CONTRACT

BETWEEN

THE CITY AND COUNTY OF DENVER

AND

BOMBARDIER TRANSPORTATION (HOLDINGS) USA INC.

FOR THE PURCHASE OF MODEL INNOVIA APM 300R
AUTOMATED PEOPLE MOVER VEHICLES,
FOR THE
AUTOMATED GUIDED TRANSITSYSTEM (AGTS)

AT

DENVER INTERNATIONAL AIRPORT

PURCHASE CONTRACT

THIS CONTRACT, is made and entered into as of the date stated on the signature ("Effective Date") by and between the **CITY AND COUNTY OF DENVER**, a municipal corporation of the State of Colorado ("City"), Party of the First Part, and **BOMBARDIER TRANSPORTATION (HOLDINGS) USA INC.**, a Delaware corporation authorized to do business in Colorado ("Contractor"), Party of the Second Part;

W I T N E S S E T H:

WHEREAS, the City owns and operates Denver International Airport ("DEN" or the "Airport"), and

WHEREAS, the City desires to obtain custom manufactured vehicles, and any required equipment hardware or software to integrate the new vehicles into the existing Automated Ground Transportation System ("AGTS"); and

WHEREAS, the Contractor is fully qualified and ready, willing and able to provide these goods and services to the City at DEN, in accordance with its proposal submitted to the City;

NOW, THEREFORE, for and in consideration of the premises and other good and valuable consideration, the parties hereto agree as follows:

SECTION 1 – DEFINITIONS

As used in this Contract, unless the context requires otherwise:

1.01 AIRPORT; DEN

"Airport" or "DEN" means Denver International Airport.

1.02 AGTS ADMINISTRATOR

The Chief Executive Officer Denver International Airport, his/her designee or successor in Function (hereinafter referred to as the "CEO") authorizes all work performed under this Agreement. The CEO hereby delegates his/her authority over the work described herein to the Senior Vice President of Airport Operations hereinafter referred to as "Senior Vice President," as the CEO's authorized representative for the purpose of administering, coordinating and approving work performed under this Agreement. The Senior Vice President's authorized representative for day-to-day administration of the Contractor's goods and services under this Agreement is the AGTS Administrator. The Contractor shall submit its reports, memoranda, correspondence and submittals to the AGTS Administrator. The CEO and Senior Vice President may from time to time designate a different individual to act as AGTS Administrator upon notice to the Contractor.

The Project Manager is authorized to approve changes in the design, specifications, and technical requirements of the AGTS Vehicles, and to perform review and inspection of the

AGTS Vehicles at the manufacturing plant and on site at Denver International Airport ("DEN"). The Project Manager is the City's representative with day to day responsibility for administration of this Contract, and for all decisions except those reserved to the CEO Department of Aviation ("CEO") and the Senior Vice President of Operations. The Contractor shall direct all correspondence concerning this Contract to the Project Manager.

Certificates of Final Completion and Substantial Completion shall be issued by the Senior Vice President – Airport Operations, subject to the approval of the CEO.

The terms and conditions of this Contract may not be changed except by a duly executed written amendment, except for the details of the design, specifications, schedules, and technical requirements, which may be changed by the Project Manager if such changes do not increase the maximum contract amount.

The Contractor shall designate a representative to whom the City shall direct communications under this Contract, and the Contractor shall disclose in writing to the City its line of authority for the engineering, manufacturing and testing work to be performed hereunder.

1.03 CONTRACT DOCUMENTS

It is agreed by the parties hereto that the following list of instruments, drawings and documents which are attached hereto and bound herewith or incorporated herein by reference constitute and shall be referred to either as the Contract Documents or the Contract between the parties hereto, and they are as fully a part of this agreement as if they were set out verbatim and in full herein:

Exhibit A	Pricing
Exhibit C	Special Conditions
Exhibit D	Technical Specifications for AGTS Vehicles
Exhibit E	Project Management Provisions
Exhibit F	Project Schedule
Exhibit G	Payment Milestone Schedule
Exhibit H	Certificate of Substantial Completion – AGTS Vehicles
Exhibit I	Certificate of Final Completion
Exhibit J	Standard Federal Assurances
Exhibit M	Insurance Certificate
Exhibit P	Form of Letter of Credit/Payment and Performance Bond

1.04 CONTRACTOR EMPLOYEE; CONTRACTOR PERSONNEL

"Contractor employee" or "Contractor personnel" shall include employees and personnel of the
Contractor and subcontractors, if any.

1.05 CHIEF EXECUTOVE OFFICER

"CEO" means the Chief Executive Officer City and County of Denver Department of Aviation.

SECTION 2 – SCOPE OF WORK

2.01 SCOPE OF WORK

The Contractor agrees to and shall furnish all labor, tools, supplies, equipment, materials and everything necessary whether specifically identified or not to provide the city with 26 fully functional 300R vehicles that are fully integrated into the existing AGTS System at DEN in accordance with the schedule and the contract documents as set out in this Contract. All existing system vehicles will also be operational as they are today.

A. AGTS Vehicles: manufacture, delivery, installation and testing of AGTS Vehicles described in this Contract, including the Technical/Management Specifications, attached to this Contract as Exhibits and incorporated herein. Exhibit D along with other attached Exhibits contain the detailed specifications for the AGTS Vehicles, the factory testing requirements that shall be performed by the Contractor, and the requirements for spare parts and special tools for the new vehicles that will be provided under this Contract.

B. Professional Responsibility: The Contractor shall faithfully perform the Scope of Work required under this Agreement in accordance with standards of care, skill, expertise, training, diligence and judgment customarily exercised by highly competent professionals who perform work of a similar nature to the work described in this Agreement.

C. Diligence: The Contractor acknowledges that time is of the essence in the performance of its services under this agreement and that the City of Denver may suffer damages if the Project is delayed as a result of the Contractor's failure to provide its services in a timely and diligent manner. Contractor shall perform the work described herein in a timely manner and as directed by the Senior Vice President or his or her authorized representatives.

D. Neither the Contractor nor any of its employees shall perform any work at the Airport other than that which is defined herein, except as permitted in writing by the Senior Vice President Operations. When such other work is approved, it is expressly understood that the needs of the Department of Aviation are to have precedence over any such work.

2.02 COORDINATION AND LIAISON

The Contractor agrees that during the term of this Contract it shall coordinate its work with any interested City agency, any person or firm under contract with the City, and with other governmental agencies which are affected by or interested in any part of the services the Contractor performs under this Contract.

2.03 COMMENCEMENT OF WORK; PROJECT SCHEDULES

Following delivery to the Contractor of a fully executed copy of this Contract, the City will issue a written Notice to Proceed. Within ten (10) days after receipt of a Notice to Proceed, the Contractor shall commence the work, in accordance with the Project Schedule for the AGTS Vehicles.

The Project Schedule for all of the work covered by this Contract is set out in Exhibit F. The Project Schedule is subject to change by the City upon notice to the Contractor. Changes in project schedule originated by the City may be subject to additional cost and time. Such additional cost and time shall be mutually negotiated by the parties. However, the maximum contract amount will not be changed for delays caused by the contractor.

SECTION 3 – TERM

3.01 TERM

The Contractor agrees to begin the performance of the work required under this Contract within ten days (10) after being notified to commence work by the Senior Vice President. The Contractor agrees to complete the Work in its entirety within Five Years from the date of said Notice to Proceed. In addition, the term of this Contract may be extended in the CEO's discretion, by written notice from the City to the Contractor, to allow the completion of any work which has been commenced prior to the date upon which this Agreement otherwise would terminate. However, no extension of the Contract Term shall increase the Maximum Contract Amount stated herein; such amount may be changed only by a duly executed written amendment to this Contract.

SECTION 4 – COMPENSATION AND PAYMENT

4.01 COMPENSATION

The City hereby agrees to pay the Contractor, and the Contractor agrees to accept as its sole compensation for its complete costs incurred in the project's scope of work as set forth in the Contract Documents. Payment schedule of values is attached as Exhibit G.

4.02 BILLING SCHEDULE

The City will make progress payments to the Contractor in accordance with the Payment Milestone Schedule, Exhibit G, upon invoices submitted by the Contractor documenting that the work described in the applicable payment milestone has been completed. The Contractor's invoices shall be in the form prescribed by the City and shall be subject to review and approval by the City, and paid in accordance with the City's prompt payment ordinance, D.R.M.C. §§ 20-107 to 20-118. The Contractor will provide, when requested, such additional supporting documentation as the Project Manager may request in order to process any invoice. The failure of the City to timely make payment to the Contractor shall not permit the Contractor to stop or suspend work hereunder. The City's payment of an invoice before Final Acceptance of the equipment, goods and/or services for which the invoiced work was performed, shall neither:

(a) constitute an acknowledgment of the acceptance of such work, nor

(b) affect the obligation of the Contractor to repair, correct, renew, or replace, at its expense, any defects, imperfections, errors or omissions in the design, fabrication, installation, construction of such equipment or work, which the City discovered on or before Final Acceptance of such work.

4.03 MAXIMUM LIABILITY

A. Any other provision of this Contract notwithstanding, in no event shall the City be liable for payment for services rendered and expenses incurred by the Contractor under the terms of this Contract for any amount in excess of the sum of Seventy-Eight Million Eight Hundred Fifty Thousand Dollars and Zero Cents ($78,850,000.00) (the "Maximum Contract Liability"). The Maximum Contract Liability may only be increased by amendment to this Agreement. All payments under this Agreement shall be paid solely and exclusively from the City's Funds of the Airport System and from no other fund or source. The City is under no obligation to make any future apportionments or allocations to said fund. Any services performed beyond those set forth therein are performed at Contractor's risk and without authorization under the Agreement.

B. The City reserves the right to direct the Contractor to perform only limited portions of the work described in this Contract and the Contractor agrees that it shall not continue work in excess of approved and encumbered amounts without a written Notice from the City stating the funding limit and term. If the Contractor chooses to proceed with work prior to receiving such a written Notice, then the Contractor shall do so at its own risk without any liability for payment by the City. The City's written Notice must be signed by the City's Senior Vice President and by the Department of Aviation's Chief Financial Officer ("CFO"), otherwise it is invalid and the Contractor is without authority to proceed. Payments hereunder will be made subject to the multi-year conditions stated above.

C. The maximum aggregate liability of Contractor under this Contract, including for default, breach, negligence, indemnity obligations or otherwise in connection with the work provided hereunder, shall not exceed Seventy-Eight Million Eight Hundred Fifty Thousand Dollars and Zero Cents ($78,850,000.00).

D. The limitations of liability in Section 4.03 C hereof shall not apply to, nor shall the calculation thereof include

1. liabilities that arise out of (i) the injury to or death of persons, the loss of or the physical damage to the property of third parties, or third party intellectual property, or (ii) any other third party claims arising out of an act or omission of the Contractor;
2. liabilities that arise out of the gross negligence, willful misconduct, deliberate acts of wrongdoing or fraud of Contractor;
3. fines and penalties under any law or any costs incurred by Contractor in complying with obligations that arise out of any failure by Contractor to comply with any laws (including workman's compensation, employment or health and safety laws or regulations);
4. fines and penalties under any law incurred by City as a result of a failure by Contractor to comply with any laws (including workman's compensation, employment or health and safety laws or regulations); or
5. any reasonable amount incurred by City in enforcing any claim, including any action necessary to vacate encumbrances, against Contractor under or in connection with this Contract.

4.04 TIME OF PAYMENT/PROMPT PAYMENT

Terms shall be subject to the City's Prompt Payment Ordinance D.R.M.C. 20-107 *et-seq.* subject to the Maximum Contract Liability set forth herein. Payments shall be based upon monthly invoices and receipts submitted by Contractor in accordance with the provision of this Agreement and that have been audited and approved by the City. The Contractor agrees that interest and late fees shall be payable by the City hereunder only to the extent authorized and provided for in the City's Prompt Payment Ordinance. For any subcontractor engaged by Contractor under this Agreement, the Contractor is subject to Section 20-112, D.R.M.C., requiring the Contractor to pay its subcontractors in a timely fashion. A payment is timely if it is mailed to the subcontractor no later than seven days after receipt of any payment from City. Any late payments by Contractor are subject to a late payment penalty as provided for in Section 20-112, D.R.M.C.

4.05 FAIR MARKET PRICING

The pricing of the vehicles under this Contract will be at fair market value, accounting for the number of vehicle, terms, conditions and other project-specific factors which may impact the pricing under this Contract as compared to other contracts under which identical vehicles may be sold by the Contractor to other of its customers.

SECTION 5 – CONTRACTOR'S PERFORMANCE

5.01 CONTRACTOR PERSONNEL – GENERAL REQUIREMENTS

A. The Contractor shall at all times provide properly trained and competent number and competent personnel in the number and classifications necessary to perform its services in an efficient manner and in accordance with the Contract Documents. The Contractor shall be responsible for the conduct of all the Contractor's personnel at all times. Contractor personnel are required to be properly trained and competent to perform the duties of their positions, and must possess adequate communication and English language skills to accurately provide information to the public and to respond to routine and emergency communications by telephone or radio. They shall be properly uniformed, clean and neat in appearance while on duty, and shall deal with members of the public, including parking patrons, in a prompt, polite and businesslike manner.

B. The Contractor shall remove from the Airport work site any Contractor employee on, or invited by it onto, the Airport, when the CEO notifies the Contractor in writing that such person: (a) is, in the reasonable opinion of the CEO or his/her designee, incompetent, unfit or disorderly; or (b) has used profane or abusive language or behavior toward any person at the Airport. Such person shall not be reassigned to Airport work by the Contractor, except with the express written consent of the CEO or his/her designee.

5.02 EMPLOYEE DRIVER LICENSES AND RECORDS

A. Contractor employees driving either City or Contractor provided vehicles under this Contract are required to maintain an excellent driving record. Drivers with a driving record unacceptable to the City's insurance underwriter will be assigned by the Contractor to a non-driving job if available.

B. All drivers with an alcohol or drug related charge shall be dealt with in accordance with the provisions of Executive Order No. 94.

C. All Contractor personnel assigned to the Airport who drive vehicles in the course of their work under this Contract must obtain and maintain a Colorado Class "R" driver's license and Airport Identification Badge at all times during their employment at the Airport.

D. All Contractor personnel assigned to the Airport will carry Airport Identification Badges at all times during their employment at the Airport.

5.03 AIRPORT SECURITY

A. It is a material requirement of this Contract that the Contractor shall comply with all rules, regulations, written policies and authorized directives from the City and/or the Transportation Security Administration with respect to Airport security. The Contractor shall conduct all of its activities at the Airport in compliance with the Airport security program, which is administered by the Airport Security Section, Department of Aviation. Violation by the Contractor or any of its employees, subcontractors or vendors of any rule, regulation or authorized directive from the City or the Transportation Security Administration with respect to Airport Security shall be grounds for immediate termination by the City of this Contract for cause.

B. The Contractor, promptly upon notice of award of this Contract, shall meet with the Airport's Assistant Security Manager to establish badging and vehicle permit requirements for Contractor's operations under this Contract. The Contractor shall obtain the proper access authorizations for all of its employees, subcontractors and vendors who will enter the Airport to perform work or make deliveries and shall be responsible for each person's compliance with all Airport rules and regulations, including without limitation those pertaining to security. Any person who violates such rules may be subject to revocation of his/her access authorization. The failure of the Contractor or any subcontractors to complete any required services hereunder shall not be excused on account of the revocation for good cause of access authorization of any person.

C. The security status of the Airport is subject to change without notice. Should the security status of the Airport change at any time during the term of this Contract, the Contractor shall take immediate steps to comply with these security modifications that occur as a result of the changed status. The Contractor may at any time obtain current information from the Airport Security Office regarding the Airport's security status in relation to the Contractor's operations at the Airport.

D. The Contractor shall return to the City at the expiration or termination of this Contract, or upon demand by the City, all access keys issued to it for any area of the Airport, whether or not restricted. If the Contractor fails to do so, the Contractor shall be liable to reimburse the City for all the City's costs for work required to prevent compromise of the Airport security system. The City may withhold funds in the amount of such costs from any amounts due and payable to the Contractor under this contract.

5.04 SAFETY

A. The Contractor shall operate at all times under this Contract in compliance with the Occupational Safety and Health Act.

B. For all operations requiring the placement and movement of the Contractor's equipment, Contractor shall observe and exercise and compel its employees to observe and exercise all necessary caution and discretion so as to avoid injury to persons, damage to property of any and all kinds, and annoyance to or undue interference with the movement of the public and City personnel.

C. Protection of Property. The Contractor shall be totally responsible for the design and installation of all temporary structures such as shoring that may be required to perform work under this Contract. The Contractor shall also perform its work under this Contract so as not to load or overload any structural, electrical or HVAC System in any way, which might endanger its present or future integrity or capacity.

D. Access. The Contractor shall obtain the approval of the Contract Administrator and notify all tenants of the Airport, other contractors or other affected persons at least 48 hours before starting any delivery, repair or installation work under this Contract which may block access to such persons, and shall restore such access to a usable condition, or with the Manager's permission provide replacement access, as soon as possible.

E. Vehicle Permitting. Vehicle access on the Airport Operation Area ("AOA") is controlled by and requires permission from the Airport Access Services Office. Only direct construction support vehicles and/or equipment will be allowed in the contractor's work areas or sites.

F. Site Communications. Any site communications at DIA must be approved by DIA Operations.

G. Construction Access. The City will provide to the Contractor a laydown area for its use as required during the term of this Contract. The City may from time to time direct the Contractor to move to a different laydown area, and the Contractor shall move to such area within 72 hours after such notice. The Contractor shall be responsible for maintaining its laydown area in a clean and orderly condition and for cleanup of the area after it has removed its materials and equipment from the area.

H. Employee Parking. The City will not provide parking spaces for the Contractor's employees or subcontractor employees at the Airport. Arrangements for transportation and parking for all of its and its subcontractors employees will be the responsibility of the Contractor. The Purchase Price includes any and all costs associated with the Contractor's and subcontractors' employee parking. Information about parking facilities and charges is available from the Airport Parking Office. Refundable deposits are required for all parking passes.

I. Fences. Unless specifically required by the Contract, the Contractor shall install no fences or other physical obstructions on or around any project work area without the approval of the City.

J. Access of subcontractors and suppliers. The Contractor shall provide the Project Manager's office with a list of its equipment/material subcontractors and suppliers. Subcontractors or suppliers shall access the construction work areas via the Contractor's access route, described above. All delivery vehicles are subject to search.

5.05 LAWS, REGULATIONS, TAXES AND PERMITS

A. The Contractor shall procure all permits and licenses, pay all charges, taxes and fees and give all notices necessary and incidental to the due and lawful prosecution of the work under this Contract. All costs thereof shall be deemed to be included in the prices proposed for the work.

B. Contractor agrees that he, or any subcontractor under him, will pay all sales and use taxes levied by the City and County of Denver on any tangible personal property built into the work by the Contractor. These materials are exempt from Colorado State Taxes per CRS 1973 39-26-114 Rev. It shall be the responsibility of the Contractor to obtain a Certification of Exemption from the State of Colorado Department of Revenue prior to the purchase of any materials to be built into the work. A copy of the certificate shall be furnished the City prior to final payment. The Purchase Price for the AGTS Vehicles do not include Colorado or City sales/use taxes or City property taxes for which the City is exempt. The City's Federal Registration Number is A-13850 dated April 5, 1960, Denver, Colorado, Department of Internal Revenue. The City's Colorado State Sales Tax Exemption Number is 98-02890.

C. The Contractor, at all times, shall observe and comply with all federal, state, county, city and other laws, codes, ordinances, rules and regulations in any manner affecting the conduct of the work, including without limitation the Williams-Steiger Occupational Safety and Health Act of 1970 (Public Law 91-596).

D. Without limiting the foregoing, the Contractor shall establish appropriate procedures and controls so that services under this Contract will not be performed by using any alien who is not legally eligible for such employment under United States Immigration laws. Failure to satisfactorily comply with this condition may cause the City to terminate this Contract.

E. Any employee working for the contractor or one of its subcontractors who earns at least $500 working in the City or County of Denver during a calendar month, is subject to payment of the Employee Occupational Privilege Tax. The Contractor or any of its subcontractors who have any employee, working in the City and County of Denver, who earns the amount set forth above must withhold the employee occupational privilege tax from the wages of each employee subject to it, remit it to the City and pay to the City the correlative business Occupational Privilege Tax imposed on the employer for such employee.

F **Change In Law.** If during the term of this Contract any unforeseeable changes in such laws, ordinances, rules and regulations, or orders occur which result in actual significant increased costs to the Contractor, the Contractor may submit to the City a written request for an equitable adjustment to reimburse it for such costs. The request shall include documentation of the costs claimed by Contractor, identification of the change in law, ordinance, rule, regulation or order which caused the increased costs and a statement of the reasons why the change was not reasonably foreseeable and the reasons why the change caused the increased costs. The CEO may in his/her discretion grant or deny an equitable adjustment after review of the information submitted by the Contractor.

5.06 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

A. The Contractor in conducting any activity on the Airport shall comply with all applicable local, state and federal environmental rules, regulations, statutes, laws and orders (collectively "Environmental Requirements"), including but not limited to Environmental Requirements regarding the storage, use and disposal of Hazardous Materials or Special Wastes to the environment. For purposes of this Agreement the terms "Hazardous Materials" shall refer to those materials, including without limitation asbestos and asbestos-containing materials, polychlorinated biphenyls (PCBs), oil or any other petroleum products, natural gas, source material, pesticide, and any hazardous waste, toxic substance or related material, including any substance defined or treated as a "hazardous substance," "hazardous waste" or "toxic substance" (or comparable term) in the Comprehensive Environmental Response, Compensation and Liability Act (42 U.S.C. Sec. 9601 et seq. (1990), the Toxic Substances Control Act (15 U.S.C. Sec. 2601 et seq. (1990), and any rules and regulations promulgated pursuant to such statutes or any other applicable federal or state statute.

B. In addition, Environmental Requirements include applicable Environmental Guidelines developed for DIA's Environmental Management System (EMS), as summarized in DEN Rules and Regulations Part 180 (Environmental Management) and DEN's Environmental Policy, both available at www.flydenver.com/biz/index.asp. These Environmental Requirements include, but are not limited to, requirements regarding the storage, use, and disposal of Hazardous Materials, petroleum products; the National Environmental Policy Act (NEPA); the Clean Water Act (CWA); and all other federal, state, and local water, wastewater, and air quality regulations.

C. The Contractor shall acquire all necessary federal, state, local, and airport permits/approvals and comply with all permit/approval requirements.

D. Prior to use, the Contractor shall provide to the City copies of Safety Data Sheets (SDSs) for all chemicals or detergents to be used in its activities for approval. This obligation is continuing for the term of this Agreement, and the Contractor shall provide updated SDSs and SDSs for new chemicals, as such information is updated and as new chemicals or detergents are placed into use, as applicable.

E. The Contractor agrees to ensure that its operations hereunder are conducted in a manner that minimizes environmental impact through appropriate preventive measures. The Contractor agrees that it shall be responsible for any notice of violation from CDPHE, the City and County of Denver or the EPA. The Contractor further agrees that it is responsible for the health and safety of its personnel in connection with such environmental requirements.

F. In the case of a release, spill or leak as a result of the Contractor's activities, the Contractor shall immediately control and remediate the contaminated media to applicable federal, state and local standards. The Contractor agrees that in such event it will immediately clean up all spills and the cleanup material must be disposed of offsite at the Contractor's sole expense. The Contractor agrees that it shall reimburse the City for any penalties and all costs and expenses, including without limitation attorney's fees, incurred by the City as a result of the release or disposal by the Contractor of any pollutant or hazardous material on or about the Airport.

5.07 EXISTING UTILITIES AND STRUCTURES

The Contractor shall adequately protect the work, Airport property, adjacent property and the public. In the event of damage to facilities and/or disruption in services at the facilities, as a result of the Contractor's operations or lack thereof when required, the Contractor shall take immediate steps to notify the AGTS Administrator and subsequently repair or restore all services to the satisfactory approval of the AGTS Administrator The Contractor shall also provide temporary services to maintain uninterrupted use of the facilities.

All costs involved in making repairs and restoring disrupted service shall be borne by the Contractor, and the Contractor shall be fully responsible for any and all claims resulting from the damage.

The AGTS Administrator at her/his option, may elect to perform such repairs and deduct the cost of such repairs, replacements and outside services from the monthly charges by the Contractor.

SECTION 6 – INDEMNITY; INSURANCE; BONDS

6.01 INSURANCE

A. The Contractor shall obtain and keep in force during the entire term of this Agreement, all of the insurance policies described in the City's form of insurance certificate which is attached to this Agreement as Exhibit M and incorporated herein. Such insurance coverage includes workers' compensation and employer liability, commercial general liability, product liability and business automobile liability. Upon execution of this Agreement, the Contractor shall submit to the City an ACORD form, which specifies the issuing company or companies, policy numbers and policy periods for each required coverage.

B. The City's acceptance of any submitted insurance certificate is subject to the approval of the City's Risk Management Administrator. All coverage requirements specified in the certificate shall be enforced unless waived or otherwise modified in writing by the City's Risk Management Administrator.

C. All certificates required by this Agreement shall be sent directly to Denver International Airport, Risk Management, Airport Office Building, Room 8810, 8500 Peña Boulevard, Denver, Colorado 80249. The City Project/Agreement number and project description shall be noted on the certificate of insurance.

D. The Contractor shall comply with all conditions and requirements set forth in the insurance certificate for each required coverage during all periods in which coverage is in effect.

E. Unless specifically accepted in writing by the City's Risk Management Administrator, the Contractor shall include all subconsultants performing services hereunder as insureds under each required policy or shall furnish a separate certificate for each subconsultant if requested by City. All coverage for subconsultants shall be subject to all of the requirements set forth in the form certificate and the Contractor shall insure that each subconsultant complies with all of the coverage requirements.

F. The parties hereto understand and agree that the City and County of Denver, its officers, officials and employees, are relying on, and do not waive or intend to waive by any provisions of this agreement, the monetary limitations or any other rights, immunities and protections provided by the Colorado Governmental Immunity Act, §§ 24-10-101 to 120, C.R.S., or otherwise available to the City and County of Denver, its officers, officials and employees.

G. The insurance coverage forms specified in this Agreement are the minimum requirements, and these requirements do not lessen or limit the liability of the Contractor under the terms of this Agreement, including the Indemnification provisions herein. The Contractor shall maintain, at its own expense, any additional kinds and amounts of insurance that it may deem necessary to cover its obligations and liabilities under this Agreement.

6.02 DEFENSE AND INDEMNIFICATION

A. Contractor hereby agrees to defend, indemnify, reimburse and hold harmless City, its appointed and elected officials, agents and employees for, from and against all liabilities, claims, judgments, suits or demands for damages to persons or property arising out of, resulting from, or relating to the work performed under this Agreement ("Claims") including (but not limited to) the manufacture, delivery, and testing (both at DEN and prior to delivery to DEN) of the AGTS vehicles, except to the extent such Claims have been specifically determined by the trier of fact to be caused by the negligence or willful misconduct of the City. This indemnity shall be interpreted in the broadest possible manner to indemnify City for any acts or omissions of Contractor or its subcontractors either passive or active.

B. Contractor 's duty to defend and indemnify City shall arise at the time written notice of the Claim is first provided to City regardless of whether Claimant has filed suit on the Claim. Contractor's duty to defend and indemnify City shall arise even if City is the only party sued by claimant.

C. Contractor will defend any and all Claims arising from the Contractor's performance which may be brought or threatened against City and will pay on behalf of City any expenses incurred by reason of such Claims including, but not limited to, court costs and attorney fees incurred in defending and investigating such Claims or seeking to enforce this indemnity obligation. Such payments on behalf of City shall be in addition to any other legal remedies available to City and shall not be considered City's exclusive remedy.

D. Insurance coverage requirements specified in this Agreement shall in no way lessen or limit the liability of the Contractor under the terms of this indemnification obligation. The Contractor shall obtain, at its own expense, any additional insurance that it deems necessary for the City's protection.

E. This defense and indemnification obligation shall survive the expiration or termination of this Agreement.

6.03 PATENT INDEMNITY BY CONTRACTOR

The Contractor shall at its expense, defend or, at its option, settle any claim, suit or proceeding brought against the City insofar as it is based on an allegation that the AGTS Vehicles, or any part thereof, furnished by Contractor, infringe a claim of any U.S. patent. This obligation shall be effective only if the Contractor is notified promptly in writing and is given authority, information, and assistance for the defense of said claim, suit or proceedings. The Contractor shall pay all damages and costs in the claim, suit or proceeding so defended. In the event the AGTS Vehicles become the subject of any claim, suit or proceeding for infringement of any U.S. patent, or in the event of any adjudication that the AGTS Vehicles infringe any U.S. patent, the Contractor shall, at its option and its own expense, either (a) procure for the City the right of continue using said AGTS Vehicles or any part thereof; or (b) with the City's consent, modify the AGTS Vehicles so they become non infringing.

6.04 INSPECTION OF RECORDS

A. During the term of this Agreement, upon request of the AGTS Administrator or the City Auditor, the Contractor shall make available all payroll records, training records, books of account, and other relevant records pertinent to the Agreement for the purposes of inspection and audit of such records at the Contractor's office. The Contractor agrees that the City's duly authorized representatives shall, until the expiration of three (3) years after the final payment under this Agreement, have access to and the right to audit, examine and copy any directly pertinent books, documents, papers and records of the Contractor related to work performed under this Agreement.

B. The Contractor agrees that it shall maintain a true and complete cost accounting system acceptable to the Federal Aviation Administration and the City and County of Denver, in accordance with generally accepted accounting principles which are acceptable to the City Auditor. Such system shall be kept in a manner as to allow Contractor's operations hereunder to be distinguishable from all other operations of Contractor. The City, the Federal Aviation Administration, the Comptroller General of the United States and any of their duly authorized representatives shall have access to any books, documents, papers and records of the Contractor which are directly pertinent to this Agreement for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees that such records will contain information concerning the personnel, hours and specific tasks performed, along with the federal project number, if applicable. The Contractor further agrees to maintain all books, records and reports required under this Agreement for a period of not less than three years after final payment is made and all pending matters are closed, and that the Auditor of the City or any of his duly authorized representatives shall, until the expiration of three (3) years after the final payment under this agreement, have access to and the right to examine any directly pertinent books, documents, papers and records of the Contractor involving transactions related to this agreement. Subject to the prior written approval of the City and County of Denver, upon termination of this Agreement, the Contractor may surrender to the City all records and documents relating to this Agreement.

In the event such records are not made available in the Denver metropolitan area, Contractor shall pay to the City in full, in advance, travel and related expenses of a City representative to travel to any location outside the Denver area for such examination.

Following the travel, expenses shall be reconciled, and any difference between the advance payment and the actual expenses shall be paid by or refunded to Contractor as appropriate. Such documents shall be available to the City representative within fourteen (14) calendar days of the date of the written request.

The parties agree that any delay in furnishing such records to the City will cause damages to the City which the parties agree are liquidated in the amount of Three Hundred and Fifty Dollars ($350.00) per day for each day the records are unavailable beyond the date established as the City's notice.

6.05 PAYMENT AND PERFORMANCE BOND

A Performance, Payment, and Guarantee Bond satisfactory to the City and County of Denver on the form required by the City, in an amount not less than One Million Five Hundred Thousand Dollars and Zero Cents ($1,500,000.00) is required of the Contractor to guarantee that it will perform the work in strict accordance with Agreement Documents and shall pay all debts incurred under this Agreement. The Surety named in the Bond must be authorized to do business in the State of Colorado.

This Bond must be either renewed annually by the Surety named in the Bond or replaced with an identical Bond covering the subsequent year of the Agreement issued by another Surety which has been approved in advance by the CEO. If the CEO does not receive written notice from the Surety in the manner provided in the Bond at least thirty(30) days before it expires or does not receive a substitute Bond in the form required by the City from an approved Surety at least thirty days (30) before the Bond expires, then the Contractor shall be in default of this Agreement and the CEO may immediately terminate this Agreement by giving the Contractor written notice of such default. If the City elects to extend the Agreement for additional periods at the same prices, terms and conditions pursuant to Section 3.2 of this Agreement, the Contractor shall obtain and submit either an extension of the existing Performance, Payment and Guarantee Bond or the an identical Bond from another Surety that is acceptable to the City.

Under no circumstances shall the City be liable to the Contractor for any costs incurred or payments made by the Contractor to obtain an extension of an existing Bond or a new Bond.

The only acceptable alternative to a Performance, Payment, and Guarantee Bond is an Irrevocable Unconditional Letter of Credit from a local financial institution acceptable to the City and County of Denver in the amount One Million Five Hundred Thousand Dollars and Zero Cents ($1,500,000.00). Renewal of said Irrevocable Unconditional Letter of Credit during the term and any one-year extensions of the Agreement shall be as set out above with respect to the Performance, Payment, and Guarantee Bond.

The City's forms of Performance, Payment and Guarantee Bond or Irrevocable Unconditional Letter of Credit must be used. Those forms are attached to this Agreement and incorporated herein as Exhibit P. Attorneys-in-Fact who sign Performance, Payment, and Guarantee Bonds must file with such Bonds a certified copy of their Power-of-Attorney to sign such Bonds that is certified to include the date of the Bond.

SECTION 7 – SUBCONTRACTING

7.01 SUBCONTRACTING ALLOWED

The Contractor may sublet portions of the Work. No subcontractor shall in turn subcontract any portion of its work; there shall only be one tier of subcontracting.

7.02 OBLIGATIONS OF CONTRACTOR

The Contractor shall be responsible for any acts or omissions of its employees, agents, suppliers, material men and subcontractors. The Contractor shall make available to each proposed subcontractor, prior to the execution of the subcontract, copies of the Contract. In addition, all work performed for the Contractor by a subcontractor shall be pursuant to an agreement between the Contractor and the subcontractor which shall contain provisions that:

A. Preserve and protect the rights of the City and its funding agencies under the Contract Documents with respect to the work to be performed so that the subcontracting thereof will not prejudice those rights; and

B. Require that the Subcontractor be bound to the Contractor by the terms of the Contract Documents, that its work be performed in accordance with the requirements of the Contract Documents, and with respect to the work it performs, that it assume toward the Contractor all the obligations and responsibilities the Contractor assumes toward the City.

7.03 APPROVAL OF SUBCONTRACTORS

All subcontractors that the Contractor expects to perform Work under this Contract must be approved in writing by the CEO before the subcontractor begins work. The CEO may refuse to approve a subcontractor for reasons that include, but are not limited to, the following:

A. Default on a contract within the last five (5) years.

B. Default on a contract that required that a surety complete the contract under payment or performance bonds issued by the surety.

C. Debarment within the last five (5) years by a public entity or any organization that has formal debarment proceedings.

D. Significant or repeated violations of Federal Safety Regulations (OSHA).

E. Failure to have the specific qualifications listed in the Contract Documents for the work that the subcontractor will perform.

F. Failure to have the required City or Colorado licenses to perform the work described in the subcontract.

G. Failure to pay workers the proper wage and benefits or to pay suppliers or subcontractors with reasonable promptness within the last five (5) years.

H. The Subcontractor or any of its officers or employees are convicted, plead nolo contendere, enter into a formal agreement in which they admit guilt, enter a plea of guilty, or otherwise admit culpability to criminal offenses of bribery, kickbacks, collusive bidding, bid-rigging, antitrust, fraud, obstruction of justice, undue influence, theft, racketeering, extortion or any offense of a similar nature in connection with the Subcontractor's business.

Before the CEO approves any such subcontractor, the Contractor shall submit to the CEO a statement signed by an officer or principal of the Contractor certifying that the Contractor has investigated the qualifications and background of its proposed subcontractors and identifying the existence of any of the problems listed above or certifying that to the best of his/her knowledge the problems listed do not exist.

7.04 NO CONTRACTUAL RELATIONSHIP

The City does not intend that this Section 7, or any other provision of this Contract, be interpreted as creating any contractual relationship between the City and any subcontractor. The City does not intend that its approval of a subcontractor will create in that subcontractor a right to any subcontract. The City's approval of a subcontractor does not relieve the Contractor of its responsibilities to the City for the work to be performed by the subcontractor.

7.05 DIVERSITY AND INCLUSIVENESS

The City encourages the use of qualified small business concerns doing business within the metropolitan area that are owned and controlled by, economically or socially disadvantaged individuals.

The Contractor is encouraged, with respect to the goods or services to be provided under this Contract, to use a process that includes small business concerns, when considering and selecting any subcontractors or suppliers.

7.06 SMALL BUSINESS ENTERPRISES

Contractor is subject to City's ordinance, DRMC Chapter 28, Article III (MBE/WBE Ordinance) which prohibits discrimination in the awarding of contracts and subcontracts and directs the DSBO Director to establish goals for MBE and WBE participation in the preconstruction and construction of City-owned facilities. The goal for this Agreement is 0%. Project goals must be met with certified MBE and WBE participants or by demonstrating good faith efforts under the MBE/WBE Ordinance. The Contractor must comply with the terms and conditions of the MBE/WBE Ordinance in soliciting and contracting with its sub-contractors and sub-contractors in administering the performance of the work hereunder. It shall be an ongoing, affirmative obligation of the Contractor to maintain, at a minimum, compliance with the originally achieved level of MBE/WBE participation upon which this Agreement was awarded 0%, for the duration of this Agreement, unless City initiates a material alteration to the Scope of Work.

7.07 CITYS NON-DISCRIMATION POLICY

In connection with the performance of Services under this Agreement, Contractor agrees not to refuse to hire, discharge, promote, demote, or to discriminate in matters of compensation against any person otherwise qualified solely because of race, creed, color, religion, national origin, gender, gender variance, age, military status, sexual orientation, gender variance, marital status, and/or physical and mental disability. Contractor further agrees to insert the foregoing provision in all subcontracts hereunder

SECTION 8– WAGES AND SALARIES

8.01 PAYMENT OF PREVAILING WAGES

A. Pursuant to Section 20-76 of the Denver Revised Municipal Code, the Contractor and each of its subcontractors shall pay every worker, laborer or mechanic employed by it directly upon the site of the work under this Contract the full amounts accrued at the time of payment, computed at wage rates not less than those shown on the current prevailing wage rate schedule for each class of employees performing work for the Contractor and its subcontractors under this Agreement. The wages shall be those prevailing as of the date of this Contract, and the Contractor shall post in a prominent and easily accessible place in its work area at the Airport, a copy of the wage rates for the positions or positions to which the prevailing wage ordinance applies. All construction workers, mechanics and other laborers shall be paid at least once per week; non-construction workers such as janitorial or custodial workers shall be paid at least twice per month.

