayed. The management tools shall enable MTD staff to add menu items, and to monitor and display call traffic and telephone line activities. Contractor shall provide IVR management tools to edit, add, or delete bus stop information in MTD's bus stop database. The IVR system shall:

- Automatically recover from power failures.
- Include a call logging feature that keeps a record of call details by menu options.
- Include a selectable option for the caller to be connected to a live telephone receptionist.
- When certain bus stop IDs are entered, automatically connect caller to a live person.

- Allow recording of and option to play general service announcements.
- Offer more detailed instructions if caller fails to enter in bus stop ID within settable time period.
- Offer static time of arrival information for arrivals beyond a settable threshold from current time.
- Include a methodology to assist the caller in determining the stop ID number.
- Provide the caller with an option to hear the information in Spanish.
- Include text to speech capability for the creation of announcement and stop location recordings.
- Include speech recognition.
- Include the capability to play advertisements based on the location of the stop ID.

### **4.3 ROUTE & SCHEDULE ADHERENCE ANALYSIS**

Contractor shall provide tools for the analysis and reporting of route and schedule adherence data collected by the AVL system. Such system is separate and distinct from the CAD system route and schedule adherence incident reporting. Key areas that the analytical tools and standard reports shall address or include:

- Selectable by bus, bus stop, line, run, block, time, or date
- Reporting on detailed and/or summary level
- Calculation of average, mean, variance, standard deviation, or other analytics
- Reporting on exception basis with user selectable exception levels or ranges
- Reports addressing vehicle travel, revenue, and dwell time
- Reports addressing vehicle adherence to schedule timetable
- Reports addressing vehicle adherence to route path
- Creation of custom reports
- Tools for management and archival of AVL route and schedule database

### **4.4 ONBOARD VIDEO SURVEILLANCE**

#### **4.4.1 General**

Contractor shall provide and install a Video Surveillance System (VSS) composed of fixed video cameras and digital recorders on all MTD buses. Key VSS features include:

- Capability of recording video at up to 30 frames per second
- Installation of 8 cameras on buses greater than 25 feet in length and 5 on buses less than 25 feet
- Recording of video at all times that bus operator master switch is turned to the “ON” position
- Provision of evidence acceptable in the State of California criminal courts
- Provision of G-force sensor indicating vehicular accidents for incident tagging purposes
- Provision of covert microphones for recording of audio under MTD-determined conditions

##### **4.4.1.1 Incident Tagging & Audio**

The VSS shall provide the capability for tagging incidents on the onboard video recorder. The VSS shall tag recorded video (and audio) as an incident by either manual initiation by operator or dispatcher (if CAD option selected for latter); or automatic initiation by a G-force sensor. Upon initiation of and throughout incident tagging, the VSS shall record audio through the covert microphones. Camera-integrated microphones are preferred. Other requirements, capabilities, or features related to incident tagging and audio recording shall include:

- Initiation of incident tagging by operator through the silent alarm system.
- Initiation of incident tagging by dispatcher through AIM Computer-Aided Dispatch system (if CAD option selected).
- Immediate dispatcher notification, including audio alarm, of initiation through CAD system (if CAD option selected).
- Increase of camera and recording speed to 30 frames per second during incident tagging event.
- Set video tag to user-settable time period prior to activation of initiation of incident tagging.
- Continue incident tagging and audio recording until the SAS or Incident Tagging is cleared.
- Discontinue incident tagging after thirty minutes if not cleared by operator or dispatcher.

#### **4.4.1.2 Video Surveillance System Integration**

The VSS shall interface with AIM to the extent necessary to meet the requirements of the VSS. AIM shall automatically upload tagged video and audio data via the wireless LAN at the bus yard.

### **4.4.2 Cameras**

#### **4.4.2.1 Specifications**

Cameras shall be day/night type generally using color during the day and black & white at night and applicable low light conditions. Cameras shall be sufficiently durable for usage in the transit bus environment. Other requirements, capabilities, or features of the cameras include:

- Be NTSC compatible with 1/3" or larger CCD imager and fixed length lens.
- Capable of speeds of up to 30 frames per second.
- Have integrated microphones to be used for audio recording.
- Use an automatically adjusting iris.
- Use camera-lens combinations that maximize image quality by location, conditions, and purpose.
- Use focal length and f/stop selected to maximize viewable area by location.
- Be housed in vandal-resistant enclosure using tamper-proof screws.
- Accommodate normal and wide-angle lenses.
- Have minimum resolution of 720p.

#### **4.4.2.2 Locations**

MTD shall consider Contractor recommendations on camera locations. However, MTD anticipates locating cameras to at least provide surveillance of the following areas and/or purposes:

- Operator compartment facing forward through front windshield
- Front door with emphasis on passenger boarding and alighting
- Rear door with emphasis on passengers alighting
- Farebox area with emphasis on passenger fare transactions
- Operator compartment with perspective from upper right side location
- Rear passenger area with emphasis on detecting window and seat vandalism

### 4.4.3 Recording Unit

The VSS recording unit shall be capable of digitizing video and audio from eight cameras, provide compression of the video and audio, and store the video and audio on a removable hard drive. Other requirements, capabilities, or features of the recording unit include:

- There shall be a minimum of eight video inputs.
- Video shall be recorded in NTSC format in either black & white or color.
- Images shall be digitized with at least 720p resolution.
- Video from each input shall be recorded at 15 frames per second in normal mode.
- Video from each input shall be recorded at 30 frames per second in incident tagging mode.
- Video compression shall use the H.264/MPEG-4 AVC standard with a 3Kb file size.
- On-bus storage capacity shall be for seven days at 18 hours per day in normal mode.
- The oldest video stored shall be automatically over-written when storage is at capacity.
- The storage format shall use encoding such that alteration to the images can be detected.
- Video that is tagged shall not be over-written until after the tag is removed.
- Recorder shall synchronize internal clock to the GPS provided for the AVL system at least daily.
- Recorder shall watermark and date/time stamp all recorded video using GPS clock time.
- Recording unit shall have a digital output port for downloading video via the yard wireless LAN.
- Hard drive shall be designed for rapid removal and installation.
- Hard drive shall be housed in a ruggedized enclosure that locks to the recording unit.
- Hard drive shall automatically connect and synchronize to the VSS.
- A common key shall be used for removing and installing all VSS hard drives.

## 4.5 YARD WIRELESS SYSTEM

Contractor shall provide, configure, and install an AIM Wireless Yard System to facilitate and manage the transfer of data between buses and applicable service vehicles in the yard and in the shop bays at Terminal 1 and the fixed AIM local area network (LAN). There is presently no available wireless capability in the yard. **As an option**, the Wireless Yard System shall indicate and manage the location, status, and assignment of buses within the yard.

### 4.5.1 AIM Data Transfer

The yard data transfer function shall be accomplished using a wireless local area network (WLAN) for the uploading and downloading of AIM system data between vehicles and the fixed AIM data network.

#### 4.5.1.1 WLAN Design

The design characteristics and capacities of the WLAN shall accommodate the data transfer needs of AIM without delays or excessive administration affecting the efficiency of overall MTD operations. The final WLAN design shall be dependent upon the AIM systems ultimately provided by Contractor. The WLAN shall utilize one or more fixed wireless access points (AP) located in the MTD yard which shall communicate with vehicles via appropriate onboard wireless communications systems and hardware. Other requirements, capabilities, or features of the WLAN shall include:

- Adequate WLAN coverage to accommodate efficient data transfer with vehicles throughout the bus yard and maintenance shop
- Equipment using IEEE 802.11n specification preferably on the 5 GHz frequency

- Equipment that conforms to the Wireless Ethernet Compatibility Alliance certification standards for interoperability among IEEE 802.11n High Rate products from multiple manufacturers
- Wireless AP(s) of rugged construction suitable for fixed installation in a bus yard, transit fueling building, and maintenance area environment
- Usage of encryption of WPA2 or better including logging of unauthorized access attempts
- Management tools that monitor and maintain the WLAN including reports on client status, fault indications, and log of files uploaded and downloaded by vehicle
- Automated initiation of efficient sequence of data transference by bus, time, and data type
- Administrator ability to manage or manually override automated settings

#### **4.5.1.2 Full Video Upload Option**

For the video surveillance system, Contractor shall assume that the wireless upload of video (and related audio) shall be restricted to incidents that have been tagged. **As an option**, the WLAN design shall accommodate the nightly upload of all new video from all buses to the AIM server. Such design shall address and include any additional AIM system requirements including sufficient storage capacity to accommodate six months of recorded video.

#### **4.5.1.3 Access Point Network Interface**

Interface with the fixed AIM LAN shall be via a “master” access point located on the Administration Building exterior hardwired to the Server Room. The interface shall incorporate protocol filters and broadcast traffic filters with adjustable bandwidth allocation. The broadcast filter shall block broadcast messages from the wireless LAN. Network bridging shall be configured to allow communication only with clients that the AP knows to exist in the Wireless LAN behind the wireless bridge.

#### **4.5.2 Yard Location & Status (option)**

The Yard Wireless System shall maintain a yard plan showing the current bus locations, IDs, availability status, and assignments by operator and run; and provide for bus status updates by the Maintenance Department. The yard plan and vehicle status shall be available to the Dispatch Center console and to selected pre-existing Maintenance Department workstations. Other requirements, capabilities, or features of the Wireless Yard Location system shall include:

- Display yard plan in graphical format matching the actual layout of the yard.
- Automatically record movements of a bus in, out of, and within the yard.
- Provide for scheduling future vehicle status such as holding vehicles for maintenance, etc.
- Provide standard reports on vehicle movements and status.

#### **4.5.3 Bus Assignments (option)**

The Yard Wireless System shall make bus assignments based upon the next bus available in a preferred bus series at a ready line at least sixty minutes prior to the time the operator is ready and scheduled to pull out. Other requirements, capabilities, or features of the bus assignment system shall include:

- Accept a list and changes to the list of preferred series for each line.
- Select first available bus in the highest available preferred series to assign to the line/operator.
- Alternatively, make assignments based only upon pullout schedule.
- Accept or automatically make assignments of buses to unscheduled work assignments.
- Allow holding of bus assignments by the Dispatch Center or Yard workstation.

- Send alert to Dispatch Center if a pullout is not made within a settable time after it is due.
- Automatically update applicable Trapeze bus assignment applications.

AIM shall be integrated with applicable Trapeze applications as necessary to meet these Bus Assignment specifications. MTD shall obtain the necessary licenses from Trapeze for any such integration. Contractor shall be sufficiently knowledgeable of Trapeze software to carry out the required integration. Such bidirectional data transfer and synchronization with the TDB, Trapeze, or other AIM systems shall occur seamlessly without the necessity of intermediate applications or databases.

## **4.6 AUTOMATIC VOICE ANNUNCIATORS (OPTION)**

Contractor shall provide an Automatic Voice Annunciator (AVA) system in each bus that shall automatically audibly and visually announce bus stops and stop requests; and change exterior electronic headsigns. The AVA system shall determine where or when to make bus stop announcements and headsign changes using AVL system data and pre-defined location or time parameters. Once the bus operator is logged into AIM, the AVA system shall be fully automatic requiring no driver interaction.

### **4.6.1 Announcements**

#### **4.6.1.1 Destination Announcements**

When a bus is approaching a bus stop, one or more announcements shall be made for such approaching bus stop. Requirements, capabilities, or features of the announcement system shall include:

- Meet Americans with Disabilities Act (ADA) requirements for the bus stop announcements.
- Make line and destination location announcements prior to and upon arriving at bus stops.
- Include pre-defined announcements in Spanish in addition to English.
- Allow administrator to program:
  - Bus stops at which announcements will be made.
  - Distance or time of announcement(s) prior to the bus stop.
  - Multiple occurrences of announcement for a given bus stop, including upon arrival.
  - Type of announcement (visual, interior audio, and/or exterior audio) by bus location.
  - The use or non-use of the Spanish language announcements.
  - Disabling of exterior audio announcement by time of day.
  - Destination description by street, intersection, location, or landmark.
- If bus goes off-route, disable announcements until bus returns to the assigned route.
- If an unscheduled stop is made, continue to make correct next bus stop announcements.
- Make audio and visual “Stop Requested” announcements and clear when a door is opened.
- Display time and/or operator name periodically or at pre-defined locations.
- Automatically make other pre-defined announcements periodically or at pre-defined locations.
- Allow operator to manually invoke the pre-defined announcements.
- Allow operator to disable AVA system in the event of malfunction.

#### **4.6.1.2 Stop Announcement Database**

The AVA system shall include a database of the audio and visual bus stop and other pre-defined announcements. Contractor shall initially set up the database including all announcements, which shall be subject to review and approval by MTD. The database shall include necessary administrative tools for MTD to easily modify announcement parameters for individual bus stops including but not limited to

announcement content, location, frequency, and type. The AVA announcements shall be resident on the onboard systems. Any modifications to the database shall be updated via the Yard Wireless System.

#### **4.6.1.3 Visual Announcement Signs**

Contractor shall provide and install inside each bus one electronic variable display sign for visual bus stop and other pre-defined announcements. Requirements or capabilities of the signage shall include:

- Mount sign above and behind the driver compartment facing the rear of the bus.
- Use text of sufficient size, brightness, contrast, and clarity to be readable by persons with normal vision from anywhere in the bus under typical day and night ambient lighting conditions.
- House sign in a vandal-resistant enclosure with a scratch resistant faceplate lens.
- Conceal cable connections to the sign enclosure behind the sign.

#### **4.6.1.4 Audio Announcement Equipment**

Audio announcements shall be made using the existing public address (PA) system and equipment onboard each bus. The Clever Devices SpeakEasy II hands-free announcement system is installed on all buses except the Nova and electric shuttle fleets. The AVA system shall be interfaced with the PA system to control interior and exterior announcements to the correct speakers. MTD shall retain responsibility for the condition of the existing PA system to the extent that it is not damaged by the Contractor. Requirements, capabilities, or features of the audio announcement system shall include:

- Use ambient noise measurements to automatically control volume for audio announcements.
- Allow operator to override ongoing audio announcement through driver PA system.
- Allow operator to override AVA-determined volume level within a specified range.

#### **4.6.2 Headsign Control**

Using information from the AVL system, the AVA system shall control existing MTD electronic headsigns on buses so equipped to automatically display the correct bus line, general service message, or out-of-service status. Such control shall be of all exterior headsigns including those on the front, side, or rear of the bus. See *Appendix 2* for a summary listing of MTD's revenue vehicle fleet including key vehicle information and contacts for relevant bus equipment. Requirements, capabilities, or features of the headsign system shall include:

- Provide the drivers and data in the format necessary to control and interface with the headsigns.
- Not inhibit or degrade the use or performance of the existing headsign system.
- Allow administrator to program and modify the location at which headsign changes shall occur.
- Modify the Nova fleet headsign ODK's to include a J1708 interface.

### **4.7 VEHICLE HEALTH MONITORING (OPTION)**

#### **4.7.1 General Description**

The Vehicle Health Monitoring subsystem (VHM) shall continuously monitor the functionality, performance, and operation of onboard equipment that is equipped with a programmable controller for operator-controlled functions and indications. VHM shall provide detailed operational vehicle fault, alarm, and performance information that allows Operations and Maintenance to efficiently respond to maintenance issues. See *Appendix 2* for a summary listing of MTD's revenue vehicle fleet including key vehicle information and contacts for relevant bus equipment. At a minimum, VHM shall interface with, monitor, collect and report data for the following systems that are equipped with digital interfaces:

- All Onboard AIM subsystems
- Electronically-controlled engines & transmissions
- Brakes (anti-lock and condition monitoring)
- Air conditioners
- Electric vehicle battery monitoring and management systems
- Fire suppression and event data recorder systems
- Multiplex-interfaced equipment (e.g., doors, wheelchair lifts, lights, etc.)

#### **4.7.2 Data Collected**

Equipment data collected shall generally fall into four categories: status, performance, code-generated events, and alarm-generated events. MTD understands that the categories, detail, and frequency of information collected by VHM will be limited to that generated by each particular onboard equipment type. At a minimum, it is expected that VHM shall collect and report the following information:

- Any codes generated by interfaced equipment
- Engine and transmission temperature
- Engine, transmission, and radiator fluid pressures and/or levels
- Air, charging, interlock, and A/C system status
- Vehicle speed
- Throttle and brake position activity

##### **4.7.2.1 Alarm Reporting**

Contractor shall determine which VHM data collected shall be defined as an alarm-generating event that necessitates immediate notification to Operations and Maintenance for consideration of a roadcall. Such determination shall be in consultation with MTD and using manufacturers' recommendations. VHM shall immediately transmit and display such alarms to the onboard MDT, the Dispatch Center, and to the Maintenance workstation.

##### **4.7.2.2 Data Communication**

VHM shall communicate collected information to AIM servers and the TDB via the Yard system WLAN. VHM data shall also be directly available on each bus through connection to a laptop computer. As indicated above, alarms shall be immediately reported to Operations and Maintenance which shall be via the wireless data radio/cellular communications system.

##### **4.7.2.3 Administration & Monitoring Points**

VHM settings and reports shall be accessed and managed through fixed AIM consoles. VHM shall provide for the configuration of monitoring points for relevant data collected (e.g., set the oil pressure level at which an alarm shall be generated) which shall be disseminated to the fleet via the yard WLAN. VHM shall employ frequency and duration threshold algorithms to ensure that false positives and nuisance codes are eliminated based upon MTD experience.

#### **4.7.3 Onboard Interfaces**

VHM shall include on each bus a vehicle logic that supports seamless integration with onboard systems via a digital interface. VHM shall function with mobile equipment that is equipped with a programmable controller and a SAE J1587/J1708/CAN or SAE J1939 communications link. The VHM subsystem shall also be capable of communicating with devices using the APTA-TCIP\_S-01 3.0.3 protocols. Fleet

vehicles with multiplex systems shall be monitored via J1708/J1939 and/or RS232/485 utilizing multiplex gateways. Fault data captured shall be associated with flash codes and fault descriptions from the sub-system manual to expedite the diagnostics and troubleshooting process. Contractor shall provide any proprietary gateways or translator boxes needed to translate the data into a format that can be read and manipulated by the applications resident on the MTD Network.

## **4.8 AUTOMATIC PASSENGER COUNTERS (OPTION)**

### **4.8.1 General**

Contractor shall provide, configure, and install an Automatic Passenger Counter (APC) system on all MTD buses that shall automatically collect passenger boarding and alighting counts. See *Attachment 2* for a summary listing of MTD's revenue vehicle fleet including key vehicle information and contacts for relevant bus equipment. Requirements, capabilities, or features of the APC system shall include:

- Keep count of all passengers boarding and alighting by each doorway for each door open/close cycle by date, time, and location.
- Keep separate count of all wheelchair passengers boarding and alighting for each wheelchair lift or ramp cycle by date, time, and location.
- Correlate and store passenger/wheelchair counts by bus, run, trip, line, schedule, and bus stop.
- Include a comprehensive set of passenger data reports including detailed and summary passengers by bus, run, trip, line, bus stop, including on a per hour and mile basis.
- Include and indentify counts from unscheduled locations, including detours.
- Store and retain onboard fourteen days of recorded APC data.
- Upload and save all APC data collected in an APC database on the fixed AIM network.
- Provide accurate passenger accumulated count data that shall be within 5% accuracy for each 1,000 consecutive boardings and each 1,000 consecutive alightings.
- Provide accurate stop-by-stop count data that shall be fully accurate for 85% of all door cycles; within one passenger for 90% of all door cycles; and within two passengers for 97% of all door cycles. This shall include stops for which there was no observed boarding or alighting activity.
- Remove clearly erroneous or other data that would otherwise improperly affect statistical results due to sensor failures and temporary or unanticipated changes to scheduled routes.
- Provide means of setting various filtering thresholds for determining erroneous data.

### **4.8.2 AIM Interface**

The APC system shall interface with the Onboard AIM system to determine, record, and store passenger count data. Such interface shall correlate the counts to the bus, run, trip, line, schedule (time), and bus stop (location) using the AVL and other pertinent AIM systems as necessary. The APC system shall use the AIM Yard WLAN to upload passenger count data from the buses and to download new schedule and route information to the buses.

### **4.8.3 National Transit Database (option)**

The APC system shall collect passenger data that is in compliance with the FTA's National Transit Database (NTD) requirements. Contractor shall perform all tasks required by the FTA to initially certify the APC system.

## **4.9 COMPUTER AIDED DISPATCH (OPTION)**

The AIM computer-aided dispatch (CAD) system shall enable core Dispatch Center tasks to be carried out via an AIM Dispatch Console, which shall be located at the Terminal 1 Dispatch office and at the Transit Center. See Section 5.2 for Dispatch Console hardware requirements. The Dispatch Console shall be the primary means of assigning, overseeing, and communicating with buses in revenue service; preparing and processing incident reports; and managing voice radio communications. AIM shall support multiple user groups (e.g., driver supervisors, operations managers, system administrator) with settable system rights and privileges. Dispatch Center Console functionality shall be available on other MTD workstations of MTD's choosing via a web-based application or similar means.

### **4.9.1 Dispatch Assignment & Oversight**

#### **4.9.1.1 Integration with Trapeze**

AIM shall be integrated with applicable Trapeze applications as necessary to meet these CAD specifications. MTD shall obtain the necessary licenses from Trapeze for such integration. Contractor shall be sufficiently knowledgeable of Trapeze software to carry out the required integration. Such bidirectional data transfer and synchronization with the TDB, Trapeze, or other AIM systems shall occur seamlessly without the necessity of intermediate applications or databases.

#### **4.9.1.2 Status Notifications**

Operations status entries shall be generated automatically by AIM when an out-of-tolerance condition is detected. AIM shall generate notifications for a number of bus conditions that shall include at a minimum: off route, schedule adherence variance, out late, missed relief, voice or data communications failure, and vehicle movements without a valid logon. Tolerances for determining abnormal conditions and the recipient and type of the resulting notifications shall be settable by the system administrator. Enabling, disabling, or changing the threshold for reporting of each condition shall be settable by the Dispatch Supervisor based on lines, vehicles, and times. Other requirements, capabilities, or features related to notifications shall include:

#### **4.9.1.3 Operator Log-In**

Contractor shall establish an interface between AIM and the farebox to enable a single login for both systems. If sign-on is through an MDT, manual farebox entries, including login, shall remain available through the farebox regardless of the status of AIM. Additionally, AIM shall:

- Validate bus operator-entered identification against assignment, line, run, and vehicle.
- Report entry of invalid bus operator identification to dispatch console.
- Allow correction of invalid driver login data from the dispatch console.
- Allow disabling of vehicle location information (e.g., for AVL system failure).
- Support supervisor control of onboard AIM devices from the dispatch console.

#### **4.9.1.4 Geographic Display**

AIM consoles shall display a geographic map representation of the MTD service area and route configurations that includes icons representing the real time location of MTD buses and applicable service vehicles. Such maps shall meet the following requirements:

- Include an up to date map of all public freeways, streets, and roads by name
- Permit zooming, panning and scrolling of the geographic display
- On highest-level map, show full MTD service area

- On lowest-level map, show all streets, roads, railroad tracks, water boundaries, jurisdictional boundaries, bus stops, transfer points, and significant landmarks within the displayed area
- Allow centering geographic display on and automatically tracking a specified vehicle
- Automatically center the display on a vehicle with an SAS status while the SAS is active.
- Allow centering on specified lines, stops, and time points.
- Use easily legible text without overlap at the lowest scale including within high-density areas where many buses will frequently appear in the same area
- Automatically adjust minor vehicle location discrepancies to show vehicle icons on streets
- Allow selection of vehicle icon to display text/tabular display data about such vehicle

#### **4.9.1.5 Text/Tabular Display**

AIM shall display the conditions, location, and route/schedule adherence of buses at the dispatch console. The display shall be a combination of geographic and text/tabular presentation. AIM shall display selected lists of data, including bus schedules, bus operator identification, assignments and schedules, pull-in/layover status, back in service time/place, schedule and route adherence, and passenger loading. AIM shall display assignments of operators to lines/runs, or vehicles on the Dispatch Center consoles, when selected from any console and at appropriate display detail levels.

#### **4.9.1.6 Reporting**

AIM shall collect operation and performance data and send to the TDB. AIM shall produce standard fleet management reports and a reporting tool for custom queries and reports. CAD shall collect information for and produce by user selectable time period or other parameters the following standard reports in tabular and graphical format:

- Bus Operations
  - Trip information including line, run, direction, vehicle, operator, miles, passenger boardings and alightings, wheelchair boardings and alightings, and revenue collected
  - Stop information including line, run, direction, vehicle, operator, miles, passenger boardings and alightings, wheelchair boardings and alightings, and revenue collected
  - Timepoint data including trip vehicle, line, run, and time of timepoint passage
  - Vehicle data including location, AIM equipment status, alarms, passenger counts, and schedule adherence
  - Summary data on trip number, line, run, day of week, time period, operator ID, vehicle ID, schedule adherence, passenger boardings and alightings, wheelchair boardings and alightings, and revenue collected. Summaries shall be for weeks, months, quarters, and years
  - Road call information and status
  - Terminal supervisor information such as bus and line assignments, action events such as bus calls and alarms, and terminal supervisor responses, all with time tags for analysis.
  - Current status of service showing active SAS, number of buses currently on routes, percent of fleet on time, percent of fleet late, and total number of calls currently in queues.
- Fleet Management
  - Revenue and non-revenue miles and hours
  - Schedule adherence
  - Bus assignments including changes

- Run cancellations
- Out late buses
- Service delays, including type, reason, length of delay, service loss, mileage lost
- Dispatch performance measured by call processing time categorized by problem type
- Passenger loading and alighting counts and door open/close times for each stop (option)
- Data for FTA NTD Report including passenger miles (option) and vehicle miles
- Bus availability, including reasons for unavailability
- Employee Management
  - Operator assignments and assignment fulfillment
  - Incident Reports involving operator error
  - Accident Reports
  - SAS reports by operator and line

AIM shall enable ad hoc selective retrieval of event records of bus, operator, driver supervisor, and terminal supervisor activities, by bus, operator, route, terminal supervisor, driver supervisor, and event type or time interval. Retrieval shall be by user-specified criteria, including the use of the logical operators. AIM shall make the selected event record available both at the console and to the TDB.

#### **4.9.2 Incident Reporting**

AIM shall support automatic and manual collection and entry of bus information for Incident Reports. For each Incident Report, AIM shall automatically record bus status, run, line, schedule deviation, time, bus operator identification, location, alarm status, other pertinent bus information, system date and time, console identification, and supervisor. Incident Reports shall accept from a console and record manually entered text, coded, combo-boxed or check-boxed notes, and an indication that the incident is closed or the report cancelled. The CAD Incident Report subsystem shall also include the following features:

- Automatically assign a unique alpha-numeric identification to each created Incident Report.
- Utilize at least three levels of MTD-defined alpha-numeric incident codes.
- Be searchable by any Incident Report data field.
- Automatically update vehicle status for applicable Incident Report codes.
- Send notifications for follow-up action to appropriate AIM of TDB systems (e.g., roadcalls).
- Allow recording of free-form text comments (i.e., memo field)
- Be exportable in a various formats (e.g., comma delimited, PDF, and MS Office applications).
- Maintain a log of Incident Report creations and modifications by user, date, and time.

#### **4.9.3 Call Routing (CAD option)**

AIM shall have the ability to manage two-way radio voice communications and other communications features provided as part of AIM (e.g., text messaging). Given MTD's relatively low call volume, direct voice communications from any system radio is allowed. While MTD does not presently use a queued Request to Talk (RTT) system, AIM shall provide for such capability for future use. CAD call routing shall include the following features:

- Patching of selected radio calls and intercom channels.
- Selection of audio output of call to either console headset or primary console speaker.
- Selection and playback of at least the last five radio connections.

- Transfer of a selected call recording to another console for playback.
- Option to bypass CAD call routing and directly use the existing Motorola two-way radio system.

#### **4.9.3.1 Call Queue Management**

AIM shall route specific vehicle or supervisor radio calls and messages to specific consoles as defined by users. Any unassigned calls or messages shall be automatically assigned to an active console by AIM. AIM shall provide functionality to transfer a terminal supervisor's work assignment and calls to another terminal supervisor if the first terminal supervisor must temporarily leave his or her console.

AIM shall manage the stream of voice radio calls made to the Dispatch Center, data messages from operators, bus alarms and similar events, and Incident Report reminders ("callbacks"), and present these as a queue to the assigned console(s). AIM shall provide comprehensive user tools for selecting the detailed methodology of handling calls within queues.

- Calls shall be sorted by priority by type (e.g., SAS, PRTT, RTT, Data, etc.)
- SAS calls shall always have top priority and shall generate an audible alarm.
- Supervisors shall have the ability to select any call in the queue at any time.
- The queue information shall be displayed in a scrollable window.
- For each call, the terminal supervisor shall have the option of opening an incident report.

#### **4.9.3.2 Outgoing Calls**

AIM shall enable console action to initiate a call, announcement, or text message to a selected vehicle, supervisor, or talk group either by entering the bus number, line/run number, operator identification, or by selecting from a list in a tabular display or an icon on a graphical display.

#### **4.9.3.3 Text Messaging**

AIM shall accept both keyboard-entered and selected pre-defined text messages at a dispatch console, and transmit those messages to the selected buses or supervisor vehicles. AIM shall allow terminal supervisors to append pre-defined text messages. AIM shall maintain a visible list of unacknowledged text messages, and shall inform the console user when the acknowledgement has not been received within a time determined by the system administrator.

#### **4.9.4 Silent Alarm System (CAD Option)**

CAD shall accept a silent alarm system (SAS) request activated from a covert switch on the bus. Ideally, the SAS shall be integrated with the existing two-way radio system SAS. Buses shall have at most one physical SAS switch. If the SAS option is selected, it shall be installed on all 106 MTD buses and two road supervisor vehicles. SAS shall be considered an option for 16 of the remaining 21 service vehicles (see *Attachment 4* for optional vehicles). When activated, the SAS shall:

- Issue an emergency alarm, including vehicle location, to the Dispatch Center Consoles (DCC).
- In buses so equipped, initiate covert microphones for continuous audio to the DCCs.
- Initiate video surveillance system incident tagging.
- Discreetly display the SAS activation to the bus operator.
- Cause exterior headsigns to display an emergency message.
- Update the vehicle location to the DCCs no less than every 15 seconds.
- Send discrete visual signal to operator when a DCC acknowledges receipt of SAS.
- Disable all DCC incoming calls, messages, audible alerts, etc. while SAS is active.

- Allow supervisor to override and disable an SAS using the DCC.

## **4.10 ROAD SUPERVISOR SYSTEM (OPTION)**

The AIM Road Supervisor System shall enable supervisors in road supervisor vehicles to manage fleet operations with the same functionality as the Computer-Aided Dispatch (CAD) system. The interface for such functionality shall be a Mobile Data Computer (MDC) mounted in each road vehicle. In addition, road supervisor vehicles shall include the AVL and data communications systems utilized by buses.

### **4.10.1 Mobile Data Computers**

The Road Supervisor System shall include a mobile data computer (MDC) that enables a road supervisor to manage fleet operations and perform dispatching duties. Subject to any limitations inherent with a portable, mobile device, MDCs shall meet the same functional and display requirements as the CAD dispatch consoles specified in this document. These functions include dispatch assignment and oversight, incident reporting, and call routing. The physical configuration of the MDC shall be that of a laptop computer that is sufficiently robust for its intended use. MDC devices shall meet the following requirements:

- Utilize a commercially available operating system such as Windows 7.
- Use current commercial technologies for all components including the processor, RAM, hard drive, video/audio cards, and DVD/CD-RW drive.
- Include manual controls to adjust audio level, video display intensity, keyboard lighting and LED or indicator intensity.
- Have an automatic (timed) and manual screen saver and sleep mode.
- Use a standard QWERTY keyboard with lighted or back-lit keys for night use that is protected from dust, particles, moisture and spills.
- Have at least one parallel and three 2.0 USB connections.
- Have required GIS software installed for CAD map viewing capabilities.
- Allow data entry and word processing without active wireless communications with AIM.
- Keep an audit log file of all communications.

#### **4.10.1.1 Environmental Requirements**

MDCs shall meet the following environmental and associated requirements:

- Meet operational requirements while exposed to temperatures from 45 to 105 degrees F and withstand 20 to 140 degrees F while not operational.
- Meet operational requirements while exposed to humidity of 30 to 80% and withstand 30 to 90% while not operational.
- Withstand exposure to dust conforming to MIL-STD-810E 510.3.
- Withstand exposure to liquids conforming to MIL-STD-810E 506.3.
- Withstand vibration of 3g and shock of 20g and conform to MIL-STD-810E 516.4.
- Not adversely affect vehicle electronics nor be adversely affected by vehicle electronics.
- Meet or exceed EIA204 and RS-374 mobile radio standards.
- Not emit signals that interfere with AM/FM radio reception or with portable/mobile voice radios.
- Shielded to protect from signals emitted by vehicle, other in-vehicle equipment (including cellular phones), and external EMI sources such as power lines.

- Capable of being mounted in vehicles with driver and passenger airbags and be airbag compliant.
- Operate with the standard vehicle electrical system without the need for converters or inverters.
- Conserve vehicle battery, including use of semi-active modes similar to Onboard AIM systems.
- Shut down X minutes after ignition shut off, where X shall be a system settable parameter.
- Provide short-term battery backup or equivalent to preserve critical information during brief power failures or during vehicle start-up.
- Full functionality during starter motor operation.

#### **4.10.1.2 Vehicular Mounting**

The MDC shall not in any way interfere with vehicle operation or create a hazard to personnel who need to exit the vehicle from any position in the vehicle. To deter theft, the MDC mounting shall be semi-permanent and require special tools or a key to remove the unit. Swivel mounted MDCs are shall have a positive means of locking in the desired position.

#### **4.10.2 Automatic Vehicle Location**

The Road Supervisor System shall include the same AVL subsystem used for the MTD buses and shall meet the same the requirements. AIM shall track the road supervisor locations with a reporting cycle of thirty (30) seconds or less. The AVL subsystem shall be integrated with the mobile computer and interface with the AIM GIS/mapping software applications. The GPS receiver shall meet the same requirements as the GPS receivers onboard the buses.

#### **4.10.3 Wireless Data Communications**

The MDCs shall be connected to AIM via a wireless data service. The Supervisor subsystem shall utilize the same data radio system or cellular data network used by the MTD buses for data communications. Such data communication equipment for the Supervisor subsystem shall meet the same requirements as the data communication equipment onboard the buses.

All control of the modem such as channel selection shall be handled automatically by the modem. No manual channel selection by the user shall be required. Contractor shall be responsible for registering the modems with the service provider for the communications service and obtaining and programming the IP address and multicast address for each modem. All modems shall be configured for the same multicast group. Contractor shall act as liaison to the service provider services for MTD. Contractor shall interface with the designated service provider to establish the data service.

If necessary Contractor shall provide and install a mobile antenna that is compatible with the data modem and durable to withstand the rigors of the public transportation environment.

## 5 AIM HARDWARE

### 5.1 AIM NETWORK

AIM shall include a separate local area network (LAN) that shall be housed in the MTD server room on the 2<sup>nd</sup> floor of the Administration Building. As indicated in Section 2.2.1, it is MTD preference that Contractor make use of existing MTD network equipment to the extent feasible. Also see Section 3.2.4.1 for related information concerning the AIM network interfaces. If required, Contractor shall use standard networking hardware, including switches, bridges, and routers that incorporate SNMP management. The AIM LAN shall be configured for high availability and operational flexibility, using the most current commercial technologies. It shall be designed to operate seven days per week, twenty-four hours per day. The AIM LAN hardware shall be capable of being managed from the Server Room and up to two designated workstations in the Administration Building.

### 5.2 DISPATCH CENTER CONSOLES

#### 5.2.1 Workstations

**The dispatch and Transit Center supervisors shall each utilize a single MTD-provided workstation to carry out AIM CAD system functions as well as all other supervisor computer-related tasks (e.g., e-mail, word processing, Trapeze OPS, etc.), Such workstations, other than the displays or any ancillary audio devices for the CAD voice radio system, shall be provided by MTD and not be the responsibility of the Contractor.** The MTD workstation shall have the specifications listed below. If these specifications are deemed insufficient for meeting the demands of the Dispatch Center Consoles, Contractor shall inform MTD of the deficiencies which shall be upgraded by MTD.

- Intel i7 quad processor
- Add-in graphics card with two HDMI connectors
- 8GB of random access memory
- SATA III storage device on 6GB bus

#### 5.2.2 Displays

Contractor shall provide new display screens for each of the two Dispatch Center Console. The screens shall be of sufficient quantity, size, and resolution as determined by the Contractor to simultaneously carry out both CAD and non-AIM functions.

#### 5.2.3 Console Audio Hardware

If the CAD voice radio control option is selected, then the following audio-related hardware specifications and requirements shall apply to the two Dispatch Center Consoles.

##### 5.2.3.1 Audio Jacks

Contractor shall provide two headset interface jacks with each console. The jacks shall be located at a convenient location in the supervisor area. The jacks shall include a volume-control adjustment with a minimum-volume stop and shall include a pre-amplifier for the headset microphone.

##### 5.2.3.2 Speakers

Contractor shall provide speakers which shall be located on the work surface of the console. Select and unselect audio speakers shall have individual volume controls located on the enclosure. Mute capability

shall be provided for the unselect speaker. Each select and unselect audio speaker shall be a 5-watt (min), 8-ohm speaker.

### **5.2.3.3 Microphone**

Contractor shall provide a noise-canceling, gooseneck microphone for use with the console.

### **5.2.3.4 Headsets**

Contractor shall furnish Plantronics-style headsets that meet the following requirements:

- Headset coil cord shall measure 15 feet.
- Microphone shall be a noise canceling type compatible with the audio preamp.
- Ear set shall be a 300-ohm receiver with cushioned earpieces.
- Microphone and ear set shall be attached to a padded, adjustable leather headband.
- Coil cord plug shall match the audio jack receptacle type.

## **5.3 ONBOARD EQUIPMENT**

### **5.3.1 Control Devices**

#### **5.3.1.1 Onboard AIM Processor**

In these specifications, the Onboard AIM Processor is considered the onboard electronic processor that controls some or all onboard AIM system functions. The Onboard AIM Processor shall:

- Be of sufficient computational capacity to support all onboard AIM systems plus 50%.
- Provide for multi-protocol communications with all in-vehicle AIM devices, and external devices.
- Maintain and provide precise timing to all in-vehicle components, utilizing GPS time from the AVL subsystem as the synchronization reference.
- Collect data from other elements, determine status of the bus and shall control communication of this information via the data radio or cellular data modem.
- Use self-diagnostic software and that includes self-restarting of processes. Stability of the software shall be enforced through rigorous testing, as per IEEE quality assurance requirements.

In addition to other functions delineated throughout these specifications, the Onboard AIM processor shall monitor onboard AIM systems to detect failures, disconnected equipment, or missing equipment. The nature of any detected failure, including its location and time, shall be logged on the bus and reported to the Dispatch Center in real-time, as requested, or as scheduled. This data shall be downloaded to the AIM network at the end of the day when the bus returns to the yard.

#### **5.3.1.2 Mobile Data Terminal**

Should a mobile data terminal (MDT) in the bus operators compartment be required for the onboard AIM system, the following requirements shall be applicable:

- MDT mounting location shall be reviewed with and subject to approval by MTD.
- If MDT is mounted via a flexible arm, such arm shall be lockable into a given position and designed to prevent autonomous swaying, movement or vibration throughout its useful life.
- Vehicle wiring connections to the MDT shall be to connectors exterior to the MDT. Cable “stub outs” are unacceptable.

- Contractor shall furnish the complete software, instructions, test procedures, tools, and data to re-load the MDT.
- Contractor shall furnish a mechanism for loading software updates into all vehicles in a managed process within a three- hour period, via the wireless LAN.

### **5.3.2 Environmental Requirements**

All Onboard AIM equipment shall be suitable, designed, built, and installed for the harsh bus rapid transit operating environment. The AIM onboard equipment shall operate properly under the environmental conditions pertaining to temperature, humidity, dust, dirt, power variations, vibration, condensation, and electrical interference. All Onboard AIM equipment housings shall be weather and dust-proof to prevent degradation from exposure to moisture or dust raised by interior cleaning. Any equipment installed on the exterior of the bus (including cable runs under the floor) shall be thoroughly sealed in a manner approved by MTD, to prevent leakage of rain or bus washing water, detergent and solvents into the bus throughout the life of the installation.

The Onboard AIM bus equipment shall be designed to operate on buses providing 12 VDC and 24 VDC. The equipment shall operate reliably from the bus' direct current power source of 10 to 18 VDC and 20 to 36 VDC, without malfunction. 12 VDC and 24 VDC is available for the Onboard AIM equipment on the diesel and hybrid buses. 12 VDC is available on the electric shuttles.

#### **5.3.2.1 Energy Conservation**

The Onboard AIM equipment shall be designed to conserve vehicle battery power. Equipment shall have the ability to enter a "sleep" or idle mode when the vehicle run switch is turned off or after a predetermined time thereafter. Contractor shall submit to MTD for approval current draw information for the Onboard AIM equipment while the Onboard subsystem is in active, idle, and "sleep" mode.

#### **5.3.2.2 Power Conditioning**

The Onboard AIM equipment power supply shall include adequate filters and components to regulate the voltage supplied by the bus and render it devoid of power spikes and noise which could contribute to erroneous registration, data generation and recording. Provisions shall include elimination of electronic interference caused by such items as, but not limited to florescent light power units, bus alternators, air conditioning units, fare collection equipment, and other accessories characteristic of MTD buses. Adequate protection against transient surges on the bus power supply shall be incorporated to the extent necessary to prevent damage to electronic components. All J1708 devices shall be of a wide DC input range covering 8-36 VDC input. Contractor shall be required to access fused power from a location identified by MTD for the Onboard AIM equipment. Suitable wiring shall be identified by Contractor and approved by MTD prior to installation of the wiring by Contractor.

#### **5.3.2.3 Electromagnetic Interference**

Contractor shall ensure that the electrical and electronic components and subsystems shall operate without being affected by or causing harmful electromagnetic interference (EMI). Protection shall be provided against radio frequency interference (RFI) emission sources, as well as internal conductive or inductive emissions. The Onboard AIM equipment shall be unaffected by interference such as radiation from bus equipment, including radio, lights, farebox, electronic destination signs, air conditioners, and generators. With the exception of the equipment required for radio communications, the AIM equipment shall not emit measurable EMI or RFI capable of interfering with any other onboard electronic device or system. If, following installation of onboard equipment, it is determined that there is unacceptable EMI, Contractor shall implement corrective measures to reduce EMI as necessary.

### 5.3.2.4 Testing Standards

The Onboard AIM equipment provided by Contractor shall comply with the following standards:

Test/Standard	MIL-STD 810C	MIL-STD 810D	MIL-STD 810E
Low Pressure	500.1/Procedure 1	500.2/Procedure 1	500.3/Procedure 1
High Temperature	501.2/Procedure 1,2	501.2/Procedure 1,2	501.3/Procedure 1
Low Temperature	502.1/Procedure 1	502.2/Procedure 1,2	502.3/Procedure 1
Solar Radiation	505.1/Procedure 1	505.2/Procedure 1	505.3/Procedure 1
Rain	506.1/Procedure 2	506.2/Procedure 2	506.3/Procedure 2
Humidity	507.1/Procedure 2	507.2/Procedure 2	507.3/Procedure 2
Salt Fog	509.1/Procedure 1	509.2/Procedure 1	509.3/Procedure 1
Dust	510.1/Procedure 1	510.2/Procedure 1	501.3/Procedure 1
Vibration	514.2/Procedure 8,10	514.3/Procedure 1	510.3/Proc 1, Cat 10
Shock	516.2/Proc 1,2,3,5	516.3/Proc 1,3,4,5,6	516.4/Procedure 4
Applicable Environmental Standards:	EIA 316-B Shock, Vibration, Dust, and Humidity		

## 5.4 INSTALLATION

### 5.4.1 General Requirements

Contractor shall be responsible for the proper installation of all AIM equipment including necessary labor, mounting devices, wiring, fasteners, materials, supplies, and tools. Such installation shall be performed in a workman-like and expeditious manner using industry standard practices and procedures. MTD shall have the right to inspect installations for quality and workmanship, notwithstanding that such inspection or failure to conduct such inspection shall not relieve Contractor of any responsibilities under this Agreement or Specification. MTD reserves the right to specify installation details on the job site.

### 5.4.2 Yard WLAN

Contractor shall provide a detailed description of installation plans for the Yard wireless LAN subject to approval by MTD. Design drawings shall show installation details of all equipment, cables, conduits, power connections, and associated work. Contractor shall coordinate the schedule for installations at the yard with MTD, giving at least seven days notice prior to installation. The AIM Yard Subsystem shall be installed in a manner to protect the equipment from vandalism and the elements, and yet provide reasonable access. Connectors that are exposed to the elements shall be of the weather pack type.

### 5.4.3 Onboard Equipment

Contractor shall provide a detailed description of installation plans by class of vehicle. This shall include location of drilled holes, power feeds, and final location of all AIM equipment, and final location of the MDT (if required) in relation to the operator's position. The installation plan shall be submitted for MTD's approval no less than 30 days prior to installation of the AIM equipment. One prototype installation of all Onboard AIM equipment shall be made on each MTD vehicle type. MTD shall have the right to inspect and approve this installation before any other installation work is performed.

### **5.4.3.1 Wiring**

All wiring in buses shall be properly grounded and protected from chafing, and installed in the plenum (air handling) spaces, except as approved by MTD. Cabling shall be appropriately rated for the plenum installation. No PVC jacketed cable shall be utilized within the vehicles. Any undercarriage wiring shall be suitably protected against the road elements and fastened in a manner so as not to sag or interfere with normal bus operation and/or maintenance. No “butt connectors” shall be utilized under the bus. Exposed wire bundles inside the vehicle shall be securely anchored and carried in loom, plastic sleeve, or tightly laced. All cable assemblies shall be secured to minimize failure due to vibration and chafing. Grommets shall be used in all holes used by Contractor to minimize cable damage due to chafing. All wiring exposed within the passenger compartment of any bus shall be armored, isolated, and protected when going through drilled holes, through bulkheads, and within brackets.

Contractor shall install or verify previously installed DC wiring to ensure integrity, fusing and current capacity for the installation. All DC wiring shall be direct from the battery distribution block and shall include both A+ and A- cables. Further, both A+ and A- cables shall be adequately fused at both the battery end and the AIM end with replaceable fuses. Signal and power cables shall not be intermingled in cable runs.

### **5.4.3.2 Bus Availability & Installation Log**

All vehicle installations shall be performed at MTD’s Olive Terminal unless otherwise approved by MTD. MTD shall make vehicles available for installation to the maximum extent feasible although a maximum of two bays with hoists shall be available at any given time. No less than three buses shall be available at any given time during regular service weekdays between 6 AM and 7 PM. Greater numbers of vehicles can be made available during nights and weekends. An MTD employee will be made available to move buses for installation within the yard for installation purposes.

Contractor shall maintain a log of installation events by vehicle that shall include shall include equipment model and serial numbers, date, and software version (if applicable). The log shall be available for review by MTD and shall be delivered to MTD in electronic form when the mobile installation work is complete.

### **5.4.3.3 Equipment Modification & Removal**

If the installation of any AIM equipment requires modification or replacement of bus equipment (e.g., handrails, power supplies, mounting brackets, etc.) Contractor shall be fully responsible to provide and install such replaced or modified equipment. Any equipment permanently removed from vehicles under the project shall be labeled by vehicle number and boxed in containers for storage by MTD unless directed otherwise by MTD. Contractor shall use care in removing equipment in order to maintain the intrinsic value for later sale or disposal and shall not damage the vehicle or other MTD property. Cables shall be removed intact where possible and severed only when necessary.

## **5.5 DELIVERY**

MTD shall be notified in writing at least one week in advance of each proposed delivery date of AIM equipment, materials, and supplies. Equipment shall be delivered to MTD FOB Santa Barbara in heavy-duty boxes labeled to identify the equipment type enclosed. Equipment shall be delivered to an inside location designated by MTD. Each shipment shall be accompanied by an inventory list showing the quantities, serial numbers, and brief description of all items.

## 6 TRAINING & MANUALS

### 6.1 TRAINING

#### 6.1.1 General Requirements

Contractor shall provide training on the setup, installation, configuration, administration, operation, and maintenance of all AIM systems and equipment. General training requirements include the following:

- All training shall be onsite at MTD's Olive Terminal.
- Training courses shall have been professionally developed.
- Course materials shall accurately reflect the MTD-specific policies and equipment configuration.
- Training shall be hands-on using the same equipment and configurations that will be used live.
- Contractor shall provide training materials, tools, and equipment in sufficient quantity to support effective, hands-on training for all course attendees.
- Course documentation shall be of sufficient quality for long-term usage.

#### 6.1.2 Training Plan

Contractor shall submit a proposed training plan to MTD at least one month prior to the beginning of training. The training sessions shall be scheduled to be as close to but not before any AIM systems go live. The training plan shall include the following information:

- A proposed schedule for all training sessions taking into account employee availability
- A copy of actual training documentation and materials to be used in each course
- A list of Contractor-provided equipment, tools and test equipment, manuals, etc. to be used
- A list of any training site requirements (e.g., class sizes, equipment needs, internet access, etc.)

#### 6.1.3 Courses & Trainees

Contractor shall base training courses on the manual types and user groups identified in Section 6.2 below. There shall be two exceptions:

- The *Onboard Equipment & Systems Operation* class shall be with up to five MTD trainers rather than directly with bus operators. MTD trainers shall be responsible for providing driver training.
- There shall be an additional course for managers that provides an overview of the AIM systems including capabilities and limitations, data collected, and how to access and run reports.

### 6.2 MANUALS

#### 6.2.1 General Requirements

Contractor shall provide manuals that shall support MTD personnel in the setup, installation, configuration, administration, operation, and maintenance of all AIM systems and equipment. Manual shall meet the following requirements:

- Be organized in a clear, logical fashion with table of contents, index, and definitions.
- Be sufficiently comprehensive and detailed to enable MTD to fully operate and maintain AIM systems with little or no assistance from or reference to outside sources.
- Be specific to the MTD installation and incorporate information gathered during installation and acceptance testing.

- Provide MTD unlimited rights for duplicating and disseminating manual information for purposes related to the MTD AIM installation.
- Include safety procedures and precautions necessary to prevent damage to equipment, injury to personnel, and unsafe operational conditions.

### 6.2.1.1 Hardcopies

Contractor shall deliver to MTD the quantities of manuals specified in Section 6.2.2 in hardcopy format. Manuals shall be designed for continuous, long term service in its intended environment (e.g., a bus or shop). Manuals shall be double-sided, lie flat when opened; and permit adding and replacing pages.

### 6.2.1.2 Softcopies

Contractor shall deliver to MTD an electronic version of all manuals that are equivalent to the hardcopy versions. The files shall be in Adobe PDF format created from original electronic documents, not from scanned documents. Two full sets of the electronic manuals shall be provided via CD-ROMs or DVD-ROMs which shall be accessible on an MS Windows-based personal computer.

## 6.2.2 Manual Types & Users

Manuals for AIM systems shall be developed with specific MTD user groups in mind differentiating between administration, operation, and maintenance. The types should generally cover the following:

Manual Type	Primary User Group	Copies
Onboard equipment & systems operation	Bus Operators	170
Dispatch Center equipment & systems operation	Driver Supervisors	25
Onboard equipment & systems operation	Road Supervisors	25
Yard location equipment & systems operation	Driver Supervisors & Mechanics	38
Onboard & yard equipment maintenance	Mechanics	20
Report creation, generation & administration	IT & Staff (varies by AIM System)	tbd
AIM system applications administration	IT & Staff (varies by AIM System)	tbd
Server, network, database admin & maintenance	IT Personnel	3

## 7 SPARES & TEST EQUIPMENT

### 7.1 SPARES

Spare equipment and components shall be provided as described below. Such equipment shall include all required connectors, cables and mounting hardware. All equipment shall have been factory tested per the requirements of Chapter 8 of these specifications. Each shipment shall be accompanied by an inventory list showing the quantities, serial numbers, and brief description of all devices.

- Ten (10) full Onboard AIM systems sufficient to fully equip ten MTD buses
- One (1) Onboard Supervisor subsystem sufficient to fully equip one road supervisor vehicle
- One (1) Transit Center passenger information system electronic display sign
- One (1) wireless LAN Access Point of type implemented in bus yard

### 7.2 TEST EQUIPMENT

#### 7.2.1 Mobile Test Sets

Contractor shall furnish a complete mobile test set. The mobile test set shall include a fully functioning set of mobile equipment with a power supply mounted on a cart. The Onboard AIM subsystem components shall be mounted on shelves such that each component shall be easily removable so that units under test can be quickly substituted and functional checks performed. All connectors shall be clearly and permanently labeled. The mobile test set shall also be used for training purposes.

#### 7.2.2 Mobile Programming Sets

Contractor shall provide a rugged duty laptop computer with licensed software, interfaces, and connector cables as necessary for programming and optioning of all mobile equipment for the buses and supervisor vehicles, and for database downloads. The programming and optioning software shall be conveniently organized so that technicians can rapidly and efficiently set up a complete Onboard AIM system, or any additional component as needed.

#### 7.2.3 Fixed Radio Programming Set

If a data radio system is implemented, Contractor shall furnish a laptop computer with software, interfaces, and connector cables as necessary for programming and optioning of all fixed radio equipment, including base stations. The laptop processor, memory, and hard disc capacity shall be as necessary to store and download software.

## 8 PROJECT MANAGEMENT

### 8.1 PROJECT MANAGEMENT PERSONNEL

#### 8.1.1 Project Manager

Contractor shall establish a Project Manager who shall be highly responsive to the needs of AIM as required in these specifications. The Project Manager shall provide or meet the following requirements:

- Coordinate design and engineering activities and provide a technical liaison to MTD.
- Have the authority to assign and schedule Contractor personnel to perform all of the work required by this Specification.
- Provide a single point of contact for MTD to resolve all issues related to the Contract.
- Be responsible for directing all Subcontractors' designs and work.
- Conduct project status meetings with MTD staff.
- Have a full and complete understanding of the contract documents and site conditions sufficient to provide adequate direction for coordination of work.
- Have at least three years experience in the implementation and management of mobile ITS projects and have completed at least one such project for a fleet in excess of 50 vehicles.
- Be on site during all significant project events including installation and testing and as necessary to facilitate meetings, project activities, and information flow between Contractor and MTD.

#### 8.1.2 Senior Technical Staff Member

Contractor shall establish a Senior Technical Staff Member (STSM). The STSM shall provide or meet the following requirements:

- Act as a technical resource for coordinating all system design and implementation issues.
- Check each technical submittal prior to its being sent to MTD for approval.
- Check factory wiring and field work to assure quality.
- Have sufficient understanding of the technical requirements of these specifications and site conditions to provide design direction and determine compliance of design submittals and work.
- Be a licensed professional engineer qualified to practice electrical engineering, or an engineer who qualifies as acceptable to MTD.
- Have a minimum of three years of experience in coordinating engineering and administrative support activities for similar projects.
- Be on site during all significant project events and as necessary to facilitate meetings, project activities, and information flow between Contractor and MTD.

### 8.2 PROJECT MEETINGS

#### 8.2.1 Types & Frequency

Project Manager and STSM shall arrange and conduct meetings with MTD or its agents as follows:

- Project kickoff meeting
- Monthly progress meetings
- Weekly teleconference calls
- Additional meetings, as necessary or reasonably requested by MTD

## **8.2.2 Location**

Progress meetings shall be held at MTD facilities unless otherwise specifically approved by MTD. Other meetings shall be held at a mutually agreeable location, conducive to the topic of the meeting. For any project meetings conducted by conference call, Contractor shall, at Contractor's expense, provide a conference call-in number.

## **8.2.3 Meeting Minutes**

Contractor shall prepare minutes for each meeting, unless specifically instructed otherwise by MTD. Contractor shall distribute the minutes to attendees within one week of the meeting. Minutes of the meetings shall include names of attendees, significant proceedings, decisions, unresolved issues, follow-up actions, and a list of information requested by MTD. The minutes shall include a summary of open action items, the party responsible for each, scheduled date for the action, and the respective resolution.

## **8.2.4 Agenda**

Contractor shall provide a draft agenda to MTD at least two days prior to each meeting and request that MTD add any additional items. Review of the previous meeting minutes and any outstanding action items shall be included on the agenda for each meeting.

# **8.3 SCHEDULE**

## **8.3.1 Detailed Contract Schedule**

Contractor shall develop, maintain, and update a detailed critical-path-method contract schedule using Microsoft Project or other similar software. The schedule shall show each activity, including interface activities, for completion of the work, and shall be properly ordered and sequenced. An electronic copy of the schedule shall be submitted for MTD review within 30 calendar days after NTP. The schedule shall meet the following requirements:

- Be sufficiently detailed to preclude the use of activity durations greater than 20 working days. Activity durations shall include allowances for lost time and inefficiencies.
- For each task designation, delineate the phase of the work, and the component of the work such as design, submittal, review, procurement, fabrication, delivery, installation, and testing.

## **8.3.2 Updates**

The schedule shall be updated monthly to show actual progress and changes to projected dates. Each update shall include a narrative describing the changes made since the last update. Each update shall be provided to MTD within 5 working days from month end and submitted with each invoice.

# **8.4 SUBMITTALS**

## **8.4.1 General Requirements**

This section describes requirements and procedures for preparing and transmitting information to MTD for review, acceptance or approval. General requirements are as follows:

- Transmit submittals sufficiently in advance of Contract requirements to permit at least fourteen (14) calendar days for review, checking and appropriate response by MTD.
- Use transmittal forms that are sequentially numbered and include revisions levels (A, B, C, etc.) for resubmittals;

- Examine submittal for accuracy and stamp and sign each submittal as follows: "Having checked this submittal, we certify that it conforms to the requirements of the Contract, except as otherwise indicated".
- Provide all submittals in electronic and hardcopy format. Electronic copies shall be in an Adobe PDF or Microsoft Office product format that is compatible with Office 2003. Unless indicated otherwise in these specifications, two full-sized hardcopies of each submittal will be provided.

#### **8.4.2 MTD Review**

MTD will review and approve or take other appropriate action upon Contractor's submittals. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of Contractor. MTD review will not constitute approval of safety precautions or, unless specifically stated by MTD, of any construction means, methods, techniques, sequences, or procedures.

Upon review of contractor submittals, one of the following dispositions will be sent to Contractor:

- **APPROVED:** Work may proceed, provided it complies with the Contract. The approval of documents, shop drawings and samples shall not be construed as:
  - Permitting any departure from the Contract requirements;
  - Relieving Contractor of responsibility for errors and omissions, including details, dimensions, and quantity of materials; or
  - Approving departures from details furnished by MTD.
- **APPROVED AS NOTED (Correct and resubmit):** Work may proceed, provided:
  - It complies with the Contract as well as the corrections on the submittals, and Contractor resubmits within seven (7) calendar days corrected copies of the documents, shop drawings, working drawings, or miscellaneous submittals for final approval; and
  - Work performed by Contractor prior to receiving final approval will be at Contractor's risk.
- **DISAPPROVED (Revise and Resubmit):** Work is not recognized as being able to proceed. Revise submittal in accordance with notations thereon, and resubmit without delay. Contractor shall handle re-submittals in the same manner as first submittals, except designated with suffix A, B, C, etc. to indicate the resubmittal. On resubmittals, direct specific attention in writing on resubmitted documents to the most recent revisions.

#### **8.4.3 Drawings**

Contractor shall be responsible for accuracy and correctness of all drawings. Contractor's Project Manager and STSM shall initial each drawing after checking it, indicating that it complies with all requirements of these specifications and accurately reflects intended or actual field conditions. Drawings that require a Professional Engineer's seal per California State Law shall be sealed and signed by Contractor's Professional Engineer before submittal.

Contractor shall prepare design, working, and shop drawings as are necessary to adequately perform the work. Mounting and installation drawings shall be accurately scaled. All symbols and abbreviations used shall be defined on each drawing or on a master symbol sheet.

#### **8.4.4 Product Data**

A submittal shall be prepared for each major piece of material or equipment. These product submittals shall contain a list of any parameters for which the submitted products do not meet these specifications and a description of how these changes will affect system design. Each submittal shall contain a description of any changes in design or products that the submitted products will cause. Each submittal shall contain sufficient information to determine that the system component complies with these specifications. All closely related products shall be submitted as a single package. When pre-printed material is used in a submittal, the specific model number and options to be furnished shall be clearly identified. Standard manufacturer data sheets can be used provided data that is not applicable to the project is deleted or marked as such.

#### **8.4.5 Testing**

Contractor shall develop testing procedures and carry out testing as appropriate for a project of this scope. Each test form shall include the following information which shall be made available to MTD upon request:

- Test description and purpose
- The manufacturer, model number and calibration date of each piece of test equipment
- A table to record individual readings taken and inspections performed for each unit tested, identified by the serial number of the unit tested.
- An indication that the unit has passed or failed each individual test
- The signature of the technician performing the test and date of the test

### **8.5 AS-BUILT DOCUMENTATION**

As a condition of acceptance, Contractor shall provide as-built documentation and drawings based on the actual design and installation plans for all AIM systems.

#### **8.5.1 As-Built Drawing Submittals**

Each design, working and shop drawing that was submitted for approval shall be modified to reflect the actual installed condition. Such drawings shall comply with the following:

- All nomenclature and labels shall correspond to the actual labels on the installed equipment.
- Each connection to each piece of equipment, junction box, or terminal block shall be identified by function and color code.
- All dimensions, physical details, connections, and other information pertinent to system diagnostics, maintenance or troubleshooting shall be shown.
- All drawings germane to a subject shall be submitted as a package with a cover sheet, index, and symbols and abbreviations table.

Final versions of the as-built drawings shall be submitted within two weeks after acceptance testing or maintenance training, whichever is later. Three hardcopies and an electronic version of final as-built drawings shall be submitted to MTD.

#### **8.5.2 As Built Software Documentation**

Contractor shall provide all software and data to allow MTD to fully maintain and update all applications software which shall include as-built versions of:

- Software Requirements Specification;

- Software Version Description Document, or equivalent;
- All "batch" or equivalent files, and all object libraries and "include" files, for editing, compiling, linking, and installing application software. Corresponding instructions shall also be provided.
- All files required to define, allocate, and load the database, and any other data files required to define, configure, load, or operate the system. Corresponding instructions shall also be provided.
- A list of the configuration parameters and their values including a list of potential problems if the configuration parameters are set to extreme values.

**Contractor shall provide source code and sufficient source code documentation in Escrow to permit modification of the delivered software without the necessity of contacting Contractor in the event Contractor is unwilling or unable to undertake such modifications.**

## **8.6 PROJECT CLOSEOUT**

### **8.6.1 Initial Survey**

Prior to requesting an initial closeout survey of AIM, Contractor shall ensure that the following conditions have been met:

- System acceptance tests have been conducted.
- Contractor has listed those items yet to be completed or corrected and has submitted a detailed plan of action and schedule for completion of the outstanding items.
- Contractor has submitted special guarantees, warranties, maintenance agreements, final certifications and similar documents.
- Contractor has obtained and submitted operating certificates, if required, final inspection and test certificates, and similar releases enabling full and unrestricted use of the work.
- Contractor has submitted operations and maintenance manuals and final as-built documentation.
- Contractor has delivered tools, including special tools, test equipment, standby equipment, and similar items.

Upon receipt of the request for initial survey, MTD will schedule a time for MTD and Contractor to inspect the work and prepare a list of exceptions, if any.

### **8.6.2 Final Survey**

Contractor shall perform the work necessary to complete and correct the items noted during the initial survey. Contractor shall provide written notice to MTD that the items have been completed and AIM is ready for final survey. Upon receipt of the notice, MTD will schedule a final survey to verify that all of the work items have been completed satisfactorily.

## **8.7 SYSTEM SUPPORT**

### **8.7.1 Prior to System Acceptance**

MTD intends to begin operating AIM after completion of the first incremental acceptance. At such time—after incremental acceptance and prior to System Acceptance—Contractor shall provide full support for the maintenance and operation of installed AIM subsystems; repair AIM equipment; and assist with data management and report generation. All requests by MTD for assistance shall be answered within one hour of a phone call, text message, or email from MTD. If necessary, on-site support shall be provided within two hours.

### **8.7.2 Post System Acceptance (Warranty)**

MTD shall carry out basic system administration, maintenance, and repairs/swap outs for which Contractor training is provided. Beyond these basic tasks, **Contractor shall provide on-call and on-site support as necessary to keep AIM operating per these specifications for a period of one year commencing with system acceptance (the warranty period).**

### **8.7.3 Maintenance Agreement (optional)**

**Contractor shall provide on-call and on-site support as necessary to keep AIM operating per these specifications for two one-year periods following the warranty period.**

## **8.8 QUALITY ASSURANCE**

### **8.8.1 Program Plan**

Contractor shall submit to MTD within sixty days of the NTP, a Quality Assurance (QA) Program Plan designed to ensure the quality of all activities—including design, purchasing, inspection, handling, assembly, fabrication, testing, storage, shipping, and warranty/repair work. The plan shall describe all quality control procedures of Contractor and any sub-suppliers. Contractor shall conduct regular inspections in accordance with guidelines defined by the QA Program Plan. Performance of any manufacturing or construction work shall not commence until the QA Program Plan relating to such work has been accepted by MTD. Upon request, Contractor's QA records shall be made available to MTD for inspection. Such QA activities performed (or not performed) by MTD shall not reduce nor alter Contractor's QA responsibilities or its obligation to meet the requirements of this document. At any time during the manufacturing process, MTD may choose to visit Contractor's facility or a subcontractor's facility during normal working hours to audit the manufacturing and quality control processes.

### **8.8.2 System Components**

Contractor shall conduct regular inspections and audits in accordance with guidelines defined by the QA Program Plan. Contractor's Project Manager shall establish a quality assurance process and assign qualified professionals to check all system components for compliance with the AIM specifications and consistency in production quality.

### **8.8.3 Manufactured Products**

Contractor shall utilize products manufactured by companies that utilize formal, documented quality assurance practices that meet or exceed the standard of care established by the industry. Contractor shall proactively monitor each supplier's quality system. Quality systems that conform to ISO 9000 practices are preferred.

## 9 DESIGN REVIEW

This chapter defines the requirements regarding submittals and formal design reviews. Additional submittals are required as appropriate to the work. The format for submittals shall be as per Section 8.4.