B. The Contractor shall furnish to the City Auditor or his authorized representative, each week during which work is performed under this Contract, a true and correct copy of the payroll records of all workers employed to perform the work, to whom the prevailing wage ordinance applies. All such payroll records shall include information showing the number of hours worked by each worker, the hourly pay of such worker, any deductions made from pay, and the net amount of pay received by such worker for the period covered by the payroll. The payroll record shall be accompanied by a sworn statement of the Contractor that the copy is a true and correct copy of the payroll records of all workers performing such work, either for the Contractor or a subcontractor, that payments were made to the workers as set forth in the payroll records, that no deductions were made other than those set forth in such records, and that all workers were paid the prevailing wages as set forth in this Contract.

C. If the term of this Contract extends for more than one year, the minimum City prevailing wage rates that contractors and subcontractors shall pay during any subsequent yearly period or portion thereof shall be the wage rates in effect on the yearly anniversary date of this Contract which begins such subsequent period. Decreases in prevailing wages subsequent to the date of this Contract shall not be effective except on the yearly anniversary date of this Contract. In no event shall any increases in prevailing wages after the first anniversary of this Contract result in any increased liability on the part of the City and the possibility and risk of any such increase is assumed by the Contractor.

D. If the Contractor or any subcontractor fails to pay such wages as required herein, the City Auditor shall not approve any warrant or demand for payment to the Contractor until the Contractor furnishes to the Auditor evidence satisfactory to the Auditor that such wages so required by this Contract have been paid. The Contractor may utilize

the procedures set out in D.R.M.C. §20-76(d)(4) to satisfy the requirements of this provision.

E. If any worker to whom the prevailing wages are to be paid, employed by the Contractor or any subcontractor to perform work hereunder, has not been or is not being paid a rate of wages required by this Section 8, the CEO may by written notice to the Contractor, suspend by a stop-work order or terminate the Contractor's services hereunder, or the part of such services performed by such workers. The issuance of a stop-work order shall not relieve the Contractor or its sureties of any obligations or liabilities to the City under this Contract, including liability to the City for any extra costs incurred by it in obtaining substitute services for Airport facilities while any such stop-work order is in effect or following termination for such cause.

F. Payment of "Fringe Benefits" as determined by the Career Service Board's current prevailing wage schedule is required except when the vendor attaches to his/her proposal a Conversion Fringe Benefit Schedule approved by the Career Service Authority as applicable to this contract only, and in which event, the vendor and all subcontractors hereunder as a part of this contract shall be required to pay to the workers, mechanics, and laborers affected, the approved conversion in lieu of the "Fringe Benefits" set forth in the Prevailing Wage Schedule.

SECTION 9 – CONRACT ADMINISTRATION; CONTRACT DOCUMENTS

9.01 AUTHORITY OF THE AGTS ADMINISTRATOR

A. The day to day administration of this Contract is vested in the Airport's AGTS Administrator. The AGTS Administrator or other City representative is to have free access to the Contractor's work areas at the Airport. The AGTS Administrator or other City representative shall have the right to inspect facilities and equipment to ensure compliance with the Contract. The AGTS Administrator will decide any and all questions which may arise as to the quality and acceptability of supplies and equipment furnished and work performed, and as to the manner of performance and rate of progress of the work.

B. The AGTS Administrator may make changes in the specifications of work performed by the Contractor, if such changes do not alter the general nature of the work being performed. Notice to the Contractor of such changes will be made orally if the duration of such changes is less than one week; otherwise, notice will be given in writing.

9.02 CONTRACTOR'S UNSATISFACTORY PERFORMANCE

If, in the opinion of the CEO, the Contractor's performance under this Contract becomes unsatisfactory, the City shall notify the Contractor in writing, specifying the instances of unsatisfactory performance. The Contractor will have three (3) days from the time of such notice to commence correction any specific instances of unsatisfactory performance, unless such corrections have an impact on the safety or operation of the AGTS System. In the event the unsatisfactory performance is not corrected within a reasonable time after commencement at specified above, the City shall have the immediate right at the Contractor's sole expense to complete the work to its satisfaction and the City shall deduct the cost to cover same from any balances due or to become due the Contractor.

9.03 DISPUTE RESOLUTION

Disputes arising out of this Agreement shall be resolved by administrative hearing before the CEO following the procedures outlined in Denver Revised Municipal Code Section 5-17. It is further agreed that no cause of action shall be brought against the City until there has been full compliance with the terms of this Section.

9.04 CONTRACT DOCUMENTS; ORDER OF PRECEDENCE

This Contract consists of Sections 1 through 11, which precede the signature page, and the following appendixes and exhibits, which are incorporated herein and made a part hereof by reference:

In the event of an irreconcilable conflict between (i) a provision of Sections 1 through 11 and any of the listed appendixes and exhibits or (ii) between provisions of any appendix or exhibit, such that it is impossible to give effect to both, the order of precedence to determine which document shall control to resolve such conflict, is as follows, in descending order:

Sections 1 through 11 then:

Exhibit A	Pricing
Exhibit C	Special Provisions
Exhibit D	Technical Specifications for AGTS Vehicles
Exhibit E	Project Management Provisions
Exhibit F	Project Schedule
Exhibit G	Payment Milestone Schedule
Exhibit H	Certificate of Substantial Completion – AGTS Vehicles
Exhibit I	Certificate of Final Completion
Exhibit J	Standard Federal Assurances
Exhibit M	Insurance Certificate
Exhibit P	Form of Letter of Credit/Payment and Performance Bond

SECTION 10 – DEFAULT; REMEDIES; TERMINATION

10.01 TERMINATION

This Contract may be terminated in accordance with the following conditions:

A. Termination upon Final Completion. Except for the Warranty provision hereof, this Contract shall terminate when a Certificate of Final Completion has been issued to the Contractor by the City for the all of the AGTS Vehicles, and the City has paid to the Contractor all of the amounts due to the Contractor and properly invoiced in accordance with this Contract.

B. Termination for Default. The City may terminate this Contract for default. The following events shall be considered defaults under this Contract:

1. The Contractor fails to commence work, within the stipulated time, upon receipt of applicable Notice(s) to Proceed, following the delivery of this Contract by the City.

2. The Contractor fails to maintain satisfactory progress of any of the work hereunder and it is determined that the Contractor will be unable to complete the work within the time permitted by the terms of this Contract.

The City shall notify the Contractor in writing describing the event of default in writing. The Contractor shall respond, in writing, within five days after such notice, with a specific plan by which the Contractor will remedy the cited default by a date no later than 30 days after the City's notice, at no additional cost to the City. Should the Contractor fail to respond to such notice, or if the Contractor's plan is not deemed feasible or otherwise acceptable to the City, or if the Contractor fails to cure the cited default within 30 days after the City's notice, then the City may terminate this Contract for default.

C. Procedures Following Termination for Default. If this Contract shall be terminated for default by the City, the Contractor shall upon receipt of notice of termination, terminate its work under this Contract in an economical and orderly manner. The City shall pay the Contractor for the portion of the work hereunder satisfactorily performed by the Contractor prior to termination, and for materials and completed items delivered by the Contractor prior to termination which meet all requirements of this Contract.

D. Termination for Convenience. The City may terminate this Contract for convenience on thirty (30) days written notice to the Contractor.

E. Procedures Following Termination for Convenience. If this Contract shall be terminated for convenience by the City, the Contractor shall upon receipt of such notice of termination, take all necessary actions so that it shall have, within thirty days after receipt of notice of termination, terminated its work under this Contract in an economical and orderly manner. The Contractor shall not at any time after receipt of such notice of termination purchase additional materials or incur avoidable costs in pursuit of its work hereunder. The City shall pay the Contractor for the portion of the work hereunder satisfactorily performed by the Contractor prior to termination, and for materials and completed items delivered by the Contractor prior to termination which meet all requirements of this Contract. In addition, the City shall reimburse the Contractor for its reasonable actual demobilization costs incurred on account of the City's termination of this Contract for convenience.

10.02 DEFAULT

Termination for Default. The City may terminate this Contract for default. The following events shall be considered defaults under this Contract, provided the applicable cure period or, if the Contract is silent with respect to given a cure period, a reasonable cure period has lapsed:

A. The Contractor fails to commence work upon receipt of applicable Notice(s) to Proceed, following the delivery of this Contract by the City.

B. The Contractor fails to maintain satisfactory progress of any of the work hereunder and it is determined that the Contractor will be unable to complete the work within the time permitted by the terms of this Contract.

C. In the opinion of the CEO, the Contractor fails to perform adequately the services required in the contract.

D. In the opinion of the CEO the Contractor fails to perform the required work within the time stipulated in the contract.

E. In the opinion of the CEO, the Contractor provides material that does not meet the requirements of the Contractual Agreement.

F. In the opinion of the CEO, the Contractor attempts to impose on the City and County of Denver materials, products, service or workmanship which is of an unacceptable quality.

G. In the opinion of the CEO, the Contractor fails to make progress in the performance of the requirements of the contract and/or gives the City and County of Denver a positive indication that the Contractor will not or cannot perform to the requirements of the Contractual Agreement.

H. The Contractor is in default under any other contract, purchase order or agreement with the City.

I. The Contractor becomes insolvent, or takes the benefit of any present or future insolvency or bankruptcy statute, or makes a general assignment for the benefit of creditors, or consents to the appointment of a receiver, trustee or liquidator of any or substantially all of its property.

J. The Contractor transfers its interest under this Contract, without the prior written approval of the City, by reason of death, operation of law, assignment, sublease or otherwise, to any other person, entity or corporation.

K. The Contractor gives its permission to any person to use for any illegal purpose any portion of the Airport made available to Contractor for its use under this Agreement.

L. The Contractor fails to comply with any of the provisions of this Contract concerning Airport security.

M. The Contractor or any of its officers or employees are convicted, plead nolo contendere, enter into a formal agreement in which they admit guilt, enter a plea of guilty, or otherwise admit culpability to criminal offenses of bribery, kickbacks, collusive bidding, bid-rigging, antitrust, fraud, obstruction of justice, undue influence, theft, racketeering, extortion, or any offense of a similar nature, in connection with Contractor's business.

N. The Contractor fails to keep, perform and observe any other promise, covenant or agreement set forth in this Contract, and such failure continues for a period of more than 30 days after delivery by the City of a written notice from the CEO of such breach or default, except where a shorter period is specified herein, or where fulfillment of

its obligation requires activity over a period of time and Contractor within 10 days of notice commences in good faith to perform whatever may be required to correct its failure to perform and continues such performance without interruption except for causes beyond its control.

O. The City shall notify the Contractor in writing describing the event of default in writing. The Contractor shall respond, in writing, within five days after such notice, with a specific plan by which the Contractor will remedy the cited default by a date no later than 30 days after the City's notice, at no additional cost to the City. Should the Contractor fail to respond to such notice, or if the Contractor's plan is not deemed feasible or otherwise acceptable to the City, or if the Contractor fails to cure the cited default within 30 days after the City's notice, then the City may terminate this Contract for default.

10.03 REMEDIES

If Contractor commits an Event of Default, as described in Section 10.02, the City may exercise any one or more of the following remedies:

A. The City may elect to allow this Contract to continue in full force and effect and to enforce all of City's rights and remedies hereunder.

B. The City may cancel and terminate this Contract upon giving 10 days written notice to Contractor of its intention to terminate; provided, however, that if the Contractor has committed an Event of Default as defined in Subsections 10.02(H), (I), (J) or (K), termination may be effective either immediately upon notice, or within a stated period after notice, as determined by the CEO in his/her discretion.

C. Perform any test or analysis on materials as to whether they conform in all respects to the specifications of the Contractual Agreement. If the results indicate non-compliance with the specifications, any actual expense of testing will be borne by the vendor.

D. The City may obtain necessary services in the open market, or otherwise perform or obtain performance of the services covered by this Contract, at the expense of the Contractor. The City may recover any actual excess costs by: (1) deduction from an unpaid balance or (2) any other legal methods. Nothing herein shall prevent the City from using any other method of collection available to it.

10.04 REMEDIES CUMUALTIVE

The remedies provided in this Contract shall be cumulative and shall in no way affect any other remedy available to the City under law or in equity.

10.05 NON-PERFORMANCE DEDUCTIONS

The Project Schedule, Exhibit F, sets out the time for achieving substantial completion for all of the AGTS Vehicles. If any of the AGTS Vehicles are not brought to substantial completion by the Contractor in accordance with the Project Schedule, the Contractor shall pay as liquidated damages to the City the sum of $2,000.00 per AGTS Vehicle for each calendar day that the date of substantial completion for such AGTS Vehicle extends

beyond the scheduled substantial completion date. The total amount of non-performance deductions assessed under this Section, if any, shall not exceed ten percent (10%) of the Maximum Contract Amount.

SECTION 11 – GENERAL CONDITIONS

11.01 COLORADO OPEN RECORDS ACT

The Contractor acknowledges that the City is subject to the provisions of the Colorado Open Records Act, Colorado Revised Statutes §24-72-201 et seq., and all documents prepared or provided by Contractor under this Agreement may be subject to the provisions of the Colorado Open Records Act. Any other provision of this Agreement notwithstanding, including exhibits, attachments and other documents incorporated into this Agreement by reference, all materials, records and information provided by the Contractor to the City shall be considered confidential by the City only to the extent provided in the Open Records Act and the Contractor agrees that any disclosure of information by the City consistent with the provisions of the Open Records Act shall result in no liability of the City. The Contractor agrees that it will fully cooperate with the City in the event of a request for disclosure of such documents or a lawsuit arising under such act for the disclosure of any documents or information, which the Contractor asserts, is confidential and exempt from disclosure.

In the event of a request to the City for disclosure of such information, time and circumstances permitting, the City will make a good faith effort to advise the Contractor of such request in order to give the Contractor the opportunity to object to the disclosure of any of material the Contractor may consider confidential, proprietary or otherwise exempt from disclosure. In the event of the filing of a lawsuit to compel disclosure, the City will tender all such material to the court for judicial determination of the issue of disclosure and the Contractor agrees it will either intervene in such lawsuit to protect materials the Contractor does not wish disclosed, or waive any claim of privilege or confidentiality. If the Contractor chooses to intervene in such a lawsuit and oppose disclosure of any materials, the Contractor agrees to defend, indemnify, and save and hold harmless the City, its officers, agents, and employees, from any claim, damages, expense, loss or costs arising out of the Contractor's intervention including, but not limited to, prompt reimbursement to the City of all reasonable attorney fees, costs and damages that the City may incur directly or may be ordered to pay by such court.

11.02 BOND ORDINANCES; GOVERNING LAW: VENUE; SERVICE OF PROCESS

This Contract shall be deemed to have been made in, and shall be construed in accordance with the laws of, the State of Colorado and the Charter and Ordinances of the City and County of Denver. This Agreement is in all respects subject and subordinate to any and all City bond ordinances applicable to the Denver Municipal Airport System and to any other bond ordinances which amend, supplement or replace such bond ordinances. Venue for any action hereunder shall be in the City and County of Denver, State of Colorado. The Contractor agrees that any and all notices, pleadings and process may be made by serving two copies of the same upon the Colorado Secretary of State, State Capitol, Denver, Colorado, and by mailing by return mail an additional copy of the same to the Contractor at the address shown herein; that said service shall be considered as

valid personal service, and judgment may be taken if, within the time prescribed by Colorado law or Rules of Civil Procedure, appearance, pleading or answer is not made.

11.03 NO DISCRIMINATION IN EMPLOYMENT

In connection with the performance of work under this contract, the Contractor agrees not to refuse to hire, nor to discharge, promote or demote, nor to discriminate in matters of compensation against any person otherwise qualified, solely because of race, color, religion, national origin, gender, age, military status, sexual orientation, marital status or physical or mental disability; and the Contractor further agrees to insert the foregoing provision in all subcontracts hereunder.

11.04 ASSIGNMENT OF CONTRACT

The Contractor may not assign or otherwise transfer any of its rights or obligations under this Contract, except to another entity if such entity is whole owned, directly or indirectly by the Contractor's ultimate parent company, without the prior written approval of the CEO. If the Contractor attempts to assign or transfer any of its rights or obligations hereunder without obtaining the prior written consent of the CEO, the CEO may elect to terminate this Contract. The CEO has the sole and absolute discretion to grant or deny any transfer or assignment request.

11.05 NONEXCLUSIVE CONTRACT

The parties agree this contract is non-exclusive and the City reserves the right to purchase the same services and materials through other procurements. The City also reserves the right to purchase from other sources those items which are required on an emergency basis and cannot be supplied immediately from stock by the vendor.

11.06 COOPERATION WITH OTHERS

The Technical Specifications describe the constraints on the physical work site areas at DEN. These descriptions are not exhaustive and the Contractor is required to coordinate its activities and work as may be required to meet TSA, FAA or City requirements while performing work on the Airport.

11.07 NO THIRD-PARTY BENEFICIARIES

This Contract does not, and shall not be deemed or construed to confer upon or grant to any third party or parties any right to claim damages or to bring any suit, action or other proceeding against either the City or the Contractor because of any breach hereof or because of any of the terms, covenants, agreements and conditions herein contained. Any person other than the City or the Contractor receiving any benefit hereunder shall be deemed to be an incidental beneficiary only.

11.08 RISK OF LOSS

Contractor agrees to bear all risk of loss, injury, or destruction of goods and materials ordered as a result of this Proposal which occur prior to delivery to the City and County of

Denver; and such loss, injury or destruction shall not release Contractor from any obligation hereunder.

11.09 PATENTS AND TRADEMARKS

A. The Contractor covenants that it is the owner of or fully authorized to use any and all services, processes, machines, articles, marks, names or slogans to be used by it in its operations under or in any way connected with this Contract. The Contractor agrees to save and hold the City, its officers, employees, agents and representatives free and harmless of and from any loss, liability, expenses, cost, suit or claim for damages in connection with any actual or alleged infringement of any patent, trademark or copyright arising from any alleged or actual unfair competition or other similar claim arising out of the operations of the Contractor under or in any way connected with this Contract.

B. The Contractor agrees that it will not engage in or allow its employees, subcontractors or agents to engage in, any unauthorized use or infringement of any trademark or copyright. The Contractor agrees to save and hold the City free and harmless of and from any loss, liability, expenses, cost, suit or claim for damages in connection with any infringement by the Contractor or its officers, employees, subcontractors, agents or representatives, of any trademarks or copyrights, arising out of the operations of the Contractor under or in any way connected with this Contract.

11.10 MASTER PLAN

No liability shall attach to the City, its officers, agents and employees by reason of any efforts or action toward implementation of any present or future master plan for the development or expansion of DEN and the Contractor waives any right to claim damages or other consideration arising therefrom.

11.11 STATUS OF CONTRACTOR AS INDEPENDENT CONTRACTOR; CITY DOES NOT FURNISH UNEMPLOYMENT OR WORKERS COMPENSATION COVERAGE

A. It is understood and agreed by and between the parties that the status of the Contractor shall be that of an independent contractor retained on a contractual basis to perform professional or technical services for limited periods of time as described in Section 9.1.1.E(x) of the Charter of the City, and it is not intended nor shall it be construed that the Contractor, its employees, or its subcontractors are employees or officers of the City under Chapter 18 of the Revised Municipal Code or for any purpose whatsoever.

B. Without limiting the foregoing, the parties hereby specifically acknowledge that the Contractor is not entitled to unemployment insurance benefits unless the unemployment compensation coverage is provided by the Contractor or some other entity besides the City, that the Contractor is not entitled to worker's compensation benefits from the City, and that the Contractor is obligated to pay federal and state income tax on moneys earned pursuant to this Agreement. The parties further acknowledge that the provisions of this paragraph are consistent with the Contractor's insurance obligations which are set forth in this Agreement.

11.12 NO WAIVER OF RIGHTS

No assent, expressed or implied, to any breach of any one or more of the covenants, provisions and agreements of this Contract shall be deemed or taken to be by the City a waiver of any succeeding or other breach. Payment by the City, and its acceptance by the Contractor shall not be construed to be a waiver of any breach which may then exist on the part of the Contractor.

11.13 NOTICES

Notices concerning termination of this Contract, notices of default, notices of violations of the terms or conditions of this Contract, and other notices of similar importance shall be made:

by Contractor to:

Chief Executive Officer
City and County of Denver Department of Aviation
Airport Office Building, 9th Floor
Denver International Airport
8500 Peña Boulevard
Denver, CO 80249

by City to: Bombardier
1501 Lebanon Church Road
Pittsburgh, PA 15236-1491
Attn: Jason Aguirre

Either party hereto may designate in writing from time to time the address of substitute or supplementary persons within the State of Colorado to receive such notices.

11.14 FEDERAL PROVISIONS

This contract is subject and subordinate to the terms, reservations, restrictions and conditions of any existing or future agreements between the City and the United States, the execution of which has been or may be required as a condition precedent to the transfer of federal rights or property to the City for airport purposes, and the expenditure of federal funds for the extension, expansion or development of Denver International Airport. The provisions of the attached Appendices are incorporated herein by reference.

11.15 USE, POSSESSION OR SALE OF ALCOHOL OR DRUGS

The Contractor and Contractor's agents shall cooperate and comply with the provisions of the City and County of Denver Executive Order No. 94 and Exhibit A thereto concerning the use, possession or sale of alcohol or drugs. Violation of these provisions or refusal to cooperate with implementation of the policy can result in the City's barring the Contractor and Contractor's agents from City facilities or participating in City operations.

11.16 CITY SMOKING POLICY

Contractor acknowledges that smoking is not permitted in Airport buildings and facilities except for designated Airport Smoking Concessions, and so agrees that it will prohibit

smoking by its employees and the public in indoor areas and within 15 feet of entryways of the Airport Premises, except as may otherwise be permitted by the Colorado Clean Indoor Air Act, C.R.S. §§ 25-14-201 to 209. Contractor and its officers, agents, and employees shall cooperate and comply with the provisions of the Denver Revised Municipal Code, §§ 24-301 to 317 et. seq., the Colorado Clean Indoor Air Act, C.R.S. §§ 25-14-201 to 209, City's Executive Order No. 99 dated December 1, 1993, and Executive Order No. 13 dated July 31, 2002.

11.17 SOLICITING

No soliciting for any purpose is allowed on Airport premises by the Contractor's employees. The Contractor shall inform its employees of this Agreement requirement prior to the time each such employee shall begin work for the Contractor at Denver International Airport.

11.18 GRATUITIES

Neither the Contractor nor its employees, officers and agents shall solicit or accept gratuities for any reason whatsoever from any employee of the City or the General Public.

11.19 ADVERTISING AND PUBLIC DISCLOSURES

The Contractor shall not include any reference to this Agreement or to work performed hereunder in any of its advertising or public relations materials without first obtaining the written approval of the CEO, which will not be unreasonably withheld. Nothing herein, however, shall preclude the transmittal of any information to officials of the City, including without limitation, the Mayor, the CEO, member or members of City Council, or the Auditor.

11.20 CERTIFIABLY GREEN DENVER PROGRAMS AND INITIATIVES

Contractor shall, when applicable and practicable, follow standards and recommendations of the United States Environmental Protection Agency EPP program, the Green Seal organization, and standards and practices specified by the U.S. Green Building Council, including the Leadership in Energy and Environmental Design (LEED) program. Contractor shall fully implement all appropriate LEED-EB principals to minimize negative economic, environmental, and public health impacts of its operations and maintenance. Services must meet any directly applicable LEED-EB standards, and otherwise help the City realize the goals of the City's Certifiably Green Denver programs and initiatives.

11.21 TIME IS OF THE ESSENCE

In the performance of this contract by the Contractor, time is of the essence.

11.22 CONFLICT OF INTEREST

The Contractor represents and warrants that it is under no obligation or restriction, nor will the Contractor assume any obligation, which would in any way interfere with or be inconsistent with the services to be furnished by the Contractor under this Contract.

11.23 NO CONSTRUCTION AGAINST DRAFTING PARTY

This Contract is the result of negotiations between the City and Contractor and each of the Parties acknowledge that they and their respective counsel have had an opportunity to review and revise this Contract. Therefore, the Parties agree that any ambiguity in this agreement shall not be construed against any Party merely because this Contract or any of its provisions were prepared by a particular Party.

11.24 SEVERABILITY

If any of the provisions of this Contract are held to be unenforceable or invalid by any court of competent jurisdiction, the remaining provisions herein which are severable shall not be affected.

11.25 COMPLIANCE WITH ALL LAWS AND REGULATIONS

The Contractor shall comply with all local, state and federal laws, rules, codes and regulations which are applicable to the work to be performed under this Contract, including manufacture of OS Equipment and AGTS Vehicles, and their delivery to and installation at DIA.

11.26 BOND ORDINANCES

This Contract and the City's obligations herein are in all respects subject and subordinate to any and all City bond ordinances applicable to the Denver Municipal Airport System, and to any other bond ordinances which amend, supplement or replace such bond ordinances.

11.27 NO THIRD-PARTY BENEFICIARIES

The enforcement of the terms and conditions of this Contract and all rights of actions relating to such enforcement, shall be strictly reserved to the City and the Contractor, and nothing contained in this Contract shall give or allow any such claim or right of by any other third person on this Contract.

11.28 GOVERNING LAW

This Contract shall be deemed to have been made in, and shall be construed and interpreted in accordance with the laws of the State of Colorado.

11.29 FORCE MAJEURE

Neither party to this Contract shall be liable to the other party for any failure, delay or interruption of the performance of its obligations, hereunder due to causes or conditions beyond that party's control, including, without limitation, acts of God, explosions, fire and accidents. For the purposes hereof, strikes, lockouts and labor disputes involving the Contractor's employees or subcontractors shall not be considered to be causes or conditions beyond the control of the Contractor, and will not relieve the Contractor of liability caused by any failure, delay or interruption in its performance under this Contract.

11.30 HEADINGS

The headings contained in this Contract are for reference purposes only and shall in no way affect the meaning or interpretation of this Contract.

11.31 ENTIRE CONTRACT

The parties acknowledge and agree that the provisions contained herein constitute the entire agreement between the parties as to the subject matter hereof, and that all representations made by any officer, agent or employee of the respective parties unless included herein are null and void and of no effect. No alterations, amendments, changes or modifications to this Contract, except those which are expressly reserved herein to the CEO, shall be valid unless they are contained in an instrument which is executed by all the parties with the same formality as this Contract.

11.32 ELECTRONIC SIGNATURES AND ELECTRONIC RECORDS:

Contractor consents to the use of electronic signatures by the City. The Agreement, and any other documents requiring a signature hereunder, may be signed electronically by the City in the manner specified by the City. The Parties agree not to deny the legal effect or enforceability of the Agreement solely because it is in electronic form or because an electronic record was used in its formation. The Parties agree not to object to the admissibility of the Agreement in the form of an electronic record, or a paper copy of an electronic document, or a paper copy of a document bearing an electronic signature, on the ground that it is an electronic record or electronic signature or that it is not in its original form or is not an original.

11.33 CITY EXECUTION OF CONTRACT

This Contract is expressly subject to, and shall not become effective or binding on the City, until it is fully executed by all signatories of the City and County of Denver.

END OF PAGE

Contract Control Number: PLANE-201841190-00

Contractor Name: BOMBARDIER TRANSPORTATION (HOLDINGS) USA INC

By: Jennifer A. Callery

Name: JENNIFER A. CALLERY
(please print)

Title: Vice President
(please print)

BOMBARDIER TRANSPORTATION HOLDINGS (USA) INC. CORPORATE SEAL 1988 DELAWARE

ATTEST: [if required]

By: Johnetta Falk

Name: Johnetta Falk
(please print)

Title: Secretary
(please print)

EXHIBIT P

Bond No. PB11526700009

CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION

PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned Bombardier Transportation (Holdings) USA Inc., a corporation organized and existing under and by virtue of the laws of the State of Delaware, hereafter referred to as the "Contractor", and Philadelphia Indemnity Insurance Company, a corporation organized and existing under and by virtue of the laws of the Commonwealth of Pennsylvania, and authorized to transact business in the State of Colorado, as Surety, are held and firmly bound unto the CITY AND COUNTY OF DENVER, a municipal corporation of the State of Colorado, hereafter referred to as the "City", in the penal sum of **ONE MILLION FIVE-HUNDRED THOUSAND DOLLARS AND NO CENTS ($1,500,000.00)**, lawful money of the United States of America, for the payment of which sum, well and truly to be made, we bind ourselves and our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents;

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT:

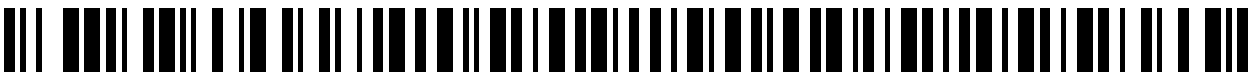
WHEREAS, the above bounden Contractor has entered into a written contract with the City for furnishing all labor and tools, supplies, equipment, superintendence, materials and everything necessary for and required to do, perform and complete **CONTRACT NO. 201841190,** Denver, Colorado, and has bound itself to complete the project within the time or times specified or pay liquidated damages, all as designated, defined and described in the said Contract and Conditions thereof, and in accordance with the Plans and Technical Specifications therefore, a copy of said Contract being made a part hereof;

NOW, THEREFORE, if the said Contractor shall and will, in all particulars well and truly and faithfully observe, perform and abide by each and every Covenant, Condition and part of said Contract, and the Conditions, Technical Specifications, Plans, and other Contract Documents thereto attached, or by reference made a part thereof and any alterations in and additions thereto, according to the true intent and meaning in such case, then this obligation shall be and become null and void; otherwise, it shall remain in full force and effect;

PROVIDED FURTHER, that if the said Contractor shall satisfy all claims and demands incurred by the Contractor in the performance of said Contract, and shall fully indemnify and save harmless the City from all damages (liquidated or actual, including, but not limited to, damages caused by delays in the performance of the Contract), claims, demands, expense and charge of every kind (including claims of patent infringement) arising from any act, omission, or neglect of said Contractor, its agents, or employees with relation to said work; and shall fully reimburse and repay to the City all costs, damages, losses and expenses which it may incur in making good any breach or default based upon the failure of the Contractor to fulfill its obligation to furnish maintenance, repairs, services, or replacements for the full guarantee period provided in the Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect;

PROVIDED FURTHER, that if said Contractor shall at all times promptly make payments of all amounts lawfully due to all persons supplying or furnishing it or its subcontractors with labor and materials, rental machinery, tools or equipment used or performed in the prosecution of work provided for in the above Contract and that if the Contractor will indemnify and save harmless the City for the extent of any and all payments in connection with the carrying out of such Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect;

PROVIDED FURTHER, that if the said Contractor fails to duly pay for any labor, materials, team hire, sustenance, provisions, provender, gasoline, lubricating oils, fuel oils, grease, coal, or any other supplies or materials used or consumed by said Contractor or its subcontractors in performance of the work contracted to be done, or fails to pay any person who supplies rental machinery, tools or equipment, all amounts due as the result of the use of such machinery, tools or equipment in the prosecution of the work, the Surety will pay the same in any amount not exceeding the amount of this obligation, together with interest as provided by law;



PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to contracts with others in connection with this project, or the work to be performed thereunder, or the Technical Specifications and Plans accompanying the same, shall in any way affect its obligation on this bond and it does hereby waive notice of any change, extension of time, alteration or addition to the terms of the Contract, or contracts, or to the work, or to the Technical Specifications and Plans.

IN WITNESS WHEREOF, said Contractor and said Surety have executed these presents as of this 13th day of June, 2018

Attest:

Secretary

Bombardier Transportation (Holdings) USA Inc.
Contractor

By: _____
Vice President

Bombardier Transportation (Holdings) USA Inc.
Contractor

By: _____

Philadelphia Indemnity Insurance Company
Surety

By: _____
Joyce M. Houghton, Attorney-In-Fact

(Accompany this bond with Attorney-in-Fact's authority from the Surety to execute bond, certified to include the date of the bond).

APPROVED AS TO FORM:

KRISTIN M. BRONSON,
City Attorney for the City and County of Denver

By: _____
Assistant City Attorney

APPROVED FOR THE CITY AND COUNTY OF DENVER

By: _____
MAYOR

By: _____
CEO DEPARTMENT OF AVIATION

PHILADELPHIA INDEMNITY INSURANCE COMPANY
One Bala Plaza, Suite 100
Bala Cynwyd, PA 19004-0950

Power of Attorney

KNOW ALL PERSONS BY THESE PRESENTS: That **PHILADELPHIA INDEMNITY INSURANCE COMPANY** (the Company), a corporation organized and existing under the laws of the Commonwealth of Pennsylvania, does hereby constitute and appoint **David A. Johnson, David C. Rosenberg, Denise M. Bruno, Harry C. Rosenberg, Jonathan F. Black, Joyce M. Houghton, Julia R. Burnet, Matthew J. Rosenberg, Sherri L. Feeney, Stephanie S. Helmig and Elizabeth P. Cervini of Rosenberg & Parker, Inc.,** its true and lawful Attorney-in-fact with full authority to execute on its behalf bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, issued in the course of its business and to bind the Company thereby, in an amount not to exceed **$Unlimited**.

This Power of Attorney is granted and is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Board of Directors of PHILADELPHIA INDEMNITY INSURANCE COMPANY on the 14th of November, 2016.

RESOLVED: That the Board of Directors hereby authorizes the President or any Vice President of the Company: (1) Appoint Attorney(s) in Fact and authorize the Attorney(s) in Fact to execute on behalf of the Company bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof and to attach the seal of the Company thereto; and (2) to remove, at any time, any such Attorney-in-Fact and revoke the authority given. And, be it

FURTHER RESOLVED: That the signatures of such officers and the seal of the Company may be affixed to any such Power of Attorney or certificate relating thereto by facsimile, and any such Power of Attorney so executed and certified by facsimile signatures and facsimile seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached.

IN TESTIMONY WHEREOF, PHILADELPHIA INDEMNITY INSURANCE COMPANY HAS CAUSED THIS INSTRUMENT TO BE SIGNED AND ITS CORPORATE SEALTO BE AFFIXED BY ITS AUTHORIZED OFFICE THIS 27TH DAY OF OCTOBER, 2017.

(Seal)

Robert D. O'Leary Jr., President & CEO
Philadelphia Indemnity Insurance Company

On this 27th day of October, 2017, before me came the individual who executed the preceding instrument, to me personally known, and being by me duly sworn said that he is the therein described and authorized officer of the **PHILADELPHIA INDEMNITY INSURANCE COMPANY**; that the seal affixed to said instrument is the Corporate seal of said Company; that the said Corporate Seal and his signature were duly affixed.

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Morgan Knapp, Notary Public
Lower Merion Twp., Montgomery County
My Commission Expires Sept. 25, 2021
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

(Notary Seal)

Notary Public: Morgan Knapp

residing at: Bala Cynwyd, PA

My commission expires: September 25, 2021

I, Edward Sayago, Corporate Secretary of PHILADELPHIA INDEMNITY INSURANCE COMPANY, do hereby certify that the foregoing resolution of the Board of Directors and this Power of Attorney issued pursuant thereto on this 27th day of October, 2017 are true and correct and are still in full force and effect. I do further certify that Robert D. O'Leary Jr., who executed the Power of Attorney as President, was on the date of execution of the attached Power of Attorney the duly elected President of PHILADELPHIA INDEMNITY INSURANCE COMPANY,

In Testimony Whereof I have subscribed my name and affixed the facsimile seal of each Company this 13TH day of June, 20 16

Edward Sayago, Corporate Secretary
PHILADELPHIA INDEMNITY INSURANCE COMPANY

PHILADELPHIA INDEMNITY INSURANCE COMPANY

Statutory Statements of Admitted Assets, Liabilities and Capital and Surplus
(in thousands, except par value and share amounts)

Admitted Assets	As of December 31, 2017	2016
Bonds (fair value $6,911,411 and $6,366,973)	$ 6,708,174	$ 6,256,540
Preferred stocks (fair value $50,134 and $61,596)	48,537	60,425
Common stocks (cost $31,965 and $73,723)	33,817	71,273
Mortgage loans	400,590	358,530
Real estate	3,294	3,518
Other invested assets (cost $234,382 and $210,393)	240,475	216,318
Receivables for securities	399	2,527
Cash, cash equivalents and short-term investments	140,468	44,778
Cash and invested assets	7,575,754	7,013,909
Premiums receivable, agents' balances and other receivables	831,770	781,505
Reinsurance receivable on paid losses	33,955	23,669
Accrued investment income	86,998	77,957
Receivable from affiliates	6,611	5,883
Federal income taxes receivable	4,869	-
Net deferred tax asset	113,125	177,984
Other assets	89	93
Total admitted assets	$ 8,653,171	$ 8,081,000
Liabilities and Capital and Surplus		
Liabilities:		
Net unpaid losses and loss adjustment expenses	$ 4,263,696	$ 3,856,578
Net unearned premiums	1,533,201	1,449,732
Reinsurance payable on paid loss and loss adjustment expenses	23,933	13,357
Ceded reinsurance premiums payable	80,592	72,331
Commissions payable, contingent commissions and other similar charges	225,361	249,225
Federal income taxes payable	-	13,273
Accrued expenses and other liabilities	117,799	92,865
Payable to affiliates	10,761	12,467
Provision for reinsurance	1	642
Payable for purchased securities	81,458	49,033
Total liabilities	$ 6,336,802	$ 5,809,503
Capital:		
Common stock, par value of $10 per share; 1,000,000 shares authorized, 450,000 shares issued and outstanding	4,500	4,500
Surplus:		
Gross paid-in and contributed surplus	386,071	386,071
Unassigned surplus	1,925,798	1,880,926
Total surplus	2,311,869	2,266,997
Total capital and surplus	2,316,369	2,271,497
Total liabilities and capital and surplus	$ 8,653,171	$ 8,081,000

The undersigned, being duly sworn, says: That she is the Executive Vice President and Chief Financial Officer of Philadelphia Indemnity Insurance Company; that said Company is a corporation duly organized in the state of Pennsylvania, and licensed and engaged in the State of Pennsylvania and has duly complied with all the requirements of the laws of the said State applicable of the said Company and is duly qualified to act as Surety under such laws; that said Company has also complied with and is duly qualified to act as Surety under the Act of Congress. And that to the best of her knowledge and belief the above statement is a full, true and correct statement of

Attest:

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Kimberly A. Kessleski, Notary Public
Lower Merion Twp., Montgomery County
My Commission Expires Dec. 18, 2020

Karen Gilmer-Pauciello, EVP & CFO

PHILADELPHIA
INSURANCE COMPANIES

A Member of the Tokio Marine Group

PERFORMANCE AND PAYMENT BOND
SURETY AUTHORIZATION

FAX NUMBER: 303-342-2552
TELEPHONE NUMBER: 303-342-2540

Assistant City Attorney
Airport Office Building
8500 Pena Blvd. #9810
Denver, CO 80249-6340

RE: Bombardier Transportation (Holdings) USA Inc., 1501 Lebanon Church Road, Pittsburgh, PA 15236

Contract No:	201841190
Project Name:	Purchase of Model INNOVIA APM 300R Automated People Mover Vehicles for the Automated Guided TransitSystem (AGTS) at Denver International Airport
Contract Amount:	$1,500,000.00
Performance and Payment Bond No.:	PB11526700009

Dear Assistant City Attorney,

The Performance and Payment Bonds covering the above captioned project were executed by this agency, through Philadelphia Indemnity Insurance Company, on June 13, 2018.