### 9.1 PRELIMINARY DESIGN SUBMITTAL

Contractor shall provide a detailed preliminary design submittal within sixty (60) calendar days of the Notice to Proceed. This submittal shall be reviewed with MTD to verify that all aspects of Contractor's design are in conformance with the specifications. The preliminary design submittal shall include a complete description and functionality of each AIM system and system component, updates to any technical information submitted with the proposal, and a detailed project schedule. Some of the key elements of the preliminary design submittal shall include but are not limited to:

- A draft software requirements specification document for any new functionality that is being developed for AIM with an emphasis on the user interfaces and interfaces to external systems.
- Data sheets for all major hardware and off-the-shelf software components.
- Description of the computer subsystem including servers, dispatcher workstations, monitoring workstations, yard workstation, interfaces, data archival, TDB, and installation information.
- Description of radio or wireless data communications systems including anticipated coverage maps. If applicable, the coverage map shall indicate the overlap coverage areas and areas where phasing delay will inhibit data.
- A description of the methodology for maintaining MTD's current route and schedule database in Trapeze and its interface with AIM. This description shall include how the database will be edited, handled, and interfaced to AIM; and the methodology for providing the database onboard each bus for tracking route and determining schedule adherence.
- Scaled drawings showing details of the passenger information electronic display sign hardware. The submittal shall also include a description of the display interface with the wired and/or wireless data network used to provide data to the sign and the details for the data network.
- Mockups of web pages for the time of arrival passenger information including a description of the website, a list of the pull down menus and items, a sample map display time of arrival tables.
- A description of the CAD user interface including AVL map displays, tabular displays, incident reports, SAS functionality, data communication functions, fleet management reports, AVL playback, incident reports, sample screens, a list of the pull down menus and items.
- Scaled drawings of the MDT with the exact key labeling and typical screen displays; and a description of the operator interface with the MDT including all prompts, displays, and menus.

### 9.2 FINAL DESIGN SUBMITTAL

Contractor shall provide a detailed final design submittal within three (3) months of the Notice to Proceed. This submittal shall be reviewed with MTD to verify that all aspects of Contractor's design are in conformance with the specifications. The final design submittal shall include a complete description of each AIM system and system component, updates to the technical information submitted in the preliminary design submittal, and an updated detailed project schedule. At a minimum, the overview shall provide details of each system and discuss any changes and updates that have been made since the preliminary design submittal.

### 9.3 DESIGN REVIEWS

Contractor shall conduct formal presentations of the Preliminary Design and the Final Design submittals for AIM. The design review presentations shall be scheduled approximately one week after the presentation materials have been submitted to MTD for review. Each design review shall be conducted according to the following agenda:

- Contractor shall present the design submittal in sufficient detail to demonstrate details of achieving compliance with the specifications. Use of mock-ups, samples, and demonstrations of the user graphical user interfaces is encouraged.
- MTD shall present issues and concerns for discussion.

Contractor shall furnish minutes of the design review meetings. MTD will follow up each design review with written comments on the design deliverable. Contractor shall address all of the MTD's issues and concerns in writing. At the sole discretion of MTD, if the issues and concerns warrant it, MTD may require an additional design review presentation or design review submittal.

## 10 TESTING & ACCEPTANCE

### 10.1 OVERVIEW

Contractor shall test all AIM systems, subsystems, components, equipment, hardware, software, interfaces, databases, reports, networks, communications coverage, map accuracy, or any other items or services provided under this Contract to assure that the system is compliant with these specifications, approved design concepts, and is free of manufacturing and/or material defects. Such tests shall be conducted in a multi-tiered program intended to identify and correct any deficiencies as early as practical so that overall impacts to the implementation of AIM are minimized. Successful test results shall be integral to the acceptance process by MTD. Contractor shall furnish all test equipment and test personnel. The test personnel shall be properly trained, experienced technicians who are familiar with the system.

### 10.2 TESTING PHASES

#### 10.2.1 Pre-Delivery

Applicable individual system components and subsystems shall be inspected and tested at Contractor's or manufacturer's factory prior to shipment to MTD. These factory tests shall fully exercise functionality of the systems in order to prove out design and interface characteristics. Factory testing shall be intended to simulate the installed environment as closely as practical. These inspections and tests shall verify that all system components contain the correct materials, are assembled properly, and function properly. Complete records shall be kept of all production inspections and tests that are performed including any failures and subsequent corrective measures. Such records shall be available to MTD upon request.

#### 10.2.2 Core First Article Testing

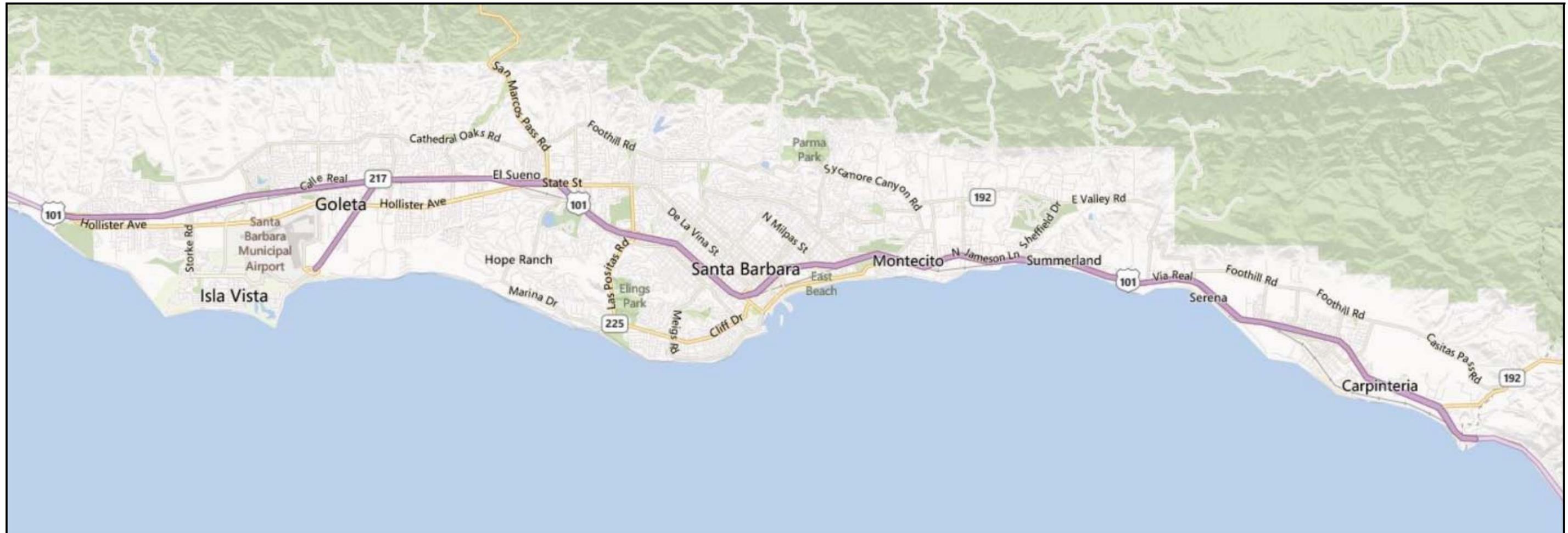
Core First Article (CFA) testing shall be conducted onsite with components installed on a selected set of MTD buses and service vehicles in order to demonstrate substantial progress and to identify and document the installed system component physical configuration. Such field testing shall prove out the system functionality prior to introduction to revenue service. CFA testing shall be performed with the AIM computer and communications systems implemented and interconnected via the AIM and MTD networks. Contractor shall provide MTD with a minimum of one week advance notice of CFA testing and shall provide MTD the opportunity to observe such testing.

Repeated malfunctions of similar system components or subsystems shall be considered as a Class Failure. In the event of a Class Failure, CFA testing shall be terminated and the cause of the Class Failure shall be determined and corrected. All system components that experience a Class Failure during testing shall be replaced by Contractor prior to acceptance by MTD. Following successful CFA testing, AIM shall be implemented on the full MTD fleet.

#### 10.2.3 Final Acceptance

Final acceptance testing shall be performed upon completion of the AIM installation while AIM is being used to support revenue service. Such testing shall be carried out over a minimum of 30 days with the goal of demonstrating that the entire fully integrated AIM system is in compliance with these specifications. Following acceptance testing, contractor shall prepare a report assessing the system performance indicating any deviations from these specifications. Corrective actions shall be suggested for any such deviations. MTD will review the recommended corrections and provide guidance to Contractor regarding Contractor's actions to correct any deficiencies.

### Appendix 1 MTD Service Area Map\*



\* MTD also operates the Coastal Express Limited route which travels between Goleta/Santa Barbara to and from the City of Ventura via Highway 101, which extends southeast beyond this map.

## Appendix 2

### Revenue Vehicle Summary

Year	Make	Nbrs	Model	Bus Qty	Door Qty	Front Door		Rear Door		System Types, Communications & Connectors					
						Width	Height	Width	Height	Comm Bus***	Headsigns**			A/C	Fire Suppression
1992	Specialty	to 11	22' Electric Shuttle*	6	1	44	72	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2000	E-Bus	after 12	22' Electric Shuttle*	14	1	42	72	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1998	Nova	401-428	40' Low-Floor Transit Bus	11	2	50	76	37	77	J1708	Luminator	Horizon (flip dots)	??	n/a	n/a
2000	Nova	429-433	40' Low-Floor Commuter Bus	3	2	50	76	37	77	J1708	Luminator	Horizon (flip dots)	??		n/a
2004	Gillig	700-710	29' Low-Floor Transit Bus	11	2	38	75	33	79	J1708	Luminator	Horizon (Gen 4)	J1708		n/a
2006	Gillig	711-713	29' Low-Floor Transit Bus	3	2	38	75	33	79	J1939	Luminator	Horizon (Gen 4)	J1708		n/a
2009	Gillig	715-717	29' Low-Floor Transit Bus-hybrid	3	2	38	75	33	79	J1939	Luminator	Horizon (Gen 4)	J1708		Amerex
2004	Gillig	600-614	40' Low-Floor Transit Bus	15	2	38	75	33	79	J1708	Luminator	Horizon (Gen 4)	J1708		n/a
2007	Gillig	900-907	40' Low-Floor Transit Bus-hybrid	8	2	38	75	33	79	J1939	Luminator	Horizon (Gen 4)	J1708		Amerex
2011	Gillig	908-915	40' Low-Floor Transit Bus-hybrid	7	2	38	75	33	79	J1939	Luminator	Horizon (Gen 4)	J1708		Amerex
2011	Gillig	615-621	40' Low-Floor Transit Bus	7	2	38	75	33	79	J1939	Luminator	Horizon (Gen 4)	J1708		n/a
2013	Gillig	622-634	40' Low-Floor Transit Bus	13	2	38	75	33	79	J1939	Luminator	Horizon (Titan)	J1939		n/a
2004	MCI	800-801	40' Commuter Coach	2	1	30	85	n/a	n/a	J1939	Luminator	Horizon (Gen 4)	J1708		Amerex
2004	MCI	802-804	45' Commuter Coach	3	1	30	85	n/a	n/a	J1939	Luminator	Horizon (Gen 4)	J1708		Amerex

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\* No doors: open air shuttle

\*\* All vehicle with headsigns have front, side, and rear units

\*\*\* Integrated bus systems include at minimum engine, transmission, brakes

### Contacts

Company	Name	Phone Number	E-Mail
Nova	Peter Cerantola	(514) 531-5362	<a href="mailto:peter.cerantola@volvo.com">peter.cerantola@volvo.com</a>
Gillig	Vincent Chan	(510) 264-3895	n/a
MCI	no contact	(800) 241-2947	n/a
Luminator	Tony Tapia	(214) 557-5735	<a href="mailto:atapia@luminatorusa.com">atapia@luminatorusa.com</a>
GFI	Mark Mahon	(847) 593-8855 x41	<a href="mailto:mark.mahon@spx.com">mark.mahon@spx.com</a>
Commline*	Jeff Fukasawa	(310) 390-8003 x112	<a href="mailto:jeff.fukasawa@commlineinc.com">jeff.fukasawa@commlineinc.com</a>
Trapeze	David Corbin	(602) 625-9728	<a href="mailto:david.corbin@trapezegroup.com">david.corbin@trapezegroup.com</a>

\*Commline provided and maintains MTD's MOTOTRBO two-way radio system.

### Appendix 3

## Revenue Vehicle Detail Listing

(Page 1 of 2)

Veh	Year	Make	Model	Description	Type	VIN	License
3	1992	Specialty Vehicle	n/a	22' Electric Shuttle	Battery	1S9BR14F1NC143507	354671
4	1992	Specialty Vehicle	n/a	22' Electric Shuttle	Battery	1S9BR14F5NC143509	354674
5	1992	Specialty Vehicle	n/a	22' Electric Shuttle	Battery	1S9BR14F1NC143510	354675
6	1992	Specialty Vehicle	n/a	22' Electric Shuttle	Battery	1S9BR14F3NC142511	354676
8	1992	Specialty Vehicle	n/a	22' Electric Shuttle	Battery	1S9BR14F9NC143523	354701
11	1992	Specialty Vehicle	n/a	22' Electric Shuttle	Battery	1S9BR14F3NC143508	1069351
12	2000	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS3123YC248028	1036203
13	2000	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS3123YC248029	1036206
14	2000	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS3128YC248026	1036226
15	2000	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS312XYC248027	1036225
16	2000	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS312XYC248030	1036231
17	2001	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS3121YC248031	1052152
18	2001	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS31251C248050	1052154
19	2001	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS31271C248051	1052155
20	2001	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS31291C248052	1052156
21	2001	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS31201C248053	1052157
26	2000	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS312X1C248034	
27	2000	E-Bus	n/a	22' Electric Shuttle	Battery	1EBS31231C248036	
28	2000	E-Bus	n/a	22' Electric Shuttle	Battery	1EBS31211C248035	1284494
29	2000	E-Bus	n/a	22' Electric Shuttle	Battery	1E9BS31271C248038	
401	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82PXW3000027	39694
402	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P6W3000011	39693
404	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P8W3000009	39698
405	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P2W3000006	39699
407	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82PXW3000013	44050
409	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P4W3000007	44052
410	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82PXW3000030	407418
411	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P9W3000004	44053
413	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P3W3000015	44055
414	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P5W3000016	44056
416	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P3W3000029	44059
417	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P7W3000017	44061
418	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82POW3000019	44060
419	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P1W3000028	44062
420	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P1W3000014	44063
421	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P4W3000024	44064
422	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVLY82P2W3000023	44066
424	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P9W3000018	44069
426	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P9W3000021	44085
427	1998	Nova	LFS 40102	40' Low-Floor Transit Bus	Diesel	2NVYL82P6W3000025	44086
429	2000	Nova	LFS 40102	40' Low-Floor Commuter Coach	Diesel	2NVYL82P4Y3000172	1036217
431	2000	Nova	LFS 40102	40' Low-Floor Commuter Coach	Diesel	2NVYL82PXY3000175	1036219
432	2000	Nova	LFS 40102	40' Low-Floor Commuter Coach	Diesel	2NVYL82P1Y3000176	1036220
433	2000	Nova	LFS 40102	40' Low-Floor Commuter Coach	Diesel	2NVYL82P8Y3000174	1036221
600	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201341074592	1110396
601	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201341074593	1180415
602	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201541074594	1180416
603	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201741074595	1180420
604	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201941074596	1180419
605	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201041074597	1180423
606	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201241074598	1180426
607	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201441074599	1180428
608	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201741074600	1180430

**Appendix 3**  
**Revenue Vehicle Detail Listing**  
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Veh	Year	Make	Model	Description	Type	VIN	License
609	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201941074601	1180429
610	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201041074602	1180432
611	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201241074603	1180431
612	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201441074604	1180434
613	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201641074605	1180436
614	2004	Gillig	G20D102N4	40' Low-Floor Transit Bus	Diesel	15GGD201841074606	1180441
615	2011	Gillig	G27D102N4	40' Low-Floor Transit Bus	Diesel	15GGD271XB1178923	1299918
616	2011	Gillig	G27D102N4	40' Low-Floor Transit Bus	Diesel	15GGD2711B1178924	1299919
617	2011	Gillig	G27D102N4	40' Low-Floor Transit Bus	Diesel	15GGD2713B1178925	1299923
618	2011	Gillig	G27D102N4	40' Low-Floor Transit Bus	Diesel	15GGD2715B1178926	1299920
619	2011	Gillig	G27D102N4	40' Low-Floor Transit Bus	Diesel	15GGD2717B1178927	1299921
620	2011	Gillig	G27D102N4	40' Low-Floor Transit Bus	Diesel	15GGD2719B1178928	1299922
621	2011	Gillig	G27D102N4	40' Low-Floor Transit Bus	Diesel	15GGD2710B1178929	1299924
622	2013	Gillig	G27D102N4	40' Low-Floor Transit Bus	Diesel	15GGD2716D1182759	1370669
623	2013	Gillig	G27D102N4	40' Low-Floor Transit Bus	Diesel	1566D271D1182760	1370670
624	2013	Gillig	G27D102N4	40' Low-Floor Transit Bus	Diesel		new
700	2004	Gillig	G19E102R2	29' Low-Floor Transit Bus	Diesel	15GGE191041090906	1180417
701	2004	Gillig	G19E102R2	29' Low-Floor Transit Bus	Diesel	15GGE191041090907	1180418
702	2004	Gillig	G19E102R2	29' Low-Floor Transit Bus	Diesel	15GGE191241090908	1180424
703	2004	Gillig	G19E102R2	29' Low-Floor Transit Bus	Diesel	15GGE191441090909	1180427
704	2004	Gillig	G19E102R2	29' Low-Floor Transit Bus	Diesel	15GGE191041090910	1180435
705	2004	Gillig	G19E102R2	29' Low-Floor Transit Bus	Diesel	15GGE191241090911	1180437
706	2004	Gillig	G19E102R2	29' Low-Floor Transit Bus	Diesel	15GGE191441090912	1180440
707	2004	Gillig	G19E102R2	29' Low-Floor Transit Bus	Diesel	15GGE191641090913	1180447
708	2004	Gillig	G19E102R2	29' Low-Floor Transit Bus	Diesel	15GGE191841090914	1180448
709	2004	Gillig	G19E102R2	29' Low-Floor Transit Bus	Diesel	15GGE191X41090915	1180449
710	2004	Gillig	G19E102R2	29' Low-Floor Transit Bus	Diesel	15GGE191141090916	1180450
711	2006	Gillig		29' Low-Floor Transit Bus	Diesel	15GGE191261090944	1215267
712	2006	Gillig		29' Low-Floor Transit Bus	Diesel	15GGE191461090945	1215268
713	2006	Gillig		29' Low-Floor Transit Bus	Diesel	15GGE191661090946	1215269
715	2009	Gillig	G30E102N2	29' Low-Floor Transit Bus	Hybrid	15GGE301591091440	
716	2009	Gillig	G30E102N2	29' Low-Floor Transit Bus	Hybrid	15GGE301791091441	1247230
717	2009	Gillig	G30E102N2	29' Low-Floor Transit Bus	Hybrid	15GGE301991091442	
800	2004	MCI	D4500	45' Commuter Coach	Diesel	1M8PDMPA14P056374	1180451
801	2004	MCI	D4500	45' Commuter Coach	Diesel	1M8PDMPA34P056375	1180452
802	2004	MCI	D4000	40' Commuter Coach	Diesel	1M8SDMPA24P056376	1180455
803	2004	MCI	D4000	40' Commuter Coach	Diesel	1M8SDMPA44P056377	1180454
804	2004	MCI	D4000	40' Commuter Coach	Diesel	1M8SDMPA64P056378	1180453
900	2007	Gillig	G19D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD191771077738	1215279
901	2007	Gillig	G19D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD191771077739	1215278
902	2007	Gillig	G19D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD191371077740	1215280
903	2007	Gillig	G19D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD191571077741	1215281
904	2007	Gillig	G19D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD191771077742	1215283
905	2007	Gillig	G19D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD191971077743	1215284
906	2007	Gillig	G19D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD191071077744	1215282
907	2007	Gillig	G19D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD191271077745	1215285
908	2011	Gillig	G30D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD3011B1179197	1299917
909	2011	Gillig	G30D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD3013B1179198	1299928
910	2011	Gillig	G30D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD3015B1179199	1299927
912	2011	Gillig	G30D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD301XB1179201	1299930
913	2011	Gillig	G30D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD3011B1179202	1299926
914	2011	Gillig	G30D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD3013B1179203	1299929
915	2011	Gillig	G30D102N4	40' Low-Floor Transit Bus	Hybrid	15GGD3018B1179200	1299925

### Appendix 4 Service Vehicle Listing

Veh ID	Year	Make	Model	Description	Miles	AVL	SAS	RSS
S89	2006	Ford	F-250 Utility	Bus Stop Truck	83,087	option	option	no
S91	2007	International	Tow Truck	Tow Truck	10,427	option	option	no
S94	2007	Toyota	Prius Hybrid	Staff Vehicle (Morris)	114,266	no	no	no
S95	2007	Toyota	Prius Hybrid	Staff Vehicle (Morse)	85,181	no	no	no
S97	2010	Ford	F-150 Pick Up	Shop Truck (Cardona)	54,597	no	no	no
S98	2011	Ford	F-350 Stakebed	Shop Truck	5,169	option	option	no
S99	2011	Ford	F-350 Utility	Shop Truck	2,921	option	option	no
S100	2010	Ford	Explorer	Supervisor Road Vehicle	84,816	yes	yes	yes
S101	2010	Ford	Explorer	Relief Vehicle	175,657	yes	yes	yes
S102	2010	Ford	Fusion	Relief Vehicle	34,715	option	option	no
S103	2010	Ford	Fusion	Relief Vehicle	34,059	option	option	no
S104	2010	Ford	Fusion	Relief Vehicle	35,756	option	option	no
S105	2010	Ford	Fusion	Relief Vehicle	37,913	option	option	no
S106	2010	Ford	Fusion	Relief Vehicle	36,771	option	option	no
S107	2010	Ford	Fusion	Relief Vehicle	35,879	option	option	no
S108	2010	Ford	Fusion	Relief Vehicle	37,937	option	option	no
S109	2010	Ford	Fusion	Relief Vehicle	17,370	option	option	no
S110	2013	Ford	Fusion	Relief Vehicle	1,391	option	option	no
S111	2013	Ford	Fusion	Staff Vehicle (Admin)	2,501	option	option	no
S112	2013	Toyota	Highlander	Fare Security Vehicle	1,833	option	option	no
S113	2013	Toyota	Highlander	Supervisor Road Vehicle	11,013	option	option	no
S114	2013	Toyota	Camry Hybrid	Staff Vehicle (Zielinski)	5,894	no	no	no
S115	2013	Toyota	Camry Hybrid	Staff Vehicle (Fisher)	7,549	no	no	no

AVL: Automatic Vehicle Location System (mandatory in 106 buses and two road supervisor vehicles; optional in 16 service vehicles)

SAS: Silent Alarm System (optional feature within optional CAD system; if selected, mandatory/optional vehicles match those for AVL)

RSS: Road Supervisor System (optional system; if selected, mandatory in two road supervisor vehicles)

**Appendix 5**  
***Transit Center Plans***

To be provided in Addendum 2

### Appendix 6 Headsign ODK Photographs

Nova ODK-Frontside



Non-Nova ODK-Frontside



Nova ODK-Backside



Non-Nova ODK-Backside



**Appendix 7**  
***Digital Two-Way Radio System–Technical & Work Specifications***

**Attached**

**Appendix 5**  
***Terminal 1 Yard Plans & Photos***

To be provided in Addendum 2

# ***SANTA BARBARA METROPOLITAN TRANSIT DISTRICT***

## **Digital Two-Way Radio System**

### ***TECHNICAL & WORK SPECIFICATIONS***

#### **I. SUMMARY PROJECT DESCRIPTION**

The Santa Barbara Metropolitan Transit District (MTD) desires to replace its existing analog two-way radio communications system with a new digital system that complies with FCC narrowbanding rules. The project is composed of but not limited to the following tasks which are described in Section III, NEW RADIO SYSTEM:

- ◆ Provide one Motorola MOTOTRBO MTR3000, or approved equal
- ◆ Provide one Motorola MOTOTRBO MTR3000 upgrade kit for MTR2000 repeater, or approved equal
- ◆ Provide 140 Motorola MOTOTRBO XPR 5550 mobile radios, or approved equal
- ◆ Provide 15 Motorola MOTOTRBO XPR 7550 and 5 XPR 3300 portable radios, or approved equals
- ◆ Remove and replace existing mobile radios in 106 buses and 22 automobiles, and at two control stations
- ◆ Provide and install antennae in 20 electric shuttles
- ◆ Provide training and documentation on system administration and operation
- ◆ Provide service and support for a three-year period

#### **II. EXISTING RADIO SYSTEM**

##### **A. MTD SERVICE AREA**

MTD is the public transit operator for southern Santa Barbara County using fixed-route buses. Two-way radio coverage is required and presently provided for the MTD service area which is defined by its fixed routes. The local service area stretches from the western end of Goleta to the southeastern edge of Carpinteria. Limited bus service is also provided to the Ventura area to the Ventura Government Center.

##### **B. CONTROL STATION LOCATIONS**

MTD maintains control base stations at two fixed locations, both within the city of Santa Barbara. MTD's combined administrative, bus dispatch and repair facility, referred to as "Olive Terminal," is located at 550 Olive Street. The second site is the MTD Transit Center, which is MTD's main passenger hub located at 1020 Chapala Street adjacent to City Parking Lot #3 and the old Greyhound station. Such locations shall continue to be used in a similar capacity as part of the new digital radio system.

##### **C. REPEATER LOCATIONS**

An MTD-owned Motorola MTR 2000 repeater is located in the mountains above Santa Barbara adjacent to Gibraltar Road at Gibraltar Peak. The Gibraltar Peak site is maintained by BNS Electronics, whose office is located at 923 Laguna Street in Santa Barbara. MTD also uses a repeater (composed of two analog mobile radios and a bi-directional repeater interface controller) owned by Telcom that is located at their facility at 201 Lombard Street in Oxnard. It is used to relay transmissions to and from the buses in the Ventura area to the main MTD channels. See Appendix 8 for a block diagram of the communications between the Gibraltar Peak site, the Telcom repeater, and the buses operating in the Ventura area. As a backup to the Gibraltar Peak repeater, MTD rents an analog repeater (also composed of two mobile radios and a RIC) from BNS Electronics that is located at their Santa Ynez Peak site in the mountains west of Santa Barbara adjacent to West Camino Cielo. MTD uses a community antennae, transmitter/combiner, and receiver/multicoupler provided by BNS at both of its sites. Such locations shall continue to be used in the same capacity as part of the new digital radio system.

##### **D. FREQUENCIES & FCC LICENSES**

The MTD voice radio system currently utilizes a UHF wideband channel pair at 453.750 MHz for transmission and 458.750 MHz for reception in MTD's primary service area. A simplex channel at 453.075 MHz is used to extend the coverage for buses in the Ventura area using a separate channel. MTD uses a separate frequency pair licensed to BNS Electronics for the backup repeater at the Santa Ynez Peak site. MTD recently renewed its FCC licenses for the three frequencies for narrowband analog or digital operation, and for voice or data use. See

Appendices 1 and 2 for copies of the current licenses. All such frequencies and locations shall continue to be used for the new digital radio system.

### E. RADIO EQUIPMENT

MTD's existing two-way radio system is composed exclusively of Motorola equipment including an MTR2000 repeater (at Gibraltar Peak); the Telcom-owned repeater (in Oxnard); CDM1250 mobile radios for the two MTD control stations; CDM1250, CM300, and MaxTrac mobile radios in MTD's 106 buses and 22 service vehicles; and 11 HT1250 and 8 MagOne handheld radios used by multiple departments. Other than the MTR2000 repeater, which shall be upgraded, all such equipment shall be replaced as part of the new digital radio system. The Telcom-owned "repeater" in Oxnard will also be replaced by MTD as part of this project.

## III. NEW RADIO SYSTEM

### A. PROJECT COMPLETION DEADLINE

Following full execution of the agreement for the project, Contractor shall promptly order project equipment and diligently carry out project work through to completion. To comply with the FCC narrowbanding deadline, Contractor shall make the new digital two-way radio system fully operational no later than December 31, 2012.

### B. FCC & NARROWBANDING COMPLIANCE

All radio equipment, individual components thereof, and any related systems and programming shall be compliant with all applicable laws and regulations including but not limited to the Code of Federal Regulations Title 47 (FCC regulations) and the narrowbanding requirements taking effect January 1, 2013. The entire system and individual components shall comply with FCC safety requirements for RF exposure. Particular attention shall be made to compliance with Part 90 Private Land Mobile Radio Services and Part 15 Radio Frequency Devices.

### C. RADIO EQUIPMENT

#### 1. Repeaters

Contractor shall provide **one (1) Motorola MTR3000 MOTOTRBO Repeater**, or approved equal; **one (1) Motorola MTR2000 MOTOTRBO Repeater Upgrade Kit**; and **one (1) bi-directional repeater interface controller** to create a repeater with two of the mobile radios specified in the next paragraph. Contractor shall provide any additionally required parts, components, supplies, licenses, or software required to make the new or upgraded repeaters compatible with the digital radio system specified herein including MTD's radio system environment and designated frequencies. See Appendix 3 for repeater specifications.

#### 2. Mobile Radios

Contractor shall provide **one hundred forty (140) Motorola MOTOTRBO XPR 5550 Mobile Radios (25-40W, UHF)** or approved equal. See Appendix 4 for mobile radio specifications. Contractor shall provide any additionally required parts, components, supplies, licenses, or software required to make the mobile radios compatible with the digital radio system specified herein including MTD's radio system environment and designated frequencies. Each mobile radio shall come with the following items or approved equals:

- ◆ One (1) Motorola IMPRES Heavy-Duty Microphone (RMN5053)
- ◆ Low Profile Bracket (RLN6076)
- ◆ One (1) 10-foot Power Cable (HKN4137)
- ◆ Replacement Button Package (for monitor, scan, backlight, emergency talkaround, text messages and contacts)

#### 3. Portable Radios

Contractor shall provide **fifteen (15) Motorola MOTOTRBO XPR 7550 Portable Radios (1-4W, UHF)** or approved equal; and **five (5) Motorola MOTOTRBO XPR 3300 Portable Radios (1-4W UHF)** or approved equal. See Appendices 5 and 6 for complete specifications. Contractor shall provide any additionally required parts, components, supplies or software required to make the portable handheld radios compatible with the digital radio system specified herein and MTD's radio system environment and designated frequencies. Each portable radio shall come with the following items or approved equals:

- ◆ UHF/GPS Combination Whip Antenna (PMAE4079)
- ◆ IMPRES Slim Li-ion 1500 mAh Submersible Battery (PMNN4407)

- ◆ IMPRES Single Unit Charger (WPLN4232)
- ◆ Spring Action 2.5 " Belt Clip (PMLN7008)

#### **4. Accessories**

In addition to whatever accessories shall be required to implement the two-way digital radio system as specified herein, Contractor shall provide the following additional accessories or approved equals:

- ◆ Two (2) Motorola Desk Top Microphones (RMN5050)
- ◆ Two (2) ICT Radio Base Station Power Supplies/Covers (CS120-20A/MOT14)
- ◆ Twenty (22) exterior antennae for electric shuttles meeting requirements of Section III(D)(4) below
- ◆ One hundred fifteen (115) covert microphones meeting requirements of Section III(D)(5) below

### **D. SYSTEM INSTALLATION**

#### **1. Work Hours & Restrictions**

It is imperative that MTD maintain and have minimal disruption to its two-way radio communications while public bus service is operational. MTD bus service hours are:

Monday – Friday: 5:00 AM to 12:30 AM  
 Saturday: 5:30 AM to 11:30 PM  
 Sunday: 6:00 AM to 11:00 PM

Contractor shall limit the transition period during which both analog and digital mode are required on the overall radio system to no more than 14 consecutive calendar days. Contractor shall provide all necessary resources, including any software, required to maintain communications during the transition period. All buses and service vehicles are based out of Olive Terminal. The number of such vehicles not in service and available for project work varies by day of the week and time of day. The number increases significantly after 6:00 PM on weekdays and all day during weekends. Contractor shall coordinate closely with MTD for the scheduling of vehicular work and obtaining access to MTD facilities. It is highly likely that Contractor will need to carry out some installation work during weeknights and/or weekends to complete the work in a timely manner.

#### **2. Installation Services**

Contractor shall install, configure, program, test and implement all project-related equipment, systems, wiring, and cabling in accordance with applicable laws, regulations, manufacturer documentation, and industry standards. Completed installations and wiring shall be neat and professional. MTD shall review and approve the mobile radio installation for each model of bus and vehicle before Contractor proceeds with remaining vehicles of like model. As part of or in addition to the necessary and required tasks for system installation, Contractor shall:

- ◆ Install new MTR 3000 repeater at BNS Electronics' Gibraltar Peak site
- ◆ Upgrade existing MTR 2000 repeater and relocate to Santa Ynez Peak site (see Section III(D)(3) below)
- ◆ Replace Telcom repeater using 2 XPR 5550 mobile radios and bi-directional repeater interface controller
- ◆ Install control stations using XPR 5550 mobile radio, RMN5050 desktop microphone, and ICT base station power supply/cover, one each at Olive Terminal and Transit Center in existing locations
- ◆ Remove existing mobile radios and any external speakers from 106 buses and 19 service vehicles
- ◆ Install XPR 5550 mobile radios in 106 buses and 22 service vehicles using existing location and wiring
- ◆ Program each installed mobile radio and active portable radio with a unique ID determined by MTD
- ◆ Remove existing mobile radio handset in 106 buses and mount new radio microphone in similar location using the existing wiring pathway, which may require enlarging existing openings in the dashboard area
- ◆ Check and tighten as necessary coaxial cable connection to exterior radio antenna in 86 diesel buses
- ◆ Replace and move radio antennae in 20 electric shuttles (see Section III(D)(4) below)

#### **3. Backup Repeater**

The upgraded MTR2000 repeater shall be relocated to the Santa Ynez Peak site and serve as a backup to the new MTR3000 repeater located at the Gibraltar Peak site. The backup repeater shall be configured to operate on a frequency pair other than that used by the Gibraltar repeater to be provided at the time of installation. All active MTD radios shall be configured to access the frequencies via a separate channel.

#### 4. Shuttle Antennae

MTD's fleet of 20 battery-electric shuttles include antennae mounted in the interior of the vehicle. To improve reception, Contractor shall replace the existing antennae with an appropriate exterior model that shall be mounted on the vehicle exterior. Note that all shuttle roofs are fiberglass or plastic with no metallic content.

#### E. TRAINING & DOCUMENTATION

Contractor shall provide on-site training by qualified representatives. Separate training sessions shall be provided for system administration and end-user radio operation. Administrator training shall accommodate up to five persons in one session; and operator training up to 10 persons in two sessions. The date and time for training, to be mutually determined between Contractor and MTD, shall take place in advance of system implementation such that there is adequate time for trained MTD staff to provide operational training to all system users.

#### F. DOCUMENTATION

Contractor shall provide all documentation necessary to administer and operate the two-way digital radio system in both paper and electronic format. A minimum of three hard copies for each equipment model or system shall be provided. MTD shall have the right to make unlimited paper and electronic copies for internal use.

### IV. WARRANTY & SUPPORT SERVICE

#### A. WARRANTY

All project work and deliverables are fully warranted and guaranteed by Contractor to be free from defects due to design or workmanship for the period stipulated below beginning on the date of project acceptance:

◆ Repeater, repeater upgrade kit, repeater interface controller, mobile radios, and handheld radios	Two (2) Years
◆ All other radio system deliverables including but not limited to hardware, software, accessories, installation, configuration & programming	One (1) Year

Contractor obligations under this warranty include any and all costs required to cure the defects including but not limited to labor, equipment, supplies, travel, mileage, and shipping. The response time requirements for curing warranty defects shall be subject to those stipulated in paragraph 4 of the Maintenance Agreement, which is discussed in the following section. This warranty is between MTD and the Contractor and provided by the Contractor. As such, it is distinct and separate from and not limited by any manufacturers' warranties. Any disputes or delays associated with any manufacturers' warranties shall not excuse the Contractor from curing warranty defects under these warranty provisions.

#### B. SUPPORT SERVICE

For a period of three (3) years commencing with overall project acceptance, Contractor shall provide on-going maintenance, support, repairs, software/firmware upgrades, or any other services necessary to keep the two-way digital radio system operating properly and up to date, and as specified in this document, the manufacturers' specifications and documentation, and in compliance with applicable laws and regulations. The terms and conditions of the support services are specified in the Maintenance Agreement, which is attached as Appendix 7.

### V. GENERAL REQUIREMENTS

#### A. COMPLETE & NEW SYSTEM

These Technical & Work Specifications do not necessarily include a full and complete description of all required equipment, materials, services, or processes required to carry out the project. Specifications and descriptions are provided only for those items, material, procedures, locations, and values that are considered key to achieving the overall goals and objectives of the project. Contractor shall provide to MTD all equipment, systems, software, hardware, cabling, programming, training, supervision, labor, and all other resources necessary to properly and successfully install and implement the new system and features as specified and described in these specifications. All equipment shall be new, unused and of recent manufacture. Contractor is expected to be experienced in, and adhere to, the customs of the industry or trade.

**B. COMPLIANCE WITH DOCUMENTATION**

Contractor shall be familiar with and follow all appropriate and relevant documentation for equipment or systems installed, used, or implemented as a part of or associated with the project. Such documentation includes, but is not limited to: installation, setup, operating and programming manuals and guides; and any related technical bulletins, announcements, or updates issued by equipment manufacturers or systems providers.

**C. LEGACY SYSTEM & CLEAN-UP**

MTD shall retain possession of and title to all legacy radio equipment removed from service as a result of the project. Contractor shall store all such equipment at a location at Olive Terminal to be determined by MTD. All debris, containers and any project-generated waste materials shall be removed from the MTD vehicles and sites and disposed of by Contractor. At completion, all project work areas shall be neat and tidy.



**Federal Communications Commission**  
Public Safety and Homeland Security Bureau

**RADIO STATION AUTHORIZATION**

LICENSEE: SANTA BARBARA METROPOLITAN TRANSIT DISTRICT

SANTA BARBARA METROPOLITAN TRANSIT DISTRICT  
550 OLIVE STREET  
SANTA BARBARA, CA 93101

<b>Call Sign</b> WQPJ699	<b>File Number</b> 0005110300
<b>Radio Service</b> PW - Public Safety Pool, Conventional	
<b>Regulatory Status</b> PMRS	
<b>Frequency Coordination Number</b> FC201244000	

FCC Registration Number (FRN): 0021127063

<b>Grant Date</b> 06-06-2012	<b>Effective Date</b> 06-06-2012	<b>Expiration Date</b> 06-06-2022	<b>Print Date</b> 06-06-2012
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**STATION TECHNICAL SPECIFICATIONS**

**Fixed Location Address or Mobile Area of Operation**

**Loc. 2** Address: GIBRALTAR MOUNTAIN ON GILBRALTAR RD  
City: SANTA BARBARA County: SANTA BARBARA State: CA  
Lat (NAD83): 34-27-57.0 N Long (NAD83): 119-40-38.0 W ASR No.: Ground Elev: 635.0

**Loc. 3** Area of Operation  
Operating within a 40.0 km radius around fixed location 2

**Loc. 4** Area of Operation  
Land Mobile Control Station meeting the 6.1 Meter Rule: CA

**Antennas**

Loc. No.	Ant. No.	Frequencies (MHz)	Sta. Cls.	No. Units	No. Pagers	Emission Designator	Output Power (watts)	ERP (watts)	Ant. Ht./Tp meters	Ant. AAT meters	Construct Deadline Date
2	1	000453.75000000	FB2	1		11K2F3E 7K60FXE	40.000	90.000	4.6	262.4	06-06-2013
3	1	000458.75000000	MO	200		11K2F3E 7K60FXE	40.000	35.000			06-06-2013
3	1	000453.75000000	MO	200		11K2F3E 7K60FXE	40.000	35.000			06-06-2013
4	1	000458.75000000	FX1	3		11K2F3E 7K60FXE	40.000	90.000			

**Conditions:**

Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

**Appendix 1**

**Licensee Name:** SANTA BARBARA METROPOLITAN TRANSIT DISTRICT

**Call Sign:** WQPJ699

**File Number:** 0005110300

**Print Date:** 06-06-2012

**Control Points**

**Control Pt. No. 1**

**Address:** 550 OLIVE ST

**City:** SANTA BARBARA

**County:** SANTA BARBARA

**State:** CA

**Telephone Number:** (805)963-3364

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**Waivers/Conditions:**

NONE



**Federal Communications Commission**  
Public Safety and Homeland Security Bureau

**RADIO STATION AUTHORIZATION**

LICENSEE: SANTA BARBARA METROPOLITAN TRANSIT DISTRICT

SANTA BARBARA METROPOLITAN TRANSIT DISTRICT  
550 OLIVE ST  
SANTA BARBARA, CA 93101

<b>Call Sign</b> WQPI467	<b>File Number</b> 0005115524
<b>Radio Service</b> PW - Public Safety Pool, Conventional	
<b>Regulatory Status</b> PMRS	
<b>Frequency Coordination Number</b> FC201244093	

FCC Registration Number (FRN): 0021127063

<b>Grant Date</b> 05-29-2012	<b>Effective Date</b> 05-29-2012	<b>Expiration Date</b> 05-29-2022	<b>Print Date</b> 05-30-2012
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**STATION TECHNICAL SPECIFICATIONS**

**Fixed Location Address or Mobile Area of Operation**

**Loc. 1** Address: 201 LOMBARD ST, STE A  
City: OXNARD County: VENTURA State: CA  
Lat (NAD83): 34-12-13.0 N Long (NAD83): 119-08-57.0 W ASR No.: Ground Elev: 19.0

**Loc. 2** Area of Operation  
Operating within a 32.0 km radius around fixed location 1

**Antennas**

Loc. No.	Ant. No.	Frequencies (MHz)	Sta. Cls.	No. Units	No. Pagers	Emission Designator	Output Power (watts)	ERP (watts)	Ant. Ht./Tp meters	Ant. AAT meters	Construct Deadline Date
1	1	000453.07500000	FB	1		11K2F3E 7K60FXE	40.000	40.000	7.6	-25.1	05-29-2013
2	1	000453.07500000	MO	20		11K2F3E 7K60FXE	40.000	40.000			05-29-2013

**Control Points**

**Control Pt. No. 1**

Address: 550 OLIVE ST  
City: SANTA BARBARA County: VENTURA State: CA Telephone Number: (805)963-3364

**Waivers/Conditions:**

NONE

**Conditions:**

Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.



THE FUTURE OF BUSINESS COMMUNICATION, DELIVERED TODAY

# MTR3000 BASE STATION / REPEATER & SATELLITE RECEIVER

The MTR3000 is a robust, high powered base station / repeater that offers reliability, future expandability, and the ease of migration from analog to digital technology. It integrates voice and data seamlessly, offers enhanced features that are easy to use and delivers increased capacity while the MTR3000 satellite receiver model helps enhance analog coverage. So no matter your needs, the MTR3000 provides a flexible communication solution from the field to the factory floor.

### SPEC SHEET

MTR3000 BASE STATION/REPEATER , SATELLITE RECEIVER

### HIGH POWERED PERFORMANCE

The MTR3000 is the ideal high power base station/repeater solution for MOTOTRBO™ digital two-way radio systems. Because MOTOTRBO uses TDMA digital technology, it delivers integrated voice and data, twice the calling capacity, plus clearer voice communications. With its integrated 100W power amplifier and AC/DC power supply, the MTR3000 has minimal cabling, rack space, expense and overall complexity. The MTR3000 operates in digital mode in MOTOTRBO Conventional, IP Site Connect, Capacity Plus, Linked Capacity Plus and Connect Plus systems delivering increased capacity, spectral efficiency, integrated data applications, and enhanced voice communications. In addition, the MTR3000 can also operate in analog mode for conventional and LTR®/PassPort® Trunking systems providing a flexible high power base station/repeater.

### SERVICEABILITY

We designed the MTR3000 for easy serviceability. You can remotely or locally monitor the performance of your system with repeater diagnostic control software. The modular based design of the MTR3000 allows you to quickly replace components with functionally separate Field Replaceable Units when needed. Feature upgrades are easy with our software-based design and direct access to service ports (no need to remove even the front panel) allows for fast installation and maintenance time. Plus, every MTR3000 is backed by a two-year warranty.

### ADDED FUNCTIONALITY

MOTOTRBO offers added functionality, including dispatch capability with the MIP 5000 VoIP console, enhanced call signaling, basic and enhanced privacy-scrambling, option board expandability and compatibility with SCADA solutions for utility and public service monitoring and alarms. Plus digital telephone interconnect capability to enable communication between radios and landline or mobile phones as well as a transmit interrupt suite – with voice interrupt, emergency voice interrupt or data over voice interrupt – to prioritize critical communication the moment you need it. Its wireline capability enables Integrated Tone Remote Control and DC Remote Control functionality with balanced audio. For improved analog subscriber talk in performance, the MTR3000 allows for voting capability with legacy Spectra-TAC and DIGITAC comparator systems. Analog voting capability is available in the base station/repeater or satellite receiver and if used in the base station/repeater, it can be redeployed to full station capability to accommodate your future needs.

### EXPANDED CAPACITY AND COVERAGE

Your workforce is hard at work every day – picking up loads, making road repairs, providing security, responding to guest requests or restoring power after a storm. That's why you need the proven performance of MOTOTRBO radio systems for non-stop communication no matter the size of your work force, no matter where they go.

The MTR3000 supports MOTOTRBO's IP Site Connect dramatically improves customer service and productivity by using the Internet to extend coverage to users anywhere in the world. Our scalable, single-site Capacity Plus solution expands capacity to over 1,000 users without adding new frequencies. Linked Capacity Plus leverages the high capacity of Capacity Plus, with the wide area coverage capabilities of IP Site Connect to keep your staff at up to five sites connected with an affordable wide area trunking solution. Connect Plus multi-site digital trunking enables you to accommodate the high volume, wide area communication your business requires. Whether you need coverage at a single site or across multiple sites, MOTOTRBO can be scaled to meet your needs.

### MIGRATE AT YOUR OWN PACE

Keeping operations running smoothly during a change in communication systems is vital to your business. It's easy to migrate to digital with MOTOTRBO because radios operate in analog and digital mode. The dynamic mixed mode repeater functionality supported by the MTR3000 streamlines automatic switching between analog and digital calls so you can begin using MOTOTRBO radios on your existing analog system. When your time and budget allow you can begin migrating to digital at your own pace.

In addition, you can leverage your current investment in existing MTR2000 base station/repeaters. With a convenient form factor, and in minimal time, you can convert an MTR2000 base station/repeater to a MTR3000 with a simple upgrade kit!

## SPEC SHEET

MTR3000 BASE STATION/REPEATER , SATELLITE RECEIVER

## UPGRADING TO DIGITAL MADE EASY

### MTR2000 MOTOTRBO™ DIGITAL UPGRADE KIT

Getting the most out of your investments is important to your business. With the MTR2000 MOTOTRBO Digital Upgrade Kit , you can begin enjoying the benefits of a MOTOTRBO digital two-way radio system by leveraging your current investment in MTR2000 base station/repeater equipment and upgrading them to the newer MTR3000 model.

The convenient design of the digital upgrade kit promotes reuse of existing MTR2000 equipment with a simple, 4-step process that is economic and easy to do. Turn your existing MTR2000 base station / repeater into a robust, reliable, high powered MTR3000 base station / repeater in less than 15 minutes!

#### THE MTR2000 MOTOTRBO DIGITAL UPGRADE KIT CONSISTS OF THE FOLLOWING COMPONENTS:

- Exciter
- Receiver
- Station Control Module
- Front Bezel
- TORX Screws (not shown)
- MTR3000 FCC upgrade label (not shown)

**STEP 1:** Remove front panel cover of MTR2000 and RF cables- Take out Control Exciter Receiver Assembly (two screws)

**STEP 2:** Assemble the MOTOTRBO Control Exciter Receiver Assembly(8 screws)

**STEP 3:** Insert the core module and secure the station (2 screws)

**STEP 4:** Reconnect RF cables and put on new front cover (configure with CPS and tune)



MTR 2000



MTR 2000 Control Exciter Receiver Assembly



MTR 3000

Please note the following items will be needed to do the upgrade but are not included with the **MTR2000 MOTOTRBO DIGITAL UPGRADE KIT**:

- TORX T20 Screw Driver
- Type A to Type B USB cable (DDN9957)
- Computer with installed Customer Programming Software (CPS) (RVN5115/GMVN5141/PMVN4130)
- Optional: Ethernet cable for IP Site Connect and Capacity Plus (3085393Y33)

## SPEC SHEET

MTR3000 BASE STATION/REPEATER , SATELLITE RECEIVER

## MTR3000 SATELLITE RECEIVER SPECIFICATIONS

RECEIVER (VHF)		
T7713A - MTR3000		
Frequency	136-174 MHz	
Selectivity (TIA603)	25 kHz / 12.5 kHz	80 dB (90 dB typical) / 75 dB (82 dB typical)
Selectivity (TIA603D)	25 kHz / 12.5 kHz	80 dB (90 dB typical) / 50 dB (60 dB typical)
Analog Sensitivity 12 dB SINAD	0.30 uV (0.22 uV typical)	
Signal Displacement Bandwidth	25 kHz/12.5 kHz	2 kHz / 1 kHz
Intermodulation Rejection	25 kHz/12.5 kHz	85 dB
Spurious and Image Response Rejection	85 dB (95 dB typical)	
FM Hum and Noise (750us de-emphasis)	25 kHz / 12.5 kHz	50 dB (56 dB typical) / 45 dB (52 dB typical)

RECEIVER (UHF)		
T7713A - MTR3000		
Frequency	403-470, 450-524 MHz	
Selectivity (TIA603)	25 kHz / 12.5 kHz	80 dB (86 dB typical) / 75 dB (78 dB typical)
Selectivity (TIA603D)	25 kHz / 12.5 kHz	75 dB (85 dB typical) / 45 dB (60 dB typical)
Analog Sensitivity 12 dB SINAD	0.30 uV (0.22 uV typical)	
Signal Displacement Bandwidth	25 kHz/12.5 kHz	2 kHz / 1 kHz
Intermodulation Rejection	25 kHz/12.5 kHz	85 dB
Spurious and Image Response Rejection	85 dB (typical 95 dB)	
FM Hum and Noise (750us de-emphasis)	25 kHz / 12.5 kHz	50 dB nominal / 45 dB nominal

RECEIVER (800/900 MHZ)		
T7713A - MTR3000		
Frequency	806 - 825 & 896 - 902 MHz	
Selectivity (TIA603)	800 MHz: 25 kHz, 12.5 kHz / 900 MHz: 12.5 kHz	
Selectivity (TIA603D)	800 MHz: 25 kHz, 12.5 kHz / 900 MHz: 12.5 kHz	
Analog Sensitivity 12 dB SINAD	0.28 uV ( 0.21 uV typical)	
Signal Displacement Bandwidth	800 MHz: 25 kHz, 12.5 kHz / 900 MHz: 12.5 kHz	
Intermodulation Rejection	800 MHz: 25 kHz, 12.5 kHz / 900 MHz: 12.5 kHz	
Spurious and Image Response Rejection	90 dB	
FM Hum and Noise (750us de-emphasis)	800 MHz: 25 kHz, 12.5 kHz / 900 MHz: 12.5 kHz	

GENERAL SPECIFICATIONS	
T7713A - MTR3000	
Number of Frequencies	Up to 16
Modulation	FM
Frequency Generation	Synthesized
Channel Spacing	12.5 kHz, 25 kHz, 30 kHz
Temperature Range	-30°C to +60°C
Antenna Connector	Type "N" Female
AC Operation	85-264 VAC, 47-63 Hz
DC Operation	21.6-32 VDC

	DIMENSIONS	WEIGHT
Satellite Receiver	5.25 x 19 x 16.5 in. (133 x 483 x 419 mm)	40 lbs (19 kg)
Audio Response	+1/-3 dB from 6 dB per octave pre-emphasis; 300-3000 Hz referenced to 1000 Hz at line output	
Audio Distortion	Less than 3% (1.5% typical) at 1000 Hz; 60% RSD	
Line Output	330 mV (RMS) @60% RSD	
RF Input Impedance	50 Ohms	

FCC TYPE ACCEPTANCE			
FREQUENCY RANGE IN MHZ	MODEL	TYPE	US TYPE ACCEPTANCE NUMBER
136 - 174	T7713A	Receiver	ABZ89FR3794
403 - 470	T7713A	Receiver	ABZ89FR4824
450 - 512	T7713A	Receiver	ABZ89FR4826
806 - 825 & 896 - 902	T7713A	Receiver	ABZ89FR5818

INPUT CURRENT (T3000A) WITH WIRELINE CARD		
	AC LINE 117 VOLTS / 220 VOLTS	28 VDC D/C BATTERY REVERT, NEG. GND.
VHF		
100W Standby	0.4A / 0.4A	0.8A
100W Transmit	3.5A / 1.9A	12.2A
UHF		
100W Standby	0.4A / 0.4A	0.8A
100W Transmit	3.3A / 1.8A	11.5A
800 / 900 MHz		
100W Standby	0.4A / 0.4A	0.9A
100W Transmit	3.4A / 1.9A	12.0A

Specifications per TIA/EIA 603D unless otherwise noted  
 Product meets ETSI 300-086 & ETSI 300-113  
 RoHS compliant; UL Listed  
 Specifications subject to change without notice.

## SPEC SHEET

MTR3000 BASE STATION/REPEATER , SATELLITE RECEIVER

## MTR3000 BASE STATION/REPEATER VHF SPECIFICATIONS

## GENERAL SPECIFICATIONS

	T3000A - MTR3000	T2003A - UPGRADE KIT FOR MTR2000 STATIONS
Number of Frequencies		Up to 16
Modulation		FM & 4FSK
Frequency Generation		Synthesized
Channel Spacing	Analog/Digital	12.5 kHz, 25 kHz / 12.5 kHz (6.25e compliant)
Mode of Operation		Simplex / Semi-Duplex / Duplex
Temperature Range		-30°C to +60°C
Antenna Connectors		Transmit and Receive, Type "N" Female
AC Operation		85-264 VAC, 47-63 Hz
DC Operation		28.6 VDC (25.7-30.7 VDC full rated output power)
Dimensions		5.25 in H x 19 in W x 16.5 in L 133 mm H x 483 mm W x 419 mm L
Weight		40 lbs (19 kg)

## VHF INPUT CURRENT (T3000A)

	AC LINE 117 VOLTS / 220 VOLTS	28 VDC D/C BATTERY REVERT, NEG. GND.
100 W standby	0.4A / 0.4A	0.8A
100 W Transmit	3.5A/ 1.9A	12.2A

## FCC TYPE ACCEPTANCE

FREQUENCY RANGE IN MHZ	MODEL	TYPE	POWER OUTPUT IN WATTS	US TYPE ACCEPTANCE NUMBER
136-174	T3000A	Transmitter	8-100	ABZ89FC3793
136-174	T3000A	Receiver	N/A	ABZ89FR3794
136-174	T2003A	Transmitter	25 - 100	ABZ89FC3795
136-174	T2003A	Receiver	N/A	ABZ89FR3796
136-174	T2003A	Transmitter	1-30 / 40	ABZ89FC3797

## TRANSMITTER (VHF)

	T3000A - MTR3000	T2003A - UPGRADE KIT FOR MTR2000 STATIONS
Frequency	136-174 MHz	136-154, 150-174 MHz
Power Output (Continuous Duty)	8-100 watts	1-30/40 watts, 25-100 watts
Electronic Bandwidth		Full Band
Output Impedance		50 Ohms
Intermodulation Attenuation	55 dB	40 dB for 40W and 100W stations; 70 dB for 30W station
Maximum Deviation (RSD)	25 kHz/12.5 kHz	±5 kHz / ±2.5 kHz
Audio Sensitivity		60% RSD @ 80 mV RMS
Spurious and Harmonic Emissions Attenuation	90 dB	85 dB
FM Hum and Noise (750 µs de-emphasis)	25 kHz / 12.5 kHz	50 dB nomina (55 dB typical)  , 45 dB nominal (52 dB typical)
Frequency Stability (for temperature and aging variation)		1.5 ppm/external Ref (optional)
Audio Response		+1,-3 dB from 6 dB per octave pre-emphasis; 300-3000 Hz referenced to 1000 Hz at line input
Audio Distortion		Less than 3% (1% typical) at 1000 Hz; 60% RSD 30kHz
Emission Designators		FM Modulation: 12.5 kHz: 11K0F3E; 25 kHz, 30 kHz: 16K0F3E; 4FSK Modulation: 12.5 kHz - Data Only: 7K60FXD, 7K60F7D ; 12.5 kHz - Voice Only: 7K60FXE, 7K60F1E, 7K60F7E; 12.5 kHz - Data & Voice: 7K60F1W, 7K60F7W

## RECEIVER (VHF)

	T3000A - MTR3000	T2003A - UPGRADE KIT FOR MTR2000 STATIONS
Frequency		136-174 MHz
Selectivity (TIA603)	25 kHz / 12.5 kHz	80 dB (90 dB typical) / 75 dB (82 dB typical)
Selectivity (TIA603D)	25 kHz / 12.5 kHz	80 dB (90 dB typical) / 50 dB (60 dB typical)
Analog Sensitivity 12 dB SINAD		0.30 uV (0.22 uV typical)
Digital Sensitivity 5% BER		0.30 uV (0.20 uV typical)
Signal Displacement Bandwidth	25 kHz/12.5 kHz	2 kHz / 1 kHz
Intermodulation Rejection	25 kHz/12.5 kHz	85 dB
Spurious and Image Rejection		85 dB (95 dB typical)
Audio Response		+1,-3 dB from 6 dB per octave de-emphasis; 300-3000 Hz referenced to 1000 Hz at line output
Audio Distortion		Less than 3% (1% typical) at 1000 Hz, 60% RSD
Line Output		330 mV (RMS) @ 60% RSD
FM Hum and Noise (750µs de-emphasis)	25 kHz / 12.5 kHz	50 dB (56 dB typical) / 45 dB (52 dB typical)
RF Input Impedance		50 Ohms

Industry Canada Approval:  
IC ID 109AB-3793;  
IC Model T3000-VHF.  
Specifications per TIA/EIA 603D  
unless otherwise noted.  
Product meets:  
ETSI 300-086;  
ETSI 300-113.  
CE Marked  
RoHS compliant  
UL Listed  
Digital Protocol  
ETSI 102 361-1, -2, -3;  
AMBE +2™ Vocoder  
Specifications subject to change  
without notice.

## SPEC SHEET

MTR3000 BASE STATION/REPEATER , SATELLITE RECEIVER

## MTR3000 BASE STATION/REPEATER UHF SPECIFICATIONS

## GENERAL SPECIFICATIONS

	T3000A - MTR3000	T2003A - UPGRADE KIT FOR MTR2000 STATIONS
Number of Frequencies		Up to 16
Modulation		FM & 4FSK
Frequency Generation		Synthesized
Channel Spacing	Analog/Digital	12.5 kHz, 25 kHz / 12.5 kHz (6.25e compliant)
Mode of Operation		Simplex / Semi-Duplex / Duplex
Temperature Range		-30°C to +60°C
Antenna Connectors		Transmit and Receive, Type "N" Female
AC Operation		85-264 VAC, 47-63 Hz
DC Operation		28.6 VDC (25.7-30.7 VDC full rated output power)
Dimensions		5.25 in H x 19 in W x 16.5 in L 133 mm H x 483 mm W x 419 mm L
Weight		40 lbs (19 kg)

## UHF INPUT CURRENT (T3000A)

	AC LINE 117 VOLTS / 220 VOLTS	28 VDC D/C BATTERY REVERT, NEG. GND.
100 W standby	0.4A / 0.4A	0.8A
100 W Transmit	3.3A/ 1.8A	11.5A

## FCC TYPE ACCEPTANCE

FREQUENCY RANGE IN MHZ	MODEL	TYPE	POWER OUTPUT IN WATTS	US TYPE ACCEPTANCE NUMBER
406.1 - 470	T3000A	Transmitter	8 - 100	ABZ89FC4823
403-470	T3000A	Receiver	N/A	ABZ89FR4824
470 - 512	T3000A	Transmitter	8-100	ABZ89FC4825
450-512	T3000A	Receiver	N/A	ABZ89FR4826
406.1 - 470	T2003A	Transmitter	25 - 100	ABZ89FC4827
406.1 - 470	T2003A	Transmitter	2 - 30/40	ABZ89FC4829
403 - 470	T2003A	Receiver	N/A	ABZ89FR4828

## TRANSMITTER (UHF)

	T3000A - MTR3000	T2003A - UPGRADE KIT FOR MTR2000 STATIONS
Frequency	403-470, 450-524 MHz	403-470 MHz
Power Output (Continuous Duty)	8-100 watts	2-30/40 watts; 25-100 watts
Electronic Bandwidth		Full Band
Output Impedance		50 Ohms
Intermodulation Attenuation	55 dB	40 dB for 40W and 100W stations; 70 dB for 30W station
Maximum Deviation (RSD)	25 kHz/12.5 kHz	±5 kHz / ±2.5 kHz
Audio Sensitivity		60% RSD @ 80 mV RMs
Spurious and Harmonic Emissions Attenuation	90 dB	85 dB
FM Hum and Noise (750 µs de-emphasis)	25 kHz / 12.5 kHz	50 dB nominal, 45 dB nominal
Frequency Stability (for temperature and aging variation)		1.5 ppm/external Ref (optional)
Audio Response		+1,-3 dB from 6 dB per octave pre-emphasis; 300-3000 Hz referenced to 1000 Hz at line input
Audio Distortion		Less than 3% (1% typical) at 1000 Hz; 60% RSD
Emission Designators		FM Modulation: 12.5 kHz: 11K0F3E; 25 kHz: 16K0F3E 4FSK Modulation: 12.5 kHz - Data Only: 7K60FXD, 7K60F7D; 12.5 kHz - Voice Only: 7K60FXE, 7K60F1E, 7K60F7E; 12.5 kHz - Data & Voice: 7K60F1W, 7K60F7W

## RECEIVER (UHF)

	T3000A - MTR3000	T2003A - UPGRADE KIT FOR MTR2000 STATIONS
Frequency	403-470, 450-524 MHz	403-470 MHz
Selectivity (TIA603)	25 kHz / 12.5 kHz	80 dB (86 dB typical) / 75 dB (78 dB typical)
Selectivity (TIA603D)	25 kHz / 12.5 kHz	75 dB (85 dB typical) / 45 dB (60 dB typical)
Analog Sensitivity 12 dB SINAD		0.30 uV (0.22 uV typical)
Digital Sensitivity 5% BER		0.30 uV (0.20 uV typical)
Signal Displacement Bandwidth	25 kHz/12.5 kHz	2 kHz / 1 kHz
Intermodulation Rejection	25 kHz/12.5 kHz	85 dB
Spurious and Image Rejection		85 dB (95 dB typical)
Audio Response		+1,-3 dB from 6 dB per octave de-emphasis; 300-3000 Hz referenced to 1000 Hz at line output
Audio Distortion		Less than 3% (1.5% typical) at 1000 Hz, 60% RSD
Line Output		330 mV (RMs) @ 60% RSD
FM Hum and Noise (750µs de-emphasis)	25 kHz / 12.5 kHz	50 dB nominal / 45 dB nominal
RF Input Impedance		50 Ohms

Industry Canada Approval:  
IC ID 109AB-T3000;  
IC model T3000-UHFR1.  
Specifications per TIA/EIA 603D unless otherwise noted.  
Product meets:  
ETSI 300-086;  
ETSI 300-113.  
CE Marked  
RoHS compliant  
UL Listed  
Digital Protocol  
ETSI 102 361-1, -2, -3;  
AMBE +2™ Vocoder  
Specifications subject to change without notice.

## SPEC SHEET

MTR3000 BASE STATION/REPEATER, SATELLITE RECEIVER

## MTR3000 BASE STATION/REPEATER 800/900 MHZ SPECIFICATIONS

GENERAL SPECIFICATIONS			800/900 MHZ INPUT CURRENT (T3000A)		
	T3000A - MTR3000	T2003A - UPGRADE KIT FOR MTR2000 STATIONS	AC LINE 117 VOLTS / 220 VOLTS	28 VDC D/C BATTERY REVERT, NEG. GND.	
Number of Frequencies		Up to 16	100 W standby	0.4A / 0.4A	0.9A
Modulation		FM & 4FSK	100 W Transmit	3.4A / 1.9A	12.0A
Frequency Generation		Synthesized			
Channel Spacing	Analog/Digital	12.5 kHz, 25 kHz / 12.5 kHz (6.25e compliant)			
Mode of Operation		Semi-Duplex / Duplex			
Temperature Range		-30°C to +60°C			
Antenna Connectors		Transmit and Receive, Type "N" Female			
AC Operation		85-264 VAC, 47-63 Hz			
DC Operation		28.6 VDC (24.7-30.7 VDC full rated output power)			
Dimensions		5.25 in H x 19 in W x 16.5 in L 133 mm H x 483 mm W x 419 mm L			
Weight		40 lbs (19 kg)			

FCC TYPE ACCEPTANCE					
FREQUENCY RANGE IN MHZ	MODEL	TYPE	POWER OUTPUT IN WATTS	US TYPE ACCEPTANCE NUMBER	
851 - 870 & 935 - 941	T3000A	Transmitter	8-100	ABZ89FC5817	
806 - 825 & 896 - 902	T3000A	Receiver	N/A	ABZ89FR5818	
851 - 870	T2003A	Transmitter	20-75	ABZ89FC5819	
806 - 825	T2003A	Receiver	N/A	ABZ89FR5820	
935 - 941	T2003A	Transmitter	20-75	ABZ89FC5821	
896 - 902	T2003A	Receiver	N/A	ABZ89FR5822	

TRANSMITTER (800/900 MHZ)		
	T3000A - MTR3000	T2003A - UPGRADE KIT FOR MTR2000 STATIONS
Frequency	851 - 870 & 935 - 941 MHz	851 - 870, 935 - 941 MHz
Power Output (Continuous Duty)	8-100 watts	20-75 watts
Electronic Bandwidth		Full Band
Output Impedance		50 Ohms
Intermodulation Attenuation	55 dB	50 dB
Maximum Deviation (RSD)	25 kHz/12.5 kHz	±5 kHz, ±2.5 kHz / ±2.5 kHz
Audio Sensitivity		60% RSD @ 80 mV RMS
Spurious and Harmonic Emissions Attenuation	90 dB / 86 dB	80 dB / 80 dB
FM Hum and Noise (750 μs de-emphasis)	25 kHz / 12.5 kHz	50 dB nominal, 45 dB nominal / 45 dB nominal
Frequency Stability (for temperature and aging variation)		0.1ppm/ external Ref (optional)
Audio Response		+1, -3 dB from 6 dB per octave pre-emphasis; 300-3000 Hz referenced to 1000 Hz at line input
Audio Distortion		Less than 3% (1% typical) at 1000 Hz; 60% RSD
Emission Designators		FM Modulation: 800 MHz: 12.5 kHz: 11K0F3E; 25 kHz: 16K0F3E; 900 MHz: 12.5 kHz: 11K0F3E 4FSK Modulation: 12.5 kHz - Data Only: 7K60FXD, 7K60F7D; 12.5 kHz - Voice Only: 7K60FXE, 7K60F1E, 7K60F7E; 12.5 kHz - Data & Voice: 7K60F1W, 7K60F7W

RECEIVER (800/900 MHZ)		
	T3000A - MTR3000	T2003A - UPGRADE KIT FOR MTR2000 STATIONS
Frequency	806 - 825 & 896 - 902 MHz	806 - 825, 896 - 902 MHz
Selectivity (TIA603)	800 MHz: 25 kHz, 12.5 kHz / 900 MHz: 12.5 kHz	85 dB, 75 dB / 75 dB
Selectivity (TIA603D)	800 MHz: 25 kHz, 12.5 kHz / 900 MHz: 12.5 kHz	80 dB (87 dB typical), 55 dB (62 dB typical) / 55 dB (62 dB typical)
Analog Sensitivity 12 dB SINAD		0.28 uV (0.21 uV typical)
Digital Sensitivity 5% BER		0.28 uV
Signal Displacement Bandwidth	800 MHz: 25 kHz, 12.5 kHz / 900 MHz: 12.5 kHz	2 kHz, 1 kHz / 1 kHz
Intermodulation Rejection	800 MHz: 25 kHz, 12.5 kHz / 900 MHz: 12.5 kHz	85 dB (90 dB typical) / 85 dB (90 dB typical)
Spurious and Image Response Rejection		90 dB
Audio Response		+1, -3 dB from 6 dB per octave pre-emphasis, 300 - 3000 Hz referenced to 1000 Hz at line output
Audio Distortion		Less than 3%(1.5% typical) at 1000 Hz, 60% RSD
Line Output		330 mV (RMS) @60% RSD
FM Hum and Noise (750us de-emphasis)	800 MHz: 25 kHz, 12.5 kHz / 900 MHz: 12.5 kHz	50 dB nominal, 45 dB nominal / 45 dB nominal
RF Input Impedance		50 Ohms

Industry Canada Approval:  
 IC ID 109AB-5817;  
 IC Model T3000-8/900  
 Specifications per TIA/EIA 603D  
 unless otherwise noted.  
 Product meets:  
 ETSI 300-086;  
 ETSI 300-113.  
 RoHS compliant  
 UL Listed  
 Digital Protocol  
 ETSI 102 361-1, -2, -3;  
 AMBE +2™ Vocoder  
 Specifications subject to change  
 without notice.