We hereby authorize the City and County of Denver, Department of Aviation, to date all bonds and powers of attorney to coincide with the date of the contract.

If you should have any additional questions or concerns, please don't hesitate to give me a call at 610-668-9100 x110.

Thank you.

Sincerely,

Joyce M. Houghton

Joyce M. Houghton, Attorney-in-Fact

PHILADELPHIA INDEMNITY INSURANCE COMPANY
One Bala Plaza, Suite 100
Bala Cynwyd, PA 19004-0950

Power of Attorney

KNOW ALL PERSONS BY THESE PRESENTS: That **PHILADELPHIA INDEMNITY INSURANCE COMPANY** (the Company), a corporation organized and existing under the laws of the Commonwealth of Pennsylvania, does hereby constitute and appoint **David A. Johnson, David C. Rosenberg, Denise M. Bruno, Harry C. Rosenberg, Jonathan F. Black, Joyce M. Houghton, Julia R. Burnet, Matthew J. Rosenberg, Sherri L. Feeney, Stephanie S. Helmig and Elizabeth P. Cervini of Rosenberg & Parker, Inc.,** its true and lawful Attorney-in-fact with full authority to execute on its behalf bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, issued in the course of its business and to bind the Company thereby, in an amount not to exceed **$Unlimited**.

This Power of Attorney is granted and is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Board of Directors of PHILADELPHIA INDEMNITY INSURANCE COMPANY on the 14th of November, 2016.

RESOLVED: That the Board of Directors hereby authorizes the President or any Vice President of the Company: (1) Appoint Attorney(s) in Fact and authorize the Attorney(s) in Fact to execute on behalf of the Company bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof and to attach the seal of the Company thereto; and (2) to remove, at any time, any such Attorney-in-Fact and revoke the authority given. And, be it

FURTHER RESOLVED: That the signatures of such officers and the seal of the Company may be affixed to any such Power of Attorney or certificate relating thereto by facsimile, and any such Power of Attorney so executed and certified by facsimile signatures and facsimile seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached.

IN TESTIMONY WHEREOF, PHILADELPHIA INDEMNITY INSURANCE COMPANY HAS CAUSED THIS INSTRUMENT TO BE SIGNED AND ITS CORPORATE SEALTO BE AFFIXED BY ITS AUTHORIZED OFFICE THIS 27TH DAY OF OCTOBER, 2017.

(Seal)

Robert D. O'Leary Jr., President & CEO
Philadelphia Indemnity Insurance Company

On this 27th day of October, 2017, before me came the individual who executed the preceding instrument, to me personally known, and being by me duly sworn said that he is the therein described and authorized officer of the **PHILADELPHIA INDEMNITY INSURANCE COMPANY**; that the seal affixed to said instrument is the Corporate seal of said Company; that the said Corporate Seal and his signature were duly affixed.

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Morgan Knapp, Notary Public
Lower Merion Twp., Montgomery County
My Commission Expires Sept. 25, 2021
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

(Notary Seal)

Notary Public: Morgan Knapp
residing at: Bala Cynwyd, PA
My commission expires: September 25, 2021

I, Edward Sayago, Corporate Secretary of PHILADELPHIA INDEMNITY INSURANCE COMPANY, do hereby certify that the foregoing resolution of the Board of Directors and this Power of Attorney issued pursuant thereto on this 27th day of October, 2017 are true and correct and are still in full force and effect. I do further certify that Robert D. O'Leary Jr., who executed the Power of Attorney as President, was on the date of execution of the attached Power of Attorney the duly elected President of PHILADELPHIA INDEMNITY INSURANCE COMPANY,

In Testimony Whereof I have subscribed my name and affixed the facsimile seal of each Company this 13th day of June, 20 18.

Edward Sayago, Corporate Secretary
PHILADELPHIA INDEMNITY INSURANCE COMPANY

Contract Control Number:

IN WITNESS WHEREOF, the parties have set their hands and affixed their seals at Denver, Colorado as of

SEAL

CITY AND COUNTY OF DENVER

ATTEST:

By_____

_____

APPROVED AS TO FORM:

REGISTERED AND COUNTERSIGNED:

By_____

By_____

By_____

EXHIBIT A

BOMBARDIER TRANSPORTATION (HOLDINGS) USA INC.
1501 LEBANON CHURCH ROAD
PITTSBURGH, PA 15236 USA
TEL. 412-655-5700
FAX. 412-655-5260
www.bombardier.com

BOMBARDIER
the evolution of mobility

June 7, 2018

Mr. Dave LaPorte
Senior Vice President
Airport Operations
Denver International Airport

Subject: Firm Fixed Pricing for 26 *INNOVIA* APM 300R Vehicles

Dear Mr. LaPorte:

As per your request, Bombardier Transportation is pleased to present with you with firm fixed pricing for 26 *INNOVIA* APM 300R vehicles. As reflected below, you can find the unit and total price, but I have also requested my team provide a breakdown of what I envision are main elements you would like to see.

Price Schedule	Description	Amount (US$)
A	Project Management	2,202,689
B	Design	12,383,791
C	Manufacturing and Quality Assurance	9,099,144
D	Procurement	49,478,504
E	Testing and Commissioning	2,107,572
F	Contingency for Change Orders	1,428,300
Total Price		**76,700,000**
Price per Vehicle		**2,950,000**

This firm fixed offer is based on the following commercial conditions:

- Pricing is quoted in USD and is Firm and Fixed.
- Pricing assumes an NTP date of August 17, 2018.
- Pricing includes a 1-year warranty period starting from time of delivery.
- Pricing includes a Performance Bond worth $1.5 M for 54 months.
- Pricing includes shipment of goods to Denver.
- Pricing is subject to agreement on mutually acceptable terms and conditions.
- Pricing assumes that the customer is exempt from sales and use tax.
- Pricing assumes 30-day payment terms.

This firm fixed offer is based on the following scope of work:

- Procurement and Installation of 26 *INNOVIA* APM 300R vehicles.
- Systems Integration
- Manufacturing / Assembly of Equipment.
- Engineering support throughout the project.
- Manuals & Training will be provided to the customer.
- Project Management support throughout the entire project.
- Testing & Commissioning of vehicles.
- Quality Assurance support.
- Decommissioning of 16 vehicles, which includes: pulling the vehicles off the system, stripping of certain parts, removal of any hazardous material, and loading vehicles onto a trailer.

I hope the information presented here satisfies your request for a firm fixed offer. Should you have any questions regarding the information or wish to further discuss any aspect of the offer, please do not hesitate to contact me at (412) 655-5534.

Sincerely,

Jason S. Aguirre
Sales & Business Development North America
Bombardier Transportation

PROJECT MANUAL

CONTRACT NO.
201841190

Exhibit C

Special Conditions

CITY & COUNTY OF DENVER
DEPARTMENT OF AVIATION

Special Conditions
Contract No. 201841190

TABLE OF CONTENTS

SPECIAL CONDITIONS

SC-1 MANUFACTURING LOCATION

The Contractor is to manufacture the 26 cars covered by this contract at the facility to be designated in writing by Contractor prior to commencement of manufacturing.

SC-2 CONTRACTOR PERFORMANCE; SUBCONTRACTING

The contractor can subcontract no more than 10% of the Contract value.

SC-3 CONTRACTOR RESPONSIBILITY

The Contractor is responsible to provide fully functional equipment that interfaces with the DEN system. Any and all work or equipment that is required weather identified in the Technical Specifications or not will be provided by the Contractor. The Technical Specifications describe the minimum requirements. These descriptions are not exhaustive, and the Contractor is required to coordinate its activities and work as may be required to meet the DEN AGTS operating requirements, TSA, FAA or City requirements while performing work at DEN.

SC-4 PROSECUTION AND COMPLETION OF THE WORK:

The Work to be performed under the Contract is described in the Technical Specifications and Contract Documents. The Contractor shall complete the Work within 48 months from Notice to Proceed.

The Contractor will develop the contract schedule that will become part of the contract which shall be Exhibit F.

However, the following trains in service schedule shall be achieved:

Spare cars 1-2

Train #1 cars (3, 4, 5, 6) (these dates need to be identified as days after NTP)

Train #2 cars (7, 8, 9, 10)

Train #3 cars (11,12,13,14)

Train #4 cars (15,16,17,18)

Train #5 cars (19, 20, 21, 22)

Train #6 cars (23, 24, 25, 26)

SC-5 FACILITY SECURITY AND PERSONNEL ACCESS

The Contractor shall conduct all its activities at the Airport in compliance with the Airport security system rules and regulations, which are administered by the Airport Operations Division. The Contractor shall obtain the proper access authorizations for its employees, subcontractors and suppliers (i.e., Badges and Permits), and shall be responsible for such persons' compliance with all the Airport rules and regulations. A copy of the Contractors' section of the Airport Security rules and regulations are available for Contractor review at the Airport Access Services Office, Concourse A East Subcore, 4th Level. Persons regularly entering the construction areas must obtain personnel access badges from the Airport Access Services Office and must display badges, at all times, upon entering the construction, restricted and sterile areas of the airport. Any employee, subcontractor or supplier who violates such rules may be subject to revocation of his access authorization, including authorization for access to the construction site and all other restricted and sterile areas.

The security status of the Airport is subject to change without notice. These contract Special Conditions are applicable to the current security status of the Airport. Should the security status of the Airport change at any time during the term of this Contract, a written notice shall be issued to the Contractor detailing all applicable security modifications from the airport's current security status. The Contractor shall take immediate steps to comply with those security modifications as directed in the written notice.

If these security modifications involve any additional project cost, the Contractor shall submit a Contractor Change Request in accordance with the General Conditions for the additional cost. The Contractor Change Request shall outline in specific detail the effects of the security modifications on the Contractor's performance of the Contract, and shall provide a detailed cost breakdown for each item for which the Contractor is requesting reimbursement.

The Contractor shall return to the City, at contract completion or termination, or upon demand by the City, all access keys issued to it by the City to all areas of the Airport. If the Contractor fails to return any such key or keys at contract completion or termination or upon demand by the City, the Contractor shall be liable to the City for all the City's costs, including the City's labor costs for employees, incurred in re- coring doors and any other work which is required to prevent compromise of the Airport security system. In order to collect such costs hereunder, the City may withhold funds in such amount from any amounts due and payable to the Contractor under this Contract.

The construction of all the Project / Task Items that involve the breaching of any airport perimeter security boundary or continued access to restricted access rooms or areas will require the posting of authorized contract security personnel to maintain required security controls. The Contractor's Guarantee Maximum Price / Total Contract Proposal Amount / Task Order Proposal shall include the cost of providing security services to maintain control and supervision of any and all airport perimeter security boundary breaches and

for the duration of work activities where access to restricted areas is required and until the airport perimeter security boundaries are reestablished.

When security boundaries are opened for any reason, the Contractor must maintain one hundred percent (100%) control and supervision for the entire time that the openings are present to prevent unauthorized access to the secure / restricted access areas.

THE IMPORTANCE OF THIS SPECIAL CONDITION CANNOT BE OVER-EMPHASIZED.

SEVERE FINANCIAL PENALTIES AS WELL AS CONTRACT TERMINATION COULD RESULT IF AIRPORT PERIMETER SECURITY REQUIREMENTS ARE NOT STRICTLY FOLLOWED. THE REQUIREMENT TO PROVIDE ONE HUNDRED PERCENT (100%) CONTROL AND SUPERVISION OF BREACHES IN THE AIRPORT'S PERIMETER SECURITY BOUNDARY IS ABSOLUTE. AT NO TIME, DURING WORK AND NON-WORK HOURS SHALL ANY BREACHES IN THE AIRPORT'S SECURITY PERIMETER BE UNSUPERVISED AND / OR UNSECURED.

For off-hours of construction, the Contractor may choose to erect a temporary wall to close all perimeter openings. The wall construction shall be of sufficient materials and strength to prevent access to the airport's Sterile/Restricted Areas. The Contractor shall submit for review and approval, the details and materials for the temporary closure of security perimeter breaches for review and approval.

The Contractor will provide contract security guard services to maintain supervision of these openings. The security services must provide coverage to allow for lunch breaks, comfort breaks and etc. The security services must be obtained from the following contract security guard company:

HSS
900 S. Broadway, Suite 100
Denver, Colorado 80209
DEN Contact: Glenn Spies (303) 342-4323

All security guards provided for this project must have a Denver Airport SIDA Badge.

The DEN Security Guard Contractor may change between the proposal phases of this contract from Notice to Proceed to closure of all security perimeter breaches. The Contractor shall maintain a contractual relationship with the Security Guard Contractor holding the most current contract with Denver International Airport.

The Contractor shall continue to provide security of these areas until such time that the breaches in the airport's security perimeter have been permanently secured.

The Contractor shall submit a written security plan for approval to the Director of Airport Security prior to the start of construction on any work where a breach of the perimeter security boundaries is required.

SC-6 FACILITY ACCESS

The Contractor shall have access to the work site via the north DEN access gate. This access will be for all equipment and materials.

SC-7 VEHICLE PERMITTING

Vehicle access on the Airport Operation Area ("AOA") is controlled by and requires permission from the Airport Access Services Office. It is not anticipated that the Contractor will need to operate vehicles on the AOA to perform the Work other than the delivery of the finished vehicles. The on-site AGTS O&M contractor will coordinate these deliveries with DEN operations.

SC-8 COMMUNICATION DEVICES

Any site communications devices, mobile communication devices or internet data devices used at DEN must be approved by DEN Technologies.

SC-9 ATTORNEY'S FEES

Colorado Revised Statute 38-26-107 requires that in the event any person or company files a verified statement of amounts due and unpaid in connection with a claim for labor and materials supplied on this project, the City shall withhold from payments to the Contractor sufficient funds to insure the payment of any such claims. Should the City and County of Denver be made a party to any lawsuit to enforce such unpaid claims or any lawsuit arising out of or relating to such withheld funds, Contractor agrees to pay to the City its costs and a reasonable attorney's fee. Because the City Attorney Staff does not bill the City for legal services on an hourly basis, Contractor agrees a reasonable fee shall be computed at the rate of two hundred dollars per hour of City Attorney time.

SC-10 PAYMENTS TO CONTRACTORS

Contractor agrees that, to the fullest possible within the CPM System, the City shall be entitled to all non-Confidential records, reports, data, and other information related to the project that are available to Contractor through the CPM System, including, but not limited to, information related to Contractor and subcontractor billings. To that end, Contractor agrees that it will activate any available settings within the CPM System that are necessary to grant the City access to such non-Confidential information related to the contract and the project. Applications for payment shall be based on the Contract Unit Prices or the approved Schedule of Values described in the contract documents.

In accordance with the City's, PAYMENT PROCEDURE, the party(ies) responsible for review of all Pay Applications shall be:

Agency/Firm	Name	Telephone
DEN	To be assigned	303-342-XXXX

Applications for payment shall include the following:

1. The estimate of Work completed shall be based on the approved schedule of values or unit prices, as applicable, and the percent of the Work complete.
2. Each Application for Payment shall include each and every independent subcontractor's payroll information including pay dates and pay amounts.

Applications for Payment must be accompanied by completed Partial or Final Claim Release Form, as appropriate, from EACH subcontractor and supplier, AND the Contractor's Certification of Payment Form.

SC-11 DISPOSAL OF EXISTING VEHICLES AND RECYCLING

Once new 300R vehicles have been received and placed in revenue service, DEN will begin to retire cars in the existing CX-100 fleet. The contractor will assist and support DEN with the logistics involved in the Disposal of the vehicles. This is anticipated to include the coordination and on-site support with any rigging or packaging for the vehicles to be removed from site. The contractor is required to provide the rigging, packaging, and transport to a location on DEN property.

The contractor is required to comply with the City's Recycling program. this will include the following the removal of all hazardous materials from the vehicles to include as minimum: refrigerant, oils, lubricants etc. and precious metals. Technical Specification 01566 Environmental Controls will apply to this contract.

The Contractor may be permitted to collect and use any salvageable materials from the retired CX-100 fleet as spare parts under the O&M Contract executed the 6th day of December 2017.

SC-12 Vehicle Certificate of Substantial Completion

The contractor is directed to Exhibit E the Project Management Provisions of the contract. Exhibit E provided a detailed description of the substantial and final completion requirements of the contract.

Substantial completion will be granted on a car by car basis. Warranty will begin on a car by car basis and is subject to a restart if the car fails the 90-day demonstration period.

Final completion and acceptance will be on a contract basis after all cars have passed all requirements and all the requirements of the contract have been completely satisfied.

EXHIBIT D

DEN AGTS NEW CAR PROCUREMENT

NEW CAR SPECIFICATION

TECHNICAL SPECIFICATIONS

Contract No. 201841190
Denver International Airport

	DRAFT | 4 April 2018

Revisions

Revision	Date	Remark/Explanation of Changes
1	10/23/2017	LB Edits
2	10/25/2017	LG Edits per MF
3	11/14/2017	LG Edits per MF
4	12/18/2017	LG Formatting
5	1/18/2018	LG Formatting, Lists of Figures, Tables, Attachments
6	2/22/2018	Edit Required CDRL wording
7	4/17/2018	TW edits per discussions with Bombardier and DEN Staff

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1 INTRODUCTION

The vehicles covered by this specification will be APM 300R and will be a new design leveraging the concepts of the latest APM 300 cars combined with APM 100 bogies to allow operation on the Denver International Airport ("DEN") system. The new vehicles are designed to be a direct replacement for the present vehicles requiring no updates to the existing wayside infrastructure. However, additional wayside equipment may be required to support some of the more advanced features and benefits of the APM 300R product. The vehicles are designed to require no changes to the existing wayside infrastructure. They will utilize the same wheelbase, door size and spacing, and clearance envelope as the vehicles currently in service. Guidance and power collection will be the same as the existing fleet.

The vehicles will offer improvements in interior appearance, energy consumption, diagnostics, and other areas.

The vehicles will utilize an AC-AC propulsion system similar to the APM 300 vehicle technology and will be able to operate with the newly installed CITYFLO 550 control system, but shall be able to operate on any future control upgrade.

With this combination of subsystems, it is intended to combine the advantage of maintenance reduced energy saving AC-AC propulsion technology with the modern properties of the APM 300 series and make them available for the DEN APM.

2 VEHICLES

APM 300R Vehicles shall be automatically controlled and operate normally without a driver. They shall be capable of operating as single- or multiple-vehicle trains of up to six (6) vehicles. All newly supplied vehicles must be identical and operate interchangeably with each other. The new vehicles are not required to electrically couple with vehicles in the existing fleet, however, mechanical coupling is required for towing in recovery situations.

2.1 CLEARANCE ENVELOPE AND PLATFORM LENGTH

The APM 300R vehicles must fit the same clearance envelope as the existing vehicles.

2.2 VEHICLE SPACE AND WEIGHT ALLOCATIONS

Vehicle space and weight allocations for purposes of these Technical Provisions shall be:

A. 2.5 ft^2 and 160 pounds for each standing passenger.

B. 4.5 ft^2 and 160 pounds for each seated passenger. A seat space larger than 4.5 ft^2 will be permitted so long as it will accommodate only one passenger, therefore permitting a lighter seated load density to achieve a lower AW2 load.

C. For a passenger in a wheelchair: 250 pounds and 10.0 ft^2.

Vehicle weight definitions are:

A. AW0 – The weight of an empty vehicle.

B. AW1 – The weight of the vehicle loaded to normal capacity. Normal capacity shall be computed by assuming all seats are occupied with passengers, one passenger in a wheelchair, and adding one standing passenger for each 2.5 ft^2 of floor space in the vehicle available to standees.

C. AW2 – The maximum weight of the vehicle. This weight shall be computed by adding AW0, 105 pounds for each square foot of floor area available to standees, and 36 pounds for each square foot of seat, wheel well, sill, or other interior surface area on which passengers or baggage may be loaded. Any area for seating which can be removed to create additional floor space shall be loaded at 105 pounds per square foot.

D. For vehicle dimensions, see APM 300R in Attachment Drawing 1 and Attachment Drawing 2.

2.3 VEHICLE CAPACITY

The vehicle passenger capacity at AW1 shall be equal to or greater than the existing vehicles.

2.4 STRUCTURAL DESIGN

This Section defines the structural requirements for the System vehicle. Prior to vehicle fabrication a complete structural analysis of the vehicle major suspension elements and frame load paths shall be performed and documented by the Contractor.

The car body will be made from aluminum with preferably friction-stir welded extrusions, where applicable, and fiberglass end caps.

Figure 2.4-1 shows an example of a carbody model.

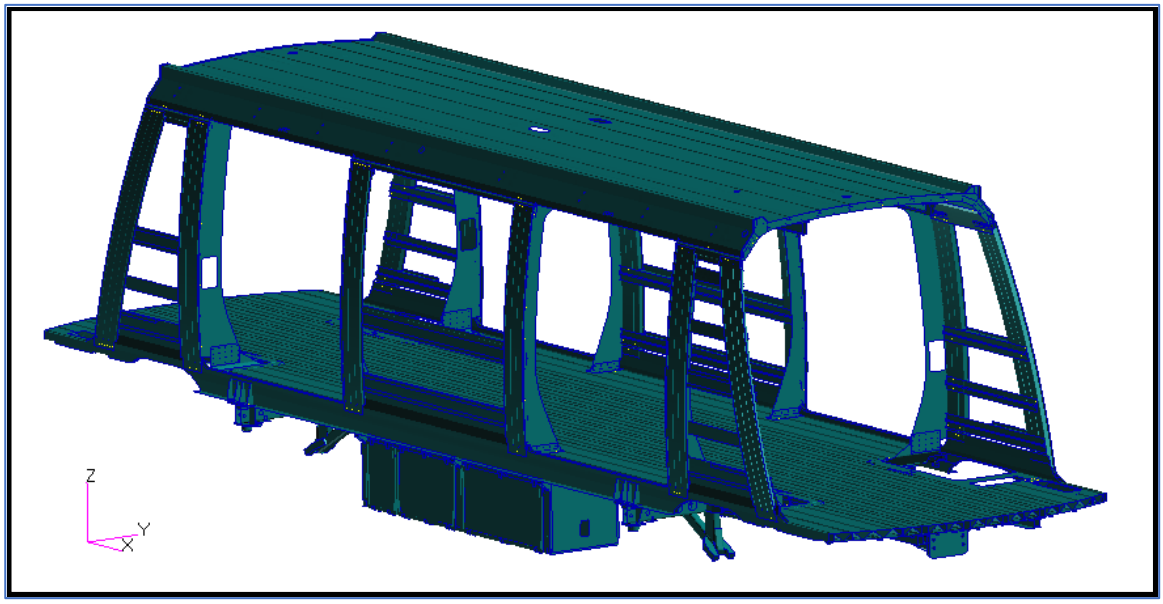


Figure 2.4-1 Car body FEA model example

2.4.1 Design Criteria

The vehicle shall sustain all of the loading conditions defined in Section 2.2 without detrimental permanent deformation or any interference with safe operation.

The structural design criteria for a modified vehicle structure shall include the following:

A. Design loads for the frame, coupler and draft gear, trucks and major steering/suspension members. There shall be defined as either working loads (normal loads expected in service) or limit loads (worst-case loads expected in service).

B. The safety factor applied to these loads. The safety factor shall be identified as being with respect to yield strength, ultimate strength, or endurance limits.

C. Additional safety factor applied to castings and welds.

D. Additional safety factor applied to any part, the failure of which could result in an unsafe condition.

E. The torsional and flexural deflection of the vehicle frame under load and the means by which these criteria are to be verified.

Any structural material used in modified vehicle structure shall not have a yield strength that exceeds eighty percent (80%) of its tensile strength, unless the design can be substantiated to have a proven record of successful use in a similar transit application.

All structural body and panels shall have resonant frequencies that are sufficiently removed from primary excitation frequencies so as to preclude resonant vibrations at all speeds and power conditions below 110 percent of maximum cruise speed.

Vehicle structural design shall comply with ASCE 21-13 Section 7.4:

2.4.1.1 Fail-safe structured design

Tipping analysis will be performed as a hand calculation (sum of moments) to verify that the drive tires remain loaded under all required scenarios. Figure 2.4-2 shows a typical example of a tipping stability free body diagram (FBD).

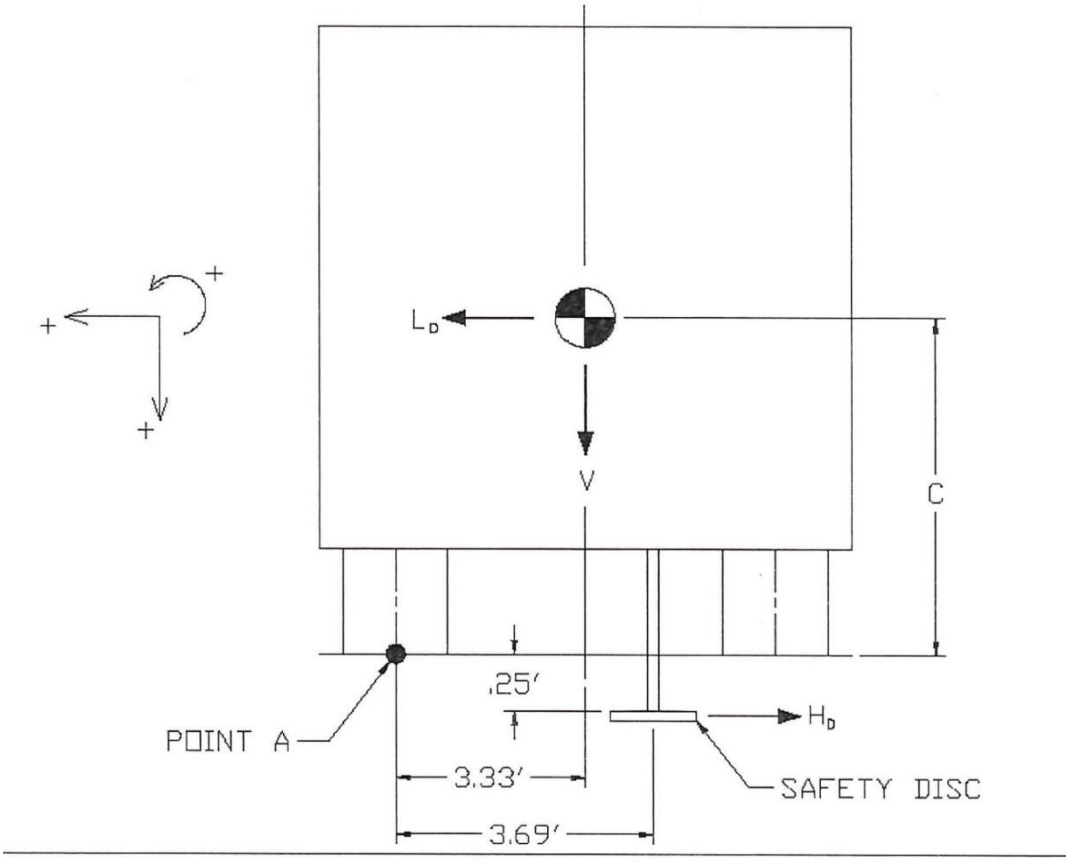


Figure 2.4-2 Typical tipping stability FBD

2.4.2 Deformation

Notwithstanding any of the foregoing, the modified vehicle structure must be shown to be capable of meeting the following additional design criteria:

A. Deformation shall comply with ASCE 21-13 Section 7.4.4.6.

B. All exposed parts of the coupler which a person can stand on shall withstand a downward vertical load of 350 pounds without damage or permanent deformation. Couplers and draft gear shall be designed so that no combination of vehicle deflections including failures to suspension components, loss of tire pressure, and guideway lateral and vertical curvature, shall cause the coupler to bind or produce stresses which will damage the couplers or the vehicles.

C. The Seats, Doors, Floor, roof and Stanchions shall withstand loading as specified in ASCE 21-13 Section 7.4.4.1.2.

2.4.3 Tipping Stability

The Contractor shall determine the location of the center of gravity (C.G.) for the vehicle at AW0 and AW2 loads. The Contractor shall analyze the tipping stability of the vehicle and document its compliance with the requirements defined below. If the height above the running surface and longitudinal and lateral location of the proposed vehicle's C.G. is within 5 percent of the C.G. location of essentially identical vehicles that have been successfully proven in previous deliveries, the approval of the City will not be required. However, the results of analyses and/or testing of tipping stability for vehicle C.G. location changes greater than 5 percent shall be submitted to the City for record.

The vehicle shall be verified as stable under the conditions specified in ASCE 21-13 Section 7.4.4.8.

2.4.4 Jacking Pads and Hoists

Adequate attachment points for hoisting the vehicle with a crane, including any special slings or fixtures, shall be provided by the Contractor. Jacking pads shall be provided to facilitate jacking the chassis at all suspension tie-down points. If the cabin is not integral with the chassis, jacking pads or hoisting points shall be provided to permit its removal. It shall be possible to jack the vehicle where required to remove a disabled vehicle or train, with sufficient space to place jacking equipment at all locations along the guideway.

Jacking and lifting shall comply with ASCE 21-13 Section 7.4.4.2.

2.4.5 Crashworthy Design

The vehicle and/or train shall be capable of withstanding collisions with overtravel buffers with deceleration rates and damage limitation the same as the existing system. Vehicles shall be designed with an anti-climbing capability to maintain alignment and engagement of the collision structure and to prevent excessive damage and telescoping. The passenger compartment shall be completely enclosed with no openings through which passengers' heads or limbs may protrude.

The vehicles shall be provided with a shell design and couplers compliant with crashworthiness requirements specified in ASCE 21-13 Section 7.4.4.9:

2.4.6 Bolts, Nuts, Fasteners, and Welding Standards

All bolts shall be equal in strength to, at least, an SAE grade 5. All welding shall be in accordance with American Welding Society Structural Welding Code for dynamically loaded structures: ANSI/AWS D1.1 for steel and ANSI/AWS D1.2 for aluminum or other industry standard with City approval.

Unless otherwise specified, all structural connections shall be designed and implemented so that the ultimate strength of a fastener or the local area of the fastened structure shall not be the limit of the load-carrying capacity of that structure.

Each removable bolt, screw, nut, pin, or other fastener shall incorporate a locking device, if it is:

A. Part of a major structural load path, including all suspension members and propulsion and braking force paths; or

B. Part of a sensor, detector, or antenna mounting essential to control system operation; or

C. Part of an actuator or control linkage essential to vehicle control; or

D. Performing any other safety-related function.

Self-locking nuts may be used to satisfy this requirement only if the Contractor provides data specifically demonstrating that such fasteners are suitable for the above applications.

2.5 VEHICLE DESIGN LIFE

The Contractor shall design the vehicle to operate up to or exceeding 67,000 miles per year for twenty (25) years in passenger service in an operating duty cycle as specified in these Technical Provisions. The vehicle shall provide safe and reliable service during its entire design life. Normal deterioration due to causes such as corrosion and fatigue shall not degrade safety or performance of the body, chassis, and running gear.

Axles and suspension, propulsion motors and controls, door equipment, HVAC and draft gear shall operate ten (10) years without major overhaul. Consumables, such tires, and brake linings, are excluded from this requirement.

All car borne wiring, conduit, and piping shall not require replacement during the design life of the vehicle.

2.6 PASSENGER COMFORT

This Section defines the requirements for passenger comfort on the vehicle. The following subsections provide descriptions of acceptable environmental performance, and testing conditions with regard to HVAC, interior noise, and ride quality.

2.6.1 Heating, Ventilation, and Air Conditioning

Vehicle heating, ventilation, and air conditioning (HVAC) shall meet the following performance requirements. HVAC load calculations shall be submitted for review.

The 300R Heating, Ventilation, and Air Conditioning (HVAC) system will consist of two independent, identical package units (no split units) per car, mounted to the undercar at each end. The HVAC units will use R-407c; an environmentally friendly, non-ozone-depleting refrigerant. Each unit uses highly reliable scroll compressors. The condenser coils are cooled by air drawn through the coils by an axial fan.

The evaporator blower unit draws air through the evaporator coils and forces it through the sidewall ducts to the air distribution diffusers in the ceiling of the car. The air diffusers distribute the supply air throughout the length of the passenger compartment to maintain temperature uniformity.

The controls of each fully automatic unit are accessible only to authorized personnel. A temperature sensor is in the return air stream of the unit and provides an input signal to the temperature controller, which compares the return air temperature to an adjustable set point temperature. The temperature controller automatically selects the necessary mode of operation: recirculation, cooling, or heating. The controller has a graphic display unit (GDU) which provides temperature, operation mode, operational parameters, and fault information.

The HVAC blower assemblies provide the required airflow at design conditions. Fresh air enters the unit in the evaporator section and mixes with the return air before it enters the evaporator coil. Normal operation supplies fresh outside air. Return air filters in each unit filter the air before it enters the evaporator coil.

A. Air Conditioning - Each vehicle shall have two equal and independent air conditioning systems having an aggregate cooling capacity equal to the maximum calculated cooling requirement for the vehicle. The failure of one unit will not cause extreme temperature differences along the length of the car.

The systems shall maintain vehicle interior conditions of 75°F Design Dry-Bulb and 55% relative humidity under the specified ambient design conditions. Ambient design conditions shall be either the more stringent conditions of (1) the 2.5% Design Dry-Bulb and the mean coincident 2.5% Design Summer Wet-Bulb temperatures reported in the ASHRAE, 2009 Fundamentals Volume, for the Official Weather Observation Station closest to the Airport or (2) the ambient tunnel conditions. The internal contributions due to the AW1 passenger loading and the interior lighting, electric, and electronic equipment within the passenger compartment, shall be used to determine cooling requirements. For purposes of this calculation, occupants shall be evaluated at 270 Btu/hr sensible and 240 Btu/hr latent heat each.

B. Ventilation – Positive ventilation of outside air during all operating conditions shall be at least 25% of the total airflow or 5 cfm per passenger at the AW1 loading, whichever is greater. All of the ventilated air shall be introduced through the air conditioning equipment and shall not include air which might be introduced when the doors are open. Incoming as well as recycled air within must be sufficiently filtered.

C. Heating – Each air conditioning system shall contain direct resistance electric heaters located in the air stream and arranged to provide heating for the vehicle interior when the control system so dictates. Heaters shall maintain the vehicle interior at 65°F at the ambient tunnel conditions. Heating capacity calculations shall include only the transmission and ventilation losses. Heating may be provided elsewhere in the vehicle if the above performance requirements, including ambient air, are met. The maximum air supply outlet temperature shall not be greater than 100°F.

D. Condensation and Humidity Control – The HVAC system shall minimize condensation on vehicle interior surfaces, including windows. The cooling system shall not induce condensation on metallic or other surfaces. Reheat shall be permitted if required to limit the interior humidity to a maximum of 60%.

E. Controls/Temperature Uniformity – A control system shall be provided to control the interior temperature at 75°F during cooling and 65°F during heating conditions. The control set point shall be adjustable to a range of +/- 5°F. The inside temperature in the occupied portion of the vehicle shall not vary more than +/-4°F from the design temperature one (1) foot from any inside surface.

Digital numeric read out for interior temperature at No. 1 and No. 2 end will be provided for maintenance personnel.

F. Temperature Variations – In the event that summer or winter temperatures encountered exceed the defined design values, the vehicle interior temperature will be permitted to rise or drop degree for degree with the temperature in excess of or below the design values at full load.

G. Air Flow and Diffusion – The air distribution system shall provide sufficient diffusion at the outlet or diffuser so that air mixing will prevent direct impingement of coil discharge temperature air onto occupants. In addition, air velocities one foot from the diffuser or outlet face shall not exceed 400 fpm and velocities throughout the occupied portion of the vehicle shall not exceed 150 fpm. HVAC outlet location and performance shall be subject to review and approval by the City if they are within 12 inches of the normal passenger seating positions. Moisture carryover from cooling coils shall not be permitted. The air will be longitudinal distributed throughout the car.

H. Failure Operations – In the event of failure of both cooling systems, indicated by an inability to maintain interior temperatures, the systems shall continue the highest speed blower operation.

If vehicle primary electrical power is lost, ventilation of at least 5 cfm of outside air per passenger at AW1 loading shall be provided for at least 60 minutes, using power from the vehicle batteries (see Section 2.8.2).

2.6.2 Interior Noise Level

Interior noise, measured four feet above, and at the geometric center of, the floor shall not exceed the levels indicated below under normal operating conditions with all equipment functioning.