**SPEC SHEET**

MTR3000 BASE STATION/REPEATER , SATELLITE RECEIVER

For more information on how to make your business more efficient  
and better connected, visit [motorolasolutions.com/mototrbo](http://motorolasolutions.com/mototrbo)

Motorola Solutions, Inc.  
1301 East Algonquin Road Schaumburg, Illinois 60196, U.S.A. 800-367-2346  
**motorolasolutions.com**

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POD 06/12 R3-2-2010F





YOUR MOBILE VOICE JUST GOT STRONGER

# MOTOTRBO™ XPR™ 5000 SERIES DIGITAL TWO-WAY MOBILE RADIOS

From the delivery driver crisscrossing the city to the sanitation crew clearing streets, MOTOTRBO™ can transform your enterprise and make employee interactions smarter and safer. Our best-in-class audio and exceptional data capabilities empower people like never before.

Versatile and powerful, MOTOTRBO combines the best of two-way radio functionality with the latest digital technology. XPR 5000 Series radios integrate voice and data seamlessly, offer enhanced features that are easy to use, and deliver operations-critical advantages like integrated Bluetooth® and Intelligent Audio.

The XPR 5000 Series can remaster your workplace and the way people collaborate to help you achieve even greater efficiency.

### PRODUCT SPEC SHEET

MOTOTRBO™ XPR 5000 SERIES MOBILE RADIOS

#### AUDIO BEYOND EXPECTATIONS

When it comes to exceptional audio clarity, the quality of digital can't be denied. With the XPR 5000 Series mobiles, you get digital quality plus unique features to help your employees hear and speak clearly, wherever they work.

With Intelligent Audio, the radio volume automatically adjusts to compensate for background noise so workers don't have to adjust their radio volume to avoid missing a call in loud situations or disturbing others when they move into quiet places. Increased background noise suppression filters out unwanted external clamor – from road traffic to the roar of engines.

Bluetooth® audio, embedded right in the radio, provides voice communication with exceptional clarity – giving your people the freedom to move without wires. Also, IMPRES™ audio accessories enhance noise suppression and improve voice intelligibility for smarter audio than they've ever experienced before.

#### INDUSTRY-LEADING DATA

XPR 5000 Series radios feature integrated GPS that enables location tracking of mobile work teams and text messaging to enable communication when voice isn't feasible, and the large, full-color display operates in day or night mode, for easy viewing of contact lists, text messages and work order tickets even in bright sunlight. These radios also feature integrated Bluetooth®, enabling the radio to wirelessly interface with Bluetooth®-enabled devices such as barcode scanners and magnetic card readers to facilitate the collection of critical information in the field.

MOTOTRBO's Application Developer program offers customized data applications that allow you to adapt your radios to your business challenges. With the industry's largest developer program, data applications answer your objectives – from work order ticket management to telephony integration, and more.

#### HIGH-POWERED PERFORMANCE

Because MOTOTRBO uses TDMA digital technology, you get integrated voice and data, twice the calling capacity and clearer voice communications. Also, the smart IMPRES™ technology in our high-powered accessories enables easier communications – everywhere your people travel.

#### RICH FUNCTIONALITY

XPR 5000 Series radios offer plenty of features your business seeks – including enhanced call signaling, basic and enhanced privacy-scrambling, option board expandability, the transmit interrupt suite to prioritize critical communication the moment you need it and compatibility with SCADA solutions for utility and public service monitoring and alarms. Programmable button features appear on the display for easy viewing and quick access. And when workers can't be distracted, customizable voice announcement provides audible confirmation of channel and zone changes as well as programmable button features, eliminating the need to view the display.

#### EXPANDED CAPACITY AND COVERAGE

Your work crews are on the go – picking up loads, dropping off cargo, repairing roads or restoring power after a storm. That's why you need the far-reaching performance of MOTOTRBO.

IP Site Connect helps to dramatically improve customer service and productivity by using the Internet to extend coverage to create a wide area network, enhance single site coverage or link geographically dispersed locations. Capacity Plus single-site trunking expands capacity to over 1,000 users without adding new frequencies. Linked Capacity Plus leverages the high capacity of Capacity Plus, with the wide area coverage capabilities of IP Site Connect to keep your staff at up to five sites connected with an affordable wide area trunking solution. Other multi-site digital trunking solutions, such as Connect Plus, will be supported in a future release. So whether you want expanded coverage at a single site or across multiple ones, MOTOTRBO can be scaled to your needs.

#### MIGRATE AT YOUR OWN PACE

Keeping operations running smoothly during a change in communication systems is vital to business. It's easy to migrate to digital with XPR 5000 Series radios because they operate in analog and digital mode while the dynamic mixed mode repeater functionality streamlines automatic switching between analog and digital calls. So you can begin using MOTOTRBO radios and repeaters on your existing analog system, and when your time and budget allow, move to digital at your own pace.

#### DAY-IN, DAY-OUT DURABILITY

XPR 5000 Series mobile radios are backed by a two-year Standard Warranty, one-year Repair Service Advantage (U.S.)/Extended Warranty (Canada) and at least a one-year warranty for accessories.



## PRODUCT SPEC SHEET

MOTOTRBO™ XPR 5000 SERIES MOBILE RADIOS

## XPR 5550/XPR 5350 SERIES SPECIFICATIONS

GENERAL SPECIFICATIONS				
XPR 5550			XPR 5350	
	VHF	UHF Band 1	VHF	UHF Band 1
Channel Capacity	Up to 1,000		32	
Typical RF Output	Low Power	1-25 W	1-25 W	1-25 W
	High Power	25-45 W	25-40 W	25-40 W
Dimensions (H x W x L)	2.1 x 6.9 x 8.1 in (53.3 x 175.3 x 205.7 mm)		2.1 x 6.9 x 8.1 in (53.3 x 175.3 x 205.7 mm)	
Weight	3.9 lbs (1.8 kg)		3.9 lbs (1.8 kg)	
Current Drain	Standby	0.81 A max	0.81 A max	0.81 A max
	Rx @ Rated Audio	2 A max	2 A max	2 A max
	Transmit	1-25 W: 11.0 A max 25-45 W: 14.5 A max	1-25 W: 11.0 A max 25-40 W: 14.5 A max	1-25 W: 11.0 A max 25-45 W: 14.5 A max
FCC Description		1-25 W: ABZ99FT3086	1-25 W: ABZ99FT4087	1-25 W: ABZ99FT3086
		25-45 W: ABZ99FT3087	25-40 W: ABZ99FT4088	25-45 W: ABZ99FT3087
IC Description		1-25 W: 109AB-99FT3086	1-25 W: 109AB-99FT4087	1-25 W: 109AB-99FT3086
		25-45 W: 109AB-99FT3087	25-40 W: 109AB-99FT4088	25-45 W: 109AB-99FT3087

RECEIVER: XPR 5550 & XPR 5350		
	VHF	UHF Band 1
Frequencies	136-174 MHz	403-470 MHz
Channel Spacing	12.5 kHz / 25 kHz*	
Frequency Stability (-30°C, +60°C, +25°C Ref)	± 0.5 ppm	
Analog Sensitivity (12dB SINAD)	0.3uV 0.22uV (typical)	
Digital Sensitivity	5% BER @ 0.25uV (0.19uV typical)	
Intermodulation (TIA603D)	78 dB	75 dB
Adjacent Channel Selectivity (TIA603D)	50 dB @ 12.5 kHz 80 dB @ 25 kHz*	50 dB @ 12.5 kHz 75 dB @ 25 kHz*
Spurious Rejection (TIA603D)	80 dB	75 dB
Rated Audio	3 W (Internal) 7.5 W (External - 8 ohms) 13 W (External - 4 ohms)	
Audio Distortion @ Rated Audio	3% (typical)	
Hum and Noise	-40 dB @ 12.5 kHz/-45 dB @ 25 kHz*	
Audio Response	TIA603D	
Conducted Spurious Emission (TIA603D)	-57dBm	

TRANSMITTER: XPR 5550 & XPR 5350		
	VHF	UHF Band 1
Frequencies	136-174 MHz	403-470 MHz
Channel Spacing	12.5 kHz / 25 kHz*	
Frequency Stability (-30°C, +60°C, +25°C Ref)	± 0.5 ppm	
Low Power Output	1-25 W	1-25 W
High Power Output	25-45 W	25-40 W
Modulation Limiting	± 2.5 kHz @ 12.5 kHz/± 5.0 kHz @ 25 kHz*	
FM Hum and Noise	-40 dB @ 12.5 kHz/-45 dB @ 25 kHz*	
Conducted/Radiated Emission	-36 dBm < 1 GHz/-30 dBm > 1 GHz	
Adjacent Channel Power	60 dB @ 12.5 kHz/70 dB @ 25 kHz*	
Audio Response	TIA603D	
Audio Distortion	3%	
FM Modulation	12.5 kHz: 11K0F3E / 25 kHz*: 16K0F3E	
4FSK Digital Modulation	12.5 kHz Data: 7K60F1D & 7K60FXD	
	12.5 kHz Voice: 7K60F1E & 7K60FXE	
	Combination of 12.5 kHz Voice & Data: 7K60F1W	
Digital Vocoder Type	AMBE+2™	
Digital Protocol	ETSI TS 102 361-1, -2, -3	

\*25 kHz is NOT available in the USA. FCC narrowbanding rules do not allow operation of this model on 25 kHz configuration in Part 90 VHF/UHF frequencies

## Appendix 4

### PRODUCT SPEC SHEET

MOTOTRBO™ XPR 5000 SERIES MOBILE RADIOS

#### MILITARY STANDARDS: XPR 5550 & XPR 5350

APPLICABLE MIL-STD	810C		810D		810E		810F		810G	
	METHOD	PROCEDURES	METHOD	PROCEDURES	METHOD	PROCEDURES	METHOD	PROCEDURES	METHOD	PROCEDURES
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II	500.5	II
High Temperature	501.1	I, II	501.2	I/A1,II/A1	501.3	I/A1,II/A1	501.4	I/Hot, II/Hot	501.5	I/A1, II
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I/C3, II/C1	502.5	I/C3, II
Temperature Shock	503.1	-	503.2	I/A1/C3	503.3	I/A1/C3	503.4	I	503.5	I/C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.5	I/A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.5	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	-	507.5	II - Aggravated
Salt fog	509.1	-	509.2	-	509.3	-	509.4	-	509.5	-
Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.5	I
Vibration	514.2	VIII/F, Curve-W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.6	I/24
Shock	516.2	I, II	516.3	I, IV	516.4	I, IV	516.5	I, IV	516.6	I, IV, V, VI

#### GPS: XPR 5550 & XPR 5350

Accuracy specs are for long-term tracking (95th percentile values > 5 satellites visible at a nominal -130 dBm signal strength)

TTF (Time To First Fix)  
Cold Start < 1 minute

TTF (Time To First Fix)  
Hot Start < 10 seconds

Horizontal Accuracy < 5 meters

#### BLUETOOTH: XPR 5550 & XPR 5350

Version Supports Bluetooth® 2.1 + EDR Specification

Profiles Supported Bluetooth Headset Profile (HSP), Serial Port Profile (SPP), Motorola fast push-to-talk.

Devices Supported Radio supports 1 Bluetooth audio accessory and 1 Bluetooth data device simultaneously

Range Class 2, 10 meters

#### ENVIRONMENTAL SPECIFICATIONS: XPR 5550 & XPR 5350

Operating Temperature -30° C / +60° C

Storage Temperature -40° C / +85° C

Thermal Shock Per MIL-STD

Humidity Per MIL-STD

ESD IEC 61000-4-2 Level 3

Dust and Water Intrusion IP54, MIL-STD

Packaging test MIL-STD 810C, D, E, F, and G

Specifications subject to change without notice. All specifications shown are typical.

Radio meets applicable regulatory requirements. Version 1.07/11

For more information on how to strengthen your mobile voice, visit [motorolasolutions.com/mototrbo](http://motorolasolutions.com/mototrbo)

Motorola Solutions, Inc.  
1301 East Algonquin Road Schaumburg, Illinois 60196, U.S.A. 800-367-2346  
[motorolasolutions.com](http://motorolasolutions.com)

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**MOTOTRBO**  
DIGITAL  
REMASTERED.





YOUR VOICE JUST GOT STRONGER

# MOTOTRBO™ XPR™ 7000 SERIES DIGITAL TWO-WAY PORTABLE RADIOS



From the factory worker building components to the road crew making repairs, MOTOTRBO can transform your enterprise and make employee interactions smarter and safer. Our best-in-class audio and unrivaled data capabilities empower people like never before.

Versatile and powerful, MOTOTRBO combines the best of two-way radio functionality with the latest digital technology. XPR 7000 Series radios integrate voice and data seamlessly, offer enhanced features that are easy to use, and deliver business-critical advantages like integrated Bluetooth® and Intelligent Audio.

The XPR 7000 Series can remaster your workplace and the way people collaborate to help you achieve even greater efficiency.

**PRODUCT SPEC SHEET**

MOTOTRBO™ XPR 7000 SERIES PORTABLE RADIOS

**AUDIO BEYOND EXPECTATIONS**

When it comes to exceptional audio clarity, the quality of digital can't be denied. XPR 7000 Series portables give you digital audio performance throughout your coverage area plus unique features to help your employees hear and speak clearly, wherever they work.

With Intelligent Audio, the radio volume automatically adjusts to compensate for background noise so workers don't have to adjust their radio volume to avoid missing a call in loud situations or disturb others when they move into quiet areas. Increased background noise suppression helps filter out unwanted external clamor – from heavy equipment to the roar of engines.

Bluetooth® audio is embedded right in the radio, so no adapter is needed when using wireless accessories. Also, IMPRES™ audio accessories enhance noise suppression and improve voice intelligibility for smarter accessories than they've ever experienced before.

**INDUSTRY-LEADING DATA**

XPR 7000 Series radios feature integrated Bluetooth® data, so rather than waiting until the end of a shift, busy work crews can send real time information back to the office, saving valuable hours and enabling better decision making. Integrated GPS enables location tracking of mobile work teams and text messaging enables communication when voice isn't feasible. And the large, full-color, 5-line display operates in day or night mode, for easy viewing of contact lists, text messages and work order tickets even in bright sunlight.

MOTOTRBO's Application Developer Program offers customized data applications so you can adapt your radios to your business challenges. With the largest developer program in the industry, data applications help meet your objectives – from work order ticket management to telephony integration, and more.

**HIGH-POWERED PERFORMANCE**

Because MOTOTRBO uses TDMA digital technology, you get integrated voice and data, twice the calling capacity and clearer voice communications. When it comes to battery performance, MOTOTRBO radios operate up to 40 percent longer between recharges compared to analog.

**RICH FUNCTIONALITY**

XPR 7000 Series radios offer plenty of features businesses seek – including enhanced call signaling, basic and enhanced privacy-scrambling, option board expandability and the transmit interrupt suite to prioritize critical communication the moment you need it. Programmable button features appear on the display for easy viewing and quick access. And when workers can't be distracted, customizable voice announcement provides audible confirmation of channel and zone changes as well as programmable button features, eliminating the need to view the display.

**EXPANDED CAPACITY AND COVERAGE**

Your workforce is hard at work every day – picking up loads, making road repairs, providing security, responding to guest requests or restoring power after a storm.

IP Site Connect helps to dramatically improve customer service and productivity by using the Internet to extend coverage to create a wide area network, enhance single site coverage or link geographically dispersed locations. Capacity Plus single-site trunking expands capacity to over 1,000 users without having to add new frequencies. Linked Capacity Plus combines the expanded capacity of Capacity Plus with the wide area coverage of IP Site Connect, delivering a high capacity, wide area, and cost effective multi-site trunking solution. So whether you want coverage at a single site or across multiple ones, MOTOTRBO can be scaled to your business and budget.

**MIGRATE AT YOUR OWN PACE**

Keeping operations running smoothly during a change in communication systems is vital to any business. It's easy to migrate to digital with XPR 7000 Series radios because they operate in analog and digital mode. To ease the transition even further, the dynamic mixed mode repeater functionality streamlines automatic switching between analog and digital calls. So you can begin using MOTOTRBO radios and repeaters on your existing analog system, and when your time and budget allow, move to digital at your own pace.

**DAY-IN, DAY-OUT DURABILITY**

XPR 7000 Series radios meet the most demanding specs, including IP57 for water submersibility and U.S. Military 810 C, D, E, F, & G standards for exceptional durability. The radio is also "intrinsically safe" when purchased and equipped with an intrinsically safe (FM) battery, for use in environments where flammable gas, vapors or combustible dust may be present. And it's backed by a two-year Standard Warranty, one-year Repair Service Advantage (US)/Extended Warranty (Canada) and minimum 1-year warranty for batteries and accessories.

**KEEP YOUR BUSINESS RUNNING SMOOTHLY WITH BUSINESS APPLICATIONS:**

-  **Location tracking:** Monitor the whereabouts of mobile workers so they can respond immediately; in an emergency, you can pinpoint security personnel and send the nearest to the scene
-  **Integrated Bluetooth®** for sharing data wirelessly and instantly between devices
-  **Dispatch consoles** for centralized communication
-  **Email gateways** to connect to email from your radio
-  **Network monitoring** to maximize system utilization
-  **Man-down applications** so radios call for help when workers can't
-  **Telephony** for communication between radios and landline or mobile phones
-  **Text messaging** for quick and discreet communication
-  **Work order tickets** for faster customer response

## PRODUCT SPEC SHEET

MOTOTRBO™ XPR 7000 SERIES PORTABLE RADIOS

## XPR 7000 SERIES SPECIFICATIONS

GENERAL SPECIFICATIONS					
		DISPLAY XPR 7550		NON DISPLAY XPR 7350	
		VHF	UHF	VHF	UHF
Channel Capacity		1000		32	
Frequency		136-174 MHz	403-512 MHz	136-174 MHz	403-512 MHz
IMPRES Hi-Cap Li-ion 2150 mAh Battery (PMNN4409)	(HxWxL)	5.13 inch / 2.17 inch / 1.62 inch (130.3 mm / 55.2 mm / 41.1 mm)		5.13 inch / 2.17 inch / 1.56 inch (130.3 mm / 55.2 mm / 39.6 mm)	
	Weight	12.54 oz (355.5 g)		11.39 oz (323 g)	
Slim IMPRES Li-ion 1500 mAh Battery (PMNN4407)	(HxWxL)	5.13 inch / 2.17 inch / 1.41 inch (130.3 mm / 55.2 mm / 35.8 mm)		5.13 inch / 2.17 inch / 1.35 inch (130.3 mm / 55.2 mm / 34.3 mm)	
	Weight	11.83 oz (335.5 g)		10.69 oz (303 g)	
IMPRES Hi-Cap Li-ion FM 2300 mAh Battery (NNTN8129)	(HxWxL)	5.13 inch / 2.17 inch / 1.62 inch (130.3 mm / 55.2 mm / 41.1 mm)		5.13 inch / 2.17 inch / 1.56 inch (130.3 mm / 55.2 mm / 39.6 mm)	
	Weight	12.89 oz (365.5 g)		11.75 oz (333 g)	
Power Supply		7.5 V (Nominal)			
Operating Temperature		-30 ~ +60 °C <sup>1</sup>			
FCC Description		ABZ99FT3085	ABZ99FT4086	ABZ99FT3085	ABZ99FT4086
IC Description		109AB-99FT3085	109AB-99FT4086	109AB-99FT3085	109AB-99FT4086

BATTERY		
Average Battery Life	5/5/90 duty cycle with carrier squelch and transmitter in high power <sup>2</sup>	
Slim IMPRES Li-ion 1500 mAh Battery	Analog: 7.7 hrs / Digital: 11.3 hrs	Analog: 8 hrs / Digital: 11.8 hrs
IMPRES Hi-Cap Li-ion 2150 mAh Battery	Analog: 11.1 hrs / Digital: 16.2 hrs	Analog: 11.5 hrs / Digital: 17 hrs
IMPRES Hi-Cap Li-ion FM 2300 mAh Battery	Analog: 11.9 hrs / Digital: 17.3 hrs	Analog: 12.3 hrs / Digital: 18.1 hrs

RECEIVER		
	VHF	UHF
Frequencies	136-174 MHz	403-512 MHz
Channel Spacing	12.5/25kHz <sup>3</sup>	
Frequency Stability (-30°C, +60°C, +25°C Ref)	± .5 ppm	
Analog Sensitivity (12dB SINAD)	0.3uV (0.22uV typical)	
Digital Sensitivity	0.25 uV (0.19 uV typical)	
Intermodulation (TIA603D)	70 dB	
Adjacent Channel Selectivity (TIA603A)-1T	60dB @ 12.5 kHz / 70dB @ 25 kHz <sup>3</sup>	
Adjacent Channel Selectivity (TIA603D)-2T	45dB @ 12.5 kHz / 70dB @ 25 kHz <sup>3</sup>	
Spurious Rejection (TIA603D)	70 dB	
Rated Audio	0.5W	
Audio Distortion @ Rated Audio	5% (3% typical)	
Hum and Noise	-40dB @ 12.5 kHz / -45dB @ 25 kHz <sup>3</sup>	
Audio Response	TIA603D	
Conducted Spurious Emission (TIA603D)	-57dBm	

TRANSMITTER		
	VHF	UHF
Frequencies	136-174 MHz	403-512 MHz
Channel Spacing	12.5/25 kHz	
Frequency Stability	± 1.5 ppm	
Low Power Output	1W	1W
High Power Output	5W	4W
Modulation Limiting	± 2.5kHz @ 12.5 kHz / ± 5.0kHz @ 25 kHz <sup>3</sup>	
FM Hum and Noise	-40dB @ 12.5 kHz / -45dB @ 25 kHz <sup>3</sup>	
Conducted/Radiated Emission	-36 dBm < 1GHz / -30 dBm > 1GHz	
Adjacent Channel Power	60dB @ 12.5 kHz / 70dB @ 25 kHz <sup>3</sup>	
Audio Response	TIA603D	
Audio Distortion	3%	
4FSK Digital Modulation	12.5 kHz Data: 7K60F1D & 7K60FXD	
	12.5 kHz Voice: 7K60F1E & 7K60FXE	
	Combination of 12.5 kHz Voice & Data: 7K60F1W	
Digital Vocoder Type	AMBE+2™	
Digital Protocol	ETSI TS 102 361-1, -2, -3	

## Appendix 5

### PRODUCT SPEC SHEET

MOTOTRBO™ XPR 7000 SERIES PORTABLE RADIOS

#### GPS

Accuracy specs are for long-term tracking (95th percentile values >5 satellites visible at nominal -130 dBm signal strength)

TTFF (Time To First Fix) - Cold Start < 60 seconds

TTFF (Time To First Fix) - Hot Start < 10 seconds

Horizontal Accuracy < 5 meters

#### BLUETOOTH

Version Supports Bluetooth® 2.1 + EDR Specification

Range Class 2, 10 meters

#### FACTORY MUTUAL APPROVALS

MOTOTRBO XPR 7000 Series portable radios have been certified by FM in accordance with U.S. Codes as intrinsically safe for use in Class I, II, III, Division 1, Groups C, D, E, F, G, when properly equipped with a Motorola FM approved battery option. They are also approved for use in Class I, Division 2, Groups A, B, C, D.

#### MILITARY STANDARDS: XPR 7550 AND XPR 7350

APPLICABLE MIL-STD	810C		810D		810E		810F		810G	
	METHOD	PROCEDURES	METHOD	PROCEDURES	METHOD	PROCEDURES	METHOD	PROCEDURES	METHOD	PROCEDURES
Low Pressure	500.1	I	500.2	II	500.3	II	500.4	II	500.5	II
High Temperature	501.1	I, II	501.2	I/A1, II/A1	501.3	I/A1, II/A1	501.4	I/Hot, II/Hot	501.5	I-A1, II
Low Temperature	502.1	I	502.2	I/C3, II/C1	502.3	I/C3, II/C1	502.4	I-C3, II/C1	502.5	I, II
Temperature Shock	503.1	-	503.2	I/A1/C3	503.3	I/A1/C3	503.4	I	503.5	I-C
Solar Radiation	505.1	II	505.2	I	505.3	I	505.4	I	505.5	I-A1
Rain	506.1	I, II	506.2	I, II	506.3	I, II	506.4	I, III	506.5	I, III
Humidity	507.1	II	507.2	II	507.3	II	507.4	-	507.5	II
Salt fog	509.1	-	509.2	-	509.3	-	509.4	-	509.5	-
Dust	510.1	I	510.2	I	510.3	I	510.4	I	510.5	I
Vibration	514.2	VIII/F, Curve-W	514.3	I/10, II/3	514.4	I/10, II/3	514.5	I/24	514.6	II/5
Shock	516.2	I, II	516.3	I, IV	516.4	I, IV	516.5	I, IV	516.6	I, IV, VI

#### ENVIRONMENTAL SPECIFICATIONS: DISPLAY XPR 7550 & NON-DISPLAY XPR 7350

Operating Temperature -30° C / +60° C

Storage Temperature -40° C / +85° C

Thermal Shock Per MIL-STD

Humidity Per MIL-STD

ESD IEC 61000-4-2 Level 3

Dust and Water Intrusion IEC 60529 - IP57

Packaging test MIL-STD 810D and E

Testing completed using portable radio with attached battery and antenna.

<sup>1</sup> Radio only - Li-Ion battery -10C

<sup>2</sup> Actual battery runtime observed may vary based on the use of certain features such as GPS, Bluetooth, and Expansion Card based applications.

Please contact your Motorola sales representative for battery runtime expectations based on your specific radio configuration.

<sup>3</sup> 25kHz channel spacing available in Canada only

For more information on how to strengthen your portable voice, visit [motorolasolutions.com/mototrbo](http://motorolasolutions.com/mototrbo)

Specifications subject to change without notice. All specifications shown are typical.

Radio meets applicable regulatory requirements. Version 1 01/12

Motorola Solutions, Inc.  
1301 East Algonquin Road Schaumburg, Illinois 60196, U.S.A. 800-367-2346  
[motorolasolutions.com](http://motorolasolutions.com)

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**MOTOTRBO**  
DIGITAL  
REMASTERED.





EASIER CONNECTIONS, FASTER INTERACTIONS

# MOTOTRBO™ XPR™ 3000 SERIES ACCESSORIES



Supervising a manufacturing line or dispatching school buses, how do you keep customers satisfied and students safe? MOTOTRBO digital radio solutions can help by putting the power of digital communications within reach. XPR 3000 series radios offer best-in-class audio in a scalable solution to meet your communication needs and empower people like never before.

That's why it's critical to choose the only accessories certified to perform with MOTOTRBO radios. Our complete portfolio helps you remaster the way your people collaborate – with forward-thinking features such as IMPRES™, Intelligent Audio and a quick-release connector— so you can achieve greater efficiency.

### FACT SHEET

MOTOTRBO XPR 3000 SERIES ACCESSORIES

#### EASY CONNECTIONS AT HAND

Our XPR 3000 series audio accessories are uniquely designed so you can secure the accessory easily to your radio in two steps by hand, then quickly disconnect with one hand. Walking across the factory or working on a ladder, the accessory stays snugly attached and detaches easily when you need to. And because it's so slim, it won't add bulk to the radio.

#### EXCEPTIONAL AUDIO EVERYWHERE

Our exclusive IMPRES™ Smart Audio accessories communicate with the radio to suppress ambient noise, improve voice intelligibility and amplify loudness – even in high-noise and harsh weather. Automatic Gain Control (AGC) adds another layer of exceptional audio. It detects changes in voice levels from the individual talking, then increases or decreases microphone gain so the listener hears you clearly regardless of how loudly or quietly you are talking into your accessory.

#### TAKE INTELLIGENT AUDIO FURTHER WITH IMPRES

Our XPR 3000 series radios offer a smart new feature in digital mode – Intelligent Audio. With Intelligent Audio, the radio volume automatically adjusts to compensate for background noise so workers don't have to adjust their radio volume to avoid missing a call in loud situations or disturbing others when they move into quiet places. Increased background noise suppression filters out unwanted external distractions. Your workforce can also enjoy the benefits of Intelligent Audio with select audio accessories.

Plug in an IMPRES accessory and it instantly sets the volume level and enhances the Intelligent Audio capabilities on the radio. With IMPRES, your radio not only recognizes the accessory and loads the correct profile to optimize audio performance, but combined with Intelligent Audio it intuitively adjusts volume to compensate for background noise.

#### FLEXIBLE OPTIONS TO WEAR AND SHARE

Our complete portfolio of audio accessories includes remote speaker microphones, earbuds, a heavy-duty headset and a new single-wire swivel earpiece that is all-day comfortable and fits outside the ear so it is hygienic and easily shared. Nylon and leather carry cases protect your radio from the dirtiest tasks and toughest days.

#### HIGH VALUE MEETS SOLID PRODUCTIVITY

When you want greater affordability with solid performance, rely on Mag One™, the only value-line of audio accessories tested and certified by Motorola.

#### BATTERIES THAT WORK OVERTIME

Our IMPRES Smart Energy System automates battery maintenance and eliminates overcharging, no matter how long radios are left in the charger. And IMPRES batteries store critical data, so you know when they need to be replaced. These "Proven Tough" batteries also feature a unique, textured surface that makes it easier to grip the radio, even when wearing gloves.

Save energy and money by using the same charger to power up all your MOTOTRBO portable radios. Simply mix and match radios in one MOTOTRBO multi-unit charger.

#### ONE ANTENNA HANDLES THE BAND

The XPR 3000 series radios have a wideband UHF whip antenna that provides coverage across the entire band (403-512 MHz). Choose stubby antennas when you want an unobtrusive option. These stubby antennas offer even better performance than previous MOTOTRBO stubby antennas.



## FACT SHEET

MOTOTRBO XPR 3000 SERIES ACCESSORIES

## ACCESSORIES COMPATIBLE WITH MOTOTRBO XPR 3500 AND XPR 3300 PORTABLE RADIOS

### REMOTE SPEAKER MICROPHONES

PMMN4071	IMPRES Noise Canceling Remote Speaker Microphone with 3.5 mm audio jack (IP54)
PMMN4073	IMPRES Windporting Remote Speaker Microphone with 3.5mm audio jack (IP55)
PMMN4075 <sup>1</sup>	Windporting Remote Speaker Microphone, submersible (IP57)
PMMN4076 <sup>1</sup>	Windporting Remote Speaker Microphone with 3.5mm audio jack (IP54)

### CHARGERS AND BATTERIES

#### BATTERIES<sup>2</sup>

PMNN4407	IMPRES Slim Li-Ion 1500 mAh battery
PMNN4409	IMPRES Li-Ion 2150 mAh high capacity battery
PMNN4406	Slim Li-Ion 1500 mAh battery

#### CHARGERS

NNTN8275	Single Unit Charger, 120 volt
WPLN4232	IMPRES Single Unit Charger, 120 volt
WPLN4212	IMPRES Multi Unit Charger, 120 volt
WPLN4219	IMPRES Multi Unit Charger with displays, 120 volt

#### CHARGER SOFTWARE AND ACCESSORIES

NNTN7676	IMPRES Battery Fleet Management Software
NNTN7677	Multi-Unit Charger Interface Unit for IMPRES Battery Fleet Management
NNTN8045	Single-Unit Charger Interface Unit for IMPRES Battery Fleet Management
HKVN4036	IMPRES Battery Fleet Management License Key
NNTN7392	IMPRES Battery Reader
NLN7967	Wall Mount Bracket for multi-unit charger
RLN5382	Display Module for IMPRES multi-unit charger

### REMOTE SPEAKER MICROPHONE ACCESSORIES

AARLN4885	Receive-Only Covered Earbud with coiled cord
RLN4941	Receive-Only Earpiece with translucent tube
WADN4190	Receive-Only Flexible Earpiece
PMLN4620	Receive-Only D-shell Earpiece

### HEADSETS

PMLN5731	Over-the-Head Heavy Duty Headset with boom microphone, in-line PTT, noise reduction = 24dB
PMLN5732	Mag One Earset with Boom Microphone and in-line PTT

### EARPIECE ACCESSORIES

PMLN5724 / PMLN5726 <sup>1</sup>	2-wire Surveillance Kit with translucent tube (black/beige)
PMLN5727	Mag One Swivel Earpiece with in-line microphone and PTT
PMLN5733	Mag One Earbud with inline microphone and PTT

### PROGRAMMING AND TEST CABLES

PMKN4115	Portable Programming Cable
PMKN4117	Programming, Test and Alignment Cable



PMMN4071



PMNN4407



PMLN5724



PMLN5731

<sup>1</sup> These audio accessories have been optimized to work with the Intelligent Audio feature

## Appendix 6

### FACT SHEET

#### MOTOTRBO XPR 3000 SERIES ACCESSORIES

#### CARRY ACCESSORIES

PMLN5863	Hard Leather Case with 3" Fixed Belt Loop - limited keypad
PMLN5864	Hard Leather Case with 3" Fixed Belt Loop – no display
PMLN5865	Hard Leather Case with 3" Swivel Belt Loop – limited keypad
PMLN5866	Hard Leather Case with 3" Swivel Belt Loop – no display
PMLN5867	Hard Leather Case with 2.5" Swivel Belt Loop – limited keypad
PMLN5868	Hard Leather Case with 2.5" Swivel Belt Loop – no display
PMLN5869	Nylon case with 3" Fixed Belt Loop – limited keypad
PMLN5870	Nylon case with 3" Fixed Belt Loop – no display
PMLN5610	Replacement 2.5" Swivel Belt Loop
PMLN5611	Replacement 3" Swivel Belt Loop
PMLN4651	2" Belt Clip
PMLN7008	2.5" Belt Clip
NTN5243	Adjustable carrying strap
HLN6602	Universal Chest Pack
RLN4570	Break-away chest pack
1505596Z02	Replacement strap
RLN4815	Radio Pack Radio Utility Case
4280384F89	Radio Pack Extension Belt
HLN9985	Waterproof Bag
RLN4295	Epaulet Strap
4200865599	1.75" Wide Leather Belt
PMLN6066	Accessory Connector Dust Cover

#### ANTENNAS

PMAE4079	UHF Wideband Whip Antenna (403-512 MHz)
PMAE4069	UHF Stubby Antenna (403-450 MHz)
PMAE4070	UHF Stubby Antenna (440-490 MHz)
PMAE4071	UHF Stubby Antenna (470-527 MHz)
PMAD4117	VHF Helical Antenna (136-155 MHz)
PMAD4116	VHF Helical Antenna (144-165 MHz)
PMAD4118	VHF Helical Antenna (152-174 MHz)
PMAD4119	VHF Stubby Antenna (136-148 MHz)
PMAD4120	VHF Stubby Antenna (146-160 MHz)

#### ANTENNA ID BANDS

32012144001	Gray Antenna ID Band (pack of 10)
32012144002	Yellow Antenna ID Band (pack of 10)
32012144003	Green Antenna ID Band (pack of 10)
32012144004	Blue Antenna ID Band (pack of 10)
32012144005	Purple Antenna ID Band (pack of 10)



PMLN5863



PMAD4119



Antenna ID Bands

Motorola Solutions, Inc.  
1301 East Algonquin Road Schaumburg, Illinois 60196, U.S.A. 800-367-2346  
[motorolasolutions.com](http://motorolasolutions.com)

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**Santa Barbara Metropolitan Transit District**  
**State of California Provisions For Public Works Projects**  
**Last Updated January 23, 2013**

The following terms and conditions of the California Public Contract Code and the California Labor Code are incorporated into the agreement between the Santa Barbara Metropolitan Transit District (MTD) and the Contractor. In the provisions that follow, "public agency," "awarding authority," or similar terms other than "city," "county," or "state" shall be the equivalent of using the term "MTD;" and "prime contractor" or similar terms other than "subcontractor" shall be the equivalent to using "Contractor."

**Public Contract Code Provisions**

§4103 (Rights Limitations). Nothing in this chapter limits or diminishes any rights or remedies, either legal or equitable, which:

(a) An original or substituted subcontractor may have against the prime contractor, his or her successors or assigns.

(b) The state or any county, city, body politic, or public agency may have against the prime contractor, his or her successors or assigns, including the right to take over and complete the contract.

§4104 (Subcontractor Listing). Any officer, department, board or commission taking bids for the construction of any public work or improvement shall provide in the specifications prepared for the work or improvement or in the general conditions under which bids will be received for the doing of the work incident to the public work or improvement that any person making a bid or offer to perform the work, shall, in his or her bid or offer, set forth:

(a) The name and the location of the place of business of each subcontractor who will perform work or labor or render service to the prime contractor in or about the construction of the work or improvement, or a subcontractor licensed by the State of California who, under subcontract to the prime contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half of 1 percent of the prime contractor's total bid or, in the case of bids or offers for the construction of streets or highways, including bridges, in excess of one-half of 1 percent of the prime contractor's total bid or ten thousand dollars (\$10,000), whichever is greater.

(b) The portion of the work that will be done by each subcontractor under this act. The prime contractor shall list only one subcontractor for each portion as is defined by the prime contractor in his or her bid.

§4104.5 (Receipt of Bids). (a) The officer, department, board, or commission taking bids for construction of any public work or improvement shall specify in the bid invitation and public notice the place the bids of the prime contractors are to be received and the time by which they shall be received. The date and time shall be extended by no less than 72 hours if the officer, department, board, or commission issues any material changes, additions, or deletions to the invitation later than 72 hours prior to the bid closing. Any bids received after the time specified in the notice or any extension due to material changes shall be returned unopened.

(b) As used in this section, the term "material change" means a change with a substantial cost impact on the total bid as determined by the awarding agency.

(c) As used in this section, the term "bid invitation" shall include any documents issued to prime contractors that contain descriptions of the work to be bid or the content, form, or manner of submission of bids by bidders.

§4105 (Subcontractor Listing Circumvention). Circumvention by a general contractor who bids as a prime contractor of the requirement under Section 4104 for him or her to list his or her subcontractors, by the device of listing another contractor who will in turn sublet portions constituting the majority of the work covered by the prime contract, shall be considered a violation of this chapter and shall subject that prime contractor to the penalties set forth in Sections 4110 and 4111.

§4106 (Contractor Work Qualification). If a prime contractor fails to specify a subcontractor or if a prime contractor specifies more than one subcontractor for the same portion of work to be performed under the contract in excess of one-half of 1 percent of the prime contractor's total bid, the prime contractor agrees that he or she is fully qualified to perform that portion himself or herself, and that the prime contractor shall perform that portion himself or herself. If after award of contract, the prime contractor subcontracts, except as provided for in Sections 4107 or 4109, any such portion of the work, the prime contractor shall be subject to the penalties named in Section 4111.

§4107 (Subcontractor Substitution). A prime contractor whose bid is accepted may not:

(a) Substitute a person as subcontractor in place of the subcontractor listed in the original bid, except that the awarding authority, or its duly authorized officer, may, except as otherwise provided in Section 4107.5, consent to the substitution of another person as a subcontractor in any of the following situations:

(1) When the subcontractor listed in the bid, after having had a reasonable opportunity to do so, fails or refuses to execute a written contract for the scope of work specified in the subcontractor's bid and at the price specified in the subcontractor's bid, when that written contract, based upon the general terms, conditions, plans, and specifications for the project involved or the terms of that subcontractor's written bid, is presented to the subcontractor by the prime contractor.

(2) When the listed subcontractor becomes insolvent or the subject of an order for relief in bankruptcy.

(3) When the listed subcontractor fails or refuses to perform his or her subcontract.

(4) When the listed subcontractor fails or refuses to meet the bond requirements of the prime contractor as set forth in Section 4108.

(5) When the prime contractor demonstrates to the awarding authority, or its duly authorized officer, subject to the further provisions set forth in Section 4107.5, that the name of the subcontractor was listed as the result of an inadvertent clerical error.

(6) When the listed subcontractor is not licensed pursuant to the Contractors License Law.

(7) When the awarding authority, or its duly authorized officer, determines that the work performed by the listed subcontractor is substantially unsatisfactory and not in substantial accordance with the plans and specifications, or that the subcontractor is substantially delaying or disrupting the progress of the work.

(8) When the listed subcontractor is ineligible to work on a public works project pursuant to Section 1777.1 or 1777.7 of the Labor Code.

(9) When the awarding authority determines that a listed subcontractor is not a responsible contractor.

Prior to approval of the prime contractor's request for the substitution, the awarding authority, or its duly authorized officer, shall give notice in writing to the listed subcontractor of the prime contractor's request to substitute and of the reasons for the request. The notice shall be served by certified or registered mail to the last known address of the subcontractor. The listed subcontractor who has been so notified has five working days within which to submit written objections to the substitution to the awarding authority. Failure to file these written objections constitutes the listed subcontractor's consent to the substitution.

If written objections are filed, the awarding authority shall give notice in writing of at least five working days to the listed subcontractor of a hearing by the awarding authority on the prime contractor's request for substitution.

(b) Permit a subcontract to be voluntarily assigned or transferred or allow it to be performed by anyone other than the original subcontractor listed in the original bid, without the consent of the awarding authority, or its duly authorized officer.

(c) Other than in the performance of "change orders" causing changes or deviations from the original contract, sublet or subcontract any portion of the work in excess of one-half of 1 percent of the prime contractor's total bid as to which his or her original bid did not designate a subcontractor.

§4107.2 (Carpet Subcontractor). No subcontractor listed by a prime contractor under Section 4104 as furnishing and installing carpeting, shall voluntarily sublet his or her subcontract with respect to any portion of the labor to be performed unless he or she specified the subcontractor in his or her bid for that subcontract to the prime contractor.

§4107.5 (Subcontractor Listing Error). The prime contractor as a condition to assert a claim of inadvertent clerical error in the listing of a subcontractor shall within two working days after the time of the prime bid opening by the awarding authority give written notice to the awarding authority and copies of that notice to both the subcontractor he or she claims to have listed in error and the intended subcontractor who had bid to the prime contractor prior to bid opening.

Any listed subcontractor who has been notified by the prime contractor in accordance with this section as to an inadvertent clerical error shall be allowed six working days from the time of the prime bid opening within which to submit to the awarding authority and to the prime contractor written objection to the prime contractor's claim of inadvertent clerical error. Failure of the listed subcontractor to file the written notice within the six working days shall be primary evidence of his or her agreement that an inadvertent clerical error was made.

The awarding authority shall, after a public hearing as provided in Section 4107 and in the absence of compelling reasons to the contrary, consent to the substitution of the intended subcontractor:

(a) If (1) the prime contractor, (2) the subcontractor listed in error, and (3) the intended subcontractor each submit an affidavit to the awarding authority along with such additional evidence as the parties may wish to submit that an inadvertent clerical error was in fact made, provided that the affidavits from each of the three parties are filed within eight working days from the time of the prime bid opening, or

(b) If the affidavits are filed by both the prime contractor and the intended subcontractor within the specified time but the subcontractor whom the prime contractor claims to have listed in error does not submit within six working days, to the awarding authority and to the prime contractor, written objection to the prime contractor's claim of inadvertent clerical error as provided in this section.

If the affidavits are filed by both the prime contractor and the intended subcontractor but the listed subcontractor has, within six working days from the time of the prime bid opening, submitted to the awarding authority and to the prime contractor written objection to the prime contractor's claim of inadvertent clerical error, the awarding authority shall investigate the claims of the parties and shall hold a public hearing as provided in Section 4107 to determine the validity of those claims. Any determination made shall be based on the facts contained in the declarations submitted under penalty of perjury by all three parties and supported by testimony under oath and subject to cross-examination. The awarding authority may, on its own motion or that of any other party, admit testimony of other contractors, any bid registries or depositories, or any other party in possession of facts which may have a bearing on the decision of the awarding authority.

§4107.7 (Hazmat Subcontractors). If a contractor who enters into a contract with a public entity for investigation, removal or remedial action, or disposal relative to the release or presence of a hazardous material or hazardous waste fails to pay a subcontractor registered as a hazardous waste hauler pursuant to Section 25163 of the Health and Safety Code within 10 days after the investigation, removal or remedial action, or disposal is completed, the subcontractor may serve a stop notice upon the public entity in accordance with Chapter 4 (commencing with Section 9350) of Title 3 of Part 6 of Division 4 of the Civil Code.

§4108 (Subcontractor Bonding). (a) It shall be the responsibility of each subcontractor submitting bids to a prime contractor to be prepared to submit a faithful performance and payment bond or bonds if so requested by the prime contractor.

(b) In the event any subcontractor submitting a bid to a prime contractor does not, upon the request of the prime contractor and at the expense of the prime contractor at the established charge or premium

therefor, furnish to the prime contractor a bond or bonds issued by an admitted surety wherein the prime contractor shall be named the obligee, guaranteeing prompt and faithful performance of the subcontract and the payment of all claims for labor and materials furnished or used in and about the work to be done and performed under the subcontract, the prime contractor may reject the bid and make a substitution of another subcontractor subject to Section 4107.

(c) (1) The bond or bonds may be required under this section only if the prime contractor in his or her written or published request for subbids clearly specifies the amount and requirements of the bond or bonds.

(2) If the expense of the bond or bonds required under this section is to be borne by the subcontractor, that requirement shall also be specified in the prime contractor's written or published request for subbids.

(3) The prime contractor's failure to specify bond requirements, in accordance with this subdivision, in the written or published request for subbids shall preclude the prime contractor from imposing bond requirements under this section.

§4109 (Emergency Subcontracting). Subletting or subcontracting of any portion of the work in excess of one-half of 1 percent of the prime contractor's total bid as to which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, and then only after a finding reduced to writing as a public record of the awarding authority setting forth the facts constituting the emergency or necessity.

§4110 (Contractor Violations). A prime contractor violating any of the provisions of this chapter violates his or her contract and the awarding authority may exercise the option, in its own discretion, of (1) canceling his or her contract or (2) assessing the prime contractor a penalty in an amount of not more than 10 percent of the amount of the subcontract involved, and this penalty shall be deposited in the fund out of which the prime contract is awarded. In any proceedings under this section the prime contractor shall be entitled to a public hearing and to five days' notice of the time and place thereof.

§4111 (CSLB Discipline). Violation of this chapter by a licensee under Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code constitutes grounds for disciplinary action by the Contractors State License Board, in addition to the penalties prescribed in Section 4110.

§4112 (Contractor Defense). The failure on the part of a contractor to comply with any provision of this chapter does not constitute a defense to the contractor in any action brought against the contractor by a subcontractor.

§4113 (Definitions). As used in this chapter, the word "subcontractor" shall mean a contractor, within the meaning of the provisions of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code, who contracts directly with the prime contractor. "Prime contractor" shall mean the contractor who contracts directly with the awarding authority.

§7103.5 (Clayton & Cartwright Acts). In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the contractor, without further acknowledgment by the parties.

§7107 (Payment Retention). (a) This section is applicable with respect to all contracts entered into on or after January 1, 1993, relating to the construction of any public work of improvement.

(b) The retention proceeds withheld from any payment by the public entity from the original contractor, or by the original contractor from any subcontractor, shall be subject to this section.

(c) Within 60 days after the date of completion of the work of improvement, the retention withheld by the public entity shall be released. In the event of a dispute between the public entity and the original contractor, the public entity may withhold from the final payment an amount not to exceed 150 percent of the disputed amount. For purposes of this subdivision, "completion" means any of the following:

(1) The occupation, beneficial use, and enjoyment of a work of improvement, excluding any operation only for testing, startup, or commissioning, by the public agency, or its agent, accompanied by cessation of labor on the work of improvement.

(2) The acceptance by the public agency, or its agent, of the work of improvement.

(3) After the commencement of a work of improvement, a cessation of labor on the work of improvement for a continuous period of 100 days or more, due to factors beyond the control of the contractor.

(4) After the commencement of a work of improvement, a cessation of labor on the work of improvement for a continuous period of 30 days or more, if the public agency files for record a notice of cessation or a notice of completion.

(d) Subject to subdivision (e), within seven days from the time that all or any portion of the retention proceeds are received by the original contractor, the original contractor shall pay each of its subcontractors from whom retention has been withheld, each subcontractor's share of the retention received. However, if a retention payment received by the original contractor is specifically designated for a particular subcontractor, payment of the retention shall be made to the designated subcontractor, if the payment is consistent with the terms of the subcontract.

(e) The original contractor may withhold from a subcontractor its portion of the retention proceeds if a bona fide dispute exists between the subcontractor and the original contractor. The amount withheld from the retention payment shall not exceed 150 percent of the estimated value of the disputed amount.

(f) In the event that retention payments are not made within the time periods required by this section, the public entity or original contractor withholding the unpaid amounts shall be subject to a charge of 2 percent per month on the improperly withheld amount, in lieu of any interest otherwise due. Additionally, in any action for the collection of funds wrongfully withheld, the prevailing party shall be entitled to attorney's fees and costs.

(g) If a state agency retains an amount greater than 125 percent of the estimated value of the work yet to be completed pursuant to Section 10261, the state agency shall distribute undisputed retention proceeds in accordance with subdivision (c). However, notwithstanding subdivision (c), if a state agency retains an amount equal to or less than 125 percent of the estimated value of the work yet to be completed, the state agency shall have 90 days in which to release undisputed retentions.

(h) Any attempted waiver of the provisions of this section shall be void as against the public policy of this state.

§7200 (Retention Maximum). (a) This section shall apply with respect to all contracts entered into on or after January 1, 1999, between a public entity and an original contractor, between an original contractor and a subcontractor, and between all subcontractors thereunder, relating to the construction of any public work or improvement.

(b) In a contract between the original contractor and a subcontractor, and in a contract between a subcontractor and any subcontractor thereunder, the percentage of the retention proceeds withheld may not exceed the percentage specified in the contract between the public entity and the original contractor.

(c) When a performance and payment bond is required in the solicitation for bids, subdivision (b) shall not apply to either of the following:

(1) The original contractor, if the subcontractor fails or refuses to provide a performance and payment bond, issued by an admitted surety insurer, to the original contractor.

(2) The subcontractor, if a subcontractor thereunder fails or refuses to provide a performance and payment bond, issued by an admitted surety insurer, to the subcontractor.

(d) No party identified in subdivision (b) shall require any other party to waive any provision of this section.

(e) In the event that the contractor elects to substitute securities in lieu of retentions, the contractor may withhold from his or her subcontractors, who have not elected to substitute securities in lieu of retentions, the amount of retentions that would have otherwise been withheld.

§7201 (Retention 5% Maximum). (a) (1) This section shall apply with respect to all contracts entered into on or after January 1, 2012, between a public entity and an original contractor, between an original contractor and a subcontractor, and between all subcontractors thereunder, relating to the construction of any public work of improvement.

(2) Under no circumstances shall any provision of this section be construed to limit the ability of any public entity to withhold 150 percent of the value of any disputed amount of work from the final payment, as provided for in subdivision (c) of Section 7107. In the event of a good faith dispute, nothing in this section shall be construed to require a public entity to pay for work that is not approved or accepted in accordance with the proper plans or specifications.

(b) (1) The retention proceeds withheld from any payment by a public entity from the original contractor, by the original contractor from any subcontractor, and by a subcontractor from any subcontractor thereunder shall not exceed 5 percent of the payment. In no event shall the total retention proceeds withheld exceed 5 percent of the contract price. In a contract between the original contractor and a subcontractor, and in a contract between a subcontractor and any subcontractor thereunder, the percentage of the retention proceeds withheld shall not exceed the percentage specified in the contract between the public entity and the original contractor.

(2) This subdivision shall not apply if the contractor provides written notice to the subcontractor, pursuant to subdivision (c) of Section 4108, prior to, or at, the time that the bid is requested, that bonds shall be required, and the subcontractor subsequently is unable or refuses to furnish to the contractor a performance and payment bond issued by an admitted surety insurer.

(3) Notwithstanding any other provision of this subdivision, the retention proceeds withheld from any payment by an awarding entity set forth in paragraphs (1) to (5), inclusive, of subdivision (a) of Section 10106, from the original contractor, by the original contractor from any subcontractor, and by a subcontractor from any subcontractor thereunder, may exceed 5 percent on specific projects where the director of the department has made a finding prior to the bid that the project is substantially complex and therefore requires a higher retention amount than 5 percent and the department includes both this finding and the actual retention amount in the bid documents. In a contract between the original contractor and a subcontractor, and in a contract between a subcontractor and any subcontractor thereunder, the percentage of the retention proceeds withheld shall not exceed the percentage specified in the contract between the department and the original contractor.

(4) Notwithstanding any other provision of this subdivision, the retention proceeds withheld from any payment by the awarding entity of a city, county, city and county, including charter cities and charter counties, district, special district, public authority, political subdivision, public corporation, or nonprofit transit corporation wholly owned by a public agency and formed to carry out the purposes of the public agency, from the original contractor, by the original contractor from any subcontractor, and by a subcontractor from any subcontractor thereunder, may exceed 5 percent on specific projects where the governing body of the public entity or designee, including, but not limited to, a general manager or other director of an appropriate department, has approved a finding during a properly noticed and normally scheduled public hearing and prior to bid that the project is substantially complex and therefore requires a higher retention amount than 5 percent and the awarding entity includes both this finding and the actual retention amount in the bid documents. In a contract between the original contractor and a subcontractor, and in a contract between a subcontractor and any subcontractor thereunder, the percentage of the retention proceeds withheld shall not exceed the percentage specified in the contract between the department and the original contractor.

(c) A party identified in subdivision (a) shall not require any other party to waive any provision of this section.

## California Labor Code Provisions

§1771 (Prevailing Wages). Except for public works projects of one thousand dollars (\$1,000) or less, not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the public work is performed, and not less than the general prevailing rate of per diem wages for holiday and overtime work fixed as provided in this chapter, shall be paid to all workers employed on public works. This section is applicable only to work performed under contract, and is not applicable to work carried out by a public agency with its own forces. This section is applicable to contracts let for maintenance work.

§1773.1 (Per Diem Wages). (a) Per diem wages, when the term is used in this chapter or in any other statute applicable to public works, shall be deemed to include employer payments for the following:

- (1) Health and welfare.
- (2) Pension.
- (3) Vacation.
- (4) Travel.
- (5) Subsistence.
- (6) Apprenticeship or other training programs authorized by Section 3093, so long as the cost of training is reasonably related to the amount of the contributions.
- (7) Worker protection and assistance programs or committees established under the federal Labor Management Cooperation Act of 1978 (Section 175a of Title 29 of the United States Code), to the extent that the activities of the programs or committees are directed to the monitoring and enforcement of laws related to public works.

(8) Industry advancement and collective bargaining agreements administrative fees, provided that these payments are required under a collective bargaining agreement pertaining to the particular craft, classification, or type of work within the locality or the nearest labor market area at issue.

(9) Other purposes similar to those specified in paragraphs (1) to (8), inclusive.

(b) Employer payments include all of the following:

- (1) The rate of contribution irrevocably made by the employer to a trustee or third person pursuant to a plan, fund, or program.
- (2) The rate of actual costs to the employer reasonably anticipated in providing benefits to workers pursuant to an enforceable commitment to carry out a financially responsible plan or program communicated in writing to the workers affected.

(3) Payments to the California Apprenticeship Council pursuant to Section 1777.5.

(c) Employer payments are a credit against the obligation to pay the general prevailing rate of per diem wages. However, no credit shall be granted for benefits required to be provided by other state or federal law. Credits for employer payments also shall not reduce the obligation to pay the hourly straight time or overtime wages found to be prevailing.

(d) The credit for employer payments shall be computed on an annualized basis where the employer seeks credit for employer payments that are higher for public works projects than for private construction performed by the same employer, except where one or more of the following occur:

(1) The employer has an enforceable obligation to make the higher rate of payments on future private construction performed by the employer.

(2) The higher rate of payments is required by a project labor agreement.

(3) The payments are made to the California Apprenticeship Council pursuant to Section 1777.5.

(4) The director determines that annualization would not serve the purposes of this chapter.

(e) (1) For the purpose of determining those per diem wages for contracts, the representative of any craft, classification, or type of worker needed to execute contracts shall file with the Department of Industrial Relations fully executed copies of the collective bargaining agreements for the particular craft, classification, or type of work involved. The collective bargaining agreements shall be filed after their execution and thereafter may be taken into consideration pursuant to Section 1773 whenever filed 30 days prior to the call for bids. If the collective bargaining agreement has not been formalized, a typescript of the final draft may be filed temporarily, accompanied by a statement under penalty of perjury as to its effective date.

(2) Where a copy of the collective bargaining agreement has previously been filed, fully executed copies of all modifications and extensions of the agreement that affect per diem wages or holidays shall be filed.

(3) The failure to comply with filing requirements of this subdivision shall not be grounds for setting aside a prevailing wage determination if the information taken into consideration is correct.

§1774 (Prevailing Rate). The contractor to whom the contract is awarded, and any subcontractor under him, shall pay not less than the specified prevailing rates of wages to all workmen employed in the execution of the contract.

§1776 (Payroll Records). (a) Each contractor and subcontractor shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

(1) The information contained in the payroll record is true and correct.

(2) The employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by his or her employees on the public works project.

(b) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the contractor on the following basis:

(1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request.

(2) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to a representative of the body awarding the contract and the Division of Labor Standards Enforcement of the Department of Industrial Relations.

(3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request by the public for inspection or for copies thereof. However, a request by the public shall be made through either the body awarding the contract or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to paragraph (2), the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the contractor, subcontractors, and the entity through which the request was made. The public may not be given access to the records at the principal office of the contractor.

(c) The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division. The payroll records may consist of printouts of payroll data that are maintained as computer records, if the printouts contain the same information as the forms provided by the division and the printouts are verified in the manner specified in subdivision (a).

(d) A contractor or subcontractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested the records within 10 days after receipt of a written request.

(e) Except as provided in subdivision (f), any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body or the Division of Labor Standards Enforcement shall be marked or obliterated to prevent disclosure of an individual's name, address, and social security number. The name and address of the contractor awarded the contract or the subcontractor performing the contract shall not be marked or obliterated. Any copy of records made available for inspection by, or furnished to, a joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (29 U.S.C. Sec. 175a) shall be marked or obliterated only to prevent disclosure of an individual's name and social security number. A joint labor management committee may maintain an action in a court of competent jurisdiction against an employer who fails to comply with Section 1774. The court may award restitution to an employee for unpaid wages and may award the joint labor management committee reasonable attorney's fees and costs incurred in maintaining the action. An action under this subdivision may not

be based on the employer's misclassification of the craft of a worker on its certified payroll records. Nothing in this subdivision limits any other available remedies for a violation of this chapter.

(f) (1) Notwithstanding any other provision of law, agencies that are included in the Joint Enforcement Strike Force on the Underground Economy established pursuant to Section 329 of the Unemployment Insurance Code and other law enforcement agencies investigating violations of law shall, upon request, be provided non-redacted copies of certified payroll records. Any copies of records or certified payroll made available for inspection and furnished upon request to the public by an agency included in the Joint Enforcement Strike Force on the Underground Economy or to a law enforcement agency investigating a violation of law shall be marked or redacted to prevent disclosure of an individual's name, address, and social security number.

(2) An employer shall not be liable for damages in a civil action for any reasonable act or omission taken in good faith in compliance with this subdivision.

(g) The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city, and county, and shall, within five working days, provide a notice of a change of location and address.

(h) The contractor or subcontractor has 10 days in which to comply subsequent to receipt of a written notice requesting the records enumerated in subdivision (a). In the event that the contractor or subcontractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit one hundred dollars (\$100) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. A contractor is not subject to a penalty assessment pursuant to this section due to the failure of a subcontractor to comply with this section.

(i) The body awarding the contract shall cause to be inserted in the contract stipulations to effectuate this section.

(j) The director shall adopt rules consistent with the California Public Records Act (Chapter 3.5 (commencing with Section 6250) of Division 7 of Title 1 of the Government Code) and the Information Practices Act of 1977 (Title 1.8 (commencing with Section 1798) of Part 4 of Division 3 of the Civil Code) governing the release of these records, including the establishment of reasonable fees to be charged for reproducing copies of records required by this section.

**§1810 (Legal Day's Work).** Eight hours labor constitutes a legal day's work in all cases where the same is performed under the authority of any law of this State, or under the direction, or control, or by the authority of any officer of this State acting in his official capacity, or under the direction, or control or by the authority of any municipal corporation, or of any officer thereof. A stipulation to that effect shall be made a part of all contracts to which the State or any municipal corporation therein is a party.

**§1811 (Hours Limitation).** The time of service of any workman employed upon public work is limited and restricted to 8 hours during any one calendar day, and 40 hours during any one calendar week, except as hereinafter provided for under Section 1815.

**§1812 (Hours Records).** Every contractor and subcontractor shall keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by him or her in connection with the public work. The record shall be kept open at all reasonable hours to the inspection of the awarding body and to the Division of Labor Standards Enforcement.

**§1813 (Contractor Penalty).** The contractor or subcontractor shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit twenty-five dollars (\$25) for each worker employed in the execution of the contract by the respective contractor or subcontractor for each calendar day during which the worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of the provisions of this article. In awarding any contract for public work, the awarding body shall cause to be inserted in the contract a stipulation to this effect. The awarding body shall take cognizance of all violations of this article

committed in the course of the execution of the contract, and shall report them to the Division of Labor Standards Enforcement.

§1814 (Violations). Any officer, agent, or representative of the State or any political subdivision who violates any provision of this article and any contractor or subcontractor or agent or representative thereof doing public work who neglects to comply with any provision of Section 1812 is guilty of a misdemeanor.

§1815 (Overtime Pay). Notwithstanding the provisions of Sections 1810 to 1814, inclusive, of this code, and notwithstanding any stipulation inserted in any contract pursuant to the requirements of said sections, work performed by employees of contractors in excess of 8 hours per day, and 40 hours during any one week, shall be permitted upon public work upon compensation for all hours worked in excess of 8 hours per day at not less than 1 1/2 times the basic rate of pay.

## Request for Proposals for AVL & ITS Management Systems (AIM) SOLICITATION INSTRUCTIONS

### Project Summary Sheet

**Project Name:** AVL & ITS Management Systems (AIM)

**Solicitation Issuance Date:** Wednesday, October 2, 2013 (revised November 10, 2013)

**Project Description:** MTD, a public transit operator, is requesting proposals for various Intelligent Transportation Systems (ITS) with many based on the use of automated vehicle location (AVL) technology on its transit buses. Mandatory systems include AVL and the related communications network, estimated time of arrival passenger information, route and schedule adherence database, onboard video surveillance, and a yard wireless network. Optional features include automated bus stop announcements, vehicle health monitoring, automatic passenger counting, yard location and status, computer aided dispatch (CAD), and road supervisor CAD.

**Project Location:** 550 Olive Street & 1020 Chapala Street, Santa Barbara, CA 93101

**Pre-Proposal Meeting Date/Time:** Friday, October 18, 2013 at 9:30 AM (**MANDATORY**)

**Pre-Proposal Meeting Location:** 550 Olive Street, Santa Barbara, CA 93101

**Clarification & Change Request Deadline:** Thursday, October 24, 2013

**Proposal Due Date/Time:** ~~Tuesday~~Wednesday, November ~~12~~27, 2013 at ~~5~~5:00 PM (local time)

**Proposal Submittal Location:** 550 Olive Street, 2<sup>nd</sup> Floor Reception Desk Santa Barbara, CA 93101

**Proposal Evaluation & Interview Period:** ~~November 13~~December 2 – December ~~5~~31, 2013 (projected)

**Board Award Consideration Date:** Tuesday, ~~December 10~~January 7, 2013-2014 (projected)

**Project Implementation Period:** January ~~2-21, 2014~~ – ~~December 31~~January 21, 2014-2015 (projected)

**Project Contact:** Brad Davis, Assistant Controller, (805) 883-4201, [bdavis@sbmtd.gov](mailto:bdavis@sbmtd.gov)

**Type of Contract:** Firm Fixed Price

**Project Budget:** \$3,320,747

**Bonding Required:** None

Check MTD's website at <http://www.sbmtd.gov/business-and-employment/active.html> for updates

**SANTA BARBARA METROPOLITAN TRANSIT DISTRICT**  
**Request for Proposals for AVL & ITS Management Systems (AIM)**  
**SOLICITATION INSTRUCTIONS**

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Attachment 1: Forms & Certifications

Attachment 2: MTD Master Agreement

Attachment 3: AIM Specifications

[Attachment 4: State of California Provisions for Public Works Projects](#)

**SANTA BARBARA METROPOLITAN TRANSIT DISTRICT**  
**Request for Proposals for AVL & ITS Management Systems (AIM)**  
**SOLICITATION INSTRUCTIONS**

**1. PROJECT DESCRIPTION**

The Santa Barbara Metropolitan Transit District (MTD), a public transit operator, is requesting proposals for various Intelligent Transportation Systems (ITS) with many based on the use of automated vehicle location (AVL) technology on its transit buses. The project is collectively referred to as the AVL & ITS Management System, the AIM system or AIM. Mandatory systems include the vehicle AVL technology and related communications network, estimated time of arrival information, route and schedule adherence data, onboard video surveillance, and a yard wireless network. Optional features include automated bus stop announcements, vehicle health monitoring, automatic passenger counting, yard location and status, computer aided dispatch (CAD), and road supervisor CAD. Full requirements are contained in the *AIM Specifications*.

**2. PRE-SUBMITTAL ACTIVITIES**

**2.1 RFP PACKAGE CONTENTS**

These *AIM Solicitation Instructions* provide direction on preparing proposals and describe the evaluation, review, and contract award processes. Failure of an offeror to follow instructions may result in rejection or disqualification of its proposal. Attached are required forms and certifications to be completed and included as part of the proposal. The attached *AIM Specifications* describe the project requirements and deliverables. Additional terms and conditions are included in the *MTD Master Agreement*; *and the State of California Provisions for Public Works Projects*, also attached hereto.