A.	Vehicle Stationary – Door Shut	72 dBA
B.	Vehicle Moving – 10 to 15 mph @ Normal Acceleration	75 dBA
C.	Vehicle Moving – 10 to 15 mph@ Normal Braking	75 dBA
D.	Vehicle Moving – Maximum Cruise Speed	74 dBA

All noise measurements shall be taken with no more than three (3) test/observation personnel and necessary equipment in an otherwise empty vehicle. All auxiliary systems, including maximum air conditioning and all air compressors and pumps shall be operating. Noise measurements shall be made using a Type II instrument, as defined in ANSI Standard S1.4, "Sound Level Meters," with a fast response setting. The measured levels recorded in the Denver AGTS tunnel shall not exceed the levels of the existing vehicles.

Pure tones are not permitted, and shall be eliminated if found to exist. A pure tone is defined to exist when one 1/3 octave band exceeds the arithmetic average of the two adjacent bands by 4 dBA or more in a range of frequencies between 250 and 8,000 Hz/ If the adjacent band contains a pure tone, then the next closest band without a pure tone shall be used in its place.

2.6.3 Ride Comfort

The 300R bogie and suspension will incorporate the latest design changes and improvements which should improve ride quality compared to the current vehicles.

Vehicle ride characteristics for maximum sustained acceleration and deceleration, maximum rate of change of acceleration, and ride quality shall satisfy the following:

A. Maximum Sustained Acceleration/Deceleration

1)	Lateral	0.10g
2)	Vertical	0.05g with respect to 1g datum
3)	Longitudinal – normal	0.16g
4)	Longitudinal emergency	0.32g including effects of grade

B. Maximum Jerk

1)	Lateral	0.06g/sec.
2)	Vertical	0.04g/sec.
3)	Longitudinal	0.04 to 0.09g/sec., selectable

C. Ride Quality Weighted RMS values of acceleration averaged over any single station to station trip must fall below the ISO 2631 one-hour whole body reduced comfort limits.

"Sustained" refers to the nominal values used for design of curves, crests, sags, and speed profiles and excluding random vibration effects. Sustained shall include durations equal to or greater than 0.10 seconds.

"Longitudinal" is fore and aft motion, the x direction in ISO 2631; "vertical" is up and down motion, the z direction in the ISO 2631; and "lateral" is side to side motion, the y direction in ISO 2631.

Lateral and vertical acceleration and deceleration include grade effects and are the values obtained with a an inertial accelerometer acceptable by the DEN PM.

Longitudinal acceleration and deceleration ignoring grade are the rates of change of speed as determined from the maximum slope of tachometer-generated data. Longitudinal acceleration and deceleration including grade are the values obtained with a standard piezoelectric accelerometer with a frequency range of at least 0.1 – 80 Hz.

"Jerk" is the rate of change of sustained acceleration/deceleration with lateral and vertical acceleration/deceleration and with longitudinal acceleration/deceleration ignoring the effect of grade. In switch

turnouts, lateral acceleration need not be jerk limited, providing the total change of lateral acceleration and braking. Longitudinal jerk during removal of emergency brakes need not be controlled.

Ride quality shall be measured on an empty vehicle, with no more than three (3) test/observation personnel and necessary equipment, using a Bruel & Kjaer Type 2512 Human Response Vibration Meter or equivalent with a 4322 triaxial accelerometer located on the floor of the vehicle at the geometric center of the floor. The "equivalent continuous vibration level" or "1 eg.," weighted according to ISO 2631, shall not exceed the value for one hour of exposure using the "whole body reduced comfort" criteria. This value is 0.038g RMS or 111.43 dB re 1 micrometer per second squared. Weighted peak acceleration as measured by the peak detector shall not exceed 0.14g (122.76 dB re 1 micrometer per second squared) for lateral vertical acceleration and 0.08g (117.90 dB re 1 micrometer per second squared) for longitudinal acceleration.

2.6.4 Elderly and Handicapped Considerations

Special consideration shall be given to the car interior so as not to impede elderly and handicapped passengers from having full accessibility to the System. Each car shall have at least two easily accessible seats signed for priority seating for elderly and handicapped. Each car shall provide a clear space to accommodate one wheelchair. This wheelchair parking area shall be free of vertical stanchions or other obstructions. Passengers shall be able to walk on and off the car without being impeded by the wheelchair. Maneuvering room inside the car shall provide easy travel for a passenger in a wheelchair between the door and the designated wheelchair parking area. No width dimension shall be less than 34 inches. Areas requiring 90° turns of wheelchairs shall have a clearance arc dimension no less than 45 inches. In the wheelchair parking area, where 180° turns are expected, space shall be clear in a full 60-inch diameter circle. A vertical clearance of 12 inches above the floor surface shall be provided on the outside of turning areas for wheelchair foot rest clearance.

Cars shall have automatic on-board audible announcements that identify each station as it is approached to inform passengers, particularly the visually impaired, of the impending stop. Automatic announcements shall also announce the next station the vehicle is destined for after the vehicle departs. This subsystem may have other appropriate messages related to passenger information and safety. The graphic station door displays as well as Blinking LEDs which are installed at the top of each train door set shall visually indicate the impending door movements before the opening and closing operations commence. On-board dynamic signs located for good visibility shall provide station information concurrently with the station identification announcements (see Section 2.13.9).

2.7 PROPULSION AND BRAKING SYSTEMS

All vehicles, and all trains up to and including the Ultimate-length of 6-car trains for the System, shall be capable of continuous operation at the maximum speeds proposed for the System for an AW1 vehicle operating on tangent System guideway. All vehicles and trains shall be fully bi-directional, with equal propulsion and braking performance in either direction.

Each car will have two separate propulsion units, using proven APM 300 technology, 3 phase AC-AC propulsion equipment. The cars will have two brushless 3 phase AC motors, that will also be used for regenerative braking. Each traction circuit will have two converters to rectify the 600v, 3-phase AC line current to a DC link, and then to variable-voltage, variable-frequency AC to power AC traction motors. This system enhances energy efficiency through full regenerative braking and power factor correction, in addition to the inherent efficiency increase of an AC control system.

The vehicle will be capable of continuous operation at sustained cruise speed in either direction for the maximum speeds proposed for the system for vehicles loaded at AW1 and operating on level, tangent system guideway.

Simulation analysis of the cars will be performed for all configurations under AW1 load conditions to verify that the operating system technology can:

A. Cruise at least at maximum normal cruise speed under all conditions along the guideway where grade, geometry, and station constraints permit.

B. Maintain normal cruise speeds on the steepest grade in the Operating System guideway.

C. When stopped on the steepest uphill grade, start and accelerate without violating the ride quality requirements.

The propulsion and braking systems are rated to provide traction and all train movement along the guideway, under the expected loads and environmental conditions. The vehicle ATC, in automatic mode, and TCMS (Train Control and Management System), in manual mode, will ensure motion control up to the maximum specified speed, such that acceleration, deceleration and jerk rates are within the acceptable range of passenger comfort.

Each vehicle has two independent traction circuits each powering one bogie. Each traction circuit is equipped with a dedicated CM-DUO propulsion converter assembly which is made up of a four-quadrant line converter and traction converter built into a single unit. Each traction converter assembly receives power from 600VAC three phase distribution, converts this power to a dedicated DC link voltage via the line converter and, based on communication between the vehicle control system and propulsion control system, converts the DC link voltage to variable frequency variable voltage which is fed to an AC traction motor mounted on the vehicle bogie.

The design of the line converter at the input of each traction circuit allows energy recovered from motor braking to be fed back to the 600VAC distribution system. A resistor element is included also in each traction circuit to facilitate control of the link voltage and quickly discharge the DC link capacitor for maintenance activity. These independent traction circuits maximize the use of available adhesion and minimize performance loss in a failure condition.

Both traction converter circuits are equipped with the drive control units (DCUs) which receive commands and information from a single propulsion subsystem controller. This propulsion subsystem controller interfaces directly with the TCMS system where Input/output functional control signals such as direction request, tractive effort request, wheel diameter, line voltage, tractive effort delivered, etc., as well as various protection features are computed, converted, and passed.

The energy savings per car are expected to be over 30% with a fully-receptive wire compared to a regular Denver APM 100 cars. The regenerated brake energy will be fed into the system for other cars to be used or, whenever this is not possible, will be fed into the feeding power system. The contractor will coordinate the electrical energy feedback with the local power supply company.

The unity power factor of the APM 300R will be 0.99 in all modes.

The live harmonic will be controlled per IEEE-519.

2.7.1 Propulsion/Braking Control

The propulsion control system shall respond to signals from the TCM system and adjust tractive effort, blend friction with electrical braking, and produce the tractive effort and braking necessary for smooth vehicle acceleration, deceleration, and cruising. The propulsion control system shall accelerate the vehicles and any length train up to and including the Ultimate-length for the System from rest to a maximum cruise speed at rates not to exceed the maximum longitudinal acceleration and jerk rates given in Section 2.6.3.

The propulsion control system shall be stable over time. Periodic adjustments required to compensate for drift or other problems shall be capable of being incorporated efficiently in the vehicle check-out routine. Under no circumstances shall the propulsion control require adjustments more than once every 10,000 vehicle miles to maintain performance within specifications.

The propulsion control equipment shall have thermal overload protection.

Upon the occurrence of an overtemperature condition in either the propulsion controller or the propulsion motor, an alarm shall be sent to Central Control indicating that condition with the affected vehicle identified. Upon cooldown, the overtemperature sensing device shall automatically reset and the alarm at Central Control shall automatically discontinue. A change of state (e.g. “return to normal”) message shall be sent to Central Control and be displayed.

The TCMS system passes the required information to the propulsion subsystem controller based on a network of data collection as well as interaction directly with the ATC system. This allows the TCMS system to adjust tractive effort, blend friction with electrical braking, and produce the tractive effort and braking necessary for smooth vehicle acceleration, deceleration, and cruising.

Communication with the propulsion system is done over a vehicle network connection between the TCMS and the propulsion subsystem controller. The propulsion subsystem controller has two multifunction vehicle bus (MVB) Network connections to perform duty as the MVB bus administrator for the propulsion subsystem control network and control the drive control units (DCU) located at each traction converter. The DCUs are designed to work in a structure where the propulsion subsystem controller performs the vehicle level control interface and supports the communication between DCUs. Inter-vehicle communication on a multi-car train is performed by TCMS and ATC (levels above the propulsion subsystem controller) so the functions of the propulsion control

system on a particular vehicle pertain strictly to the commands communicated through the TCMS interface on that vehicle.

2.7.2 Duty Cycle

The thermal capacity of the propulsion and service brake systems shall be based on the greater of the following two requirements:

A. Continuous operation of an Ultimate-length train over the System guideway. Dwell time as currently used on the existing system. Headways shall be set for the maximum line capacity. All vehicles in the train shall be loaded to AW2. The maximum ambient temperature shall be assumed and does not include local temperature changes due to vehicle or wayside equipment. Air conditioning and other accessories shall be operating.

B. One Ultimate-length AW0-loaded train shall be able to push or pull another Ultimate-length AW2-loaded inoperative train into the most convenient station, regardless of where it is located, and then push or pull the same train with both trains empty (AWO) to the Maintenance and Storage Facility. The environmental and operating conditions of paragraph A. above shall apply except that degradation in speed, acceleration, and deceleration rates will be permitted. Assuming only one train is operable, the brakes on one train shall be able to stop both trains. Emergency braking shall be available from both trains; that is, an emergency brake condition shall cause emergency brake application on both trains, except under special conditions when the emergency brakes of the failed train must be disabled for it to be moved.

2.7.3 Service Brakes

A service braking system shall be provided. It shall be designed to and shall stop the vehicle within its normal deceleration profile and deceleration and jerk constraints for all vehicle speeds, loadings, grades, turn radii, and environmental conditions within the System's operating range. Brake capacity shall be sufficient to stop any length AW2-loaded train under the conditions specified in Section 2.7.2 and should be designed to ASCE 21-13 Section 8. Service brake system failure shall result in application of emergency brakes in accordance with Section 2.7.4 and 2.7.5.

Service brakes shall use either electric motor braking and friction braking or only friction braking. If both are used a smooth transition from one braking mode to the other shall be provided in accordance with the acceleration and jerk requirements of Section 2.6.3. If regenerative braking is used, the power generated shall be accepted by the System or shall be fed back into the supply system. Friction braking wear material shall have a minimum service life of 50,000 miles, except that no more than 3 percent of all such wear components may have a service life of less than that amount.

The friction brake is an electro-pneumatic controlled, air or spring actuated drum brake. The friction brake system provides 1) supplemental service braking to blend with dynamic brakes when it is fading; 2) substitute service braking to dynamic brake when it is unavailable; 3) emergency braking for safe operation; and 4) holding/parking braking.

The friction brakes are used for supplementing service braking or emergency braking as a fail-safe back-up. Normal service braking is accomplished by dynamic braking. When dynamic braking is insufficient, the friction brakes automatically blend in to supplement the dynamic brake. If dynamic braking is not available, the friction brakes take over the entire braking duty.

The pressure applied service brakes are also used to hold the vehicle docked in a station during a passenger exchange. The service braking pressure is monitored to ensure that this braking effort is sufficient to hold the vehicle at a standstill, under the worst conditions. The emergency brakes also function as a parking brake for holding the vehicle at a standstill when the vehicle needs long term parking.

Service braking is normally accomplished by the dynamic brake. When dynamic braking is insufficient, the friction brakes automatically blend to provide seamless braking effort. If the dynamic braking is not available, the friction brakes take over the entire braking duty.

2.7.4 Emergency Brakes

The emergency brakes shall stop the train whenever a potentially dangerous condition occurs. Such conditions include failure to maintain proper safe speed, failure of the normal braking system, or other ATP conditions as required. Emergency braking rates shall meet the requirements of Section 2.6.3.

The emergency brakes shall be irrevocable, that is, once the command is issued for them to be applied, they will remain applied until the train comes to a complete stop, even if the initiating command is removed. After the train has stopped, the emergency brakes may be reset for normal operation by a manual reset on the train by authorized personnel; additionally, the emergency brake may be reset by a control signal to that train from the Central Control Operator, unless otherwise prohibited for specific situations by these Technical Provisions. If conditions are not safe for the train to move, the emergency brakes shall remain applied regardless of any reset signals or actions. If, when safe conditions exist, and the train is allowed to move, a subsequent malfunction occurs, the emergency brakes shall be applied as before.

The emergency brake controls shall be interlocked with the propulsion controls, to include removal of propulsion power during emergency braking, in a fail-safe or checked-redundant manner such that braking commands dominate. The emergency brake may use components of the service braking system, but must operate properly without any guideway or propulsion system power and in the event of failure of electrical, hydraulic, or pneumatic power sources. In addition, the emergency brake shall incorporate sufficient redundancy and capacity such that the safe train separation assurance requirements can be met with a single worst-case element failure of the emergency brakes considering the design stopping analysis and in compliance with Section 2.7.5.

2.7.4.1 Heat Fade

The emergency braking system shall function without degradation for three (3) successive applications from the maximum speed with an AW2 load and without overheating at the maximum ambient temperature. If the emergency braking system has any components in common with the service braking system, then the emergency braking system shall function without degradation after meeting all requirements for the service brake duty cycle as specified in Section 2.7.2.

2.7.4.2 Wet Fade

Verified by calculations, ingress of water to the braking system shall not cause any departure of the braking capability from the deceleration and stopping distance requirements necessary for the safe train separation assurance requirements.

2.7.4.3 Contaminants

Contamination of the emergency braking system by any fluids or foreign substances in proximity to braking components that might reasonably enter through a leak or other system malfunction shall not adversely affect the deceleration levels required for the safe train separation assurance requirements.

2.7.5 Design Stopping Conditions

Design stopping distances for the System shall be developed analytically according to ASCE 21-B 5.1.2and the results provided for review in the appropriate design review. Such computations shall include all worst-case time delays, train and motor over speeds, and acceleration conditions. The effects of any grade shall be properly accounted for. The Ultimate-length, AW2 loaded train shall be used. Guideway, tire, and other relevant conditions shall be the cumulative worst-case conditions. The deceleration rate shall be appropriately reduced to reflect the emergency brake performance and holding capability resulting from a single worst-case element failure or loss within the brake system. This consideration is to be applied irrespective of emergency brake fail-safe design criteria.

The stopping distances, as computed above, shall be greater than the actual worst-case stopping distance exhibited by the completed System.

2.7.6 Parking Brake

The parking brake function shall be provided by a mechanical or friction parking brake. It shall be activated wherever the vehicle is stopped including normal service stops in station. The parking brake function may be provided by elements of the service and/or emergency brake equipment, provided that the requirements of Sections 2.7.3 and 2.7.4 that are applicable to that equipment are met.

The parking brake shall sustain an AW2-loaded, Ultimate-length train in a stopped position for an indefinite period on the maximum grade without application of guideway or vehicle-borne power and with 50% of the parking brakes inoperative. Alternatively, it shall hold for at least 24 hours, provided that subsequently a method capable of holding, such as chocking the wheels is provided to immobilize the train indefinitely. If a separate parking brake it provided, it does not have to be applied during normal service such as regular stops in stations. Parking brake system failure shall result in application of emergency brakes in accordance with Sections 2.7.4 and 2.7.5.

2.7.7 Additional Overrun (overshoot) Protection

The ultimate length train (6 vehicles) may be required to operate near end of line devices or parked trains. Therefore, all vehicles shall be equipped with or capable to be equipped in the future, a vital system to protect against collisions which are beyond the capabilities of the normal signal systems safety abilities.

2.8 ELECTRICAL SUBSYSTEM

The vehicle electrical subsystem shall comply with the following requirements.

2.8.1 Primary Power Subsystem

Primary power for the vehicle shall be obtained from 3-phase, 60Hz, 600v AC power rails on the guideway and conditioned on the vehicle to 120 AC single phase via as well as 30v DC control power.

2.8.2 Emergency Power Subsystem

In the event of loss of primary power, an on-board battery emergency power subsystem shall assure uninterrupted continuation of the following functions for a period of at least one hour, unless otherwise specified:

A. Public address and continuous two-way communications with Central Control;

B. Ventilation as required 2.6.1.H.

C. Vehicle emergency illumination levels of Section 2.8.8 or better and all vehicle exterior lights

D. Any vehicle function required for disabled vehicle recovery

E. TCM system; and

F. Alarm and malfunction reporting

Each vehicle shall, have a means for keeping the emergency battery(ies) in a constant state of readiness and with an indicator showing the level of charge in the battery(ies). All batteries on the vehicle shall be suitable for a transit application, shall be properly encased, ventilated, if necessary, and mounted in a corrosion resistant mounted box isolated from the passenger compartment. Also contained in this box is a temperature sensing device. A low battery charge condition shall be alarmed at Central Control. The emergency batteries will be Lithium Iron Magnesium Phosphate, or similar, specifically designed for motive applications with single-cell monitoring through the TCMs.

Implementation of lithium ion chemistry requires use of a Battery Management System (BMS) to provide additional autonomous protection and ensure that the battery is maintained within safe operating limits. The BMS is designed to communicate directly with the battery modules via an RS-485 communication link which is directly connected to a processor within the battery module case. The BMS will act to remove the batteries from the distribution system if threshold limits are exceeded to ensure safe operation is maintained.

2.8.3 Power Collection

Vehicle power shall be obtained via the power collectors. Each vehicle shall be provided with power collectors compatible with the characteristics of the existing contact rail. The power collector shall function under the maximum expected excursions of the vehicle from wind loads, passenger load, centrifugal load, dynamic load, and normal variations in tire pressure.

Power collector redundancy shall be provided to ensure continued contact throughout the guideway. Each collector assembly shall be sized to carry the entire vehicle electrical load for an indefinite period of time.

The brushes used in the power collectors shall have a minimum service life of 7,500 miles, except that no more than 3 percent of all brushes may have a service life of less than that amount.

The connector(s) of the power collectors and the vehicle electrical system shall ensure that power to the collectors is disconnected whenever maintenance shop power is provided to the vehicle. This connector and the location(s) for application of shop power shall be protected from the environment. They shall include a locking device to ensure that connections are not broken while the vehicle is in service. They shall not expose maintenance personnel to hazardous conditions.

2.8.4 Circuit Breakers and Interrupters

All onboard circuits and devices of the auxiliary subsystems shall be protected from overload and faults by circuit breakers, fuses, or other interrupt devices. All such devices shall be manufactured in accordance with NEMA standards or have demonstrated proven operation in same or similar service. All faults shall be isolated to the smallest isolatable segment of circuit. Each breaker shall have a name plate clearly and permanently marked with the name of the circuit it protects.

The electrical system distributes the 600 VAC through the appropriate circuit breakers for power and protection of HVAC system, the air supply unit, low voltage power supply, convenience outlets, battery charger, and the propulsion subsystem. The low voltage DC system is distributed to user loads through a circuit breaker distribution panel accessible in the above floor compartment. User loads are distributed among circuit breaker distribution panel accessible in the above floor compartment. User loads are distributed among circuit breaker distribution by function, redundancy, and criticality (for load shed purposes).

2.8.5 Wiring

All wiring shall be unalloyed copper and at least equal to that specified in NFPA 130, 2017 Section 8.6.7. Wiring shall be clearly marked in accordance with the vehicle electrical schematic for ease of identification in maintenance and troubleshooting. Wiring shall meet the requirements for flammability and smoke emission described in Section 8.14.1. PVC wire insulation shall not be used.

All vehicle wiring shall be properly secured and protected in enclosures or secured in wiring trays that are properly drained and that physically separate high and low voltage wiring. All plastic materials shall meet the flammability and smoke emission requirements of TP Section 2.14. All conduit shall be of a material capable of withstanding the duty and environment into which it is applied. Wire in conduit, ducts, and raceways shall be free of kinks, insulation abrasions, and insulation skinning.

Wire shall not be bundled if in a conduit, duct, or raceway. Each wire shall be removable for replacement without disturbing other wiring in the enclosure. Where wire is in open areas, bundling shall be permitted if this wire removal criterion is met. Any exposed wire shall be cleated, tied, or secured by other suitable means.

2.8.6 Connections, Connectors, and Splices

Connections shall be through environmentally protected locking-type plugs, or bolt-on terminal strips. Wires between terminals shall not be spliced or soldered. Bolted terminal connections with overall insulating sleeves may be used to connect vehicle wiring to the propulsion motor leads and the maintenance power connection. If unavoidable, solderless connectors installed under a controlled process may be used.

2.8.7 Grounding

Each vehicle shall be grounded at all times by means of a non-fused grounding circuit. A minimum of two grounding brushes, each with sufficient current-carrying capacity to handle fault currents of the entire vehicle electrical subsystem, shall be in contact with the ground rail at all times. The worst-case fault current shall not permit a voltage greater than 25 volts to appear between the vehicle with the vehicle operating at any location on the guideway and with only one ground brush contacting the ground rail.

The vehicle body, frame, or structure shall not be used to carry current for any vehicle electrical circuit. All electrical and electronic metal enclosures and all equipment that uses electrical power shall provide a low-impedance path from the enclosure/equipment to the vehicle structure. Where feasible, bonding shall be direct metal-to-metal contact between the enclosure/equipment and vehicle structure; otherwise, conductors of sufficient cross-sectional area to carry fault current of the equipment shall be used.

2.8.8 Lighting

A – Interior: Vehicle interiors shall be designed with lighting fixtures that are secure, rattle free, and vandal resistant. Powered fixtures shall be inaccessible to passengers. Diffusers of a material that is shatterproof shall be provided. Interior LED-type lights will provide illumination levels that shall be at least 323 lux (30-foot candles) at all points in a plane 18 inches above the horizontal sitting area of the passenger seats and at least 5-foot candles at all floor level locations. When power is provided by the vehicle emergency battery, lighting levels at all locations shall be at least 54 lux (5-foot candles). The values are to be measured with all light diffusing panels in place.

Emergency exit LED lighting shall illuminate the path from each vehicle emergency exit to the emergency walkway. Such lighting shall be at least 54 lux (5-foot candles) and shall be powered from the vehicle battery.

There shall be no degradation in the above specified LED lighting levels for the design life of 50,000h the LED lamp (Section 2.5).

Interior lighting is provided by 2 rows of energy efficient LED lighting fixtures that run the full length of the vehicle and are integral to the ceiling. These fixtures provide a consistent level of light throughout the vehicle interior with no “hot spots” unpleasant to the eye.

The LED light fixtures also provide emergency lighting in the event of track power loss. Due to the efficiency and low current draw of the LEDs all interior lighting will remain illuminated during loss of track power. End interior lighting can be manually turned on/off via the manual controller located on the vehicle by an operator to reduce glare while operating in manual mode.

These LED light fixtures also house air diffusers that run the entire length on both sides of the car for even air distribution ensuring passenger comfort.

B – Exterior: Amber reflectors with a total surface area of at least 50 square inches shall be mounted on each end of each train in the System. The reflectors shall be located at least 36 inches above the floor level of the vehicle.

LED-type headlamps and taillights shall be provided on each end of each vehicle. The exterior lights are designed to function as follows: During normal (automatic) operation of the vehicle, the headlights (on either end in the front vehicle) will be illuminated in white. They will be able to provide two different levels of intensity.

The directional lights will illuminate white light in the direction of travel (partial and full) and red light in the opposing direction. During manual operation of the vehicle, the headlights in the direction of travel will be illuminated such that they provide a good view of the guideway ahead such as to permit safe manual operation of the vehicle. During manual operation, the directional lights will operate in the same manner as they do in automatic mode.

2.8.9 120-Vac Power Supply

An on-board power supply shall provide 120 Vac, 60 Hz sine wave power through two (2) standard, double, three-prong grounded outlets. Each outlet shall be protected against unauthorized use or vandalism by a tamper-resistant cover. A total 20-ampere minimum capacity is required for the 120V power system.

2.8.10 Maintenance Power Connection

The vehicle shall include a device to accommodate the connection of electrical power to the vehicle from a source other than the power collectors described in Section 2.8.3. This device shall be protected from weather when not in use. Such a connection shall be for the purposes of conducting vehicle maintenance and shall be through an umbilical cable and connector assembly. It shall be possible to operate all vehicle electrical loads, including propulsion at AW0 loading, through this connection. Connection of this umbilical connector to the vehicle electrical subsystem shall ensure that it is not possible for the vehicle collectors to be powered from the maintenance power source. While connected to the maintenance power source, the vehicle shall be grounded through a non-fused grounding circuit.

2.9 SUSPENSION AND GUIDANCE SUBSYSTEMS

The vehicle suspension and guidance subsystems shall provide positive mechanical methods for retaining the vehicle in the lateral direction. The vehicle shall be stable against tipping for all operating and environment conditions (see Section 2.4.2).

2.9.1 Suspension and Guidance System Overview:

Each bogie incorporates a single rigid truck axle equipped with two sets of dual pneumatic tires. Each vehicle bogie has a fully functional drive train that consists of the following major items:

- Traction motor
- Drive shaft
- Drive axle

These major underframe subassemblies are standard designs that have millions of miles of proven field service at all APM 100 sites where Bombardier systems are in operation.

Two AC traction motors provide the propulsion to each car to obtain the required speeds and accelerations. Connecting the motor and the axle is a short tubular drive shaft, utilizing single Cardan U-joints and a slip-yoke at the motor end.

Central to each bogie is a rigid (non-steering) truck axle suspended from the bogie by conventional leaf springs. The drive axle assembly on a bogie is composed of an off-highway rigid axle with planetary hubs commonly used as a rear axle of a tandem arrangement. Primary speed reduction is through a full-floating differential with hypoid-type gears mounted in a machined housing. Planetary geared hubs provide a secondary speed reduction. The final gear reduction is 11.56:1.

The vertical suspension consists of two semi-elliptic taper leaf springs and two air springs per bogie. The leaf springs support the empty vehicle weight while the air springs support the passenger load. Height control valves are provided with the air springs to level the suspension.

In the event of an air spring failure, the air springs are equipped with an internal rubber spring. The vehicle envelope is studied under various failure conditions to guarantee clearance between the vehicle and civil structures. Failure conditions include all possible combinations of failures at the drive tires, guide tires and air springs.

Steering is affected by allowing the rigid axle and the entire suspension system to pivot on a large diameter bearing that attaches the bogie to the underframe of the car.

A combination of split lock washers, cotter pins and safety wire are utilized on the bogie and underframe equipment to ensure fastener integrity. Fastener configuration has evolved to the current level through years of operating experience.

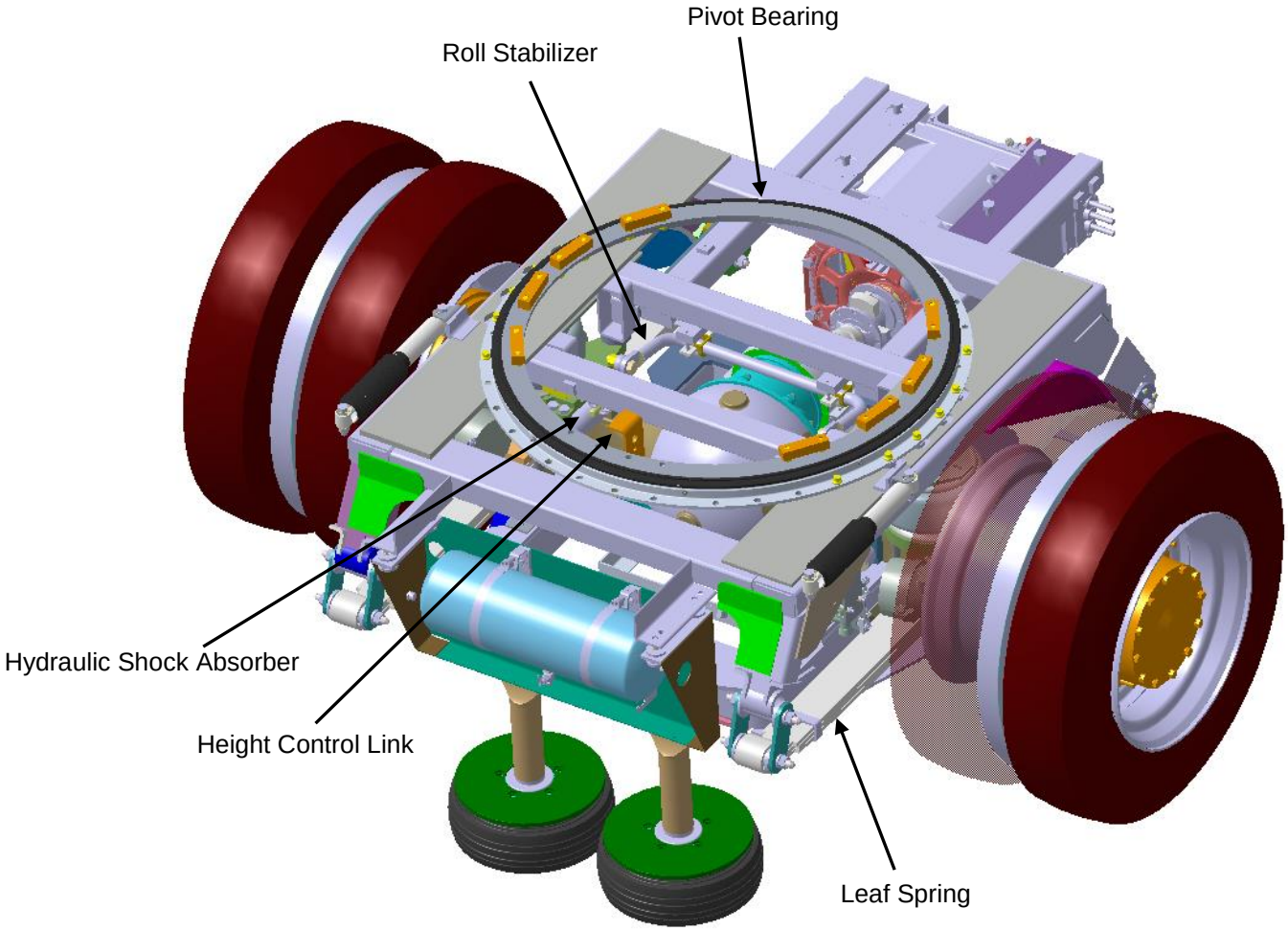


Figure 2.9-1 Suspension System Outline

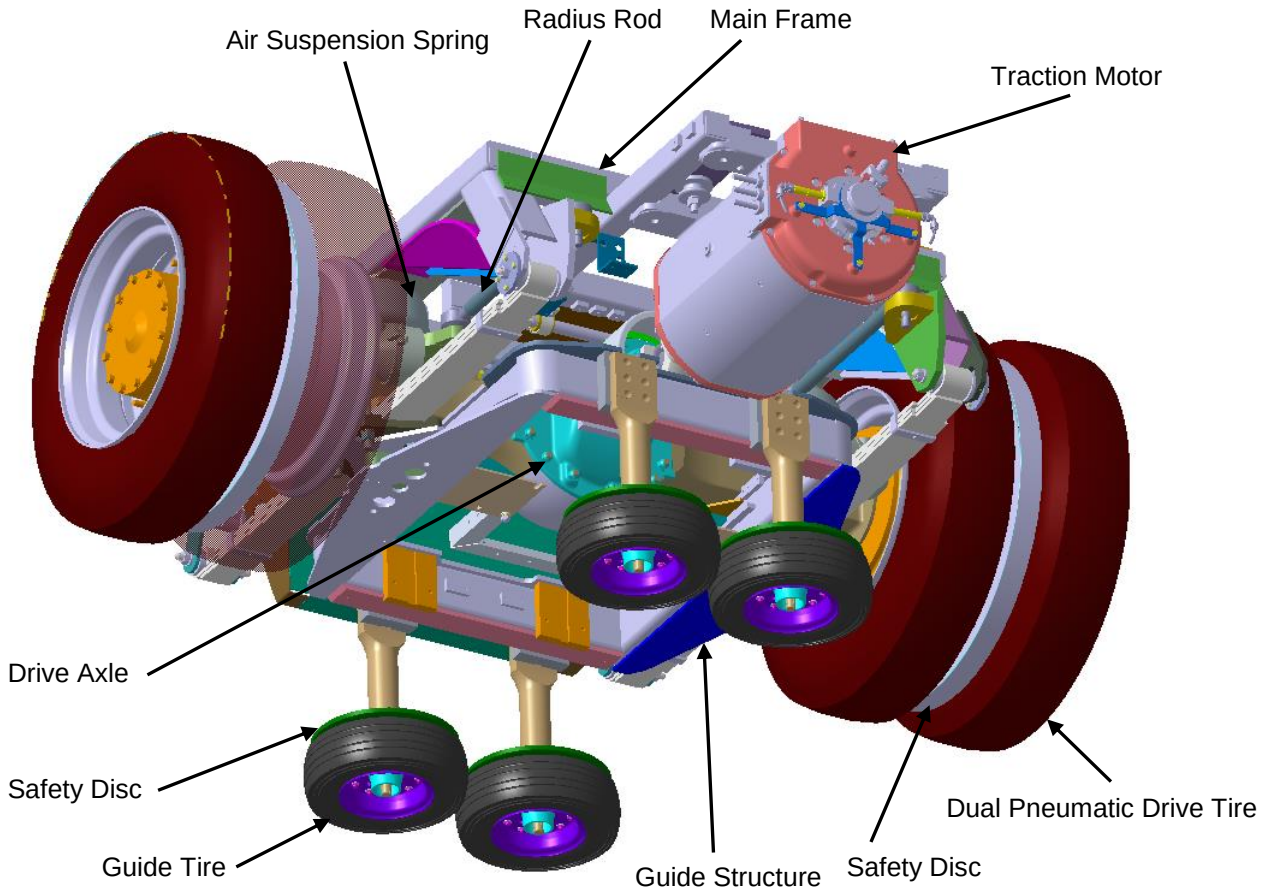


Figure 2.9-2 Suspension System Outline

2.9.2 Suspension and Guidance System Component Description:

Drive Tires

The drive tires are 10R22.5 tires in a dual set configuration. They are equipped with a safety disc located between each dual set to limit the drop of the vehicle in the unlikely event of dual flat tires. The drive tires will achieve a minimum life of 50,000 miles. The tires are equipped with a tire pressure monitoring system. In the event of pressure falling below the designated threshold, an alarm will be sent to central control and the vehicle will hold at its next station.

Air Springs

Four air springs (two on each suspension assembly) support all loads added to an empty car. They are controlled by height control valves to keep the car floor the same height as the station platform.

Two height control valves (one at each side) on the #2 end axle, and one in the center of the #1 end axle, provide a stable tripod arrangement of height-sensing that adjusts the air pressure in all four of the air springs to keep the car body height constant at all times.

As the car is loaded, the leaf springs deflect, lowering the main body frame. The height control valves sense this lowering and opens to provide air to the air springs, raising the car floor back to platform height.

When the load lightens as passengers leave the car, the frame rises. The height control valves sense this rise and open to exhaust air from the springs, lowering the car body until the floor is even with the station platform.

The air springs receive air from the vehicle's compressed air system that also supplies the brakes. Air enters the springs via a hollow box-beam reservoir that is part of the drive and suspension assembly frame.

Leaf Springs

The weight of the car and its passenger load is shared by a combination of leaf springs and air springs. The leaf springs support the car weight when it is empty, while the air springs support the passenger load. The weight of the car is supported by four of these leaf springs, one on each side of each drive and suspension assembly.

Pivot Bearing

The pivot bearings are ball-bearing ring assemblies that attach the drive and suspension assemblies to the underframe. The drive and suspension assemblies pivot on these bearings to address any curves on the guideway.

Radius Rod

Two radius rods stabilize each drive and suspension assembly by overcoming the tendency of the springs to wrap-up due to the torque produced when accelerating or braking. One end of the rod is attached to a bracket on the drive and suspension assembly, the other end attaches to the axle. There are ball joints on each end of the radius rods.

Shock Absorbers

Two heavy-duty shock absorbers are attached diagonally between the axles and the suspension frame. These shock absorbers stabilize the car against sway and wheel bounce due to irregularities in the roadway. Each drive and suspension assembly are equipped with twin-opposed horizontally mounted shock absorbers that dampen rotational motion of the drive and suspension assembly with respect to the car body.