**2.2 PRE-PROPOSAL MEETING (MANDATORY)**

There is a **MANDATORY** pre-proposal meeting at MTD's administrative offices at 550 Olive Street in Santa Barbara on Friday, October 18, 2013 at 9:30 AM. **MTD will not consider proposals from parties not attending the pre-proposal meeting.** Attendance at the meeting is defined as arriving and signing in at the meeting no later than **9:50 AM**. The mandatory attendance is limited to those business entities that would enter into the contract with MTD if a contract is awarded. Potential key partners, subcontractors, and suppliers are strongly encouraged to attend the meeting as well. The purpose of the meeting is to review, discuss and answer questions regarding the RFP process, proposal preparation, and the project; and to inspect the facilities and a sample of vehicles subject to the project. The meeting will also include visiting the MTD Transit Center at 1020 Chapala Street, Santa Barbara, CA. Parties are strongly encouraged to submit any questions or requests in advance of the pre-proposal meeting. MTD may address questions during the meeting however **any oral response by MTD at the pre-proposal conference not confirmed by a written addendum shall not be official or binding on MTD.**

**2.3 REQUESTS FOR CHANGES OR CLARIFICATIONS**

All communications concerning this RFP and the project shall be directed to the Brad Davis, the project manager, via e-mail to [bdavis@sbmtd.gov](mailto:bdavis@sbmtd.gov). Unless authorized by the project manager, offerors and their representatives shall not communicate or make contact with other MTD employees or consultants in regard to any aspect of this solicitation. Offerors may request a clarification or change to any aspect or requirement of the RFP or any addenda thereto. Such requests must be received by MTD by Thursday, October 24, 2013. To be considered, change requests must be supported with pertinent data evidencing that it is in the best interests of MTD.

## 2.4 RFP MODIFICATIONS & ADDENDA

MTD reserves the right to amend this RFP through written addenda. **Other than written addenda, no other form of communication with any officer, employee or agent of MTD shall be binding upon MTD.** Addenda will be posted to MTD's website and concurrently sent via e-mail to all parties known to have received the RFQ. However, MTD's e-mailing of addenda does not relieve the submitter of its responsibility to ensure that it has obtained any issued addenda by checking the MTD website. Additionally, failure of an offeror to receive an addendum shall not relieve it from any obligation under its proposal or under the RFP as clarified or modified.

## 3. PROPOSAL PREPARATION & SUBMITTAL

### 3.1 MANDATORY SYSTEMS PROPOSED

**Only proposals that address all of the mandatory systems and the optional automated bus stop announcement system, including pricing, will be considered and evaluated by MTD. Proposals that do not address at least these systems will be rejected.** However, the inclusion of all optional systems is strongly encouraged and may be considered in the evaluation of proposals.

### 3.2 PRIME OFFEROR/CONTRACTOR

MTD will enter into a contractual relationship with only one party for this project. If parties plan to partner or subcontract with one another to carry out the project, one party must act as the lead in submitting the proposal. Such party shall be the prime contractor in the event that they are awarded the contract for the project.

### 3.3 PROPOSAL CONTENTS

The proposal to be provided under this RFP is generally composed of two types of information: offeror-completed forms provided by MTD; and offeror-prepared documents. Offeror-prepared documents to be included in proposals shall include:

- ◆ Cover Letter
- ◆ Description of the Firm
- ◆ Prior Experience with Similar Projects
- ◆ Key Project Personnel Résumés
- ◆ Description of Key Partners, Subs & Suppliers
- ◆ Technical Proposal
- ◆ Maintenance Agreement(s)

Forms provided as part of this RFP that must be completed and submitted by the Offeror as part of its proposal include:

- ◆ Acknowledgement of Addenda
- ◆ Price Proposal
- ◆ Bidder Information
- ◆ Credit & Work References
- ◆ Partner, Joint Venture, Subcontractor Listing
- ◆ Noncollusion/Compensation Certification

### 3.4 OFFEROR-PREPARED DOCUMENTS

**Cover Letter**—Letter shall be signed by an officer authorized to bind the offeror contractually and shall address the below matters (**Review of contract documents by legal counsel is strongly advised.**)

- ◆ Offeror's interest and willingness to enter into a contract with MTD to carry out the project as described in the attached AIM Specifications.
- ◆ Offeror's willingness to accept the contract terms and conditions included in the MTD Master Agreement, the State of California Provisions for Public Works Projects, and the AIM

Specifications. If there are any contract terms that the offeror will not accept or proposes modifications to, the specifics of such should be addressed in the cover letter or an attachment thereto. MTD is limited in its ability to alter the terms and will assess during the evaluation and interview process whether it would be able to contract with the offeror under the offeror's proposed contract revisions. **MTD will not negotiate contractual terms and conditions once the contract is executed unless it is in its best interest to do so.**

- ◆ Offeror's ability and willingness to obtain insurance meeting the requirements indicated in the *Master Agreement*. An insurance certificate meeting the requirements will be required prior to execution of the contract.

Description of the Firm—Proposal shall include a description of the proposing firm including its line(s) of business, size, location(s), years in business, and any other information deemed appropriate for providing a general overall picture of the firm. If a large entity, information on the division of the firm that would be responsible for the project should be emphasized. Please limit such information to a maximum of two pages.

Prior Experience with Similar Projects—Proposal shall include a description of five similar projects carried out by the offeror and three similar projects carried out by each significant subcontractor. Offeror projects shall be for those work references listed on the *Credit & Work References* form. Please limit each project description to a maximum of one page.

Key Project Personnel Résumés—Proposal shall include résumés of key project personnel with an emphasis on education and experience relevant to the project. Résumés shall be included for at least the project manager (primary MTD contact), the senior technical/design engineer, and the lead onsite installation field person. As appropriate, résumés of a similar nature shall be provided for partners and subcontractors. Please limit each résumé to a maximum of two pages.

Description of Partners, Subcontractors & Suppliers—Proposal shall include a description of all partners or joint venturers; and any significant subcontractors or suppliers that would be participating in the project. The descriptions must include all parties that would be supplying the major mandatory and optional systems. Such firms shall be included on the *Partner, Subcontractor & Supplier Listing* form discussed below. Provide the same information as that described above for the Offeror (see above) but limit information to a maximum of one page for each entity.

Technical Proposal—Proposal shall include a comprehensive Technical Proposal that describes how the offeror would meet the requirements of the *AIM Specifications* (see Section 3.1 above for information on AIM systems that **must** be included in the Technical Proposal). The Technical Proposal should use narrative descriptions, data sheets, cut sheets, catalogs, brochures, illustrations, diagrams, tables, charts, photos, etc. as necessary to enable MTD to evaluate compliance with the *AIM Specifications*. The *AIM Specifications* describe MTD's understanding of current methods, designs, technologies, or features available to meet various ITS goals for improvements to passenger service and operational efficiencies. **MTD will consider alternative approaches and specifications for achieving these goals. The Technical Proposal shall identify any such variances from the requirements set forth in the AIM Specifications and the benefits of the alternative.** To the extent feasible, Technical Proposals shall be organized to match the sequence of the *AIM Specifications*. Following are certain items that shall be addressed in the Technical Proposal. It is **not** a complete listing of Technical Proposal contents but simply a description of some items MTD deems significant for properly evaluating proposals.

Credit & Work References—Proposal shall include the fully completed *Credit & Work References* form included in this RFP package. Please be certain to list appropriate and current contact names, phone numbers, and e-mails for all parties. For the five work references listed, please include the same parties as those listed in the *Prior Experience with Similar Projects* element of your proposal.

Partner, Subcontractor & Supplier Listing—Proposal shall include the fully completed *Partner, Supplier, Subcontractor Listing* form included in this RFP package. The form shall list all partners or joint venturers; and any significant subcontractors or suppliers that would be participating in the project. The listing must include all parties that would be supplying the major mandatory and optional systems.

Noncollusion Declaration/Compensation Certification—Proposal shall include the signed and dated *Noncollusion Declaration* and *Compensation Certification* forms included as a single page in this RFP package. The declaration and certification are required on the basis of the usage of California state funding for the project.

### 3.6 PROPOSAL SUBMISSION

One original and four complete copies of offeror's proposal shall be submitted in a non-transparent, sealed envelope or other appropriate packaging plainly marked on the exterior with the name of the offeror and the following: "AIM System Proposal." Proposals must be delivered to:

Santa Barbara Metropolitan Transit District  
2<sup>nd</sup> Floor Reception Desk  
550 Olive Street  
Santa Barbara, CA 93101

If using a delivery service, proposals must be enclosed in the specified envelope packaging within the delivery service packaging. Fax or e-mail submittals will not be considered. **Proposals will be accepted by MTD until ~~Tuesday~~Wednesday, November 1227, 2013, at 53:00 PM (local time).** Unless due to the fault of MTD, submittals received after such time cannot be considered and will be returned to the offeror unopened. There will be no public opening of submittals at the deadline or otherwise.

### 3.7 WITHDRAWAL OF PROPOSAL

A bidder may withdraw a submittal any time prior to the submittal deadline by submitting a written request executed by the bidder's authorized representative. Any such withdrawal does not prejudice the right to resubmit a submittal by the submittal deadline.

### 3.8 PROPOSAL SUBMITTAL STIPULATIONS

Submittals submitted as a result of this solicitation become the property of MTD. MTD will not pay any cost incurred by a bidder resulting from preparation or delivery of its submittal. MTD reserves the sole right to review, accept, or reject submittals; or to cancel this solicitation in whole or in part if it is in MTD's best interest to do so.

## 4. PROPOSAL EVALUATION

### 4.1 EVALUATION PROCESS OVERVIEW

Proposals will be evaluated, negotiated, selected and any award made in accordance with procedures applicable to a competitive negotiated procurement using the "best value" selection process. All proposals found to be "responsive" received from offerors determined to be "responsible" (see §4.3 and §4.4 below) will be evaluated to determine which proposals fall within a competitive range. Discussions,

- ◆ Technical Proposal
- ◆ Proposal Price
- ◆ Prior Experience

Proposals will be evaluated using the above criteria to determine a relative ranking in order to ascertain those proposals which fall within the competitive range, or may reasonably be made to fall within it. Such process may involve requesting additional information from an offeror. Once the competitive range is established, MTD shall notify all offerors in writing that either: their proposal falls within or can reasonably be made to fall within the competitive range and that they are proceeding to the discussion, demonstration, and negotiation stage of the process; or their proposal does not or cannot reasonably be made to fall within the competitive range and its proposal is therefore being rejected. MTD reserves the right to select a proposal for award at this point or to request Best & Final Offer(s).

#### **4.6 OFFEROR INTERVIEW**

Upon determination of the competitive range parties, the parties will be invited to MTD for interviews. Such interviews will provide MTD an opportunity to ask offerors questions and request clarifications about their proposal; provide offerors an occasion to demonstrate, promote and explain their proposal; and allow the discussion and negotiation of technical and pricing terms and conditions.

#### **4.7 BAFO & FINAL EVALUATION**

Dependent upon what is considered in its best interest, following initial interviews MTD may attempt to negotiate further or request a Best & Final Offer from one or more of the competitive range firms; or recommend award of a contract without further discussion. Once the Evaluation Committee reaches a decision as to that proposal that provides MTD with the best value, a recommendation will be forwarded to the MTD General Manager.

#### **4.8 SINGLE PROPOSAL ANALYSIS**

If only one proposal is received in response to this RFP and it is found acceptable to MTD—either initially or after discussions and negotiations with the offeror—detailed price and/or cost analysis of the proposal may be required in order to determine if the price is fair and reasonable. A price analysis involves comparison to other similar procurements with similar quantities, specifications and time frames. Where it is impossible to determine price reasonableness through price analysis, it may be necessary to conduct a cost analysis of the proposed price, which is a more detailed evaluation of the cost elements in the offeror's proposal. It is conducted to form an opinion as to the degree to which the proposed costs represent what the offeror's performance should cost; whether the offeror is applying sound management in proposing the application of resources to the contracted effort; and whether costs are allowable, allocable and reasonable. Any such analyses shall not obligate MTD to accept such a single proposal, which may be rejected at MTD's sole discretion.

### **5. CONTRACT AWARD**

#### **5.1 AWARD PROCESS**

If considered in MTD's best interest, the MTD General Manager will recommend to the MTD Board of Directors that a contract be awarded to the offeror that has submitted the proposal that is most advantageous to MTD. Accordingly, MTD may not necessarily make an award to the offeror with the highest technical ranking nor award to the offeror with the lowest price proposal if doing so would not be in the overall best interest of MTD. It is anticipated that such recommendation shall be considered by the Board at its regular meeting of Tuesday, ~~December 10, 2013~~ January 7, 2014.

## 5.2 CONTRACT EXECUTION

The contract will be executed, as signified by the signature of all parties to the contract, as soon as practical after contract award and receipt of a certificate of insurance meeting the requirements of the MTD Master Agreement and naming MTD as an additionally insured; a copy of City of Santa Barbara business license; or any other deliverables determined during the solicitation process. The contract shall be composed of the *MTD Master Agreement*, *the State of California Provisions for Public Works Projects*, the *AIM System Specifications*, and relevant portions of the Contractor's proposal. In all cases, the most recent versions of the preceding documents—including any addenda thereto, as modified through negotiations, and/or submittal of a Best and Final Offer—shall be used in the final and binding agreement.

## 5.3 FUNDING EXPENDITURE DEADLINE

This project is funded in part from State of California Proposition 1B bonds. ~~\$250,000~~**\$375,000 of such Prop 1B funding has an expenditure deadline of March 31, 2014. Once the contract is awarded, timing is of the essence such that sufficient project work is completed to the meet the required expenditure deadline.**

## 6. PROTEST PROCEDURES

MTD has established procurement protest procedures to ensure uniform, timely, and fair consideration of complaints received by MTD concerning its procurement activities. Such procedures are available on MTD's website at: <http://www.sbmtd.gov/business-and-employment/purchasing.html>



# **AVL & ITS Management (AIM) System**

## ***SPECIFICATIONS***

*~~Issued October 2~~ Revised November 10, 2013*

**Santa Barbara Metropolitan Transit District**  
**550 Olive Street**  
**Santa Barbara, CA 93101**  
**[www.sbmtd.gov](http://www.sbmtd.gov)**

# 1 SCOPE OF WORK

## 1.1 INTRODUCTION

The Santa Barbara Metropolitan Transit District (MTD), a public transit provider, has developed these specifications for the procurement of a number of Intelligent Transportation Systems (ITS) which are collectively referred to as the *AVL & ITS Management System*. In these specifications, the *AVL & ITS Management System* project shall be referred to as the “AIM System” or “AIM.” The mission of MTD is to enhance the personal mobility of South Coast residents and visitors by offering safe, clean, reliable, courteous, accessible, environmentally responsible, and cost-effective transit service throughout the service area. The AIM system is being implemented to aid MTD in fulfilling this mission. AIM shall be designed to be an efficient, effective, reliable, flexible, and expandable bus fleet management system that meets the needs of the MTD bus operators, supervisors, management, and public ridership. In an era of rapid technology advances and increasing interoperability requirements, AIM must be designed to allow it to be easily maintained, upgraded, and expanded.

## 1.2 SCOPE OF WORK

Contractor shall design, furnish, install, test, and make operational the AIM System for MTD. Contractor shall also provide supporting documentation, training, and technical support, as specified herein. Contractor shall be responsible for all acts, tasks, equipment, system components, and services required to provide MTD with a turnkey AIM System that is fully functional in accordance with the Contract and these specifications whether or not it is specifically identified within this Contract and these specifications. The five primary ITS enhancements or systems that AIM shall provide for MTD and its passengers are:

1. Automatic Vehicle Location
2. Time of Arrival Information
3. Route & Schedule Adherence
4. Onboard Video Surveillance
5. Yard Wireless Network

In addition to the above mandatory systems, the following additional systems or functions, in descending order of priority, will be considered as options to the core AIM System:

- Bus Stop Announcement
- Vehicle Health Monitoring
- Automatic Passenger Counter
- Yard Location/Assignment
- Computer-Aided Dispatch
- Road Supervisor CAD

## 1.3 SCHEDULE

The AIM System project duration from Notice to Proceed to System Acceptance shall not exceed one year. ~~The Master Agreement contains additional terms and conditions requiring progression of the project such that certain project funding is spent prior to funding agency deadlines. Contractor shall make all reasonable efforts to provide goods and services with a minimum contract value of \$375,000 by March 31, 2014, to enable MTD meet a California Prop 1B funding expenditure deadline.~~

## 2 MTD OVERVIEW

The following sections provide an overview of MTD's existing transit service, equipment, facilities, data network, and software systems. The provision of this information by MTD does not relieve Contractor of its own information gathering and investigatory obligations. Contractor is responsible for obtaining all necessary information regarding MTD's existing systems required to perform the work.

### 2.1 TRANSIT SERVICE DESCRIPTION

#### 2.1.1 Geographic Area

MTD was formed in 1968 as a California special district. The MTD service area of 52 square miles covers the populated South Coast of Santa Barbara County including the cities or unincorporated regions of Carpinteria, Goleta, Montecito, Santa Barbara, and Summerland. See *Attachment 1* for a map of the service area. Bus service is also provided to the City of Ventura via the Coastal Express Limited route.

#### 2.1.2 Service Level & Equipment

MTD operates fixed-route transit service on 28 lines that, on an annual basis, carry 7.7 million riders while providing 200,000 hours and 2.7 million miles of revenue service. For specific route and schedule information, refer to MTD's website at <http://www.sbmtd.gov/maps-and-schedules/index.html>. Service is provided with a fleet of 106 revenue vehicles with a peak service requirement of 82 buses. See *Attachment 2* for a summary listing of MTD's revenue vehicle fleet including key vehicle information (e.g., number of doors, communication protocol) and manufacturer contacts; and *Attachment 3* for a detailed listing. MTD has 23 service vehicles including 10 driver relief cars, 2 road supervisor SUVs, 7 shop trucks, and 43 staff cars. See *Attachment 4* for a detailed listing of MTD's service vehicles, including which will be equipped with AIM systems. MTD currently employs 208 individuals including 144 bus operators, 13 mechanics, 12 service workers, 8 supervisors, and 31 administrative staff members.

#### 2.1.3 Facilities

MTD's combined administrative, operations, dispatch, and maintenance facility, referred to as Olive Terminal or Terminal 1, is located at 550 Olive Street in Santa Barbara. MTD facility hours of operation are from 4AM to 1 AM Monday through Friday, 5AM to midnight on Saturdays, and 5AM to 11PM on Sundays. MTD's Transit Center is the hub of the MTD system and is located at 1020 Chapala Street in downtown Santa Barbara. More than 10,000 passengers use this facility every day. MTD has approximately 750 distinct physical bus stop locations throughout the service area plus five additional bus stops on the Ventura end of the Coastal Express Limited route.

### 2.2 EXISTING SYSTEMS

#### 2.2.1 Network Environment

~~MTD's existing server technologies are Windows DataCenter Server 2008 and Windows DataCenter Server 2012. The virtual server technology used is Microsoft HyperV. There are two physical servers running about 8 guests each. For data storage, MTD uses a Hitachi SAN. For cost effectiveness and due to limited server room space, it is MTD's preference that Contractor may propose using use these MTD's existing MTD-IT systems for the AIM data network system. Such usage would be contingent upon not to the maximum extent feasible without~~ negatively impacting the performance or functionality of either the existing MTD or the AIM System.

MTD's existing server technologies are Windows DataCenter Server 2008 and Windows DataCenter Server 2012. The virtual server technology used is Microsoft HyperV. There are two physical servers running about 8 guests each. These are Supermicro 7046A-3 4U system with 2 E5520 Xeon processors. These provide 16 CPUs each which typically run at about 10% utilization under normal loads. Each system has 48GB of memory with a little over half of that used under normal loads. Each server has a 3TB array of 6Gb/sec SAS storage. Each server has two Gigabit network cards.

MTD is using 10% to 20% of the cores on a normal basis. Utilization moves up to 50% during some tasks. About 20GB of RAM is typically available for use. Available disk space is approx 1.5TB. We do not use redundant cores, drives, etc. Our systems currently do not require 24/7 uptime. The servers are redundant. If one fails, we can move guests to the other using our continuous backup. We have replacement parts on hand. No specialized system monitoring software. One of our consultants uses Kayseya agents to monitor our systems.

The SAN is a Hitachi AMS 2500 with 1TB of SATA storage and 3TB of SAS storage. This system is expandable. Contractor would need to provide additional storage for their applications. An expansion unit would be required.

## 2.2.2 Scheduling, Runcutting & Operations Applications

The software in use at MTD that is of primary relevance to AIM are the following Trapeze applications:

- FX 10.0.7.0 for scheduling
- OPS 10.0.24.0 for transit operations management
- Blockbuster 10.0.7.0 for runcutting.

It is not the intent of MTD to replace these Trapeze applications within the next several years.

## 2.2.3 Fare Collection & Passenger Counting Systems

MTD utilizes the GFI GenFare Odyssey electronic validating farebox on all revenue vehicles for collecting fare revenue and recording passenger counts. The system was implemented in 2000 and most equipment dates to that time. The software version is 2300-328. MTD will not be replacing the farebox system for at least several years. **As indicated later in these specifications, MTD's preference is that driver's utilize a single in-vehicle sign-on for both the AIM System and the Odyssey farebox system.**

## 2.2.4 Voice Radio System

To meet FCC narrowbanding requirements, MTD upgraded its two-way radio communications system in late 2012 with Motorola MOTOTRBO digital technology. See Appendix 7 for the radio system specifications and cut sheets. Physical equipment in use is composed of:

- Two MTR3000 repeaters (one each on Gibraltar Peak and Santa Ynez Peak)
- One bi-directional repeater composed of two XPR 5550 mobile radios (in Oxnard)
- Two XPR 5550 control base stations (one each at Olive Terminal and the Transit Center)
- 129 XPR 5550 mobile radios (one each in 106 buses and 23 service vehicles)
- 15 XPR 7550 portable radios (used by operations management and supervisors)
- Five XPR 3300 non-display portable radios (used by staff)

The radio system utilizes a UHF wideband channel pair at 453.750 MHz for transmission and 458.750 MHz for reception in MTD's primary service area using the Gibraltar Peak repeater. MTD has a backup

repeater on Santa Ynez Peak using 453.2375 MHz for transmission and 458.2375 MHz for reception. A simplex channel at 453.075 MHz is used to extend the coverage for buses on routes in the Ventura area using the bi-directional repeater located in Oxnard to relay transmissions onto the main MTD channels. All three repeater locations have access to internet connectivity through the site owner, but MTD is not currently utilizing this service.

MTD does not presently utilize the data capabilities (e.g., messaging, GPS) of the MOTOTRBO system. **For cost effectiveness and space utilization issues, it is the preference of MTD that, if possible, onboard AIM systems utilize the data communications capabilities of the MOTOTRBO system.**

### **2.2.5 Telephone System**

MTD uses a ShoreTel VoIP telephone system purchased in 2008. The ShoreGear 120/24 is the primary PBX for voice switching, which is housed in the MTD server room.

### 3.2.3 Response Times

**AIM shall be designed and utilize systems and components that, operating under full design capacity, minimize response times such that system users may continue their work in normal continuous progression without excessive delays.**

### 3.2.4 AIM Interfaces

AIM shall interface with existing MTD systems, applications, software, hardware, and vehicle systems as necessary to meet these specifications. Integration, coordination, scheduling, and communications for such interfaces shall be managed by Contractor.

#### 3.2.4.1 MTD Network & Transit Database

AIM shall ~~share real-time data with the applications that reside on the MTD network via~~include a Transit Database (TDB) ~~to allow MTD to have on-demand access to all data created by the AIM system, including both real time and historical data.~~ The TDB shall be ODBC-compliant and provide for ~~the export of such data to non-AIM datastores.~~ The Contractor provided, ODBC-compliant TDB shall provide for bi-directional data transfer ~~as necessary to meet support multiple applications, as detailed in these specifications (e.g., route, schedule and bus stop data within Trapeze).~~ Contractor shall furnish to MTD the definitions of and a data dictionary for AIM data on the TDB. ~~The data shall be in a form that is accessible through SQL.~~ Contractor shall ~~provide all~~ be responsible for any necessary conversion utilities to provide data to the TDB ~~in a format usable by MTD applications and to read data provided by the MTD applications to the TDB.~~ Interfaces shall be configured such that AIM automatically initiates requests for information and completes data transfers without manual intervention. Contractor shall utilize a firewall to protect against unauthorized access to or modification of the MTD network from ~~the~~ AIM ~~network or the TDB.~~ The firewall shall be based on current technology and accommodate AIM under full design capacity.

#### 3.2.4.2 Vehicle Equipment

AIM shall interface to multiple existing equipment onboard MTD buses as required to meet these specifications. These include, but are not limited to, fareboxes, public address equipment, headsigns, engine control computers, transmission control computer, driver interface computers, and odometers. Contractor shall develop, document, and implement such interfaces and be responsible for all work necessary for seamless interface with existing bus equipment.

### 3.2.5 Utilities & Third Party Services

Contractor shall be responsible for coordinating any utility or other third party services required for the implementation and operation of AIM. Such services may be related but are not limited to telephone lines; wireless, cellular or radio communications; and provision of electrical power. Any third-party agreements for such ongoing services must be approved by MTD (the costs of such services—whether fixed or estimated, one time or monthly—and the party responsible for payment thereof shall have been determined as part of the review and negotiation process resulting in the contract for this project).

### 3.2.6 Log-in Device

**It is MTD's strong preference that operator onboard sign-in be through a single input device for both AIM and the GFI farebox.** This may be accomplished through either the farebox or a separate mobile data terminal (MDT). ~~If through an MDT, manual farebox entries, including login, shall remain available through the farebox regardless of the status of AIM. If the MDT is used in lieu of the farebox~~

~~control head, the MDT must accommodate all entries normally carried out through the farebox (e.g., passenger counts and types).~~ See related requirements in Sections 4.9.1.3 and 5.3.1.2.

### 3.3 VEHICLE DATA COMMUNICATIONS

#### 3.3.1 General

As necessary for AIM systems provided by Contractor to meet these specifications, Contractor shall implement a wireless data communications system between MTD vehicles in the field and MTD fixed facilities systems (the requirements and specifications for wireless communications within the MTD yard are contained in Section 4.5). **It is MTD's strong preference that the method of such data communications minimize ongoing operating costs for the provision of such communications.**

**AIM shall communicate with each active (powered-up) vehicle at least once every thirty seconds.** AIM shall have the ability to enable fast polling for selected vehicles. AIM shall use an efficient means of controlling this periodic reporting such as group or synchronized polling. Traditional single vehicle poll-respond cycles are not efficient and shall not be acceptable. The time period for reporting shall be adjustable by the system administrator.

#### 3.3.2 Onboard Equipment

Onboard data communications equipment including, but not limited to, radio or cellular transceivers, modems, and antennae shall be of rugged construction suitable for the public transit environment. Vehicle modems may be integrated with the onboard AIM processor, integrated within the data radio or cellular device, or as a physically separate device.

#### 3.3.3 Data Radio System

If a data radio system is implemented for AIM, the requirements in this section shall apply. **To the extent feasible, Contractor shall utilize MTD's existing frequencies and Motorola MOTOTRBO radio system for the data radio system.** The existing system is described in Section 2.2.4. The data radio system shall use protocols optimized for the short message length typical of this type of system. Long modem training times and extensive pre-ambls shall be avoided. The protocol shall provide for efficient reporting of changes of state in real time and shall also provide for regular status checks of all mobile units to verify that data communications is functioning properly. Allocation of the data channel utilization shall be dynamic so as to maximize throughput under the actual current conditions. Allocation of the data channel utilization shall provide sufficient message slots for real-time messages to support all operator messages during pullout of the maximum design fleet, while continuing to support specified response times for all other functions. The data radio system shall utilize a bit rate sufficient to fulfill the needs of the AIM systems under the anticipated maximum communications level.

#### 3.3.4 Cellular Service System

If a cellular system is implemented for communications, upon approval by MTD, Contractor shall arrange and implement the necessary cellular data service. Contractor's price shall have included any setup, installation or other cellular service provider one-time fees. MTD shall be fully responsible for paying any ongoing data communications service fees charged by the cellular service provider.

- GPS Data Update Frequency: once per second
- Location Accuracy: 5 meters
- Velocity Accuracy: 0.1 meter per second
- Time: 1.5 microseconds
- Cold Start Acquisition Time: 4 minutes
- Warm Start Acquisition Time: 30 seconds
- Reacquisition Time: 2 seconds

#### 4.1.5 Ventura Route AVL (option)

As an option, AVL shall be expanded to cover the geographic area traveled by the Coastal Express Limited bus route, which includes downtown Ventura. Such option shall address and accommodate usage of applicable AIM systems (e.g., time of arrival information, bus stop announcements, etc.).

## 4.2 TIME OF ARRIVAL INFORMATION

### 4.2.1 General

AIM shall determine dynamic estimated time of arrival to the next bus stop for each bus based on data from the AIM AVL system. The time of arrival information shall be available for electronic display signs and monitors, internet access including MTD's public website, the computer-aided dispatch (CAD) and telephone interactive voice response (IVR) systems (options), the TDB, and the MTD network. AIM shall be capable of providing AVL and time of arrival information for all buses in XML format for a future interface to a regional 511 system.

#### 4.2.1.1 Algorithm

The time of arrival information shall be determined using a predictive algorithm that utilizes the current AVL information for the approaching buses to a bus stop. AIM shall calculate the arrival times for the next three buses that will arrive at each stop for all routes and directions serving that stop. The time of arrival information shall be updated at least every thirty seconds and made available to the systems using such information within one second after the AIM server receives a location update. AIM shall also calculate time of departure information and provide MTD the option to display time of arrival or departure information or both. The accuracy of the predictive algorithm shall be such that the average predicted error shall be less than two minutes 90% of the time when a bus is between five to eight minutes or less from a stop; and less than one minute 90% of the time when a bus is five minutes or less from a stop. The AIM predictive algorithm shall be a learning algorithm that is based on historical data for the stop location, route, and the time of day, day of week, and week of year.

#### 4.2.1.2 Source Information

MTD maintains its bus stop and schedule databases in applicable Trapeze applications, which shall be the source of data used for time of arrival calculations. **MTD shall be required to maintain only one bus stop and schedule database for usage by both Trapeze and AIM.**

### 4.2.2 Webpage

Contractor shall develop a webpage, including a Spanish language option, accessible from MTD's public website for accessing estimated time of arrival information. The website shall provide a real time map display of all current MTD lines and bus stops with vehicle locations updated at least every 30 seconds. If the computer-aided dispatch (CAD) system is obtained as part of AIM, there shall be a single map database to maintain for both the webpage and CAD. The dynamic time of arrival information shall

be accessible directly from the map display when a user clicks or mouses over a bus stop icon or by user entry or selection of pertinent data (i.e., bus stop ID, line number, etc.). If a dynamic time of arrival prediction is not available for a stop, the website shall display the Trapeze schedule data with a note indicating that the information is not dynamic. Other map display features and requirements include:

- Clearly visible street names, bus stop icons, vehicle icons, and local landmarks
- Ability for user to zoom in and out and pan the map display
- Allow MTD posting of real time messages for public service announcements, detours, etc.
- Ability for user to select a single line to be displayed
- Development of mobile device-optimized webpage version for smartphones, tablets, etc.
- Webpage management tools to edit, add, or delete lines, bus stops, landmarks, etc.

### 4.2.3 E-Mail & Wireless Messaging

The Time of Arrival Information system shall enable MTD to manage and send announcements and alerts to the public through e-mail, wireless text messaging, and social media applications (e.g., Facebook and Twitter). Such messages may be developed and sent automatically by AIM or manually by MTD. The emphasis of such messages shall be on estimated time of arrival information and alerts, including late arrivals. The system shall also enable the sending of public service announcements, newsletters, or other information of MTD's choice, which shall have the capability for including Spanish language versions. The Time of Arrival Information webpage shall enable users to sign up to receive such messages for the topic and via the medium of their choice.

### 4.2.4 Bus Stop Codes

AIM shall include the means for both smartphones and non-smartphones to easily obtain dynamic time of arrival predictions at all MTD bus stops. This may include, for instance, listing ~~the an e-mail~~ address, ~~and/or~~ content of a text message, or providing a QR code to be scanned for accessing the information. MTD will consider alternatives to these methods. Contractor shall establish a database for the e-mail address, text message ~~address~~/content, QR codes, etc. and their associated bus stops and bus service, and ~~mount-post~~ such information in both English and Spanish at the bus stops along with instructions on how to use it to obtain time of arrival information.

### 4.2.5 Electronic Display Signs

Contractor shall provide and install electronic display signs showing estimated time of arrival information at the MTD Transit Center (TC). Such information shall be visible in both the interior and exterior passenger waiting areas of the TC and shall include the ability for audio announcements. Signage shall include the ability to display public service or other static or video announcements of MTD's choosing. Standard default public service announcements shall include a Spanish language version as well. The time of arrival information displayed shall be of sufficient size, sharpness, contrast, color, and brightness to provide ease of visibility and meet any applicable ADA requirements. Contractor shall provide software on the AIM network and any equipment necessary to configure the display signs.

#### 4.2.5.1 Installation

Contractor shall work with MTD to determine the location and quantity of the TC electronic display signs during the Design Review. Any exterior signage at the TC is subject to review by the City of Santa Barbara Historical Landmarks Commission, which process shall be the full responsibility of MTD. Otherwise, Contractor~~and~~ shall perform all tasks necessary for ~~their-sign~~ implementation including

obtaining ~~necessary local~~ typical building permits, ~~licenses, and approvals~~; provision of power to the displays from the existing TC building electrical system; and the necessary data communications link between AIM and the electronic display signs. There is an existing LAN and internet service at the TC, but no present wireless capability. Electrical plans from a recent TC project are included as Attachment 5.

#### 4.2.5.2 Physical & Environmental Requirements

The displays shall be of rugged construction, reliable, maintainable, and suitable for the designated installation location. Contractor shall utilize vandal resistant enclosures and the faceplate shall be scratch resistant. Cable connections to the signs shall be concealed to the extent feasible. All exposed surfaces of the system components shall be unaffected by brushes, detergents, and cleaning solvents normally used by maintenance crews. All exposed surfaces shall also be resistant to ultraviolet radiation and air contaminants. Electronic displays signs and monitors shall be certified to function in the given environment and shall not be affected by the following environmental conditions:

- Temperature: 20°F to 120°F for outdoor displays, 50°F to 100°F for indoor displays
- Relative humidity (non-condensing): 15% - 95% for outdoor displays; 20% - 80% for indoor
- Rainfall: up to 6 inches per hour, for outdoor displays
- Freezing precipitation: up to 1 inch per hour, for outdoor displays
- Wind speed: up to 80 mph, any direction, for outdoor displays
- Sunlight: None to full, direct, for outdoor displays
- Pollutants: Characteristic of the area, including salt, dust and corrosive or base chemicals.

#### 4.2.5.3 Remote Bus Stop Displays (OPTION)

~~As an option~~, Contractor shall provide signage for five non-TC bus stops. Such signage shall be suitable for remote, outside locations; have audio capabilities; include communications via wired LAN or cellular service, and in addition to meeting the requirements of the TC exterior displays. The inbound bus stop at State St. and La Cumbre Road (closest to southeast corner) shall be used as a model for determining signage. **Contractor shall not be responsible for the installation, permitting, power, or communications of the remote displays, which shall not be considered part of these specifications** (such services may be added to the Contract later through a change order or through a separate competitive solicitation).

#### 4.2.6 Interactive Voice Response (IVR) (Option)

The AIM Interactive Voice Response system shall receive telephone calls from MTD clients and provide them with dynamic time of arrival information for the bus stop ID entered. The IVR subsystem shall provide dynamic time of arrival predictions for the next three buses for each route that is serving the bus stop location, including direction of travel and destination.

Management tools shall enable MTD staff to create, edit, or delete audio files for bus stop names and locations, public service announcements, menu items, and real time messages, and to schedule when the messages shall be displayed. The management tools shall enable MTD staff to add menu items, and to monitor and display call traffic and telephone line activities. Contractor shall provide IVR management tools to edit, add, or delete bus stop information in MTD's bus stop database. The IVR system shall:

- Automatically recover from power failures.
- Include a call logging feature that keeps a record of call details by menu options.
- Include a selectable option for the caller to be connected to a live telephone receptionist.

- When certain bus stop IDs are entered, automatically connect caller to a live person.
  - Allow recording of and option to play general service announcements.
  - Offer more detailed instructions if caller fails to enter in bus stop ID within settable time period.
  - Offer static time of arrival information for arrivals beyond a settable threshold from current time.
  - Include a methodology to assist the caller in determining the stop ID number.
  - Provide the caller with an option to hear the information in Spanish.
  - Include text to speech capability for the creation of announcement and stop location recordings.
  - Include speech recognition.
  - Include the capability to play advertisements based on the location of the stop ID.
- ~~• Provide users of TTY/TDD devices with automated access to time of arrival information.~~

### 4.3 ROUTE & SCHEDULE ADHERENCE ANALYSIS

Contractor shall provide tools for the analysis and reporting of route and schedule adherence data collected by the AVL system. Such system is separate and distinct from the CAD system route and schedule adherence incident reporting. Key areas that the analytical tools and standard reports shall address or include:

- Selectable by bus, bus stop, line, run, block, time, or date
- Reporting on detailed and/or summary level
- Calculation of average, mean, variance, standard deviation, or other analytics
- Reporting on exception basis with user selectable exception levels or ranges
- Reports addressing vehicle travel, revenue, and dwell time
- Reports addressing vehicle adherence to schedule timetable
- Reports addressing vehicle adherence to route path
- Creation of custom reports
- Tools for management and archival of AVL route and schedule database

### 4.4 ONBOARD VIDEO SURVEILLANCE

#### 4.4.1 General

Contractor shall provide and install a Video Surveillance System (VSS) composed of fixed video cameras and digital recorders on all MTD buses. Key VSS features include:

- Capability of recording video at up to 30 frames per second
- Installation of 8 cameras on buses greater than 25 feet in length and 5 on buses less than 25 feet
- Recording of video at all times that bus operator master switch is turned to the “ON” position
- Provision of evidence acceptable in the State of California criminal courts
- Provision of G-force sensor indicating vehicular accidents for incident tagging purposes
- Provision of covert microphones for recording of audio under MTD-determined conditions

##### 4.4.1.1 Incident Tagging & Audio

The VSS shall provide the capability for tagging incidents on the onboard video recorder. The VSS shall tag recorded video (and audio) as an incident by either manual initiation by operator or dispatcher (if CAD option selected for latter); or automatic initiation by a G-force sensor. Upon initiation of and

throughout incident tagging, the VSS shall record audio through the covert microphones. Camera-integrated microphones are preferred. Other requirements, capabilities, or features related to incident tagging and audio recording shall include:

- Initiation of incident tagging by operator through the silent alarm system.
- Initiation of incident tagging by dispatcher through AIM Computer-Aided Dispatch system (if CAD option selected).
- Immediate dispatcher notification, including audio alarm, of initiation through CAD system (if CAD option selected).
- Increase of camera and recording speed to 30 frames per second during incident tagging event.
- Set video tag to user-settable time period prior to activation of initiation of incident tagging.
- Continue incident tagging and audio recording until the SAS or Incident Tagging is cleared.
- Discontinue incident tagging after thirty minutes if not cleared by operator or dispatcher.

#### **4.4.1.2 Video Surveillance System Integration**

The VSS shall interface with AIM to the extent necessary to meet the requirements of the VSS. AIM shall automatically upload tagged video and audio data via the wireless LAN at the bus yard.

### **4.4.2 Cameras**

#### **4.4.2.1 Specifications**

Cameras shall be day/night type generally using color during the day and black & white at night and applicable low light conditions. Cameras shall be sufficiently durable for usage in the transit bus environment. Other requirements, capabilities, or features of the cameras include:

- Be NTSC compatible with 1/3" or larger CCD imager and fixed length lens.
- Capable of speeds of up to 30 frames per second.
- Have integrated microphones to be used for audio recording.
- Use an automatically adjusting iris.
- Use camera-lens combinations that maximize image quality by location, conditions, and purpose.
- Use focal length and f/stop selected to maximize viewable area by location.
- Be housed in vandal-resistant enclosure using tamper-proof screws.
- Accommodate normal and wide-angle lenses.
- Have minimum resolution of 720p.

#### **4.4.2.2 Locations**

MTD shall consider Contractor recommendations on camera locations. However, MTD anticipates locating cameras to at least provide surveillance of the following areas and/or purposes:

- Operator compartment facing forward through front windshield
- Front door with emphasis on passenger boarding and alighting
- Rear door with emphasis on passengers alighting
- Farebox area with emphasis on passenger fare transactions
- Operator compartment with perspective from upper right side location
- Rear passenger area with emphasis on detecting window and seat vandalism

### 4.4.3 Recording Unit

The VSS recording unit shall be capable of digitizing video and audio from eight cameras, provide compression of the video and audio, and store the video and audio on a removable hard drive. Other requirements, capabilities, or features of the recording unit include:

- There shall be a minimum of eight video inputs.
- Video shall be recorded in NTSC format in either black & white or color.
- Images shall be digitized with at least 720p resolution.
- Video from each input shall be recorded at 15 frames per second in normal mode.
- Video from each input shall be recorded at 30 frames per second in incident tagging mode.
- Video compression shall use the H.264/MPEG-4 AVC standard with a 3Kb file size.
- On-bus storage capacity shall be for seven days at 18 hours per day in normal mode.
- The oldest video stored shall be automatically over-written when storage is at capacity.
- The storage format shall use encoding such that alteration to the images can be detected.
- Video that is tagged shall not be over-written until after the tag is removed.
- Recorder shall synchronize internal clock to the GPS provided for the AVL system at least daily.
- Recorder shall watermark and date/time stamp all recorded video using GPS clock time.
- Recording unit shall have a digital output port for downloading video via the yard wireless LAN.
- Hard drive shall be designed for rapid removal and installation.
- Hard drive shall be housed in a ruggedized enclosure that locks to the recording unit.
- Hard drive shall automatically connect and synchronize to the VSS.
- A common key shall be used for removing and installing all VSS hard drives.

## 4.5 YARD WIRELESS SYSTEM

Contractor shall provide, configure, and install an AIM Wireless Yard System to facilitate and manage the transfer of data between buses and applicable service vehicles in the yard and in the shop bays at Terminal 1 and the fixed AIM local area network (LAN). There is presently no available wireless capability in the yard. As an option, the Wireless Yard System shall indicate and manage the location, status, and assignment of buses within the yard.

### 4.5.1 AIM Data Transfer

The yard data transfer function shall be accomplished using a wireless local area network (WLAN) for the uploading and downloading of AIM system data between vehicles and the fixed AIM data network.

#### 4.5.1.1 WLAN Design

The design characteristics and capacities of the WLAN shall accommodate the data transfer needs of AIM without delays or excessive administration affecting the efficiency of overall MTD operations. The final WLAN design shall be dependent upon the AIM systems ultimately provided by Contractor. The WLAN shall utilize one or more fixed wireless access points (AP) located in the MTD yard which shall communicate with vehicles via appropriate onboard wireless communications systems and hardware. Other requirements, capabilities, or features of the WLAN shall include:

- Adequate WLAN coverage to accommodate efficient data transfer with vehicles throughout the bus yard and maintenance shop
- Equipment using IEEE 802.11n specification preferably on the 5 GHz frequency

- Send alert to Dispatch Center if a pullout is not made within a settable time after it is due.
- Automatically update applicable Trapeze bus assignment applications.

AIM shall be integrated with applicable Trapeze applications as necessary to meet these Bus Assignment specifications. MTD shall obtain the necessary licenses from Trapeze for any such integration. Contractor shall be sufficiently knowledgeable of Trapeze software to carry out the required integration. Such bidirectional data transfer and synchronization with the TDB, Trapeze, or other AIM systems shall occur seamlessly without the necessity of intermediate applications or databases.

## **4.6 AUTOMATIC VOICE ANNUNCIATORS (OPTION)**

Contractor shall provide an Automatic Voice Annunciator (AVA) system in each bus that shall automatically audibly and visually announce bus stops and stop requests; and change exterior electronic headsigns. The AVA system shall determine where or when to make bus stop announcements and headsign changes using AVL system data and pre-defined location or time parameters. Once the bus operator is logged into AIM, the AVA system shall be fully automatic requiring no driver interaction.

### **4.6.1 Announcements**

#### **4.6.1.1 Destination Announcements**

When a bus is approaching a bus stop, one or more announcements shall be made for such approaching bus stop. Requirements, capabilities, or features of the announcement system shall include:

- Meet Americans with Disabilities Act (ADA) requirements for the bus stop announcements.
- Make line and destination location announcements prior to and upon arriving at bus stops.
- Include pre-defined announcements in Spanish in addition to English.
- Allow administrator to program:
  - Bus stops at which announcements will be made.
  - Distance or time of announcement(s) prior to the bus stop.
  - Multiple occurrences of announcement for a given bus stop, including upon arrival.
  - Type of announcement (visual, interior audio, and/or exterior audio) by bus location.
  - The use or non-use of the Spanish language announcements.
  - Disabling of exterior audio announcement by time of day.
  - Destination description by street, intersection, location, or landmark.
- If bus goes off-route, disable announcements until bus returns to the assigned route.
- If an unscheduled stop is made, continue to make correct next bus stop announcements.
- Make audio and visual “Stop Requested” announcements and clear when a door is opened.
- Display time and/or operator name periodically or at pre-defined locations.
- Automatically make other pre-defined announcements periodically or at pre-defined locations.
- Allow operator to manually invoke the pre-defined announcements.
- Allow operator to disable AVA system in the event of malfunction.

#### **4.6.1.2 Stop Announcement Database**

The AVA system shall include a database of the audio and visual bus stop and other pre-defined announcements. Contractor shall initially set up the database including all announcements, which shall be subject to review and approval by MTD. The database shall include necessary administrative tools for MTD to easily modify announcement parameters for individual bus stops including but not limited to

announcement content, location, frequency, and type. The AVA announcements shall be resident on the onboard systems. Any modifications to the database shall be updated via the Yard Wireless System.

#### 4.6.1.3 Visual Announcement Signs

Contractor shall provide and install inside each bus one electronic variable display sign for visual bus stop and other pre-defined announcements. Requirements or capabilities of the signage shall include:

- Mount sign above and behind the driver compartment facing the rear of the bus.
- Use text of sufficient size, brightness, contrast, and clarity to be readable by persons with normal vision from anywhere in the bus under typical day and night ambient lighting conditions.
- House sign in a vandal-resistant enclosure with a scratch resistant faceplate lens.
- Conceal cable connections to the sign enclosure behind the sign.

#### 4.6.1.4 Audio Announcement Equipment

Audio announcements shall be made using the existing public address (PA) system and equipment onboard each bus. The Clever Devices SpeakEasy II hands-free announcement system is installed on all buses except the Nova and electric shuttle fleets. The AVA system shall be interfaced with the PA system to control interior and exterior announcements to the correct speakers. MTD shall retain responsibility for the condition of the existing PA system to the extent that it is not damaged by the Contractor. Requirements, capabilities, or features of the audio announcement system shall include:

- Use ambient noise measurements to automatically control volume for audio announcements.
- Allow operator to override ongoing audio announcement through driver PA system.
- Allow operator to override AVA-determined volume level within a specified range.

#### 4.6.2 Headsign Control

Using information from the AVL system, the AVA system shall control existing MTD electronic headsigns on buses so equipped to automatically display the correct bus line, general service message, or out-of-service status. Such control shall be of all exterior headsigns including those on the front, side, or rear of the bus. [See Appendix 2 for a summary listing of MTD's revenue vehicle fleet including key vehicle information and contacts for relevant bus equipment.](#) Requirements, capabilities, or features of the headsign system shall include:

- Provide the drivers and data in the format necessary to control and interface with the headsigns.
- Not inhibit or degrade the use or performance of the existing headsign system.
- Allow administrator to program and modify the location at which headsign changes shall occur.
- Modify the Nova fleet headsign ODK's to include a J1708 interface.

### 4.7 VEHICLE HEALTH MONITORING (OPTION)

#### 4.7.1 General Description

The Vehicle Health Monitoring subsystem (VHM) shall continuously monitor the functionality, performance, and operation of onboard equipment that is equipped with a programmable controller for operator-controlled functions and indications. VHM shall provide detailed operational vehicle fault, alarm, and performance information that allows Operations and Maintenance to efficiently respond to maintenance issues. [See Appendix 2 for a summary listing of MTD's revenue vehicle fleet including key vehicle information and contacts for relevant bus equipment.](#) At a minimum, VHM shall interface with, monitor, collect and report data for the following systems that are equipped with digital interfaces:

vehicles with multiplex systems shall be monitored via J1708/J1939 and/or RS232/485 utilizing multiplex gateways. Fault data captured shall be associated with flash codes and fault descriptions from the sub-system manual to expedite the diagnostics and troubleshooting process. Contractor shall provide any proprietary gateways or translator boxes needed to translate the data into a format that can be read and manipulated by the applications resident on the MTD Network.

## **4.8 AUTOMATIC PASSENGER COUNTERS (OPTION)**

### **4.8.1 General**

Contractor shall provide, configure, and install an Automatic Passenger Counter (APC) system on all MTD buses that shall automatically collect passenger boarding and alighting counts. [See Attachment 2 for a summary listing of MTD's revenue vehicle fleet including key vehicle information and contacts for relevant bus equipment.](#) Requirements, capabilities, or features of the APC system shall include:

- Keep count of all passengers boarding and alighting by each doorway for each door open/close cycle by date, time, and location.
- Keep separate count of all wheelchair passengers boarding and alighting for each wheelchair lift or ramp cycle by date, time, and location.
- Correlate and store passenger/wheelchair counts by bus, run, trip, line, schedule, and bus stop.
- Include a comprehensive set of passenger data reports including detailed and summary passengers by bus, run, trip, line, bus stop, including on a per hour and mile basis.
- Include and indentify counts from unscheduled locations, including detours.
- Store and retain onboard fourteen days of recorded APC data.
- Upload and save all APC data collected in an APC database on the fixed AIM network.
- Provide accurate passenger accumulated count data that shall be within 5% accuracy for each 1,000 consecutive boardings and each 1,000 consecutive alightings.
- Provide accurate stop-by-stop count data that shall be fully accurate for 85% of all door cycles; within one passenger for 90% of all door cycles; and within two passengers for 97% of all door cycles. This shall include stops for which there was no observed boarding or alighting activity.
- Remove clearly erroneous or other data that would otherwise improperly affect statistical results due to sensor failures and temporary or unanticipated changes to scheduled routes.
- Provide means of setting various filtering thresholds for determining erroneous data.

### **4.8.2 AIM Interface**

The APC system shall interface with the Onboard AIM system to determine, record, and store passenger count data. Such interface shall correlate the counts to the bus, run, trip, line, schedule (time), and bus stop (location) using the AVL and other pertinent AIM systems as necessary. The APC system shall use the AIM Yard WLAN to upload passenger count data from the buses and to download new schedule and route information to the buses.

### **4.8.3 National Transit Database [\(option\)](#)**

The APC system [shall](#) collect passenger data that is in compliance with the FTA's National Transit Database (NTD) requirements. Contractor shall perform all tasks required by the FTA to [initially](#) certify the APC system.

## 4.9 COMPUTER AIDED DISPATCH (OPTION)

The AIM computer-aided dispatch (CAD) system shall enable core Dispatch Center tasks to be carried out via an AIM Dispatch Console, which shall be located at the Terminal 1 Dispatch office and at the Transit Center. See Section 5.2 for Dispatch Console hardware requirements. The Dispatch Console shall be the primary means of assigning, overseeing, and communicating with buses in revenue service; preparing and processing incident reports; and managing voice radio communications. AIM shall support multiple user groups (e.g., driver supervisors, operations managers, system administrator) with settable system rights and privileges. Dispatch Center Console functionality shall be available on other MTD workstations of MTD's choosing via a web-based application or similar means.

### 4.9.1 Dispatch Assignment & Oversight

#### 4.9.1.1 Integration with Trapeze

AIM shall be integrated with applicable Trapeze applications as necessary to meet these CAD specifications. MTD shall obtain the necessary licenses from Trapeze for such integration. have the ability to import and export pertinent data with MTD transit scheduling software, which presently is Trapeze OPS. AIM shall also have the capability to input changes to the line, pattern and schedule data from a console for full or ad hoc changes and detours at the trip, run and line levels. Contractor shall be sufficiently knowledgeable of Trapeze the transit scheduling software to carry out the required integration for meeting these CAD system specifications. Such bidirectional data transfer and synchronization with the TDB, Trapeze, or other AIM systems shall occur seamlessly without the necessity of intermediate applications or databases either automatically or upon user initiation, dependent upon system administrator settings.

#### 4.9.1.2 Status Notifications

Operations status entries shall be generated automatically by AIM when an out-of-tolerance condition is detected. AIM shall generate notifications for a number of bus conditions that shall include at a minimum: off route, schedule adherence variance, out late, missed relief, voice or data communications failure, and vehicle movements without a valid logon. Tolerances for determining abnormal conditions and the recipient and type of the resulting notifications shall be settable by the system administrator. Enabling, disabling, or changing the threshold for reporting of each condition shall be settable by the Dispatch Supervisor based on lines, vehicles, and times. Other requirements, capabilities, or features related to notifications shall include:

#### 4.9.1.3 Operator Log-In

Contractor shall establish an interface between AIM and the farebox to enable a single login for both systems. If sign-on is through an MDT, manual farebox entries, including login, shall remain available through the farebox regardless of the status of AIM. If the MDT is used in lieu of the farebox control head, the MDT must accommodate all entries normally carried out through the farebox (e.g., passenger types). Additionally, AIM shall:

- Validate bus operator-entered identification against assignment, line, run, and vehicle. —
- Report entry of invalid bus operator identification to dispatch console.
- Enable Allow remote bus logon and the correction of invalid bus driver login data from the dispatch console.
- Allow disabling of vehicle location information (e.g., for AVL system failure).
- Support automatic or manual supervisor control of onboard AIM devices from the dispatch console.

road supervisor vehicles. SAS shall be considered an option for 16 of the remaining 21 service vehicles (see *Attachment 4* for optional vehicles). When activated, the SAS shall:

- Issue an emergency alarm, including vehicle location, to the Dispatch Center Consoles (DCC).
- In buses so equipped, initiate covert microphones for continuous audio to the DCCs.
- Initiate video surveillance system incident tagging.
- Discreetly display the SAS activation to the bus operator.
- Cause exterior headsigns to display an emergency message.
- Update the vehicle location to the DCCs no less than every 15 seconds.
- Send discrete visual signal to operator when a DCC acknowledges receipt of SAS.
- Disable all DCC incoming calls, messages, audible alerts, etc. while SAS is active.
- Allow supervisor to override and disable an SAS using the DCC.

#### **4.10 ROAD SUPERVISOR SYSTEM (OPTION)**

The AIM Road Supervisor System shall enable supervisors in road supervisor vehicles to manage fleet operations with the same functionality as the Computer-Aided Dispatch (CAD) system. The interface for such functionality shall be a Mobile Data Computer (MDC) mounted in each road vehicle. In addition, road supervisor vehicles shall include the AVL and data communications systems utilized by buses.

##### **4.10.1 Mobile Data Computers**

The Road Supervisor System shall include a mobile data computer (MDC) that enables a road supervisor to manage fleet operations and perform dispatching duties. Subject to any limitations inherent with a portable, mobile device, MDCs shall meet the same functional and display requirements as the CAD dispatch consoles specified in this document. These functions include dispatch assignment and oversight, incident reporting, and call routing. The physical configuration of the MDC shall be that of a laptop computer that is sufficiently robust for its intended use. MDC devices shall meet the following requirements:

- Utilize a commercially available operating system such as Windows 7.
- Use current commercial technologies for all components including the processor, RAM, hard drive, video/audio cards, and DVD/CD-RW drive.
- Include manual controls to adjust audio level, video display intensity, keyboard lighting and LED or indicator intensity.
- Have an automatic (timed) and manual screen saver and sleep mode.
- Use a standard QWERTY keyboard with lighted or back-lit keys for night use that is protected from dust, particles, moisture and spills.
- Have at least one parallel and three 2.0 USB connections.
- Have required GIS software installed for CAD map viewing capabilities.
- Allow data entry and word processing without active wireless communications with AIM.
- Keep an audit log file of all communications.

##### **4.10.1.1 Environmental Requirements**

MDCs shall meet the following environmental and associated requirements:

- Meet operational requirements while exposed to temperatures from 45 to 105 degrees F and withstand 20 to 140 degrees F while not operational.

## 5 AIM HARDWARE

### 5.1 AIM NETWORK

AIM shall include a separate local area network (LAN) that shall be housed in the MTD server room on the 2<sup>nd</sup> floor of the Administration Building. As indicated in Section 2.2.1, it is MTD preference that Contractor make use of existing MTD network equipment to the extent feasible. Also see Section 3.2.4.1 for related information concerning the AIM network interfaces. If required, Contractor shall use standard networking hardware, including switches, bridges, and routers that incorporate SNMP management. The AIM LAN shall be configured for high availability and operational flexibility, using the most current commercial technologies. It shall be designed to operate seven days per week, twenty-four hours per day. The AIM LAN hardware shall be capable of being managed from the Server Room and up to two designated workstations in the Administration Building.

### 5.2 DISPATCH CENTER CONSOLES

#### 5.2.1 Workstations

**The dispatch and Transit Center supervisors shall each utilize a single MTD-provided workstation to carry out AIM CAD system functions as well as all other supervisor computer-related tasks (e.g., e-mail, word processing, Trapeze OPS, etc.), Such workstations, other than the displays or any ancillary audio devices for the CAD voice radio system, shall be provided by MTD and not be the responsibility of the Contractor.** The MTD workstation shall have the specifications listed below. If these specifications are deemed insufficient for meeting the demands of the Dispatch Center Consoles, Contractor shall inform MTD of the deficiencies which shall be upgraded by MTD.

- Intel i7 quad processor
- Add-in graphics card with two HDMI connectors
- 8GB of random access memory
- SATA III storage device on 6GB bus

#### 5.2.2 Displays

Contractor shall provide new display screens for each of the two Dispatch Center Console. The screens shall be of sufficient quantity, size, and resolution as determined by the Contractor to simultaneously carry out both CAD and non-AIM functions.

#### 5.2.3 Console Audio Hardware

If the CAD voice radio control option is selected, then the following audio-related hardware specifications and requirements shall apply to the two Dispatch Center Consoles.

##### 5.2.3.1 Audio Jacks

Contractor shall provide two headset interface jacks with each console. The jacks shall be located at a convenient location in the supervisor area. The jacks shall include a volume-control adjustment with a minimum-volume stop and shall include a pre-amplifier for the headset microphone.

##### 5.2.3.2 Speakers

Contractor shall provide speakers which shall be located on the work surface of the console. Select and unselect audio speakers shall have individual volume controls located on the enclosure. Mute capability

- Examine submittal for accuracy and stamp and sign each submittal as follows: "Having checked this submittal, we certify that it conforms to the requirements of the Contract, except as otherwise indicated".
- Provide all submittals in electronic and hardcopy format. Electronic copies shall be in an Adobe PDF or Microsoft Office product format that is compatible with Office 2003. Unless indicated otherwise in these specifications, two full-sized hardcopies of each submittal will be provided.
- ~~• Industry prevalent software shall be utilized for preparing all submittals. Drawings shall be submitted in AutoCAD 2007 or later, or DXF format. Contractor shall furnish to MTD two fully licensed copies of all software necessary for viewing and marking up submittals.~~

#### 8.4.2 MTD Review

MTD will review and approve or take other appropriate action upon Contractor's submittals. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of Contractor. MTD review will not constitute approval of safety precautions or, unless specifically stated by MTD, of any construction means, methods, techniques, sequences, or procedures.

Upon review of contractor submittals, one of the following dispositions will be sent to Contractor:

- APPROVED: Work may proceed, provided it complies with the Contract. The approval of documents, shop drawings and samples shall not be construed as:
  - Permitting any departure from the Contract requirements;
  - Relieving Contractor of responsibility for errors and omissions, including details, dimensions, and quantity of materials; or
  - Approving departures from details furnished by MTD.
- APPROVED AS NOTED (Correct and resubmit): Work may proceed, provided:
  - It complies with the Contract as well as the corrections on the submittals, and Contractor resubmits within seven (7) calendar days corrected copies of the documents, shop drawings, working drawings, or miscellaneous submittals for final approval; and
  - Work performed by Contractor prior to receiving final approval will be at Contractor's risk.
- DISAPPROVED (Revise and Resubmit): Work is not recognized as being able to proceed. Revise submittal in accordance with notations thereon, and resubmit without delay. Contractor shall handle re-submittals in the same manner as first submittals, except designated with suffix A, B, C, etc. to indicate the resubmittal. On resubmittals, direct specific attention in writing on resubmitted documents to the most recent revisions.

#### 8.4.3 Drawings

Contractor shall be responsible for accuracy and correctness of all drawings. Contractor's Project Manager and STSM shall initial each drawing after checking it, indicating that it complies with all requirements of these specifications and accurately reflects intended or actual field conditions. Drawings that require a Professional Engineer's seal per California State Law shall be sealed and signed by Contractor's Professional Engineer before submittal.

Contractor shall prepare design, working, and shop drawings as are necessary to adequately perform the work. Mounting and installation drawings shall be accurately scaled. All symbols and abbreviations used shall be defined on each drawing or on a master symbol sheet.

### **8.7.2 Post System Acceptance (Warranty)**

MTD shall carry out basic system administration, maintenance, and repairs/swap outs for which Contractor training is provided. Beyond these basic tasks, **Contractor shall provide on-call and on-site support as necessary to keep AIM operating per these specifications for a period of ~~three~~ one year~~s~~ commencing with system acceptance (the warranty period).**

### **8.7.3 Maintenance Agreement (optional)**

**Contractor shall provide on-call and on-site support as necessary to keep AIM operating per these specifications for two one-year periods following the warranty period.**

## **8.8 QUALITY ASSURANCE**

### **8.8.1 Program Plan**

Contractor shall submit to MTD within sixty days of the NTP, a Quality Assurance (QA) Program Plan designed to ensure the quality of all activities—including design, purchasing, inspection, handling, assembly, fabrication, testing, storage, shipping, and warranty/repair work. The plan shall describe all quality control procedures of Contractor and any sub-suppliers. Contractor shall conduct regular inspections in accordance with guidelines defined by the QA Program Plan. Performance of any manufacturing or construction work shall not commence until the QA Program Plan relating to such work has been accepted by MTD. Upon request, Contractor's QA records shall be made available to MTD for inspection. Such QA activities performed (or not performed) by MTD shall not reduce nor alter Contractor's QA responsibilities or its obligation to meet the requirements of this document. At any time during the manufacturing process, MTD may choose to visit Contractor's facility or a subcontractor's facility during normal working hours to audit the manufacturing and quality control processes.

### **8.8.2 System Components**

Contractor shall conduct regular inspections and audits in accordance with guidelines defined by the QA Program Plan. Contractor's Project Manager shall establish a quality assurance process and assign qualified professionals to check all system components for compliance with the AIM specifications and consistency in production quality.

### **8.8.3 Manufactured Products**

Contractor shall utilize products manufactured by companies that utilize formal, documented quality assurance practices that meet or exceed the standard of care established by the industry. Contractor shall proactively monitor each supplier's quality system. Quality systems that conform to ISO 9000 practices are preferred.

## Appendix 2

### Revenue Vehicle Summary

Year	Make	Nbrs	Model	Bus Qty	Door Qty	Front Door		Rear Door		System Types, Communications & Connectors					
						Width	Height	Width	Height	Comm Bus***	Headsigns**			A/C	Fire Suppression
1992	Specialty	to 11	22' Electric Shuttle*	6	1	44	72	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2000	E-Bus	after 12	22' Electric Shuttle*	14	1	42	72	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1998	Nova	401-428	40' Low-Floor Transit Bus	11	2	50	76	37	77	J1708	Luminator	Horizon (flip dots)	??	n/a	n/a
2000	Nova	429-433	40' Low-Floor Commuter Bus	3	2	50	76	37	77	J1708	Luminator	Horizon (flip dots)	??		n/a
2004	Gillig	700-710	29' Low-Floor Transit Bus	11	2	38	75	33	79	J1708	Luminator	Horizon (Gen 4)	J1708		n/a
2006	Gillig	711-713	29' Low-Floor Transit Bus	3	2	38	75	33	79	J1939	Luminator	Horizon (Gen 4)	J1708		n/a
2009	Gillig	715-717	29' Low-Floor Transit Bus-hybrid	3	2	38	75	33	79	J1939	Luminator	Horizon (Gen 4)	J1708		Amerex
2004	Gillig	600-614	40' Low-Floor Transit Bus	15	2	38	75	33	79	J1708	Luminator	Horizon (Gen 4)	J1708		n/a
2007	Gillig	900-907	40' Low-Floor Transit Bus-hybrid	8	2	38	75	33	79	J1939	Luminator	Horizon (Gen 4)	J1708		Amerex
2011	Gillig	908-915	40' Low-Floor Transit Bus-hybrid	7	2	38	75	33	79	J1939	Luminator	Horizon (Gen 4)	J1708		Amerex
2011	Gillig	615-621	40' Low-Floor Transit Bus	7	2	38	75	33	79	J1939	Luminator	Horizon (Gen 4)	J1708		n/a
2013	Gillig	622-634	40' Low-Floor Transit Bus	13	2	38	75	33	79	J1939	Luminator	Horizon (Titan)	J1939		n/a
2004	MCI	800-801	40' Commuter Coach	2	1	30	85	n/a	n/a	J1939	Luminator	Horizon (Gen 4)	J1708		Amerex
2004	MCI	802-804	45' Commuter Coach	3	1	30	85	n/a	n/a	J1939	Luminator	Horizon (Gen 4)	J1708		Amerex

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\* No doors: open air shuttle

\*\* All vehicle with headsigns have front, side, and rear units

\*\*\* Integrated bus systems include at minimum engine, transmission, brakes

### Contacts

Company	Name	Phone Number	E-Mail
Nova	Peter Cerantola	(514) 531-5362	<a href="mailto:peter.cerantola@volvo.com">peter.cerantola@volvo.com</a>
Gillig	Vincent Chan	(510) 264-3895	n/a
MCI	no contact	(800) 241-2947	n/a
Luminator	Tony Tapia	(214) 557-5735	<a href="mailto:atapia@luminatorusa.com">atapia@luminatorusa.com</a>
GFI	Mark Mahon	(847) 593-8855 x41	<a href="mailto:mark.mahon@spx.com">mark.mahon@spx.com</a>
Commline*	Jeff Fukasawa	(310) 390-8003 x112	<a href="mailto:jeff.fukasawa@commlineinc.com">jeff.fukasawa@commlineinc.com</a>
Trapeze	David Corbin	(602) 625-9728	<a href="mailto:david.corbin@trapezegroup.com">david.corbin@trapezegroup.com</a>

\*Commline provided and maintains MTD's MOTOTRBO two-way radio system.

**Appendix 5**  
***Transit Center Plans***

To be provided in Addendum 2

## Appendix 6 Headsign ODK Photographs

**Nova ODK-Frontside**



**Non-Nova ODK-Frontside**



**Nova ODK-Backside**



**Non-Nova ODK-Backside**



**Appendix 7**  
***Digital Two-Way Radio System–Technical & Work Specifications***

**Attached**

**Appendix 5**  
***Terminal 1 Yard Plans & Photos***

To be provided in Addendum 2