Guide Structure

The guide structure is a welded steel frame attached to the underside of each drive and suspension assembly. It supports the four guide wheel assemblies, the current collectors and the various antenna assemblies.

The guide structure steers the drive and suspension assembly along the roadway, following the central guide beam with the guide wheels. When following a curved section of the guide beam, the guide structures pivot the drive and suspension assemblies on the pivot bearings beneath the car.

The four guide wheel assemblies are bolted to the guide structure so that each wheel is in contact with either side of the web of the guide beam. The guide tires are designed to operate for a minimum life of 50,000 miles.

Main Frame

The main frame connects the suspension components to the ring bearing. The main frame sits above the axle and is rigidly connected to the guide structure. Structural hollow tubes of the main frame act as the air reservoir for the air suspension system.

Guide Wheel Safety Disc

The outside diameter of the safety disc is 14.50," slightly smaller than the outside diameter of the rubber guide tire (16.00") it attaches to. It is provided just above the wheel to engage the upper flange of the guide beam.

Roll Stabilizer

A roll stabilizer is provided to minimize vehicle roll motion. This function is provided by a simple mechanical torsion type anti-sway bar mounted between the drive axle and the bogie main frame.

2.9.3 Loss of Load Leveling

Load leveling is used to provide vertical alignment. Unsafe vehicle tilting in the event of a failure shall be prohibited. In addition, the sides of the vehicles that might contact the platform edge shall be sufficiently strong to withstand such contact without being damaged.

2.9.4 Odometers

Each wheeled vehicle shall be equipped with an odometer for accurately determining actual mileage traveled. The odometer shall accumulate vehicle miles regardless of the direction of vehicle travel. The odometer shall be mechanical and electronic, and shall have a calibrated and readable gauge which is easily read without the need for removing panels or other obstructions when the vehicle is parked in the Maintenance and Storage Facility. The odometers shall be remotely readable from Central Control.

2.10 DOORS

Automatic, power-operated, bi-parting, horizontally sliding doors shall be provided on both sides of the vehicle for passenger entrance and exit. These vehicle doors shall operate in coordination with the station platform barrier doors. There shall be a minimum of two set of doors per side of each car. The number of doors shall be the same as the existing C 100 vehicles.

2.10.1 Features and Dimensions

Both door panels of a vehicle door shall be controlled and operated by one overhead door operator. The dimensions of the vehicle doors will be identical to the existing APM 100 vehicle fleet, apart from the door height.

The vehicle door system configuration is a bi-parting outside sliding arrangement with overhead door operators. There are left hand and right-hand door panels. Door panels are honeycomb design with safety glass. Both panel leading edges have a rubber seal to prevent pinching when the door is closed. The door panels also have a trailing edge seal which forms a water tight seal at the end of the door. The door operator is mounted under a cover for easy access from the outside.

Each door operator is controlled by a Door Control Unit (DCU) which is connected to the vehicle MV-Bus. The DCU controls the function of the door opening according to the signals from the MV-Bus or the alternate door opening trainline.

The door operator is powered by a 24volt motor. The motor drives a screw which then opens or closes the doors depending on the rotation direction.

The door closing behavior shall be programmable on site and allow for different speeds and **** profiles.

2.10.2 Door Operation

Automatic operation of the vehicle and corresponding station doors shall occur only if the following conditions are satisfied.

A. The train speed is zero, and;

B. The train is properly aligned with the station doors, and;

C. The brakes have been properly applied and power has been removed from the propulsion motors.

Automatic operation of the vehicle and corresponding station doors shall be controlled by the ATO subsystem, subject to the safety checks of the ATP sub-system.

The TCMS interfaces to the door control units and the TCMS controls the doors based on train-wide commands received from the vehicle ATC.

The door system normally operates fully automatically. Under certain conditions it may be necessary for the passengers to open the doors, however this can only occur when the vehicle is stopped and only at the positions and side that are permitted to be opened.

2.10.3 Door Safety

Door or door control subsystem failures shall not result in a vehicle door unlocking or opening when not commanded to do so and shall meet the following requirements.

The ATP subsystem shall ensure that no automatic mode failure shall result in the unlocking or opening of a vehicle or station door.

If any vehicle door or emergency exit unlocks for any reason while a train is in motion, the train shall be irrevocably service braked to a stop. Actuation of the emergency release on any regular vehicle door or the unlocking of any vehicle emergency exit at any time shall also cause irrevocable service braking. For all instances in this paragraph, only manual reset on board the train shall be permitted.

If any station platform or emergency door is unlocked for any reason, vehicles shall be prohibited from entering or leaving that station platform. If any station platform or emergency door is unlocked for any reason after a vehicle has entered the station platform area, the vehicle shall be emergency braked or irrevocably service braked to a stop. Brake reset shall be only by local manual reset onboard the vehicle. For any unscheduled vehicle or station door unlocking or opening, regardless of the cause, an alarm shall be automatically annunciated at the Central Control indicating that this emergency condition has occurred.

It shall not be possible to entrap fingers, hands or clothing between door panels and adjacent fixed sections while doors are opening or closing. All vehicle and station door panels shall have a door reopening feature which, when activated by the leading edge of a door panel contacting an object, shall cause both panels to recycle: stop, reverse direction, return to the fully opened position, and then begin the closing cycle again. The vehicles will conform to EN 14752 wherever applicable. Entrapment of any object down to 10mm in width shall cause reopening with both door panels operating. Door test will be performed with test object the size of 10x50mm at three locations (high, middle, low). The force to extract shall not be greater than 33lbs (150 N). The door open period in this cycle shall be adjustable from one to five seconds and in not greater than one second increments. Activation of the door reopening feature on any vehicle or station door panel shall operate all vehicle and station door panels at the affected doorway. Door panels at unaffected doorways on the train shall not be recycled. Activation of the door reopening feature causing the doors to recycle three times shall result in an alarm at Central Control.

The ATP subsystem shall insure that a train stopped in a station shall not be allowed to move unless all train and station platform doors are properly closed and locked and the train brakes have been released. Once these conditions are satisfied, the service brakes shall be applied, and an alarm shall be sent to Central Control. if the train does not move within ten (10) seconds of being commanded to do so. Manual and remote brake reset shall be provided.

With vehicle power applied to the door operating mechanism, the door panels shall automatically unlock and open, and close and lock. The doors shall not be locked until the space between door edges is 0.2in (5mm) or less. This will be tested with a test object in the size of 5x30mm at three locations (high, middle, low). In the event of loss of power to any vehicle door mechanism, it shall be possible to open the failed door manually (after unlocking) with a force not exceeding 156 N. All vehicle doors shall have a mechanism on the exterior of the vehicle to unlock and open the door panels manually without vehicle power and without the use of a key or similar device.

No door shall exert a closing force in excess of 35lb (133 N) for the full range of door motion, even when the reopening feature has been deactivated. The kinetic energy of each vehicle and platform door panel, including all parts rigidly connected to the door and completed for an average closing speed shall not exceed 7 foot-pounds (9.5 J). The average closing speed shall be calculated by measuring the time required for the leading edge of the door to travel from a point 1 inch (25.4mm) away from the open jamb to a point 1 inch (25.4mm) away from the point of closure. When the door reopening feature is no longer active, just before door closure, the kinetic energy, as computed above, shall not exceed 2.5 foot-pounds (3.4 J).

When the doors are fully closed and locked there shall be no air gap. The door panels shall not separate due to forces from acceleration or deceleration in combination with guideway grades.

Each door panel shall be of sufficient strength to meet the requirements of Section 2.4.2 Door performance shall not be adversely affected after such loads are removed.

2.10.4 Door Alignment

Under all load conditions, the vehicle door threshold shall be level with the platform floor so that the difference in elevation between the vehicle and station floors shall not exceed 7/8-inch in either direction (see also Section 2.9.3). Bombardier will verify during testing that the vehicle flow levels will not exceed a ±0.5-inch tolerance. The horizontal gap between the platform edge and the vehicle floor edge, with the door open, shall not exceed 2.0 inches.

2.10.5 Emergency Exits

Each car shall be equipped with one or more emergency exit(s) which shall lead to a safe emergency egress route at any point in the System, regardless of train length. If emergency exits separate from the regular passenger doors are required to meet evacuation requirements, they shall meet the retention and release requirements of Federal Motor Vehicle Safety Standard 217. Emergency doors shall not impede passenger exiting. Opening any emergency door and/or regular passenger door used as an emergency door shall be possible from inside and outside the vehicle by means of a mechanical latch that operates independently of any on-board power and complies with Section 2.10.3 and the following requirements. The emergency door-operating mechanisms on the inside of the vehicle shall be conspicuously marked including simple operating instructions. These mechanisms and instructions shall be clearly visible under normal and emergency lighting conditions. The emergency door and any such operable passenger door shall open onto the emergency walkway. The emergency door operating mechanism shall fail in a manner which permits the emergency doors to open when operated. Such failure shall result in an alarm message to Central Control. (See Section 2.10.3)

2.10.6 Door Reliability

Vehicle doors shall be tested in operation for at least one million cycles without failures exceeding predicted reliability values with normal scheduled maintenance. After one million cycles, doors shall continue to meet all performance requirements of this specification.

2.11 EXTERIOR DESIGN

The vehicle shall have a clean, smooth, simple design. The exterior and body features shall allow complete and easy cleaning, including in an automatic car wash. Body and windows shall be sealed to prevent leaking of air, dust, or water under normal operating conditions and during cleaning by personnel or the automatic car wash.

The color scheme and design of the vehicles shall include a maximum of three colors. The Contractor shall submit a color rendering of the proposed final vehicle exterior design, including color scheme, for review and approval by the city.

2.11.1 Passenger Module

The passenger module shall be fabricated of stainless steel, aluminum, high-strength low-alloy (HSLA) steel, gel-coated fiberglass reinforced plastic, high-strength composite material, or a combination of these materials. Aluminum shall be “A” in resistance to corrosion as defined in the Aluminum Association Structural Handbook. All exterior materials shall be designed for corrosion-resistance sufficient to withstand salt spray test in accordance with ASTM Procedure B1117, “Method of Salt Spray (Fog) Testing”. Weathering steel, such as ASTM A588, shall not be used. All dissimilar metal components including fasteners shall be electrically insulated from each other to prevent galvanic corrosion.

The passenger module is primarily made up of aluminum extrusions welded and or bolted into large sub-assemblies as shown in Figure 2.11-1. These panels are joined together using structural fasteners. The undercar has some steel substructures associated with various interfaces. The passenger module uses modern materials and assembly techniques, minimizing the use of special processes at assembly and maximizing the value of the assembly.

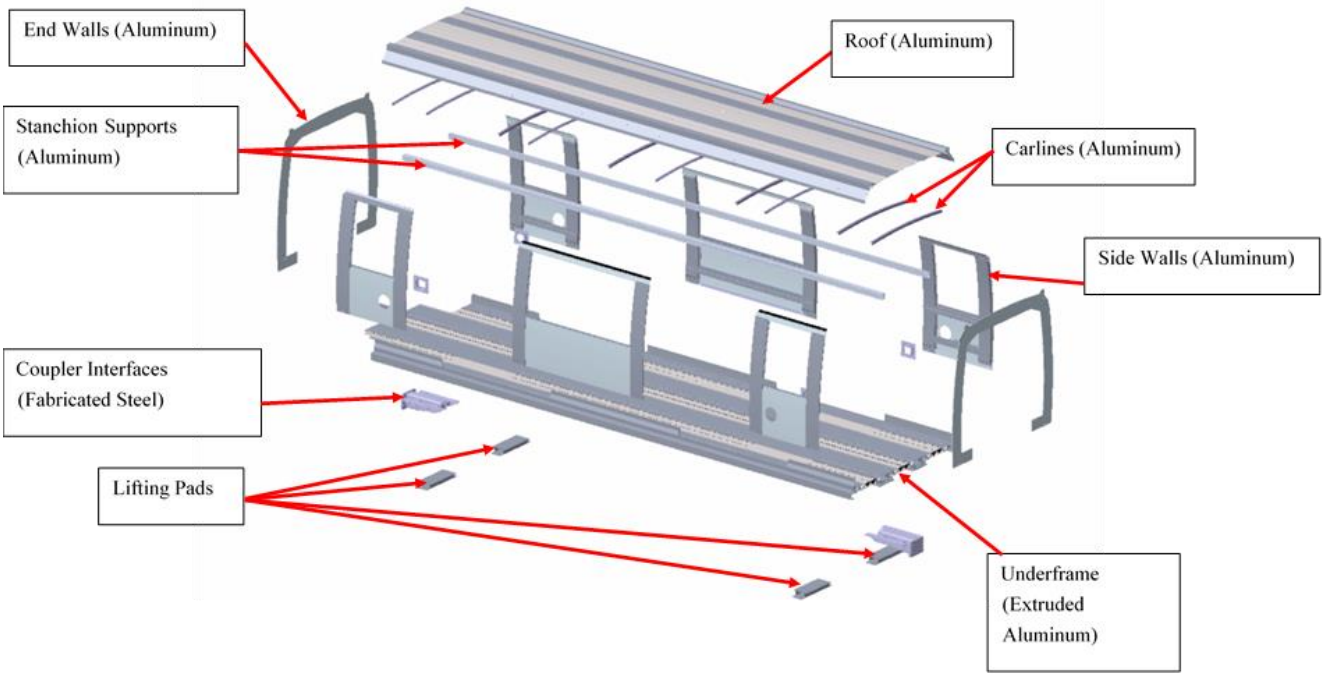


Figure 2.11-1 Passenger Module

2.11.2 Finishing

The vehicle exterior shall be painted completely to conform with the approved color scheme and design. Fiberglass need not be painted if the desired finish colors are an integral part of the gel-coat. Steel shall be completely primed and painted. Stainless steel shall be painted only as needed to meet aesthetic and thematic design requirements. Aluminum shall be anodized or completely coated with zinc-chromate primer or similar and painted.

Numbers, signage, and logos are applied to the exterior using decals. The exterior paint system is suitable for the purpose of transit applications and is expected to provide protection and aesthetics throughout the design life of the vehicle.

2.12 WATERTIGHT CONSTRUCTION

Each vehicle over its range of AWO to AW2 (one-time test for AW2 on one car) loads, including doors and window seals, shall be watertight when exposed to water spray from a 40 psi, 5 gpm nozzle located five feet from the exterior surface and directing the water perpendicular to the surface. The entire vehicle, sides, ends, and roof shall be tested after a minimum soak time of ten (10) minutes. The water tightness test shall be performed before the installation of insulation or sound deadening material on complete vehicles with the door system completely adjusted. A small amount of seepage will be permitted at the door seals; however, no water shall spray into the vehicles at the door seals. The vehicle shall incorporate a drip molding above the door openings. Removable covers and access panels that require sealing shall use reusable seals and shall not require caulking or sealant. These covers, and panels shall meet the watertightness test above with no leaking. During the watertightness testing, water shall not enter, or in any way impair the operation of any system.

The above requirements shall also be met with a completed vehicle during the automatic car wash demonstration.

2.13 INTERIOR DESIGN

Vehicle interior dimensions shall accommodate the range of the 5th percentile of female population to the 95th percentile of male population in accordance with SAE J833. Corridors and aisles shall have a height of at least 80 inches. The main aisle width shall be at least 34 inches to permit access by a wheelchair (see Section 2.6.4). All standing passengers shall have access to vertical stanchions or handholds (see Section 2.13.8). Window area shall be maximized to emphasize a feeling of openness.

The interior shall have no sharp depressions or inaccessible areas and shall be easy to clean and maintain. Handholds, lights, air vents, armrests, and other interior fittings shall appear to be integral with the vehicle interior. There shall be no sharp, abrasive edges, corners, or surfaces and no unnecessary or hazardous protuberances.

Interior panels and partitions shall be permanently mounted by tamper-resistant and vandal-resistant fasteners or welded in place. Interior panels shall be attached so that there are no exposed edges or rough surfaces. Panels and fasteners shall not be removable by passengers. Use of moldings and small pieces of trim shall be minimized. Individual trim panels and parts shall be interchangeable to maximum extent practicable.

As part of the vehicle design review and in conjunction with the similar requirement of Section 2.11, the Contractor shall submit a color rendering and other drawings showing general layout and design of the proposed interior design and color scheme for review and approval by the City.

During the design review process, the City can customize some elements of the 300R car, including:

- Interior graphics and onboard signage
- Interior floor covering
- Color schemes for the following:
    - Interior floor covering
    - Seat tops
    - Main interior panels

Other elements of the 300R car technology are integral to the car's structural design and cannot be modified. These elements include:

- The location and configuration of the light and air diffusers
- The location, size, and shape of the end seats, although additional seats may be added in other areas
- The equipment lockers, which are housed beneath the end seats
- The area available for graphics above the door openings, which is a fixed size based on the car interior design
- The size and shape of the car body, including door openings, windows, and interior panels

2.13.1 Interior Materials

Materials shall be selected based on ease of maintenance, durability, appearance, safety, and tactile qualities. Materials shall comply with the requirements of Section 2.14. Trim and attachment details shall be simple and unobtrusive. Interior trim shall be secured to avoid resonant vibration.

All composite panels, floor covering, and interior materials are easy to maintain, resistant to vandalism, and impervious to normal cleaners and ink from most felt tip pens. The materials meet the minimum requirements for flammability and smoke emission characteristics as defined by NFPA 130 with revision current at time of contract execution. Gelcoat color for the FRP liners is a customer choice item.

Interior panel material shall permit easy removal of paint, greasy fingerprints, and ink from felt tip pens, etc. Materials shall be strong enough to resist everyday abuse and vandalism and shall be resistant to scratches and markings. Door frames must be manufactured in stainless steel.

Flooring shall meet the requirements of Section 2.13.4. Seat materials shall meet the requirements of Section 2.13.5.

Samples of floor covering, seat, trim, panel, and stanchion/handhold materials shall be submitted to the City.

2.13.2 Access Panels

Access for maintenance and replacement of equipment shall be provided by panels and doors that appear to be an integral part of the interior. All equipment compartments shall be sealed to prevent unauthorized entry. Opening of all interior access panels shall require a special tool or key. Panel fasteners shall be standardized so that only one tool is required for special fasteners within the vehicle. Access doors for the door actuator compartments shall prevent entry of mechanism lubricants into the vehicle interior. All fasteners that retain access panels shall be captive in the cover. Removal of fixtures or equipment unrelated to the repair task to gain access shall be minimized. Access doors shall be hinged with props to hold the doors out of the technician's way. Overhead access panels shall have safety catches to prevent the panel from dropping.

2.13.3 Fire Barriers

The passenger compartment shall be separated from any of the compartments containing the propulsion units, the propulsion control units as well as any high-voltage powered auxiliary equipment. The partition between them shall be a fire barrier which incorporates fire-resistant materials in its construction. These fire barriers shall resist the propagation of any fire from propulsion or propulsion control unit compartment into the passenger compartment. These fire barriers shall meet the requirements of NFPA 130 (2017), ASTM E119 (2016), ASTM E648 and the latest requirements of **Error! Reference source not found.**.

All panels that provide separation between the vehicle interior and any electrical or mechanical equipment other than communication panels, light switches, destination switches, etc., shall meet the requirements of NFPA 130 (2017) and the latest requirements of **Error! Reference source not found.** for panels.

Any penetration through the fire barrier into the passenger compartment shall be designed to meet the requirements of NFPA 130 (2017) and ASTM E119 (2016).

2.13.4 Floor

The floor deck may be integral with the basic structure or mounted on the structure securely to prevent chafing or horizontal movement. Floor fasteners shall be secured and protected from corrosion for the service life of the vehicle. Floor coverings shall withstand a static load of at least 150 pounds applied through the flat end of a 1/2-inch diameter rod without permanent visible deformation. Floors shall meet the structural requirements of Section 2.4.1.

The floor of the passenger cabin shall be a continuous flat plane. Door threshold plates shall be flush with the floor surface. The entire floor shall be covered with material that remains skid-resistant in all weather conditions. Flooring material shall be installed to prevent edges from coming loose. The floor covering and transitions of floor material to thresholds shall be smooth and prevent no tripping hazards. Where the flooring meets the walls of the vehicle, the surface edges shall be blended to prevent debris accumulation. Samples of floor covering material shall be submitted to the City for review and approval as part of the vehicle design review.

The floor, as assembled, including the sealer, attachments, and covering, shall be waterproof, non-hygroscopic, resistant to wet- and dry-rot, resistant to mold growth, and impervious to insects. Any access openings in the floor shall prevent entry of fumes, flames, and water into the vehicle interior. Side kick panels shall be mounted to a minimum 1ft of high and shall be made from stainless steel.

2.13.5 Seats

The vehicles will only offer bench seating at both ends of the passenger compartments sufficient for eight (8) persons (four per bench).

Interior equipment is housed under each hinged bench seat and is easily accessible with removable covers and panels.

2.13.6 Windows

The window in front of the operator's position at both ends of trains equipped with on-board manual controllers shall provide a field of view which will permit the operation of the vehicle manually on the guideway. During this manual operation, the driver may: (1) remove failed vehicles from the guideway to the sidings or maintenance service area, (2) couple and uncouple vehicles, (3) maneuver vehicles in the maintenance and service area and elsewhere, and (4) similar tasks.

All windows shall be fixed in position, except as necessary to meet the emergency exit requirements. The windows should be structurally designed to withstand the impact of a falling person during emergency braking. All windows shall be easily replaceable without disturbing adjacent windows. Flexing or vibration during operation shall not be apparent. Windows shall minimize external glare as well as reflections from inside the vehicle. The window glazing shall be free of visual distortions.

All vehicle glazing shall be certified to meet the requirements of ANSI Z26.1. Front and rear windows shall be certified to item 1 tests (AS1). All other windows shall be certified to item 3 tests (AS3). All windows shall be of laminated glass with a minimum thickness of 0.25 inches.

The tint color shall be selected by the customer based on tint samples to be provided during the design review process.

2.13.7 Insulation

Any insulation material used between the inner and outer panels shall be fire-resistant as required by Section 3.14 and sealed to minimize entry of moisture and to prevent moisture retention in sufficient quantities to impair insulation properties. Insulation properties shall be unimpaired by vibration compacting or settling during the service life of the vehicle. The insulation material shall be non-hygroscopic, resistant to fungus and breeding of insects, and shall not absorb or retain oils.

The combination of inner and outer panels on the sides, roof, and ends of the vehicle and any material used between these panels shall provide a thermal insulation sufficient to meet the interior temperature requirements of Section 2.6.1. The vehicle body shall be thoroughly sealed so that drafts cannot be felt by the passengers during normal operations with the passenger doors closed.

2.13.8 Stanchions and Handrails

Any standing passengers at any location in the vehicle shall be able to reach easily either a vertical stanchion, a horizontal handhold between vertical stanchions, or a handhold attached to a seat back or wall.

Ceiling straps or hangars shall be permitted. Handrails and stanchions shall be convenient in location, shape, and size for both the 95th percentile male and the 5th percentile female standee in accordance with SAE J833. Vertical stanchions shall be located throughout the vehicle interior but not in areas where they obstruct aisles, doors, or wheelchair access or cause congestion near doors. (See Attachment Drawing 3) Horizontal handholds shall not present a hazard to standing passengers.

Stanchions and handholds shall be of stainless steel tubing with satin finish and shall be of the split design matching the existing components. (See **Error! Reference source not found.**) They shall be able to support the forces of the maximum number of passengers expected with AW2 loading under maximum emergency deceleration conditions. Any joints in the handrails or stanchions shall prevent vibration or passengers from moving or twisting them.

2.13.9 Passenger Information

2.13.9.1 Audio Announcements

All passenger compartments for all vehicles shall have automatic on-board announcements, synchronized with the location of the train on its route, provided in both English and one other language that accomplish the following:

A. Announce the imminent commencement of door closing with audio and visual signals.

B. Announce the imminent departure of a train from a station.

C. Announce the identity of the station the train is destined for after it departs the current station.

D. Announce the door opening side before arriving at the destination station.

E. Provide other appropriate messages related to passenger information and safety.

2.13.9.2 Graphics

Static graphical information for passengers shall be self-evident representations that require minimal written instructions. The Contractor shall provide graphics to indicate the normal exit doors, E&H (elderly & handicapped) priority seating. Emergency instructions to passengers concerning use of fire extinguisher, the two-way communication system, emergency braking, emergency egress, and manual door opening controls shall be prominently displayed using pictorial representations as much as possible. Where words are necessary, graphics shall meet the requirements of the latest edition of ANSI Z35.1. Other information, including prominent “no smoking” and similar prohibition signs shall be provided in accordance with Section 2.6.4. All interior graphics shall be subject to the review and approval of the City as part of the Graphics Plan, in accordance with the CDRL.

Dynamic signs shall be provided for each passenger compartment of such trains that indicate train route and/or destination and the name of the station at which the train is approaching or has stopped. These dynamic signs shall be located above each door set.

These devices shall conform to the following requirements:

A. Be observable and readable from all standing locations within the car;

B. Display the same messages in each car of a vehicle, and all vehicles in a train;

C. Display messages in characters at least the same height as the existing vehicles;

D. Display messages in either a sequenced or scrolling format;

E. Routinely display the next station at which the vehicle will stop on its route;

F. Automatically display emergency or informational messages as may be selected by the Central Control Operator; these messages shall be synchronized with, and substantially the same as, the audio messages described in Section 2.13.9.1;

G. Display unique messages that may be formulated by the Central Control Operator and relayed to one or more vehicles. The door opening direction (vehicle side) should be displayed.

In addition to the dynamic signs the contractor shall provide eight additional LED/LCD type displays per car measuring 24” diagonally that utilize a 16:9 ratio.

These displays shall conform to the following requirements:

A. Be observable and readable from all standing locations within the car;

B. Each display shall be controlled individually and independent of each other;

C. Can display any message type such as text, images and video or any such combination;

D. Display different messages determined by the vehicle location and operational status;

E. Be controlled and updated remotely.

Each passenger compartment shall have standard provisions for “advertising graphics” where feasible, along the tops of the side and end walls.

All interior graphics shall be subject to the review and approval of the City as part of the Graphics Plan, in accordance with the CDRL.

2.13.10 Resistance to Vandalism

Blind fasteners are preferred for fastening seatbacks, trim, and panels. Where blind fasteners cannot be used, tamper-resistant screws are to be used. Walls and ceilings shall meet, at a minimum, the graffiti-resistance rating of two (2) as specified in the “Transit Security Guidelines Manual”, Section 21, published by the American Public Transit Association.

A CCTV system is also installed on each vehicle to further discourage vandalism.

2.14 FLAMMABILITY AND SMOKE EMISSION

The vehicle, including its materials, shall comply with the requirements contained in Chapter 8 of NFPA 130-2017 or later revision as applicable at time of contract execution. These requirements apply to all combustible materials used in the vehicles.

No polyvinyl chloride, polyurethane foam, or polystyrene foam shall be used. No flammable oils or hydraulic fluids shall be used except as required for normal lubrication.

Calculations of the combustible fire load of each vehicle shall be submitted by the Contractor. These calculations shall include a listing of all non-metallic materials used in the construction of the vehicle, and shall be submitted in three sections. Each element within a section and each element's fire load shall be identified. The first section shall consist of a listing of all non-metallic materials below the vehicle floor. The second section shall consist of those non-metallic materials, integral to the vehicle floor itself. The third section shall include a listing of all non-metallic components above the floor of the vehicle.

2.14.1 Electrical Wire Insulation

All wires and cable shall be resistant to the spread of fire and shall have reduced smoke emissions by complying to NFPA 130-2017 Section 8.6.7. and Section 2.8.5 or later revision applicable at time of contract execution.

2.15 FIRE PROTECTION

Each passenger compartment shall have three (3) smoke detectors which, when activated, will annunciate a discrete alarm in Central Control. The detectors shall be appropriate for transit car application. At least one shall be mounted on the ceiling at the center of the passenger compartment and not directly in the air flow from the HVAC system. Smoke detectors shall also be located in the return air ducts of each air conditioner. There shall be a means to test the smoke detectors.

Each car shall be equipped with one, five-pound Class C fire extinguisher, clearly visible, and with clear instruction for its use. Removal of an extinguisher from its mounting location shall activate an audible alarm on the vehicle and send an alarm to Central Control.

Thermal protection for each electric motor shall be provided. This protection shall be in accordance with NFPA 70 Article 430.32(A) revision current at time of contract execution.

2.16 VEHICLE COUPLING

Vehicle-to-vehicle connections, which shall be possible from both ends of the train, are used to form multiple-vehicle trains, to retrieve disabled vehicles, and/or to move vehicles to and from storage, shall meet the requirements in this Section for mechanical, electrical, and pneumatic coupling. All mechanical couplings shall be slack-free and shall have bearing and/or wear surfaces which have a means to compensate for wear. All couplings, regardless of type, shall meet the requirements of Sections 2.4.1 and 2.4.4. Mechanical couplings shall not conduct current between vehicles.

Failure of the critical mechanical, electrical, or pneumatic connections in any coupler in a train or vehicle shall result in the application of vehicle brakes. Reset of this brake application shall be accomplished only on each vehicle and only by authorized personnel.

The APM 300R couplers will be mechanically compatible with existing APM 100 vehicle couplers and can be used between platforms in recovery situations. The electrical coupler heads will not be compatible and will need to remain in a retracted position in these situations.

2.16.1 Trainlines

Trainline couplings shall be used to provide pneumatic and/or electrical connection between vehicles. There shall be no hydraulic trainlines. It shall not be possible to move a mechanically coupled train automatically unless all trainlines necessary for safe operation are complete.

Electrical couplings shall prevent incorrect trainline connections and shall have positively-retained, weather- and moisture-resistant covers to protect contacts when not in use. High-voltage circuits shall not be trainlined. To prevent ground loop currents, electrical grounds shall not be connected between vehicles. Shielded cables shall have shields grounded only at one end.

Pneumatic trainlines shall have hand valves to shut off the lines when not coupled to another vehicle. If more than one pneumatic trainline is required, they shall be configured so that misconnection is not possible.

Trainlines shall prevent damage to vehicle-borne equipment and connecters if vehicles, which have trainlines connected but are mechanically uncoupled, are moved apart. The weak link shall be the connector so that damage does not occur to vehicle wiring, piping, or connectors.

2.16.2 Automatic Coupler

Couplers are provided at both ends of all vehicles and shall couple only the proper ends of vehicles together. Couplers shall allow coupling and uncoupling anywhere on the System including within the maintenance and storage areas without the need for manual alignment. The need for manual alignment of the couplers may be required in certain curve to tangent or crossover sections. A positive lock shall ensure that the coupler, once engaged, cannot release without, prior, on-board release of this lock.

Regardless of the type of coupler provided, it shall be possible to push or pull a failed train with another active train in accordance with the already established procedures.

Coupling shall be accomplished only by moving vehicles under on-board manual control and shall not require special tools. All uncoupling operations shall require local manual supervision and shall not require special tools. Uncoupling shall not be carried out remotely. There shall be means to uncouple from inside and outside the vehicles. A person shall not be required to stand between vehicles during the coupling or uncoupling process. No more than one person in each vehicle shall be required to perform coupling or uncoupling, including operation of the vehicles.

All required electrical and pneumatic coupling connections shall be accomplished automatically during a mechanical coupling and shall be disconnected automatically during a mechanical uncoupling. Upon uncoupling, all required electrical and pneumatic coupling connections shall be protected by automatically deployed weather- and moisture-resistant covers.

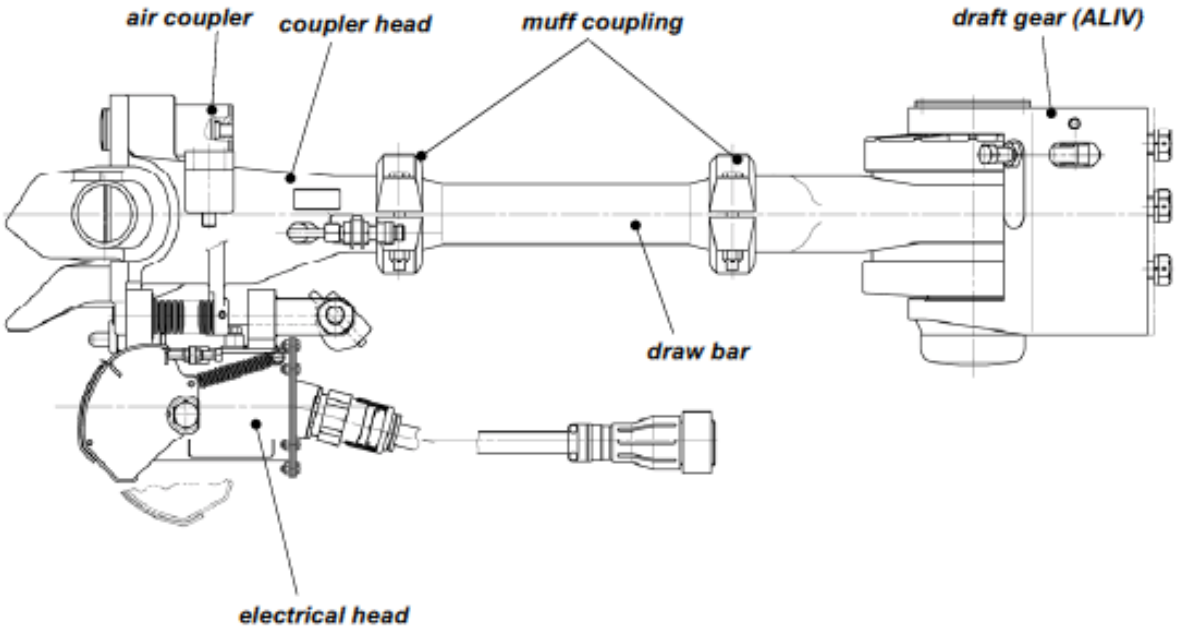


Figure 2.16-1 Vehicle Coupler (conceptual)

2.17 TRAIN INTERACTION

Trains operating on adjacent guideways shall not interact with one another to adversely affect acceleration and braking rate limits, jerk limits, stability, stopping precision, or in any way degrade the operating efficiency or safety of each other.

Controls and coupling slack within individual vehicles or trains shall ensure that when two or more cars or vehicles are coupled together, they shall not interact with one another in any way to cause hunting, instability, overheating, degradation of operating efficiency or safety, or acceleration and jerk limits in excess of those specified in Section 2.6.3. This requirement shall be met in all operating modes and for any combination of allowable passenger loading within the individual cars or vehicles.

2.18 SWITCHING

Reserved

2.19 COMMUNICATIONS AND PASSENGER INFORMATION

On-board public-address speakers shall be located to provide undistorted messages at a sound level of at least 5 dBA above the ambient noise levels of Section 2.6.2 in each car. It shall be possible for maintenance personnel, but not passengers, to adjust the volume of each on-board speakers in each car individually. Other aspects of vehicle communications and passenger information are contained in Sections 2.6.4 and 2.13.9.

2.19.1 CCTV

Bombardier will provide two fixed-mount inward facing network cameras and one ruggedized Network Video Recorder (NVR) per vehicle. The cameras, NVR and vehicle network switch will use M12 connectors, which are designed for a vibration prone environment. The cameras are powered by the network switch through Power over Ethernet (PoE).

The vehicle cameras will be tamper and vandal resistant with IP67 rated protection against dust and water, and EN50155 certified to withstand tough conditions such as vibrations, shocks and temperature fluctuations. The cameras can respond quickly to changes in light level, ensuring high image quality is maintained for viewing the vehicle interiors. The placement of the cameras will be in the ceiling at the end of the vehicles. A typical vehicle camera is shown in Figure 2.19-1.

Figure 2.19-1 CCTV Camera

The ruggedized Network Video Recorder (NVR) will be used to continuously record video from the cameras on the vehicle. The NVR will use hard drives designed for 24x7 operation in a harsh industrial environment, and have enough storage to record two cameras at 1920x1200 resolution for up to 30 days.

If necessary to retrieve archived video from the vehicle NVR, a laptop can be used to connect to the vehicle network switch to download recorded video files.

The DEN network has approved only the Axis or Panasonic cameras for connection to our Video Monitoring System.

2.20 VEHICLE CONTROL

2.20.1 Automated Mode

The 300R vehicles will be fitted with the CITYFLO 550 ATC solution. The CITYFLO 550 onboard unit will be upgraded to the latest product components by utilizing the Common On-Board Hardware Platform (CoHP-2) VATC and the latest generation of train to wayside transmitter and receivers.

The INNOVIA APM 300R ATC design will be compatible with the existing Denver Airport wayside infrastructure. It will be capable of operating in train lengths of from one to six vehicles. Because it is also the base platform for CITYFLO 650, any future migration to that technology at Denver Airport would not require replacement of the VATC, only the addition of CBTC equipment.

The VATC performs the following functions:

VATP Functions

The vehicle ATP functions establish the criteria for safe vehicle operation and guarantee that the safety criteria are met regardless of any requests made by the ATO functions. A two-channel microprocessor control system CPU A and CPU B is used to implement the ATP functions in a checked redundant manner to achieve safety.

The ATP functions are divided into five broad groups:

- Safe system initialization;
- Monitor system safety;
- Communications;
- Motion protection;
- Door control.

VATO Functions

The vehicle ATO functions include:

- Start-up conditions;
- Train speed control;
- Propulsion and Brake control;
- Station program stop;
- Train door operation;
- Passenger information control;
- Train direction control;
- Automatic hand back.

VATS Functions

The ATS functions provide the onboard diagnostics that are used for troubleshooting, maintaining, and testing various vehicle subsystems. VATO inputs and outputs are recorded in the vehicle data logger for offline performance and fault analysis. Using the onboard radio communications link to the central control, alarm indications from the vehicle ATC system are transmitted to central so that maintenance personnel can take appropriate action if a failure occurs.

The ATS functions includes:

- Vehicle alarm encoding;
- Radio communications;
- Diagnostic monitoring and subsystem testing;
- Vehicle data logger (event data recorder).

The vehicles will have on-board automatic train control (ATC) equipment for automatic operation. The ATC equipment shall be compatible with the existing wayside ATC hardware and software. The automatic train protection (ATP) portion of the vehicle ATC system shall operate in a vital manner to ensure the safety of the passengers.

The ATC equipment shall be able to support operation of 6-vehicle trains. The ATC equipment is not required to interface with the ATC equipment on the existing fleet of vehicles through the electrical couplers.

2.20.2 Manual Mode

A manual mode of operation shall be incorporated. Each self-propelled vehicle shall be capable of manual operation, as described in Section 2.20.2. This shall be implemented by means of a permanently installed manual control panel at each end of each vehicle. Remote manual train operation shall not be possible, regardless of the means of propulsion or control. In manual operation, the on-board operator shall have direct control over all necessary train functions, and the Central Control Operator shall have no control of any train functions. It shall be possible to operate a train manually in either direction. Manual train operations shall be limited to a maximum speed of 12 mph while operating in the passenger service area and 5 mph while operating in other areas. Each self-propelled vehicle/train shall enable on-board personnel to operate a train manually to push/pull an Ultimate-length train. A train shall be switchable between the automatic and manual modes of operation only by a manual action performed on the train by authorized personnel. A status change update shall be sent to the Central Control Facility and require Central Control Operator acknowledgement. It shall not be possible to affect a change-over between manual and automatic modes solely from Central Control. The manual control equipment shall be interlocked with the vehicle propulsion control system so that only the manual control equipment at the forward (direction of travel) end of the train can be used to move a train manually. It shall not be possible to move, drive under power, or coast unpowered, a train in the reverse direction from the manual control panel in the forward end of the train.

Controls for manual operation of self-propelled vehicles shall be in special, locked control panels convenient to each end of the vehicle. An operator at this position shall have a field of view which will permit an operator to perform all manual operations anywhere in the System (see also Section 2.13.6). The manual operations controls shall be designed and configured in a manner that provides an acceptable level of operator comfort should extended manual operations be required. All manual control designs shall be submitted for review and approval as part of the vehicle interior design CDRL process. Each panel shall control all vehicles in a train and have at least braking and propulsion thrust level controls, a stop button to operate the emergency brakes, and a key switch to activate the panel. The propulsion control shall have a "dead man" control to prevent train movement without positive manual actuation by the operator. If that control is released, emergency braking only shall be immediately applied.

All panels shall also have door, propulsion, and braking controls. Passive vehicles that are not self-propelled shall have all appropriate non-operating controls and features.

If the vehicle has automatic couplers, coupling/uncoupling controls shall be provided on the manual control panel to control only the coupler at that end of the vehicle. The door, switch, and uncoupling controls shall be covered by spring-loaded, hinged covers or be otherwise suitably protected to prevent inadvertent actuation. Manual operations are not subject to any ATP safety restrictions; however, vehicles being manually operated shall be detected by the ATP subsystem and any and all other vehicles which are under automatic control shall remain subject to all ATP safety restrictions.

2.21 ON-BOARD DIAGNOSTICS

2.21.1 Malfunction Annunciation

An annunciator device shall be provided on each vehicle to indicate Priority I and Priority II vehicle malfunctions. Each malfunction shall be uniquely indicated on an onboard status panel readily accessible to

maintenance personnel. Each indicator shall continue to annunciate the specific malfunction until the indicator is reset. For malfunctions which are remotely reset, the indications shall also be remotely reset at the same time. Those malfunctions which are “manually reset only” shall have their indications also reset when the emergency brakes are reset. All Priority II malfunction indications shall be resettable by a separate means on-board the vehicle.

All Priority I and II vehicle alarms are transmitted to the wayside by the ATC. There are dual-path vehicle alarms that are routed through the vehicle ORS (Bombardier OPICS) to the wayside.

2.21.2 Malfunction Classifications

Malfunctions shall be indicated in one of at least two classifications. The level of classification and reporting of faults shall be developed by the Contractor, and shall be sufficiently detailed to allow operating and maintenance personnel to make rational decisions in reacting to the reports.

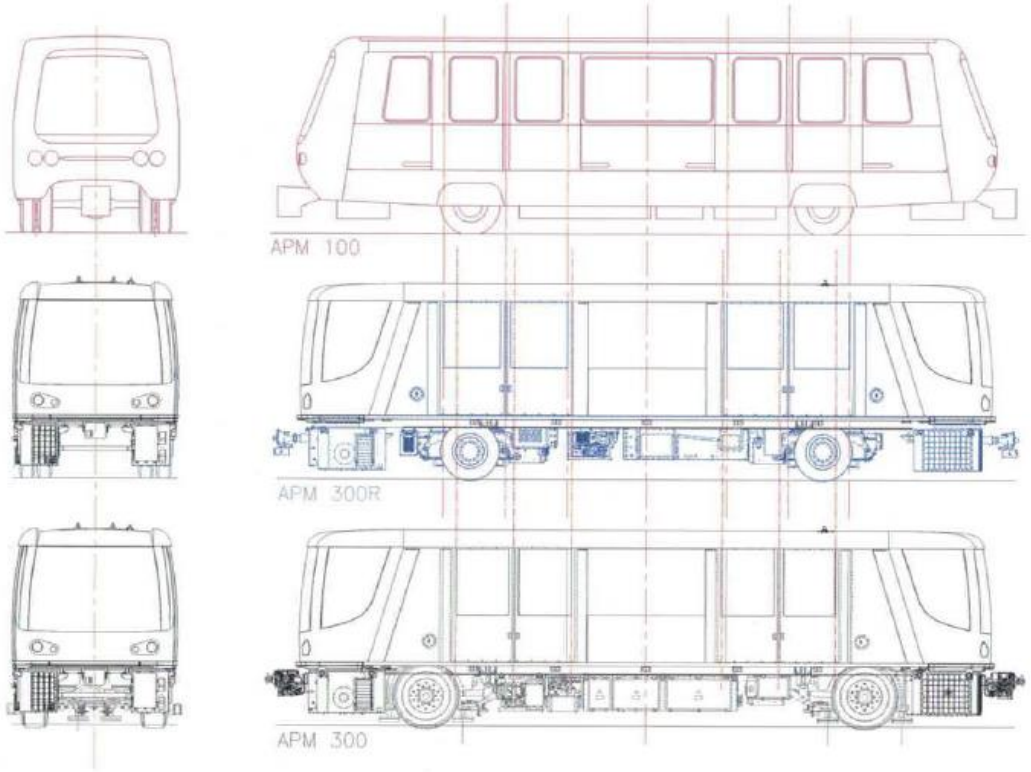
Priority I malfunctions are those which pose an immediate threat to passenger safety and/or system operation.

Priority II malfunctions are those which do not pose an immediate threat to either passenger safety or system operations, but which cause a potential threat to system operation or safety if not corrected.

The Contractor shall develop a complete list of Priority I and Priority II malfunctions for annunciation on-board the vehicles. The list shall reflect both the unique characteristics of the Contractor’s system, and the proposed operational procedures, and shall be submitted for City’s review as part of the vehicle design review.

Attachment Drawing 1

INNOVIA APM 300R
Vehicle Elevation Comparison



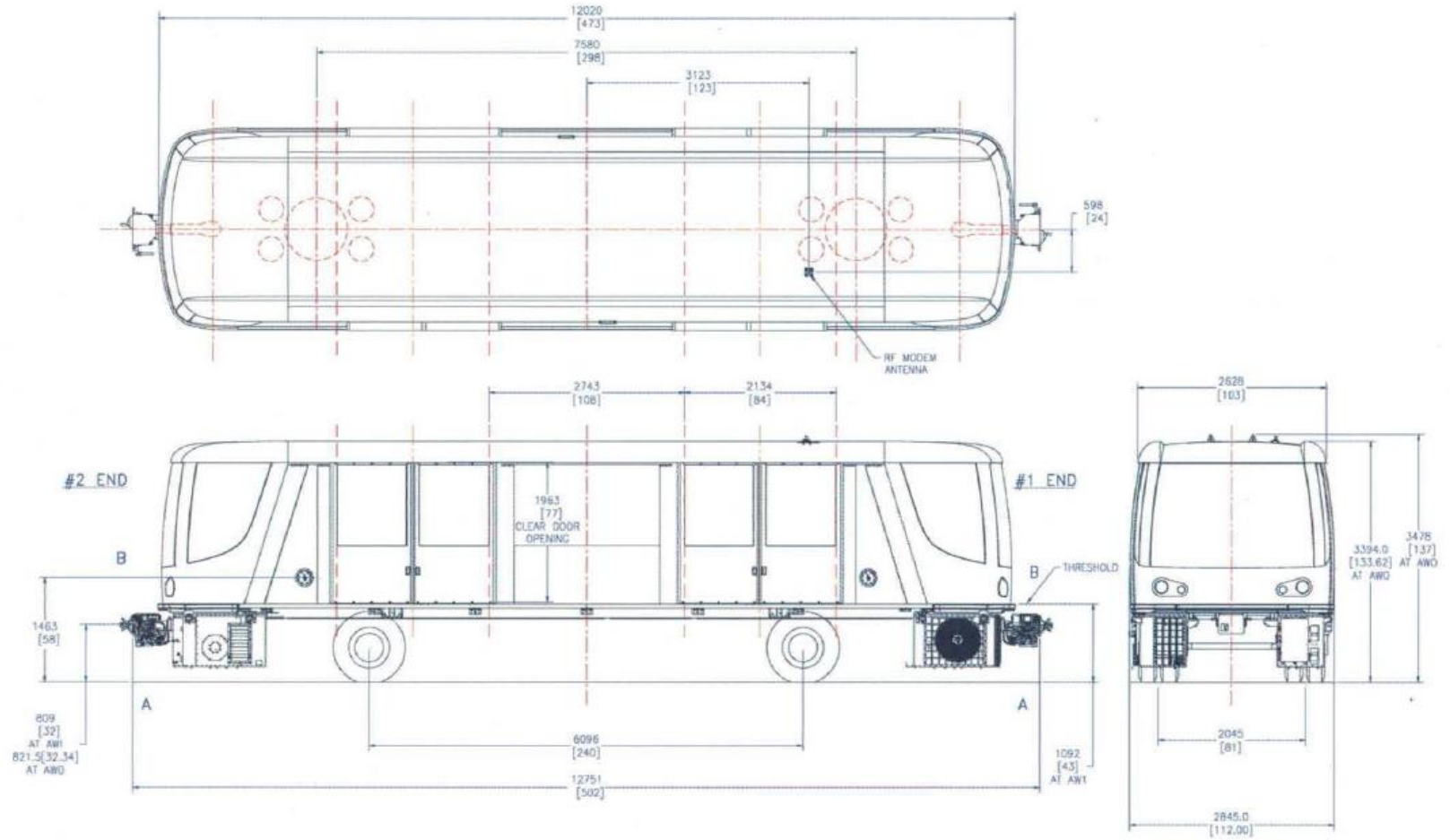
APM 100:
- Door Opening Width 2134mm [84in]
- Door Center Distance 4877mm [192in]
- Wheelbase 6096mm [240in]

APM 300R:
- Door Opening Width 2134mm [84in]
- Door Center Distance 4877mm [192in]
- Wheelbase 6096mm [240in]

APM 300:
- Door Opening Width 1980mm [78in]
- Door Center Distance 4570mm [180in]
- Wheelbase 7580mm [298in]

Attachment Drawing 2

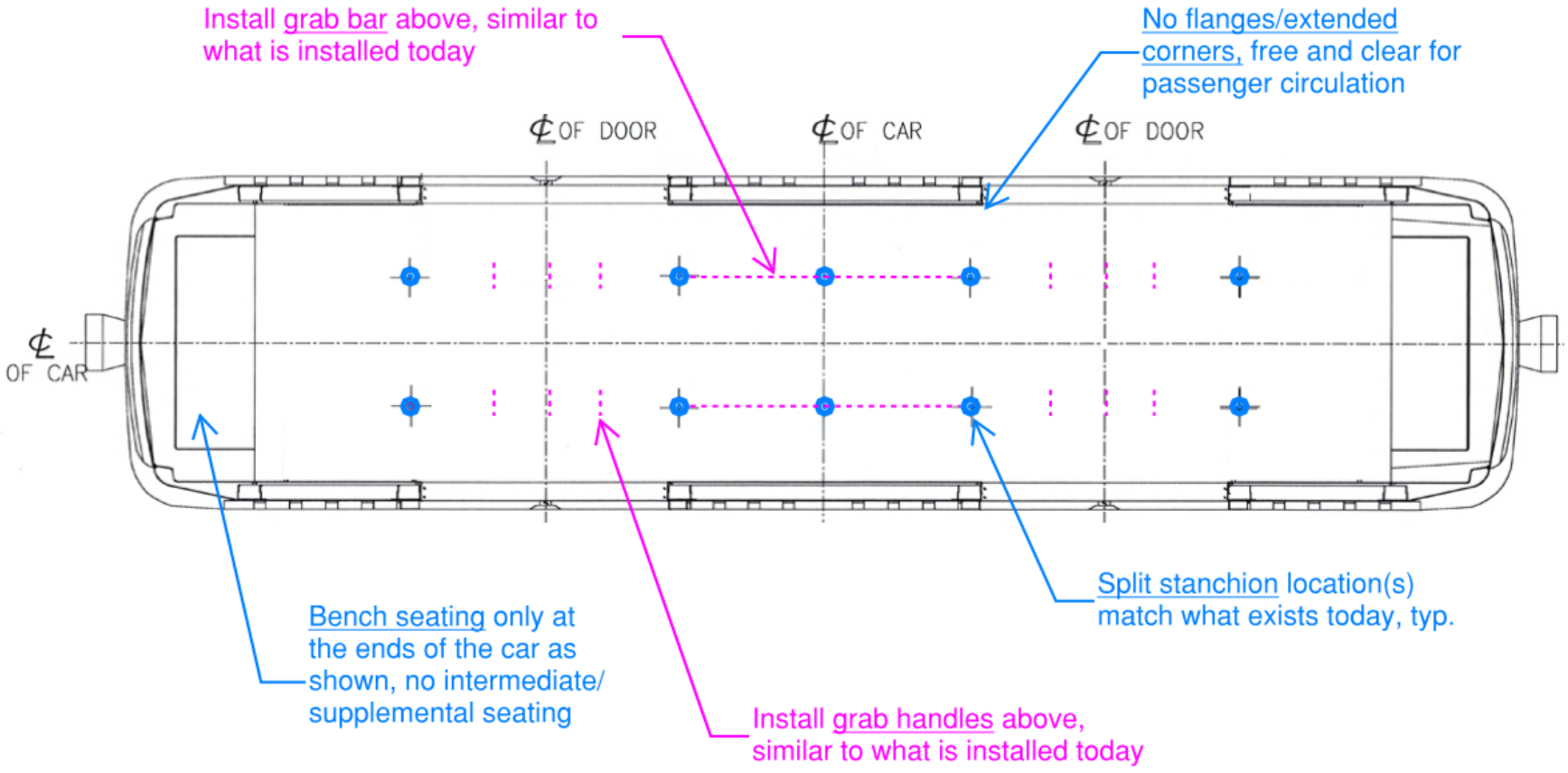
INNOVIA APM 300R
Vehicle Plan and Elevations



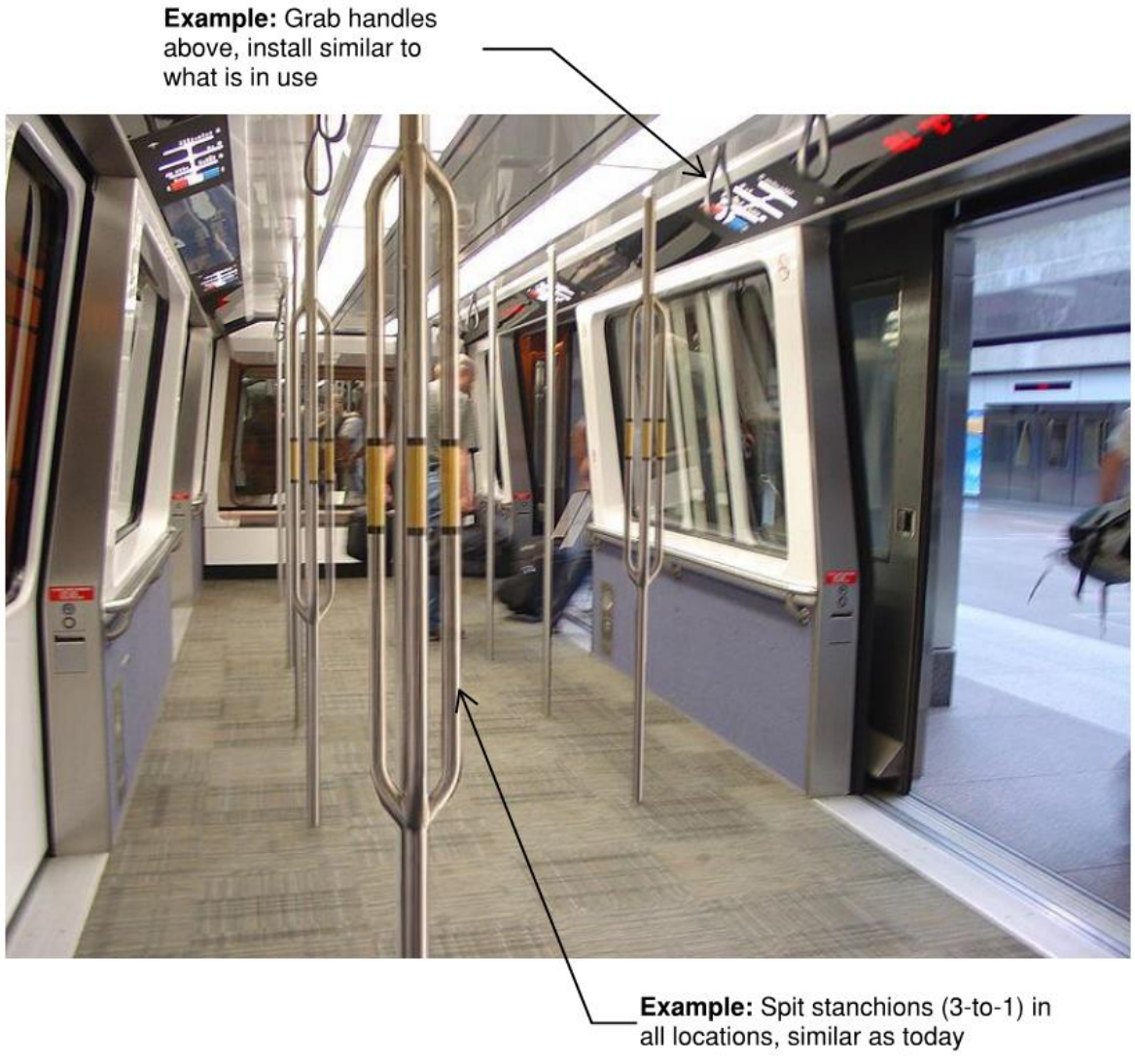
Attachment Drawing 3

INNOVIA APM 300R
Client Requests
(shown for reference)

- Items below 5' feet
- Items above 5' feet



Attachment Drawing 4



Attachment 1

Minimum Required CDRL for Design Review

The following is a list of the minimum required CDRL documents to be submitted as part of the vehicle design review and acceptance process. They are not listed in any particular order.

A. New Designs/Product Modifications Verification Plan

B. Vehicle Structural Analysis

C. Tipping Stability

D. Crashworthy Design Data Analysis

E. Design Stopping Distances

F. Safety Critical Component/Equipment Failure List

G. HVAC Calculations

H. Vehicle Exterior Design and Color Scheme

I. Vehicle Interior Design and Color Scheme

J. Samples of Floor Coverings, Seats, Trim, Panels, & Stanchion Materials

K. Interior Graphics Design (including dynamic graphics)

L. Priority I and II Malfunctions

M. Emergency Evacuation Procedures Document

N. Departure Test Document

O. Electromagnetic Compatibility Control Plan

P. Operating Manuals

Q. Maintenance Manuals

R. Training Program and Materials

S. Training Examinations

DRAFT

PROJECT MANUAL

CONTRACT NO.
201841190

Exhibit E

Project Management Provisions

CITY & COUNTY OF DENVER
DEPARTMENT OF AVIATION

Project Management Provisions
Contract No. 201841190

TABLE OF CONTENTS

PROJECT MANAGEMENT PROVISIONS

PM-1 AIRPORT RULES AND REGULATIONS

All City and Airport, safety, security, badging, vehicle permitting environmental requirements, radio and cell phone communications, necessary for the performance of this Contract will be coordinated and identical to those in place or modified by 201734112. This list is not complete.

PM-2 ON-SITE WORK SEQUENCE AND CONSTRAINTS

The Contractor has the Operation and Maintenance Contract for the AGTS System under CCD Contract Number 201734112. The work in this Contract must be performed in strict compliance with the availability requirements of the operating system. The Contractor's Project Manager for this Contract must ensure that all activities associated with the Work is coordinated with the Denver on-site AGTS Operation and Maintenance team.

1) Project Field Office, Equipment Storage, and Staging

The Contractor, if needed, is expected to use an office location dedicated to the project within the existing AGTS Maintenance Facility. The office or the maintenance facility must provide the necessary furnishings and equipment to conduct the project meetings and communicate with the Contractor's engineering and production facility. In addition, the contractor will use space within this facility for the receipt of equipment and the staging of the work required in this contract. If additional space is required, the contractor shall coordinate this request with the DEN Project Manager.

2) Work Sequence and AGTS System Access

The Work sequence shall be in compliance with the Contract Documents and in accordance with the approved WBS and Work schedule developed by the Contractor. The Schedule shall be in compliance with the requirements indicated in the Contract documents. All AGTS access is to be coordinated with the on-site AGTS O&M team.

The Contractor shall coordinate its access and construction activities if any are required with the affected Airlines and Airport operations through the DEN Project Manager.

PM-3 SYSTEM INTERRUPTIONS

AGTS system interruptions or changes in operating availability that may be required as a result of the Work in the Contract must be coordinated and scheduled with the Project Manager and the AGTS O&M team. A special system service alteration form will be developed by the Contractor and submitted for approval by the Project Manager prior to any alterations or changes in service are approved.

The request forms shall be submitted only during the normal work week (Monday through Friday) between 8:00 AM and 4:00 PM unless otherwise noted, all shutdown requests are required 72 hours before the requested shutdown time. For the Electrical

System and Fire Systems, submit requests five (5) working days prior to the time of requested interruption.

There is no anticipated complete system shutdowns of the system for the work contained in the contract documents.

It is understood that the AGTS operation is critical and that at any time it may be necessary to alter these service alterations, interruptions, or shut down requests. If, due to airport operations, the Contractor is not permitted to work on an approved work period, the City will grant the Contractor additional time in the Contract Schedule to complete the work.

PM-4 COMMUNICATIONS AND DOCUMENTATION BETWEEN THE PARTIES

Denver International Airport Planning and Development Division is actively working towards a complete paperless exchange process for contracts managed in this division. To this end it will be a goal of the contract to provide the required communications and documentations exchange in an electronic paperless fashion where ever possible.

PM-5 BUILDING INFORMATION MODEL - NOT USED

PM-6 OWNERSHIP AND TITLE

Upon the City's issuance of a Certificate of Substantial Completion for the Work, title to the equipment installed under this Contract shall transfer from the Contractor to the City subject to the City's rights under this Contract. Substantial Completion will be issued for each car once it enters the 30-day operational demonstration period. See Special Conditions 25.

PM-7 MAINTENANCE AND REPAIR

Prior to the issuance of a Certificate of Final Completion for all the vehicles, the Contractor shall be solely responsible for the maintenance and repair of the vehicles After issuance of the Certificate of Final Completion for all the vehicles the responsibility for maintenance of the vehicles shall rest solely on the City, subject to the City's rights under warranty according to this Contract. Software components of the vehicles shall remain the property of the Contractor, subject to the applicable software license agreement and escrow between the parties contained in the contract documents.

PM-8 LOSS AND DAMAGE

Until a Certificate of Substantial Completion for each vehicle is provided the Contractor shall assume the risk of loss, including theft or destruction, and the risk of damage to the vehicles from any and every cause whatsoever, whether or not such loss is covered by insurance.

PM-9 CONTRACTOR'S WARRANTY

The Contractor will guarantee that spare parts will be available for twenty-five (25) years. If original parts or components are no longer available, compatible parts or components can be used if all the requirements of the Technical Specifications will be met by such items. The Warranty period for materials and workmanship shall be limited to a period of one year from the Substantial Completion date of each car.

PM-10 CONTRACTORS MANAGEMENT PLAN

1. Project Management Plan

Within thirty (30) days after the date of receiving NTP the Contractor shall submit a Project Management Plan for review and acceptance by the City. This Plan shall include (at a minimum) the following items:

1. A listing of key personnel, together with their qualifications, responsibilities, and involvement in the Project.

2. A complete Work Breakdown Structure (WBS) organization of Work items, indicating the source/responsibility for completing each aspect of the Work. The WBS shall be the basis for organizing all Work under the Purchase Order, and shall be reflected in the organization of the Work Schedule, Submittal Schedule, and Schedule of Values. The WBS shall include a description of the Contractor's Plan for executing the Work.

3. A Preliminary Work Schedule showing all milestones, intermediate-milestones, events, and activities in bar chart format. This preliminary Work Schedule shall be a firm schedule for all activities in the first one-hundred and twenty (120) days of the Work, and preliminary for activities thereafter. This bar chart must show when City approvals are needed.

4. A preliminary Submittal Schedule for all deliverables and design review data.

5. A description and outline of the Progress Reports.

6. An organization chart showing the Contractor's organization (including subcontractors' organizations) and explanation of how each entity will be involved in this Project, defining their general and project-specific responsibilities, and discussing how the individual entities will coordinate their Work on this Project.

7. A numbering system and distribution listing for all correspondence and transmittals under this Contract, subject to acceptance by the City.

8. Work Schedule

The Contractor shall, one hundred twenty (120) days following the date of his receipt of a NTP, prepare for the City's review and acceptance a detailed Final Work Schedule. The Final Work Schedule shall be a time scaled bar chart showing the order in which the Contractor proposes to carry out all Work covered under this Contract. This detailed Final Work Schedule shall be based upon the Preliminary Work Schedule submitted with the Management Plan and shall contain all the milestones and

intermediate-milestones of the Schedule of Values. Using a bar chart format keyed to the Work Breakdown Structure, the Contractor shall indicate all major items of design, construction and procurement and installation, and the dates for starting and completing each item. The Contractor shall maintain and update the Work Schedule showing the actual progress made and any revisions in the schedules or at any time that changes in the design, construction, procurement, and installation cause any major change in the overall schedule.

PM-11 REGULATORY REQUIREMENTS

This Section identifies primary compliance with the State of Colorado and City and County of Denver's regulatory requirements, including the Department of Aviation, Colorado Department of Transportation, the Division of Wastewater Management, Colorado Department of Labor and Employment, Denver Fire Department, Fire Prevention Division, and the Department of Public Works standards which govern design, construction and equipment acquisition projects at Denver International Airport.

The work shall be based on the latest edition of the referenced codes including additions and revisions thereto that are in effect at the time of project bidding.

1. APM Alteration Permit State of Colorado Conveyance Section

The Contractor is responsible to provide the City with the necessary documentation to obtain an alteration permit if required for the work covered by this Contract. The Contractor is directed 7 C.C.R.to Section 2.2.1 & 2.2.3 of the state statute for the detailed information that is required for this permit.

2. Building Code

All design and construction work that may be required under this contract shall be governed by the Building Code for the City and County of Denver, latest edition, which is based upon the International Building Code with Denver Amendments. Appendix N of the amendments addresses Airport Buildings and Structures.

3. Permits and Certifications

The Contractor shall maintain records on-site of all permits acquired by federal, state, and local agencies. Posting of permits shall conform to requirements of the respective agencies.

At the completion of any inspection by other agencies, the Contractor shall forward copies of the status of the inspection and copies of any approved or "signed-off" inspections by the respective agencies to the Project Manager.

PM-12 PROJECT MEETINGS AND REPORTING

The Work specified in this Section requires the Contractor's Project Manager, Lead Technical Engineer, and Quality Control representative to attend project progress meetings to be scheduled as the Work demands by the City for the collection and

dissemination of information related to the subject contract. These meetings will take place at DEN and will be attended by the local on-site project team. Attendees from the Contractor's facility can attend by teleconference.

The City's Project Manager will prepare the minutes of each meeting and distribute them to each of the participants.

1. Project Kick-off Meeting

A Project Kick-off Meeting will be scheduled by the City after the Contract has been signed by all parties. The purpose of this meeting is to introduce the City's Representatives to their counterparts in the Contractor's organization and to establish lines of communication between these representatives and outline contract requirements.

The Project Manager will distribute a notice of this meeting, along with an agenda of the subjects to be addressed.

The Project Manager will explain and discuss the responsibilities and authorities of the City, the City's APM consultant, and the Project Manager's organization.

The Project Manager will provide highlights of the following information at this meeting:

Procedures for submitting deliverables, including design review materials.

Monthly pay estimate cutoff dates.

Payment procedures.

Communication procedures.

2. Project Progress Meetings

Progress meeting will be held monthly as a minimum. The Contractor will submit an agenda of the items to be discussed the day before the meeting. As a minimum the following items are to be covered at the meetings as they become relevant to the phase of the project:

Work activities, discuss the progress of the work

Identify progress against the schedule and identify any risk elements effecting meeting the schedule dates

Status of the CDRL submittals

Status of the Design Submittals Conceptual Design Review (CDR), Preliminary Design Review (PDR) and Final Design Review(FDR).

Identification of any design issue requiring discussion

Identification of any product or component delivery delay

Quality control issues and quality assurance issues

Status of manufacturing and assembly process

Status of the repair and maintenance manuals

Status of the training program and training manuals

Status of in factory testing

Status of the vehicle delivery schedule

3. On-Site Work Progress Meetings

When activities begin on site the progress meeting may change to weekly meetings. At a minimum, the following items will be addressed at each meeting. The items addressed in the meeting do not waive notification or submittal requirements as required elsewhere in the contract.

Open discussion to include coordination items with other contractors and or agencies.

Safety

Quality control issues

Three-week look ahead and discussion and identification any impact on the AGTS operating system

Vehicle deliveries scheduled and coordination with DEN Operations

Vehicle testing progress report.

Status of training and spares parts inventory

PM-13 SCHEDULE

The Contract Schedule for the performance of the Work shall be a Critical Path Method (CPM) system, with reasonable detail including a time scaled network and computer printout.

The Contractor shall submit a monthly progress report and schedule update with each monthly pay application. The Contractor will have the contract schedule available at all progress meetings.

The Contractor shall complete the Work within the contract time and in accordance with the most recent schedule submittal that has been approved in writing by the City.

A. Planning

The total contract time, including project milestones as indicated in the contract documents is the maximum allowable for the completion of the contract including final acceptance and contract close out.

In addition to the design activities, assembly and installation activities the schedule shall include activities for furnishing materials and equipment and any vendor shop drawing preparation. The Preliminary Contract Schedule, a supporting narrative, and the overall progress curve shall be submitted for approval within thirty (30) days after Notice to Proceed. Within fourteen (14) days the City will respond with approval or direction to revise and resubmit within ten (10) days. Failure of the Contractor to have a Contract Schedule approved by the City will be considered cause for withholding progress payment(s). The final contract schedule with the appropriate details is to be delivered to the City within 120 days of the NTP.

To the extent that the Contract Schedule or any revisions thereof contains anything not jointly agreed upon in writing, or fails to show anything jointly agreed upon in writing, it shall not be considered to have the approval of the City. Failure to include any work item required for performance of this Contract shall not excuse the Contractor from completing all work within applicable completion dates, regardless of the City's approval of the schedule.

DEN reserves the right to impose any additional schedule development and reporting requirements.

Failure of the Contractor to comply with this Section will be considered cause for withholding progress payment(s) or termination for default.

B. Execution

The Contractor will take the Contract Summary Schedule and develop and expand the schedule to comply with the requirements of these Project Management Provisions. The total contract time must fall within the time provided for in the contract.

The Contract Schedule shall be a computerized CPM schedule that includes:

1. The Work Breakdown Structure (WBS) for activity identification, which shall correspond with the content of the Technical Specifications

2. The order, sequence and interdependence of all significant work items including design, procurement, fabrication, testing, startup and inspection and delivery of critical or special materials and equipment, submittals and approvals of critical design review documentation, samples, shop drawings, procedures, or other documents that could have a schedule impact.

3. Work items by the City, other contractors, utilities and other third parties that may affect or be affected by Contractor's activities.

4. Proper referencing of all work items to identify applicable subcontractors or other performing parties.

5. Work item duration not to exceed fifteen (15) working days, unless approved by the Project Manager. No more than 25 percent of the work item may be on the critical path.

6. Work items shall be resource loaded to show the direct craft man-hours estimated to perform the work including work by subcontractors.

7. A narrative that explains the basis for the Contractor's logical progression of the work. It shall include estimated quantities and production rates, hours per shift, work days per week, and types, number, and capacities of major equipment to be used and whether the Contractor plans to work weekends or holidays.

   The Contract Schedule shall be prepared to include the data for the total contract duration, and the critical path shall be identified, including critical paths for interim completion dates. Scheduled start or completion dates imposed on the schedule by the Contractor shall be consistent with contract milestone dates. Milestone events shall be the schedule dates specified in the Contract documentation and shall be prominently identified and connected to the appropriate work item, denoting its start or completion. Work items related to any interim milestones shall be coded for that milestone.

   The Contractor shall submit the following documents to the City upon completion of the Contract Schedule:

   1) A time phased plot of the CPM schedule showing all logic ties.

   2) Various computer-generated construction schedule reports that contain the following data for each work item: Identification, description, responsibility, duration, early start and early finish, late start and late finish, total float, and resources. The work items shall be sorted by float, early start, subcontractor, or other sorts mutually agreed to. The reports shall also show the logic ties of successor and predecessor work items.

   3) A physical progress curve showing either manpower or other appropriate key contract items derived from the construction schedule and against which physical progress performance will be measured for schedule and payment purposes.

PM-14 PROGRESS REPORTING

1. Quarterly Progress Report

1. The Contractor shall submit to the City two copies of a Quarterly Progress Report. This Report shall contain the following sections:

   1. Executive Summary;
   2. Task Activities Planned for Next Quarter;
   3. Planned or Proposed Schedule Revisions or other Remedial Actions;
   4. Identification and Analysis of any Scheduling, Coordination, or Other Problem Areas;
   5. Progress Photos (digital camera; 4 or 5 images).

6. The exact format and detail level required for the Quarterly Progress Report will be established jointly by the City and the Contractor within thirty days after NTP based on a proposed format prepared by the Contractor.

7. The Contractor shall submit quarterly Schedule Status on a time scaled bar chart showing scheduled and actual progress to date.

PM-15 HAZARDS IDENTIFICATION AND ANALYSIS

The Contractor shall carry out the following:

Perform subsystem, System, and operating and support (O&S) detailed hazards analyses and present the findings in a document entitled Detailed Hazards Analysis (DHA) to be submitted within one hundred and twenty (120) days after the final subsystem design review. Individual detailed hazards analyses shall be documented/discussed as part of associated subsystem design reviews. Analyses may be limited to Categories I and II hazards identified by the PHA. Qualitative analyses shall be conducted for the express purpose of identifying unresolved hazards, establishing causes of failure, and providing priorities for subsequent action. Applicable analyses conducted for previous people-mover installations using the same equipment will be acceptable where it can be shown that no changes have been made which affect safety.

The Contractor shall comply with all requirements of the Hazardous Communication Standard, OSHA Standard 1910.1200.

PM-16 SAFETY DOCUMENT FILES

The Contractor shall maintain for a period of six (6) years following the termination of this Contract a complete set of safety files with all documents required by or supporting the requirements of this Section. These files shall be used, in part, to support the activities of Maintenance Manuals below. These files shall be provided to the City upon the City's request.

PM-17 SAFETY CERTIFICATION

As a condition for Substantial Completion and/or before the vehicles are placed into passenger service operation, the Contractor shall formally certify to the City that the vehicles provided by the Contractor has been designed and installed using the safety principles customarily applied in the transit industry for automated people-mover systems in the United States and the system meets or exceeds all applicable federal, state, and local laws, rules, codes, orders, and regulations.

PM-18 MAINTENANCE MANUALS

Maintenance Manuals shall be provided for the vehicles. These manuals shall provide detailed procedures and reference data for performing all of the required maintenance tasks. The text and detail of these manuals shall be consistent with the Contractor's

proposed maintenance philosophy and the required maintenance personnel skill levels, facilities, and equipment. The manuals shall include expanded assembly pictorials and complete instructions for assembly and disassembly as required. The maintenance manuals shall contain general information such as:

1. Preventive maintenance and overhaul schedules for all System components.

2. Descriptions of maintenance procedures of all System components.

3. Description of System operation including interactions between major subsystem elements.

4. Detailed descriptions of individual System components and assemblies including clearances, tolerances, circuit operations, test point voltages, waveforms, etc., with references to System drawings as applicable down to the lowest replaceable unit (LRU).

5. Detailed descriptions of operational procedures for all manual operations.

6. Detailed description of test equipment operation and procedures for its correct use in equipment maintenance.

7. Description of replacement parts, including identifying description and parts numbers as necessary to order such parts from the original parts supplier or manufacturer. There shall be a complete parts list for all numbered parts, correlating the parts number with the parts name, unit price, and name of the original manufacturer down to and including the LRU. Where an LRU is not a Contractor-specific design or product but is purchased from a vendor or subcontractor, the Original Equipment Manufacturer (OEM) shall be identified together with the OEM specified part and/or model numbers and copies of the OEM maintenance instructions. The parts list shall be provided as part of a computerized inventory control system, along with the software and hardware, for changing, updating, and sorting by any category or data field, and printing the results.

8. Appropriate drawings, literature and other information which accompany LRU's purchased from other vendors. These may be provided as appendices to the manual.

9. Troubleshooting guides at the System, subsystems, and component equipment level to aid in diagnosis of common failure modes.

10. The Contractor will provide all the manuals and documentation in the same format containing no less than all the same type of information as currently being used by the on-site O&M team.

11. The Contractor will submit a draft of the required manuals to the on-site O&M team and the City Project Manager for their review and approval no later than 150 days prior to delivery of the first vehicle. The O&M team and City will review and return comments within 30 days of receipt. The contractor will coordinate the comments and incorporate the appropriate changes requested by the City and the O&M contractor. The contract will supply 2 complete hard copies and one electronic copy 60 days prior to the arrival of the first car. Following acceptance of the manuals and prior to Final Acceptance, the Contractor shall submit a minimum of ten (10) copies of the final manuals.

PM-19 RECOMMENDED SPARE PARTS LIST FOR NEW AGTS VEHICLES

Contractor shall develop an initial list of the required spare parts for the vehicles. This list will be discussed with the project manager and the APM consultant during the design submittal process. The final agreed upon list of parts will be delivered to DEN 120 days prior to the delivery of the first vehicle.

PM-20 DESIGN REVIEWS

The purpose of the design review is to build the confidence of both the City and the Contractor that the Contractor's designs, as implemented, will meet all the requirements of this Contract, and to exchange information regarding interfaces between the Contractor's and the City's other work. It will alert the Contractor to areas where requirements might not be met, in order that the Contractor may allow time for refinement of designs and thus avoid future delays and costs due to any re-work necessary to meet requirements.

None of the review comments provided by the City shall be interpreted as directives to the Contractor to carry out any work that is not required by this Contract.

A. Execution

There will be three levels of Design Reviews, Conceptual Design Review (CDR), Preliminary Design Review (PDR) and Final Design Review (FDR). The Contractor shall present all the submittal requirements outlined in the Contract Documents for the Design Reviews that are related to the Technical Specifications.

All printed, audio and/or video information presented for design review shall be in the English language. As the basis for the design reviews, the Contractor shall submit Design Review Data to document the designs of the System and subsystems, and to facilitate the review and understanding of such designs.

Unless otherwise specified, the Contractor shall submit five (5) copies of all printed matter, drawings, audio and/or video material as part of each Design Review Data package.

Schedules for submissions of the design review material shall be developed by the Contractor and approved by the City.

The City reserves the right to request additional Design Review Data as it, in its sole discretion, deems necessary, and the Contractor shall furnish such materials as requested. Additional information requested in writing by the City shall be provided by the Contractor within two weeks after receipt of a written request. In such cases the time allowed by the City for completing the design review shall be extended accordingly.

B. Procedure

The entire design review process shall begin and be completed within the time specified

in the approved detailed Contract Schedule. The schedule and content of each design review meeting will be developed jointly by the Contractor and the City. Contract compliance for some aspects of the System may be verified through review of analyses submitted by the Contractor as part of the design review process. At the time of the design reviews, the City will examine the design review material and, in its sole discretion, will make decisions regarding the extent of its applicability for contract compliance purposes.

After reviewing the material, the City will provide the Contractor its review comments on each submittal. If necessary, subsequent meetings shall be scheduled and organized by the Contractor for clarifying and discussing design issues.

The Contractor and the City will mutually develop and distribute an agenda of topics for such meetings in advance of the meeting date. If so requested, the Contractor shall present an overview of the design information at the meeting, using standard engineering drawings, specifications, catalog cuts and other similar material, and respond to comments raised by the City in its review. After the meeting, the City and Contractor will mutually identify any remaining problems to be resolved. Prior to termination of the design review meeting, a list of action items and assigned responsibilities will be mutually agreed upon between the City and the Contractor. Within thirty (30) days thereafter, the Contractor will prepare a memorandum Record of Design Review (RDR) to document the review questions, discussions, and resolutions.

Copies of each RDR will be forwarded to the City for its records. Any exceptions taken by the City to the information contained in the RDR shall be sent to the Contractor within 21 days after receipt; otherwise, the RDR shall stand as the official record of the design review process for the affected component and subsystem.

Any issues which cannot be resolved shall be identified as “critical issues” and carried as open items on the Contractor’s monthly progress report, along with a date for their ultimate resolution. Resolution of any dispute item arising during the design review process will be resolved in accordance with the provisions of the Contract regarding dispute resolution.

C. Location

Upon request, The City Project Manager may agree to design reviews being conducted at Bombardier’s facilities in Pittsburgh PA.

PM-21 SUBMITTALS

The Work specified in this Section summarizes the requirements for the submittal of documents to the City that are defined in these Contract Documents. It also describes the procedures for "supplemental" submittals.

1) Submittal Schedule

The Contractor shall provide a submittal schedule within fourteen (14) days after Notice to Proceed. The Submittal Schedule shall be directly related to the CPM Schedule and

the Work Breakdown Structure (WBS). It shall identify all the submittals, and shall include the following information for each submittal item:

A. CDRL line item reference, Contract Article, or Specification Section or Project Management Provisions.

B. Item description

C. Date the submittal shall be submitted

D. Name of subcontractor or supplier.

The submittal schedule shall be updated monthly by the Contractor and submitted with the progress payment request.

Unless stated otherwise, two (2) copies and one (1) CD of all submittals shall be furnished. Two-sided submittals will not be accepted.

2) Initial Submittal

Each submittal document shall include a title block showing the following information:

A. Date of submittal and revision dates

B. Contract title and number.

C. The names of Contractor, subcontractor, supplier, manufacturer and when applicable, the seal and signature of an engineer registered in the State of Colorado, for the involved discipline.

D. Identification of product by description, model number, style number or lot number.

E. Subject identification by contract drawing or specification reference.

F. Include a blank space on each sheet, three inches by four inches, in the lower right corner, just above the title block, in which the City may indicate the action taken.

G. Make submissions sufficiently in advance so that the City review may be completed not less than 30 days before Work represented by those submittals is scheduled to be performed.

H. Allow a minimum cycle of 30 days for review of each submittal by the City.

Accompany submittal documents with DEN transmittal form CM-30 that shall contain the following information:

1) Contractor's name, address, and telephone number.

2) Submittal number and date.

3) Contract title and number.

4) Supplier's, manufacturer's, or subcontractor's name, address, and telephone number.

5) Identification of variations from Contract Documents.

6) Contractor's stamp and signature certifying his review.

7) Identification of submittal:

1. If the submittal is being made on a Project Management Provisions, reference the Provision number.

2. If the submittal is being made under a specification section, reference the specification number, paragraph number and subparagraph number.

3. If the submittal is being made under a drawing, reference the drawing(s) number and sub number.

The Contractor shall at the time of submission describe variations from the contract documents in writing, separate from the submittal document. If the Project Manager approves any such variations, an appropriate contract change order shall be issued except that, if the variation is minor and does not involve a change in price or in time of performance, a modification need not be issued. If a submission contains variations and the variation column is not marked on the transmittal form, it will not be considered for review and acceptance. Along with marking the transmittal as a variation, a description must be included which outlines all the differences including maintenance and utility services along with any cost savings from an item not containing the variation.

Changes in accepted submittal documents will not be permitted unless those changes have been accepted, in writing, by the City.

An electronic copy of the CM-30 and CM-30 Supplement forms are available from the Project Manager.

3) Supplemental Submittals

Supplemental submittal documents initiated by the Contractor for consideration of corrective procedures shall contain sufficient data for review. Make supplemental submittals in the same manner as initial submittals with the appropriate primary transmittal referenced.

4) Execution

1. Contractor's Review

The Contractor shall review submittal documents, stamp and sign as reviewed and approved as complying with Contract Documents prior to submission to the City.

2. City Review

Submittal documents will be reviewed by the City, the City's APM Consultant and the Project Manager for conformance to requirements of the contract drawings and specifications. Review of a separate item will not constitute review of an assembly in which the item functions. The City will withhold approval of submittals that depend on other submittals not yet submitted. Review and acceptance will not relieve the Contractor from his responsibility for accuracy of submittals, for conformity of submittal document to requirements of contract drawings and specifications, for compatibility of described product with contiguous products and the rest of the system, or for protection and completion of the Contract in accordance with the Contract drawings and Specifications.

The City, APM Consultant, and/or the Project Manager will review the submittal documents for general conformance with the contract documents and mark the Action Code, sign, and date the transmittal.

The Action Codes have the following meanings:

1. **A - ACCEPTED** is an approval, and means that the illustration and description appears to conform to the respective requirements of the contract documents.

2. **B - ACCEPTED AS NOTED** is an approval, and means that the illustration and description will conform to the respective requirements of the contract documents after changes in recognition of the reviewer's comments. Submittals so marked need not be resubmitted.

3. **C - REVISE AND RESUBMIT** means that the submittal is unacceptable and must be revised and resubmitted.

4. **E - NOT ACCEPTED** means that the submittal is not approved and that a new submittal in accordance with the contract documents shall be made.

5. **F - RECEIPT ACKNOWLEDGED** means an item is received by the Project Manager but no review was made. This mark is for use in resubmitting items that were previously accepted as noted and the Contractor has incorporated the notes and wants the Project Managers' staff to have the same material that the Contractor's field staff is using.

5) Contractor's Responsibilities

Coordinate each submittal document with the requirements of the Work; place emphasis upon ensuring that each submittal of one trade is compatible with other submittals of that trade and submittals of other trades including producing as needed drawings showing the relationship of the work of different trades.

Contractor's responsibility for errors and omissions in submittal documents and associated calculations is not relieved by the City's review, correction and acceptance of submittals.

Contractor's liability to the City, in case of variations in the submittal document from the requirements of the contract documents, is not relieved by the City's review and acceptance of submittals containing variations unless the City expressly approves the deviation in writing, in which the City describes the variation.

The Contractor shall maintain a file of all approved submittal documents at the work site. The complete file of approved submittal documents shall be turned over to the City with the as-built documents at the end of the project.

Schedule impact due to resubmittal requirements is the responsibility of the Contractor.

PM-22 SHOP AND WORKING DRAWINGS, PRODUCT DATA AND SAMPLES

The Work specified in this section consists of preparing and submitting shop and working drawings, product data, samples and record documents required by the Technical Specifications. This information is to be submitted during the Design Review process as specified in the Contract Documents.

The Project Manager will return one copy of the shop drawings, working drawings and product data to the Contractor with a written transmittal within the time periods noted in the Contract documents.

The Contractor shall not submit as shop drawings copies or reproductions of drawings issued to the Contractor by DEN.
All submittals shall be delivered to the DEN Project Manager in electronic format. All submittals must be of a consistent format (all Acrobat or all Word, etc.). No combination of electronic file types will be allowed unless required by a specific specification section. If manufacturer's printed information is in color, all copies of submittals must be in color.

1. Acceptable electronic formats

1. Adobe Acrobat 8.0 or newer.

2. Microsoft Office 2007 or newer.

3. Autodesk AutoCAD 2007 or newer. All files shall be self-contained with no external x-references.

4. Other files pre-approved by the DEN Project Manager

5. Adobe Acrobat Requirements:

1. Drawings shall have security set to "No Security". Commenting, printing, adding photos, form fields and document signing must be allowed.

2. PDF submittals shall be one continuous file. No external links are allowed.

3. All individual components of submittals shall be bookmarked inside the PDF file.

4. All original documents shall be directly converted from the original electronic format to PDF. Scanning of files shall only be allowed by the DEN Project Manager when the original electronic information is not obtainable.

5. Failure to comply with these requirements will result in a return of file to the Contractor for immediate revision.

6. Quantities

1. Electronic files of each shop or working drawing, manufacturer's standard schematic drawings, manufacturer's calculations and manufacturer's standard data, manufacturer's printed installation, erection, application and placing instructions.

2. Two samples of each item specified in the various specification sections, unless otherwise specified

3. Electronic files of inspections and test reports.

4. Changes

Changes in products for which shop or working drawings, product data or samples have been submitted will not be permitted unless those changes have been accepted and approved in writing by the Senior Vice President of Operations.

5. Quality Control

Shop drawings and record documents shall be prepared to a high standard of quality such as that set forth in ASME Y14.100M, Engineering Drawing Practices, or other equivalent specification defining equal drafting quality for microfilming.

6. Shop and Working Drawings

Prepare shop and working drawings in a reproducible electronic format supporting a sheet size of 24 x 36 inches to a scale large enough to easily depict and annotate each of the drawing details.

Include the following as they apply to the subject:

a. Contract title, work order and number.

b. Respective contract drawing numbers.

c. Applicable specification section numbers.

d. Relation to adjacent structure or materials.

e. Field dimensions clearly identified as such.

f. Applicable standards such as ASTM or Federal Specification number, AASHTO and pertinent authority specifications or standards.

g. Identification of deviations from the contract specifications.

h. Drawing name, number and revision.

i. Contractor's stamp, initialed or signed, certifying:

1. Review of submittals for compliance with contract requirements.

2. Compatibility of the Work shown thereon with the DEN AGTS system.

Drawings of equipment and other items that contain multiple parts shall include exploded views showing the relationship of parts and the description of the parts into the smallest units that may be purchased or serviced.

A. Product Data

Modify manufacturer's standard and/or schematic drawings to delete information which is not applicable to the contract. Supplement standard information with additional information applicable to this contract.

Modify manufacturer's standard(s), diagrams, schedules, performance charts, illustrations, calculations, and other descriptive data to delete information which is not applicable to the contract. Indicate dimensions, clearances, performance characteristics and capacities. Include with the submittal electrical, HVAC and any other diagrams, as applicable.

Modify erection, application and placing instructions to delete information that is not applicable to the contract or work order.

Include the following:

- Contract title, work order and number
- Respective contract drawing numbers
- Applicable contract technical specification section numbers
- Applicable standards such as ASTM or Federal Specification number, FAA, AASHTO and pertinent authority specification or standards
- Identification of deviations from the contract specifications
- Contractor's stamp, initialed or signed, certifying:

1. Dimensional compatibility of the product with the space in which it is intended to be used

2. Review of submittals for compliance with contract requirements

3. Compatibility of the product with other products with which it is to perform,

or which will be next to it.

4. The products electrical, control and HVAC requirements conform to contract documents.

B. Samples

Submit samples of sizes and quantities to clearly illustrate full color range and functional characteristics of products and materials including attachment devices.

The Contractor shall verify, through appropriate inspections and tests, that the samples submitted meet the specifications and shall provide inspection and test data with the samples. The review and comments on the sample shall not relieve the Contractor of his responsibility for completion of the Contract.

Show the following information:

1) Contract title and number

2) Respective contract drawing numbers

3) Applicable technical specification section numbers

4) Applicable standards such as ASTM or Federal Specification number

5) Identification of deviations from the contract specifications

6) Contractor's stamp, initialed or signed, certifying:

1. Dimensional compatibility of the product with the space in which it is intended to be used

2. Review of submittals for compliance with contract requirements

3. Compatibility of the product with other products with which it is to perform, or which will be next to it

If multiple samples are submitted and the Project Manager is requested to make a choice, each sample shall have a unique identification number attached to it, so the returned transmittal can state the identification number of the accepted sample and the Contractor will know which one it is.

C. Review by the City

One copy of the marked-up shop and working drawing and one copy of the product data will be returned to the Contractor by the Project Manager. Only the transmittal form, appropriately marked, will be returned on sample submittals.

Contractor's responsibility for errors and omissions in submittals for compatibility will not be reduced, waived, or otherwise limited by the review and acceptance of

submittals by the City.

PM-23 CONTRACTOR QUALITY CONTROL

This section identifies the Quality Control activities to be performed during all phases of the Contract by the Contractor.

All materials required for the Contract shall be new except where specified otherwise. The Project Manager may elect to perform additional inspections and/or tests at the place of the manufacture, the shipping point or at the destination to verify conformance to applicable specifications. Inspections and tests performed by DEN shall not relieve the Contractor from the responsibility to meet the specifications, nor shall such inspections/tests be considered a guarantee for acceptance of materials that will be delivered at a later time.

The Contractor is obligated to correct or remove non-conforming materials, whether in place or not. If necessary, the Project Manager will send written notification to the Contractor to correct or remove the defective materials from the project. If the Contractor fails to respond, the Project Manager may order correction, removal and/or replacement of defective materials by others, in which case the Contractor shall bear all costs incurred by such actions.

Materials accepted based on a Certificate of Compliance may be sampled and inspected/tested by DEN or its designer at any time. The fact that the materials were accepted based on such certification shall not relieve the Contractor of his responsibility to use materials that conform to the specifications.

The Contractor shall impose upon his suppliers the same quality control requirements, including inspection and test procedures, as imposed upon him by the specifications and referenced standards. The Contractor shall apply appropriate controls, designed to ensure that all materials supplied meet the requirements and specifications.

The Contractor shall have in place his Quality Control Program as necessary to ensure that all materials and work are completed in compliance with Contract Documents. The Contractor is solely responsible for Quality Control except for those tests and/or audits that may be conducted by the City as defined in the Contract Documents. The Quality Control Program covers all wok on the contract including work performed at the Contractor’s manufacturing facility.

a. **Quality Control Plan**

Within ten (30) days after Notice to Proceed, the Contractor shall submit a Quality Control Plan for review and acceptance. Acceptance by the Project Manager does not relieve the Contractor of compliance with the Contract requirements. The Contractor Quality Control Plan shall address the following as a minimum:

a. The Contractor shall designate an employee as the Quality Control Manager qualified to perform quality control monitoring of the Work. The designated individual shall have the authority to direct work changes required to bring the

Work into conformance with contract requirements including stopping non-conforming work in progress.

b. Provide a general description of Quality Control monitoring to be performed starting from the initial design until final acceptance by DEN.

c. The Quality Control Plan shall address the technical specification requirements for quality control. The Contractor shall identify each item requiring submittal and approval/acceptance prior to installation of work. Also, the Contractor shall identify any element of work requiring testing by the independent testing agency.

d. The Quality Control Plan shall address and establish controls and documentation format to ensure that items or materials that have been accepted through receiving inspection are used or installed. Identification and traceability shall be provided throughout all inspections, test activities and records. For stored items, provisions shall be made for the control of item/material identification, consistent with the expected duration and type of storage.

e. Provide methodology of monitoring, testing, and exercising of all equipment, and/or assemblies to ensure the Work installed on the vehicle is in proper working order.

f. The Contractor shall submit a list of suppliers and subcontractors. This list shall include items to be supplied by each supplier and/or subcontractor and shall identify work to be performed by each subcontractor. The list shall be updated and resubmitted as required.

b. **Daily Quality Control Report**

a. Once work begins on-site at DEN, the on-site Quality Control representative will furnish the Project Manager with a daily report.

b. A Daily Quality Control Report shall be submitted on the form (form to be provided by the City). The Contractor may add sheets of information to this form as required. The report shall address as a minimum the following:

1. Identify number of workers on-site each day by project title.

2. Identify notifications and discussions with/by DEN Quality Assurance Inspectors, APM consultant and other agency inspectors,

3. Identify quality of work placed that day and any deviations and/or corrections required to bring the Work into conformance with the contract,

4. Daily reporting may not be computerized or typed. Only legible, hand written reports on the approved form shall be accepted,

5. Submit two copies of the Daily Quality Control Report to the Project Manager the day following the work. The report shall be signed by the Contractor's Quality Control Representative and the Contractor's Superintendent.

c. **Documentation**

The Contractor shall not change or alter approved submittals, procedures, specifications, drawings, or other pertinent documentation without the Project Manager's written authorization.

All records and documents that are quality related shall be prepared, identified, and maintained by the Contractor and shall be made available to DEN upon request.
The Contractor shall maintain records at the actual work site and at Contractor's office to show the inspection status of materials and items installed to ensure that the required inspections and tests have been performed in a timely and correct manner. Retention time for all quality records shall be not less than three years from date of Final Acceptance of the Contract.

PM-24 CONTRACT TEST AND INSPECTION PLAN

The Contractor shall develop an implementation, start up, testing and training plan for the vehicles to be used when the vehicles arrive at DEN. Preliminary inspection and testing plans will be submitted for initial review by DEN and the local Bombardier O&M team with the Final Design Review submittal. The final inspection and testing plan will be submitted to the DEN Project Manager for approval 90 days prior to the arrival of the first car. DEN, the O&M contractor and the APM consultant will provide comments to the Contractor within 30 days of receipt and the Contractor will coordinate the appropriate changes to the plan. The final approved plan will be in place at DEN no later than 30 prior to the start of on-site commissioning and testing of the first car(s).

The Contractor's startup and testing procedures shall include detailed descriptions of all pre-operational hardware, electrical, mechanical and instrumentation used for testing work. Each control device, item of electrical, mechanical and instrumentation equipment, and all control circuits shall be considered in the testing procedures which shall be designed in a logical sequence to ensure that all equipment has been properly serviced, aligned, connected, wired, calibrated, and adjusted prior to operation. The Contractor is advised that failure to observe these precautions may place the acceptability of the equipment in question, and he may either be required to demonstrate that the equipment has not been damaged, or replace it as determined by the Project Manager.

Testing procedures shall be designed on the final installed equipment system wherever possible. In case testing requires the simulation of functions, the test shall be designed to duplicate as close and realistic as possible all conditions of operations and shall be carefully selected to ensure that the equipment is not damaged. Once the Project Manager has accepted the testing procedures, the Contractor shall provide checkout, alignment, adjustment, and calibration signoff forms for each item of equipment and each system that will be used. The Contractor and the Project Manager shall use the signoff forms in the field jointly to ensure that each item of electrical, mechanical and

instrumentation equipment and each system has been properly installed and tested. Any special equipment needed to test equipment shall be provided to the City at no cost for a period of 30 days during startup.

Before starting up the equipment, the Contractor shall properly service it and other items, which normally require service in accordance with the maintenance instructions.

The Contractor shall be responsible for the startup, adjustment, preliminary maintenance and checkout of all equipment and instrumentation. All systems shall be carefully checked for conformance with the design criteria.

If any equipment or system does not operate as specified in the Contract, the Contractor shall immediately replace or repair components until it operates properly.

Prior to the start of the implementation, start up, testing and training plan of the vehicles a pre-work meeting will be held at the AGTS site office. The meeting will be to familiarize the project team and the on-site AGTS Operations and Maintenance team with how the vehicles will be tested, accepted, and integrated into the existing system. Quality Control and Safety representative(s), the DEN Project Manager and DEN APM consultant will attend.

The purpose of the meeting is to ensure that the Contractor’s personnel and the on-site operations personnel have no misunderstandings regarding their safety and quality procedures as well as the technical requirements of the contract and the individual work element to be performed. The following items shall be presented and reviewed by the Contractor:

1) A clear presentation of the work element and its impact to the operating system.

2) An identification of the risks associated with the work

3) A recovery plan if the work will impact the AGTS operation

4) Safety, security, and environmental precautions to be observed

5) Any other preparatory steps dependent upon the operation

6) The Contractor's means and methods for performing the Work.

The Contractor's designated Quality Control Representative shall inspect the work and shall ensure the work complies with the contract requirements prior to any requests for inspection or testing.

When the specifications, laws, ordinances, rules, regulations, or orders of any public agency having jurisdiction require the Project Manager's surveillance of inspections or tests, the Contractor shall notify the Project Manager of the place, date, and time 48 hours prior to the inspection and/or test. The Contractor shall be responsible for notifying and requesting inspection by other agencies including but not limited to the Denver Building Inspection Division, and Denver Fire Department.. Prior to request for

other agency inspections, the Contractor shall meet and plan inspection times with the Project Manager and or the Project Manager's designated representative.

Special inspections or tests may be required by the Technical Specifications, City, State, and/or Federal Agencies in addition to those tests already performed. The Contractor shall notify the Project Manager at least 48 hours in advance of the additional inspections or tests.

PM-25 DEN QUALITY ASSURANCE DURING MANUFACTURING, FABRICATION, ON SITE INSPECTION AND TESTING

This Section identifies DEN Inspection activities that may be performed by inspectors employed by DEN and working under the direction of the Project Manager.

Inspection and tests, conducted by persons or agencies other than the Contractor, shall not in any way relieve the Contractor of his responsibility and obligation to meet all specifications and the referenced standards and all the elements of the approved final design.

The inspection and approval of work by other agencies above does not constitute inspection or acceptance of work required by DEN.

The Project Manager may elect to perform additional inspections and/or tests at the place of the manufacture, the shipping point or at the destination to verify conformance to applicable specifications. Inspections and tests performed by DEN shall not relieve the Contractor from the responsibility to meet the specifications, nor shall such inspections/tests be a guarantee for acceptance of materials that will be delivered at a later time.

The Project Manager or his authorized representative may inspect at its source any material or assembly to be used in the Work. Manufacturing plants may be inspected periodically for determining compliance with specified manufacturing methods or materials to be used in the Work and to obtain samples for testing and further inspection.

Should the Project Manager conduct plant inspections the following conditions shall exist:

A. The Project Manager shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.

B. The Project Manager shall have full access during scheduled production or warehousing working hours to any part of the plant that are concerned with the design manufacture, production, storage, or shipping of materials being furnished under this contract.

C. The Contractor shall arrange for adequate office or working space that can reasonably be needed for conducting inspections or tests at the contractors or their suppliers facilities Office or working space shall be conveniently located with respect to the plant and/or warehouse as required by the Project Manager.

D. It is understood and agreed that DEN shall have the right to re-test at DEN's expense any materials that have been tested and accepted at the source of supply after it has been delivered to the site.

1) Inspections and Tests

It is understood and agreed that DEN shall have the right to take samples and perform testing of samples at different intervals or at intervals concurrent to the Contractor's testing program. The Contractor shall be issued a Nonconformance Report or a Remedial Action Request in the event DEN tests fail.

Materials accepted on the basis of a certificate of compliance may be sampled and inspected/tested by DEN or its consultant at any time. The fact that the materials were accepted based on such certification shall not relieve the Contractor of his responsibility to use materials that conform to the specifications.

DEN inspection can include but not be limited to Initial Inspection, Follow-up Inspection, Completion Inspection, Pre-Final Acceptance Inspection, and Final Acceptance Inspection.

2) Remedial Action Request (RAR)

The Project Manager will request the Contractor to take remedial action when nonconforming work is discovered and/or when test results indicate nonconforming work.

The Project Manager will document remedial action that cannot be taken immediately (the same day) by issuing a Remedial Action Request form to the Contractor. Remedial Action Requests are appropriate when the affected element of work is in-progress and discrepancies can be rectified as the work proceeds. RAR's shall be written when work can be brought back into conformance with the contract documents.

When issued, a Remedial Action Request will preclude payment for elements noted and will remain in effect until corrective actions have been submitted, approved, and performed.

Upon satisfactory completion of the remedial action, the Contractor shall transmit the RAR form with the Contractor's statement of action taken (including any applicable test results) to the Project Manager. The Project Manager will perform a follow-up inspection to verify the RAR has been satisfactorily completed. The RAR then will be closed.

3) Nonconformance Report (NCR)

The Project Manager will issue a Nonconformance Report to the Contractor whenever there are violations of the terms of the contract that cannot be immediately brought back into conformance, including materials received and/or items of the work found not to be in conformance with Contract requirements. When issued, a Nonconformance Report will preclude payment for elements noted and will remain in effect until

corrective actions have been submitted, approved, and performed.

The Nonconformance Report form will describe the nature and extent of nonconforming elements and will include space for the Contractor's corrective action proposal, the designer's review of the Contractor's proposal, reinspection and/or verification of approved corrective rework and a space for the Project Manager's disposition of the nonconformance matter. Copies of the Nonconformance Report, at each step of its processing (i.e., initial issuance to Contractor through final disposition) will be sent to the Project Manager.

The Project Manager will make the disposition of nonconforming items/materials.

The Contractor is obligated to correct any item deemed deficient.

PM-26 DELIVERY AND ON-SITE TESTING OF AGTS CARS

The AGTS vehicles manufactured by the Contractor shall be delivered by the Contractor F.O.B. Denver International Airport in accordance with the delivery schedule set forth in Exhibit F. Once received and commissioned the contractor can begin the on-site testing per the approved test plans. DEN and their APM consultant may at any time participate and witness the testing. These tests are all required to be successful and complete prior to substantial completion for each vehicle. The Contractor shall be present during the testing and start up period with adequate labor and support personnel to adjust equipment and troubleshoot system failures that might arise.

1. Tests shall be as specified in the Contractors approved WBS and shall be made to determine whether the equipment has been properly assembled, aligned, and connected. Any changes, adjustments or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the work.

2. At least 30 days before the time allowed in the contract schedule for commencing startup and testing procedures, the Contractor shall submit to the Project Manager two copies of the final detailed procedures of the test and startup plan. These procedures are submitted for the final review and acceptance.

PM-27 SUBSTANTIAL COMPLETION

The City shall issue to the Contractor a Certificate of Substantial Completion on a vehicle by vehicle basis when all of the requirements of the contract documents have been met, including but not limited to the following conditions:

1. The successful completion of the on-site test
2. A final punch list for the vehicle has been accepted by DEN
3. The State inspector has been informed and deemed operation acceptable
4. Initial testing and commissioning is complete
5. Adequate spare parts are on site at DEN
6. The vehicle has run a continuous 30 days in revenue demonstration without failure

7. The contractor and the DEN Project Manager mutually agree the unit is ready for service

   The form of a Certificate of Substantial Completion is Exhibit H of the contract documents Certificates of Substantial Completion may be issued for more than one vehicle at a time if approved by the Project Manager. Issuance of a Certificate of Substantial Completion shall indicate that the City may use the AGTS Car(s) for their intended purpose of transporting passengers; however, the Contractor shall be responsible for completing the outstanding items noted on the Certificate of Substantial Completion and the Operational Demonstration requirements. The start of the demonstration period will be the start of the warranty period for that vehicle or vehicles. If the demonstration period fails, the warranty will start over when the vehicle begins the demonstration period again.

PM-28 OPERATIONAL DEMONSTRATION

Each vehicle's Operational Demonstration period can begin after it has been issued a Certificate of Substantial Completion. During this demonstration period all hardware, electrical and mechanical equipment, communications, alarm systems and associated devices shall be energized and operated under local and automatic controls. The Contractor shall be present during the demonstration period with adequate labor and support personnel to adjust equipment and troubleshoot system failures that might arise.

1. During the demonstration period each new vehicle must be incorporated into the DEN AGTS system and operated as part of the normal pinched loop operation and shuttle mode. During its demonstration period, each new vehicle must be operated for at least 300 hours in regular loop service and used as a lead, trail, and middle car, for substantially equal amounts of time during the thirty (30) day Operational Demonstration period.

2. During the 30-day Operational Demonstration period, if any new vehicle experiences more than (3) failures which cause it to be removed from service, a new 30-day Operational Demonstration period will commence when the vehicle is returned to service after repair following the 4th such failure.

3. If a new vehicle has less than (4) failures causing its removal from service during its Operational Demonstration, but has been operated in service for less than 300 hours in regular loop service, the Operational Demonstration period for that vehicle will be extended until the vehicle has been successfully operated for at least 300 hours in regular loop service and has not experienced more than 3 failures which require its removal from service. If a vehicle experiences a 4th failure causing its removal from service during any such extension of the Operation Demonstration, then the 30-day demonstration period will re-commence as described in subsection (2) above.

4. Successful completion of the Operational Demonstration shall be required before a new vehicle shall be eligible for final acceptance. Final payment will not be made until all the AGTS vehicles have successfully completed the Operational Demonstration. Repairs to vehicles during Operational Demonstration shall be at Contractor's cost, except for repair of damage from vandalism, use, or another cause other than equipment failure.

PM-29 FINAL COMPLETION

The city shall issue to the Contractor a Certificate of Final Completion when the Contractor has satisfactorily completed the delivery and the City has accepted all items required by the contract documents, all vehicles have successfully completed their operational demonstration period and when all punch list items have been cleared. A form of the Certificate of Final Completion is Exhibit I of the contract documents. A single Certificate of Final Completion will be issued for all the AGTS vehicles, and not issued separately for one or more individual vehicles. For Final Completion all shop manuals plus special tools will need to be on site and all training shall be completed.

PM-30 USE OF AGTS VEHICLES

No passengers shall be transported on any AGTS Car until the City issues a Certificate of Substantial Completion for such AGTS Car.

PM-31 ACCEPTANCE

When the term “acceptance” is used in this Contract with reference to the AGTS vehicles, it shall mean the issuance by the City of a Certificate of Substantial Completion for one or more of the AGTS vehicles or of a Certificate of Final Completion.

Any changes, adjustments or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the work.

1) Systems Start-up, Testing and Demonstration Period

After adequate spare parts are on site at DEN, training has been completed, all shop manuals, and special tools are on site and the Contractor has satisfied himself the vehicle is ready for service then the Contractor can begin the 30-day in revenue service demonstration period. During this demonstration period all hardware, electrical and mechanical equipment, communications, alarm systems and associated devices shall be energized and operated under local and automatic controls. The Contractor shall be present during the startup period with adequate labor and support personnel to adjust equipment and troubleshoot system failures that might arise.

When a piece of electrical or mechanical equipment is found to be in conflict with conflict with specific criteria, an experienced representative of the manufacturer shall make an adjustment to the item.

If adjustments fail to correct the operation of a piece of equipment or fixture, the Contractor shall remove the equipment or fixture from the project site and replace it with a workable replacement that meets the specification requirements.

The Contractor shall submit a test report to the Project Manager within 30 days after completion of the 30-day demonstration period

Final Instructions and Operations Training
The City can at their discretion participate in all training sessions provided to the O&M

Contractors personnel. The Contractor will provide the City ten (10) days' notice of all training sessions. The City may send up to four individuals to the training sessions.

PM-32 CONTRACT RECORD DOCUMENTS

The Work specified in this Project Management Provision consists of maintaining, marking, recording, and submitting contract record documents which include shop drawings, warranties, contract documents, software documentation and contractor records.

2) Maintenance of Documents

The Contractor shall maintain at the work site on a current basis one record copy of all as-built drawings, specifications, addenda, change orders, approved design review documents, working drawings, product data and samples in good order and marked currently to record all changes made during execution of the Work.

The "as built" configuration of all hardware and software which are upgrades to or deviations from the current configuration shall be documented in detailed drawings, documents, notes, and other descriptive material as defined herein.

As Work Progresses. The Contractor shall keep a complete and accurate field and manufacturing plant record of all changes or deviations from the final approved design. the Contractor's subsystem and Contract Technical Specifications the Contractor's approved construction and equipment top level assembly drawings, and similar documents, indicating the Work as actually fabricated and installed. All such changes shall be neatly and correctly shown on the blackline prints of the manufacturing drawings affected, or in the Contract with appropriate supplemental notes. All such changes shall be tracked by the Contractor's established configuration control procedures for top level assembly drawings. This set of Record Documentation shall be kept at the manufacturing plant and job site during fabrication and installation into the DEN AGTS. At the conclusion of the Work, the as-built records shall be consolidated, organized, cataloged, and submitted to the City.

Mark-up Procedure. During progress of the Work, the Contractor shall maintain a black-line set of Record Documentation for any field construction work, with mark-up of actual work which varies substantially from the work as originally shown. The Contractor shall mark whatever document is most capable of showing the actual condition, fully and accurately. Where equipment assembly or installation drawings are affected, the Contractor shall mark cross-references on contract drawings at the corresponding locations. Marks shall be made with erasable colored pencil, using separate colors where feasible to distinguish between changes for different categories of work at the same general location. Mark-up shall include important additional information which was either shown schematically or omitted from original drawings. Particular attention shall be given to information on work cancelled, which would be difficult to identify or measure and record at a later date. Alternate numbers, change order numbers and similar identification shall be noted.

On Completion of the Work. Not later than 120 days after the date of Substantial

Completion, and as a condition of Final Acceptance, the Contractor shall deliver to the City: two (2) complete hard-copy sets, one (1) complete reproducible set, and, and the CADD Electronic Submittal in AutoCAD version 14 (or newer) in approved size and format, of top level assembly drawings, design specifications, and design documents (the "as-built deliverables"). These as-built deliverables shall be complete in every detail so as to correctly reflect as-built conditions. The as-built deliverables shall be segregated into two groups: (1) non-proprietary, and (2) proprietary. The "non-proprietary" documents shall describe all aspects of the site installation work and conditions and all commercially available items/products. (A "commercially available" product is one designed and produced for a multiplicity of other purposes and is not unique to the Contractor's transit system technology that is being applied for the System.)

For all "commercially available" items (including software), the as-built deliverables shall include the purchase specifications, the names, and addresses of the Original Equipment Manufacturers (OEM's) from which the items were purchased (i.e., contractors or otherwise), the OEM's identifying information/model numbers for reordering, and a complete set of the documentation supplied by the OEM with the items.

The "proprietary" documents shall provide all the necessary design information (except for production tooling and manufacturing process design) to operate and maintain all subsystems, equipment and components that are not unique to the System. By unique to the System, it is meant that the item was designed specifically by or for the Contractor, for use in either the System or the Contractor's basic system from which the System design was derived. "Proprietary," as distinct from "commercially available," shall mean that the design of the subsystem, equipment or component was not carried out under this Contract, or other contract with the City, or a federally funded contract but that such designs were included in the Contractor's development of the items as part of the Contractor's basic system technology that it is applying under this Contract as part of the System.

Certification of As-Built. The above as-built drawings and documents shall be arranged in accordance with the accepted Work Breakdown Structure and properly indexed. The Contractor shall certify that each of the revised as-built drawings and documents is complete and accurate.

3) Monthly Review

Prior to any application for payment, the Project Manager or his designated representative will inspect the record documents to ensure that they are being maintained and contain the most current correct data with particular attention to as-built drawings.

If, during the inspection, the Project Manager determines that the documents are not being maintained and kept current as to as-built conditions, an amount may be withheld from the payment request and deducted from the contract value to cover the City's cost of collecting and recording the as-built contract data. This cost will be determined on the basis of $100.00 per man-hour of effort.

The As-built record contract documentation shall be submitted prior to Substantial Completion for each vehicle.

Each submittal of record documents shall be marked “PROJECT RECORD” and contain the following information:

1. Date
2. Project title and numbers
3. Contractor's name and address
4. Title and number of each record document
5. Certification that each document as submitted is complete and accurate
6. Signature of the Contractor or his authorized representative
7. At the completion of this contract, deliver all record documents including the following:

    1. As-built shop drawings, diagrams, illustrations, schedules, charts, brochures, and other similar data.
    2. Project Technical Specifications and drawings shall be legibly marked to record:
    3. Manufacturer, trade name, catalog number and supplier of each product and item installed
    4. Changes made by change orders, requests for information, substitutions and variations approved by submittals.
    5. Warranties, guarantees and bonds
    6. Documents including the record of delivery of software to the required escrow noted below
    7. Contractor records.

4) Software and as built documentation for software

Software and as-built documentation for software is to be delivered to the Guard-IT escrow account. The Contractor is to coordinate this activity with the City Project Manager.

Special attention shall be given to documentation procedures for all computer software programs supplied. For all software unique to the System and not commercially available, the as-built documentation shall include, at a minimum, functional, performance and interface requirements; descriptions of the supervisory, control, and operating software; source listings; flow charts; configuration control documentation; and programmer and user manuals incorporating appropriate modification and control

procedures, including the name of any subcontractor if employed for preparation of this software.

The Contractor shall for the benefit of the City also retain possession of the as-built documentation for software which is not commercially available and which is necessary for the operation and maintenance of the AGTS in a separate file and shall allow an authorized representative of the City to inspect that file at any time upon reasonable notice. Such documentation shall be kept up to date and shall include any upgrades or modifications which have been or are in the future incorporated in software programs which are used to operate the System.

For all commercially available software used, the as-built documentation shall include all of the documentation which is available from the supplier for such software. One (1) reproducible master and two (2) copies of all programmer and user manuals and other similar material will be provided to the City with the as-built drawings and documents along with a complete and fully documented listing of all software programs (one (1) copy on tape, two (2) printed copies).

5. Upon the occurrence of any of the conditions specified below, the software and proprietary documentation which is not commercially available shall be delivered to the City at no cost as soon as reasonably possible:

1) The commencement of any case or proceedings, whether voluntary or involuntary, under any applicable Federal or State bankruptcy, insolvency, reorganization, or other similar law.

2) The Contractor ceases to provide APM Systems of an equivalent quality and capability to the one being upgraded under this Contract.

3) The Contractor is acquired by or merges with another entity which does not have the capability to build, operate and maintain the AGTS Systems of the same quality as that provided by the Contractor.

At such time as the proprietary software and documentation is turned over to the City, the City shall have the right and license to use it or allow any party to use same for the operation, maintenance and repair of the System and completion of the Work under the Contract. However, the City may not sell the proprietary As-Built Deliverables or allow any party to use the same for any other project without the Contractor's written approval. Contractor shall continue to have the full and complete right to use the software in any manner it chooses.

The parties may enter into a separate software escrow agreement to accomplish the requirements of this section, or they may include the software covered by this Contract in any existing software escrow agreement between the parties which involves AGTS software.

PM-33 STANDARD FORMS

1) Forms

The forms listed below and appended to this Section will be used for performance of the Work as indicated. This is not a complete listing of all required forms. The Contractor shall properly complete all forms required by the contract or the Project Manager. The Project Manager shall review and approve all submitted forms. If submitted forms are not acceptable the Contractor shall resubmit forms in an acceptable format.

2) Appendices

Attached to these Project Management Provisions are the following forms:

- Contractor's Daily Activity Report (Form CM-13) (1 Page)
- Request for Information (Form CM-17) (1 Page)
- Pay Application Form (Form CM-18) (1 Page)
- Contractor's Certification of Payment (Form CM-19) (1 Page)
- Subcontractor Partial Lien Release (Form CM-26) (1 Page)
- Subcontractor Final Lien Release (Form CM-70) (1 Page)

DENVER INTERNATIONAL AIRPORT

Contractor's Daily Activity Report

Contract/Task Name:

Contractor: _____ Contract No.: _____

Date: _____

Prepared by: _____ Report No.: _____

Weather: ☐ Sunny ☐ Fair ☐ Cloudy ☐ Rain _____ inches ☐ Snow _____ inches

Max. Wind: _____ mph Max/Min Temp. _____ deg F/ _____ deg F

DAILY ACTIVITIES WITH LOCATION SHIFT START _____ STOP _____	LOAD COUNTS	COMPLIES WP&S YES	NO

QUANTITY COMPLETE	**MAJOR SHIPMENTS RECEIVED**

									EQUIPMENT AT SITE		
									DESCRIPTION	**NO.**	**HRS.**
Subcontractors											
Crafts											
PERSONNEL											
Work Delayed and Reason											
Rework and Reason											
Potential Future Delays											
Problems and Unusual Conditions									**UNDER REPAIR**		
Direction Received											

CERTIFIED BY (signature required):

Contractor QC Representative: _____

Contractor Superintendent: _____ Page ____ of _____

NOTE: This report must be completed with legible handwriting and submitted to the City and County of Denver Project Manager with original signatures. Use a separate sheet per shift.

FORM CM-13

Rev. September 2015

DENVER INTERNATIONAL AIRPORT

REQUEST FOR INFORMATION

RFI No.:

Contract/Task Order No.:
Contract/Task Order Name:
Contractor:
Subcontractor:
Site Location:

To be completed by DIA	
Date Received:	
Time Received:	
Log Date:	
Response Due:	
Logged by:	

Subject:

Drawing No:
Detail No:
Specification No:
Section No:

Urgent: Yes ☐ No ☐
Date Requested (if urgent):
Potential Cost Impact: Yes ☐ No ☐
Potential Schedule Impact: Yes ☐ No ☐
If yes to cost/schedule impact please explain in request or solution

Request / Issue / Question:

Proposed Solution from Contractor:

Reviewed By: Date:

Response by Project Manager:

Solution by: Date:	Reviewed By: Date:
Contractor cc:	Incoming Attachments:
DIA cc:	Outgoing Attachments:

FORM CM-17
REQUEST FOR INFORMATION

INSTRUCTIONS

Purpose: A Request for Information (RFI) is used to request clarification regarding any portion of the Contract Documents. An RFI is the formal communication tool between Contractor and Project

Application: The Contractor uses this form when initiating a request for information. Other participants in the Project may also use the RFI to obtain a clarification of the Contract Documents.

Response: Unless otherwise advised by the Project Manager (PM), a routine response to an RFI will be provided within 30 days. If the matter is critical, potentially imposing immediate delay or work stoppage, a response in less than 30 days may be requested.

The following instructions correspond to the numbers provided on the form. Items 1 through 21 are normally prepared by the Contractor. The DIA PM responds with Items 22.

Instructions:

1. Insert the Contract / Task Order number
2. Insert the name of the Contract / Task Order
3. Insert the name of the Contractor
4. Insert the name of the Subcontractor
5. Insert the name of the Subcontractor
6. Insert the name of the site/building/room related to the RFI
7. Breif description or title of the RFI
8. Insert related drawing number(s)
9. Insert related detail number(s)
10. Insert related specification number(s)
11. Insert related section number(s)
12. Indicate in the appropiate box if response is urgent
13. Insert desired date for response if YES is selected for No. 12
14. Indicateif the issue may have a cost implacation
15. Indicate if the issue may have a impact to the schedule
16. Describe the required information sufficient for response without further clarification or communication.
17. Describe any proposed solution to the issue
18. Requestor signs
19. Insert date of requestor signature
20. Insert the names of any courtsey copies
21. Indicate if there are attachments
22. The DIA Project Manager responds to the information request with sufficient detail so that further clarification or communication is unnecessary. Attach detailed clarification or sketches, as required, including information prepared by the design consultant.
23. Designer of Record signs
24. Insert date of Designer of Record signature
25. Project Manager signs
26. Insert date of Project Manager signature
27. Insert the names of any courtsey copies
28. Indicate if there are attachments
29. Insert the date when received
30. Insert the time when received
31. Insert the date when logged
32. Insert date when response is due
33. Insert who logged the RFI

DENVER INTERNATIONAL AIRPORT
REQUEST FOR INFORMATION

RFI No.: (6)

Contract/Task Order No.: (1)
Contract/Task Order Name (2)
Contractor: (3)
Subcontractor: (4)
Site Location: (5)

To be completed by DIA

Date Received:	(29)
Time Received:	(30)
Log Date:	(31)
Response Due:	(32)
Logged by:	(33)

Subject: (7)

Drawing No: (8) Urgent: (12) Yes ☐ No ☐
Detail No: (9) Date Requested (if urgent): (13)
Specification No: (10) Potential Cost Impact: (14) Yes ☐ No ☐
Section No: (11) Potential Schedule Impact: (15) Yes ☐ No ☐

If yes to cost/schedule impact please explain in the request or solution

Request / Issue / Question:
(16)

Proposed Solution from Contractor:
(17)

Reviewed By: (18) Date: (19)

Response by Project Manager:
(22)

Solution by: (23)	Date: (24)	Reviewed By: (25)	Date: (26)
Contractor cc: (20)		Incoming Attachments: (21)	
DIA cc: (27)		Outgoing Attachments: (28)	

CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION
DENVER INTERNATIONAL AIRPORT

Date of Invoice: _____
Contract No.: _____
Contract Title: _____
Contractor: _____
Application for Progress Payment No.: _____
For the Period: _____ to _____

CONTRACT
APPLICATION FOR PROGRESS PAYMENT
SUMMARY AUTHORIZATION

CONTRACTOR:

I hereby warrant that:

1) The title to the Work covered by this estimate of Work completed will pass to the City by incorporation into the completed work.
2) The Work covered by previous estimates of Work completed is free and clear of liens, claims, security interests or encumbrances, except for any interest created by retainage.
3) No Work covered by this estimate of Work completed is subject to an agreement under which an interest therein, or an encumbrance thereon, is retained by the seller or otherwise imposed by the Contractor or any other person or entity.
4) All subcontractor payments have been reported within the B2G system as required by the Procedures for Payment.

SIGNATURE / TITLE _____ DATE _____

CITY AND COUNTY OF DENVER:

I hereby certify that, to the best on my knowledge this payment application represents a true and correct statement of the work performed and is in conformance with the terms of the Contract documents.

___, Project Manager - OPS _____ DATE _____

___, Director - OPS _____ DATE _____

CC: ___, SVP - AIM

CM-18 Rev. September 2015

CONTRACT STATUS

			TOTAL CONTRACT	CURRENT APPLICATION	PREVIOUS PAYMENT
a)	ORIGINAL CONTRACT AMOUNT				
b)	PREVIOUS CHANGE ORDERS				
	NOS.	(+ or -)			
c)	NEW CHANGE ORDERS				
	NO.	(+ or -)			
	NO.	(+ or -)			
	NO.	(+ or -)	$ -		
d)	ADJUSTED TOTAL CONTRACT		$ -		
	d = [a + b + c]				
e)	PREVIOUS EARNINGS				
f)	EARNINGS THIS APPLICATION				
g)	TOTAL CURRENT EARNINGS				
	g = [e + f]		$ -		
h)	TO COMPLETE h = [d - g]		$ -		
i)	PREVIOUS RETENTION	5%			$ -
j)	RETENTION THIS APPLICATION	5%		$ -	
k)	TOTAL RETENTION				
	k = [i + j]		$ -		
l)	OTHER DEDUCTIONS				
m)	BALANCE DUE ON CONTRACT				
	m = [h + k + l]		$ -		
n)	TOTAL PREVIOUS PAYMENTS				
	n = [e - i - l]				$ -
o)	PAYMENT THIS APPLICATION				
	o = [f - j - l]			$ -	

Note: Items a, b, c, d, g, h, k and m amounts - place only in TOTAL CONTRACT column.

CONTRACTOR'S CERTIFICATION OF PAYMENT

CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION

CONTRACT / TASK NAME:

CONTRACT NO.:

CONTRACTOR NAME:

PAYMENT NO.:

TELEPHONE NO.:

CONTRACT ENCUMBRANCE NO.:

PROJECT MANAGER:

CURRENT COMPLETION DATE:

ORIGINAL CONTRACT / TASK ORDER AMOUNT: $

PERCENT COMPLETE:

REVISED CONTRACT AMOUNT THRU C.O. NO. : $

SUBCONTRACTOR	TIER OR SUPPLIER	SUBCONTRACTOR PERSON TO CONTACT	SUBCONTRACTOR TELEPHONE NO.	SUBCONTRACT AMOUNT ($)	DBE, SBE or NON	PERCENT OF ORIGINAL CONTRACT	PERCENT OF REVISED CONTRACT	NET PAID TO DATE ($)	NET PAID PERCENT COMPLETE	NET DUE THIS MONTH ($)

( ) Check here if all undisputed CERTIFIED PAYROLLS have been submitted to the CITY AUDITOR for this Pay Application

( ) Check here if copies of documentation for all disputed CERTIFIED PAYROLLS for this Pay Application have been attached

The undersigned certifies that the information contained in this document is true and accurate and that the payments shown have been made to all subcontractors and suppliers used on the project and listed herein.

Contractor Name (print): _____ Date: _____

Contractor Signature: _____ Page _____ of _____

Form CM-19

Revised September 2015

DENVER INTERNATIONAL AIRPORT
PARTIAL LIEN RELEASE – CONSTRUCTION
(Subcontractor)

Project: _____ Date: _____

City Contract No. _____ Current Subcontract Amount: $_____

FROM:
Subcontractor _____

Address: _____

City/State: _____

Telephone: _____

TO:
Contractor _____

Address: _____

City/State: _____

(1) Last Progress Payment for billing period ending _____ 20___
$_____

(2) Progress invoiced for previous billing period (if unpaid) _____ 20___
$_____

(3) Progress invoiced for current billing period ending _____ 20___
$_____

(4) **Total Paid to Date:**
$_____

( ) MBE/WBE ( ) SBE ( ) DBE ( ) Non

The undersigned Subcontractor hereby (1) acknowledges receipt of the progress payment referred to above as the Last Progress Payment which, when added to the total of all previous progress payments, constitutes full payment, less retainage, for all labor, services, material and supplies which the undersigned has provided for use in and upon the project described above through _____, 20____ and, (2) hereby releases the Contractor, surety, the City and County of Denver, and any intermediate subcontractor or supplier of any tier from any and all claims prior to the above mentioned date, except for the withheld retainage.

The Subcontractor also hereby agrees that the Contractor, Surety, the City and County of Denver, and any intermediate subcontractor or supplier of any tier shall be released from any and all claims arising out of its performance or non-performance of any contract associated with the above project through _____, 20____, except for withheld retainage after it has received full payment, less retainage, of the amount invoiced for the current billing period.

Subcontractor: _____

Certified by: _____

Title: _____

Date: _____

DENVER INTERNATIONAL AIRPORT
FINAL LIEN RELEASE – CONSTRUCTION
(Subcontractor)

Project: _____ Date: _____

City Contract No. _____ Subcontractor Contract No. _____

Dated: _____, 20 ___

FROM:
Subcontractor: _____ (1) Last Progress Payment for billing period ending _____, 20 ___

Address: _____ $_____

City/State: _____ (2) Does not apply

Telephone: _____

TO:
Contractor: _____ (3) Does not apply

Address: _____

City/State: _____ (4) **Total Paid to Date:**

$_____

( ) SBE ( ) DBE ( ) MBE ( ) WBE ( ) Non

The undersigned Subcontractor hereby (1) acknowledges receipt of the progress payment referred to above as the Last Progress Payment which, when added to the total of all previous progress payments, constitutes full payment for all labor, services, materials and supplies which the undersigned has provided for use in and upon the project described above through _____, 20____ and, (2) hereby releases the Contractor, Surety, the City and County of Denver, and any intermediate subcontractor or supplier of any tier from any and all claims prior to the above mentioned date.

The Subcontractor also hereby agrees that the Contractor, Surety, the City and County of Denver, and any intermediate subcontractor or supplier of any tier shall be released from any and all claims arising out of its performance or non-performance of any contract associated with the above project.

Subcontractor: _____

Certified by: _____

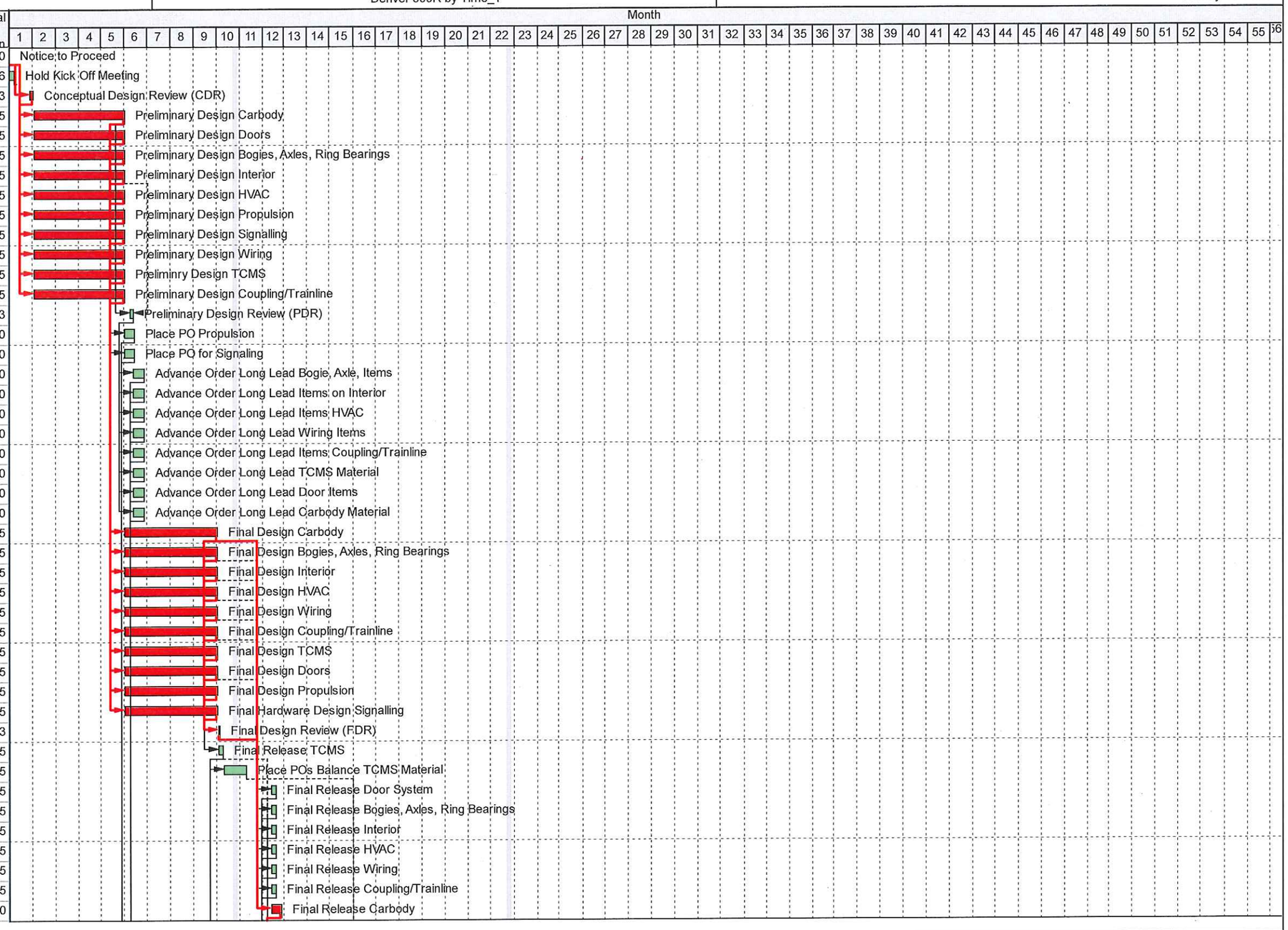
Title: _____

Date: _____

EXHIBIT F

New Vehicle Project (300R) | Denver 300R by Time_1 | 03-May-18 14:29

Activity ID	Activity Name	Original Duration
A1190	Notice to Proceed	0
A2310	Hold Kick Off Meeting	6
A1080	Conceptual Design Review (CDR)	3
A1000	Preliminary Design Carbody	85
A1010	Preliminary Design Doors	85
A1020	Preliminary Design Bogies, Axles, Ring Bearings	85
A1030	Preliminary Design Interior	85
A1040	Preliminary Design HVAC	85
A1450	Preliminary Design Propulsion	85
A1490	Preliminary Design Signalling	85
A1560	Preliminary Design Wiring	85
A1830	Preliminry Design TCMS	85
A1840	Preliminary Design Coupling/Trainline	85
A1100	Preliminary Design Review (PDR)	3
A1460	Place PO Propulsion	10
A1530	Place PO for Signaling	10
A1240	Advance Order Long Lead Bogie, Axle, Items	10
A1300	Advance Order Long Lead Items on Interior	10
A1360	Advance Order Long Lead Items HVAC	10
A1570	Advance Order Long Lead Wiring Items	10
A1760	Advance Order Long Lead Items Coupling/Trainline	10
A1850	Advance Order Long Lead TCMS Material	10
A1910	Advance Order Long Lead Door Items	10
A1930	Advance Order Long Lead Carbody Material	10
A1110	Final Design Carbody	85
A1260	Final Design Bogies, Axles, Ring Bearings	85
A1320	Final Design Interior	85
A1380	Final Design HVAC	85
A1590	Final Design Wiring	85
A1780	Final Design Coupling/Trainline	85
A1870	Final Design TCMS	85
A1090	Final Design Doors	85
A2320	Final Design Propulsion	85
A2330	Final Hardware Design Signalling	85
A1120	Final Design Review (FDR)	3
A1990	Final Release TCMS	5
A1880	Place POs Balance TCMS Material	15
A1050	Final Release Door System	5
A1270	Final Release Bogies, Axles, Ring Bearings	5
A1330	Final Release Interior	5
A1390	Final Release HVAC	5
A1600	Final Release Wiring	5
A1790	Final Release Coupling/Trainline	5
A1130	Final Release Carbody	10



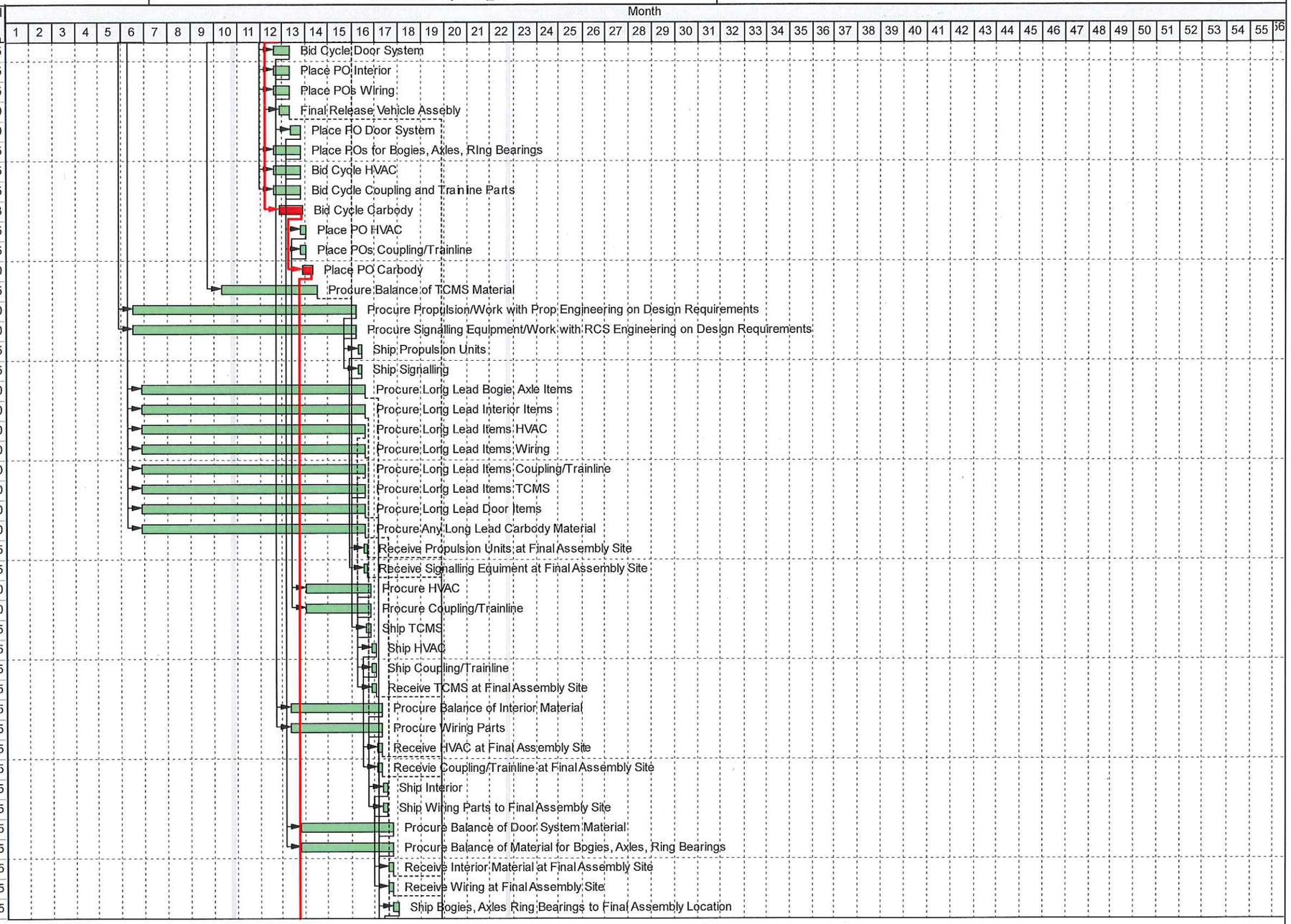
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

PRELIMINARY **Bombardier Transportation**

Denver 300R Vehicle Proposal Schedule

New Vehicle Project (300R) | Denver 300R by Time_1 | 03-May-18 14:29

Activity ID	Activity Name	Original Duration
A1060	Bid Cycle Door System	15
A1430	Place PO Interior	15
A1610	Place POs Wiring	15
A1500	Final Release Vehicle Assebly	10
A1070	Place PO Door System	10
A1420	Place POs for Bogies, Axles, RIng Bearings	25
A1970	Bid Cycle HVAC	25
A1980	Bid Cycle Coupling and Trainline Parts	25
A1160	Bid Cycle Carbody	23
A1400	Place PO HVAC	5
A1800	Place POs Coupling/Trainline	5
A1140	Place PO Carbody	10
A1890	Procure Balance of TCMS Material	85
A1470	Procure Propulsion/Work with Prop Engineering on Des	200
A1540	Procure Signalling Equipment/Work with RCS Engineeri	200
A1480	Ship Propulsion Units	5
A1550	Ship Signalling	5
A1250	Procure Long Lead Bogie, Axle Items	200
A1310	Procure Long Lead Interior Items	200
A1370	Procure Long Lead Items HVAC	200
A1580	Procure Long Lead Items Wiring	200
A1770	Procure Long Lead Items Coupling/Trainline	200
A1860	Procure Long Lead Items TCMS	200
A1920	Procure Long Lead Door Items	200
A1940	Procure Any Long Lead Carbody Material	200
A1485	Receive Propulsion Units at Final Assembly Site	5
A1555	Receive Signalling Equiment at Final Assembly Site	5
A1410	Procure HVAC	60
A1810	Procure Coupling/Trainline	60
A1900	Ship TCMS	5
A1440	Ship HVAC	5
A1820	Ship Coupling/Trainline	5
A1905	Receive TCMS at Final Assembly Site	5
A1340	Procure Balance of Interior Material	85
A1620	Procure Wiring Parts	85
A1445	Receive HVAC at Final Assembly Site	5
A1825	Recevie Coupling/Trainline at Final Assembly Site	5
A1350	Ship Interior	5
A1630	Ship Wiring Parts to Final Assembly Site	5
A1210	Procure Balance of Door System Material	85
A1280	Procure Balance of Material for Bogies, Axles, Ring Bea	85
A1960	Receive Interior Material at Final Assembly Site	5
A1635	Receive Wiring at Final Assembly Site	5
A1290	Ship Bogies, Axles Ring Bearings to Final Assembly Loc	5

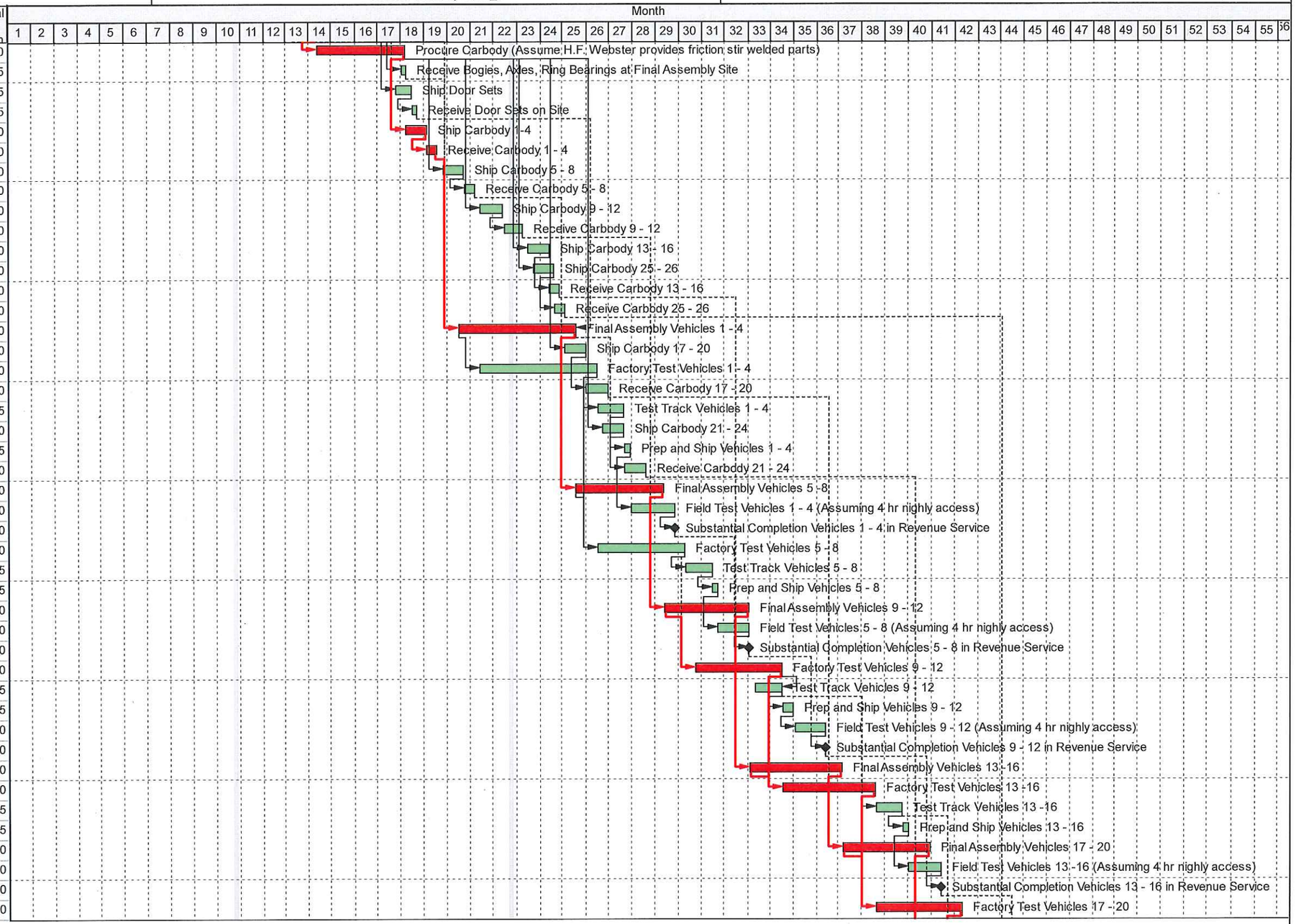


Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

PRELIMINARY **Bombardier Transportation**

Denver 300R Vehicle Proposal Schedule

Activity ID	Activity Name	Original Duration
A1150	Procure Carbody (Assume H.F. Webster provides fricti	80
A1950	Receive Bogies, Axles, Ring Bearings at Final Assembly	5
A1230	Ship Door Sets	15
A1220	Receive Door Sets on Site	5
A1170	Ship Carbody 1-4	20
A1180	Receive Carbody 1 - 4	10
A2340	Ship Carbody 5 - 8	20
A2350	Receive Carbody 5 - 8	10
A2360	Ship Carbody 9 - 12	20
A2410	Receive Carbody 9 - 12	10
A2370	Ship Carbody 13 - 16	20
A2400	Ship Carbody 25 - 26	20
A2420	Receive Carbody 13 - 16	10
A2450	Receive Carbody 25 - 26	10
A1640	Final Assembly Vehicles 1 - 4	100
A2380	Ship Carbody 17 - 20	20
A1670	Factory Test Vehicles 1 - 4	100
A2430	Receive Carbody 17 - 20	20
A1700	Test Track Vehicles 1 - 4	25
A2390	Ship Carbody 21 - 24	20
A1730	Prep and Ship Vehicles 1 - 4	5
A2440	Receive Carbody 21 - 24	20
A1660	Final Assembly Vehicles 5 -8	80
A2000	Field Test Vehicles 1 - 4 (Assuming 4 hr nighly access)	40
A2070	Substantial Completion Vehicles 1 - 4 in Revenue Servic	0
A1680	Factory Test Vehicles 5 - 8	80
A1710	Test Track Vehicles 5 - 8	25
A1740	Prep and Ship Vehicles 5 - 8	5
A1650	Final Assembly Vehicles 9 - 12	80
A2010	Field Test Vehicles 5 - 8 (Assuming 4 hr nighly access)	30
A2080	Substantial Completion Vehicles 5 - 8 in Revenue Servic	0
A1690	Factory Test Vehicles 9 - 12	80
A1720	Test Track Vehicles 9 - 12	25
A1750	Prep and Ship Vehicles 9 - 12	5
A2020	Field Test Vehicles 9 - 12 (Assuming 4 hr nighly access)	30
A2090	Substantial Completion Vehicles 9 - 12 in Revenue Serv	0
A2140	Final Assembly Vehicles 13 -16	80
A2180	Factory Test Vehicles 13 -16	80
A2220	Test Track Vehicles 13 -16	25
A2260	Prep and Ship Vehicles 13 - 16	5
A2150	Final Assembly Vehicles 17 - 20	80
A2030	Field Test Vehicles 13 -16 (Assuming 4 hr nighly access	30
A2100	Substantial Completion Vehicles 13 - 16 in Revenue Ser	0
A2190	Factory Test Vehicles 17 - 20	80

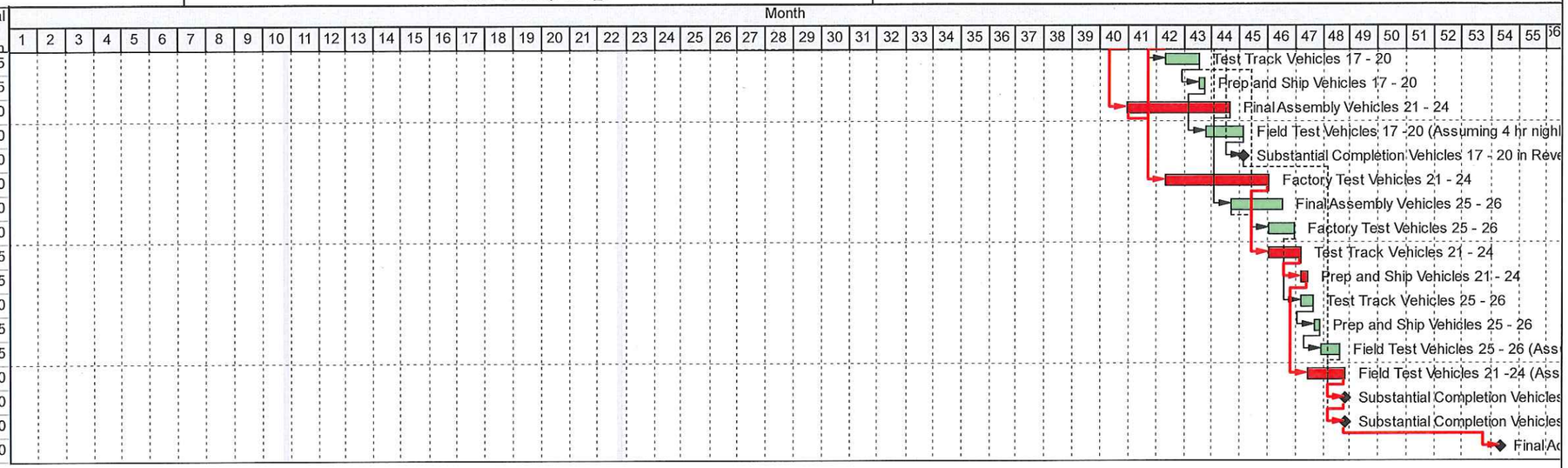


Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

PRELIMINARY **Bombardier Transportation**

Denver 300R Vehicle Proposal Schedule

Activity ID	Activity Name	Original Duration
A2230	Test Track Vehicles 17 - 20	25
A2270	Prep and Ship Vehicles 17 - 20	5
A2160	Final Assembly Vehicles 21 - 24	80
A2040	Field Test Vehicles 17 -20 (Assuming 4 hr nighly access	30
A2110	Substantial Completion Vehicles 17 - 20 in Revenue Ser	0
A2200	Factory Test Vehicles 21 - 24	80
A2170	Final Assembly Vehicles 25 - 26	40
A2210	Factory Test Vehicles 25 - 26	20
A2240	Test Track Vehicles 21 - 24	25
A2280	Prep and Ship Vehicles 21 - 24	5
A2250	Test Track Vehicles 25 - 26	10
A2290	Prep and Ship Vehicles 25 - 26	5
A2060	Field Test Vehicles 25 - 26 (Assuming 4 hr nighly acces	15
A2050	Field Test Vehicles 21 -24 (Assuming 4 hr nighly access	30
A2120	Substantial Completion Vehicles 21 - 24 in Revenue Ser	0
A2130	Substantial Completion Vehicles 25 -26 in Revenue Ser	0
A2300	Final Acceptance	0



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

PRELIMINARY **Bombardier Transportation**

Denver 300R Vehicle Proposal Schedule

Denver 300R Payments

EXHIBIT G

Month	Date	Monthly %	Monthly Payment	Quarterly Payment		
1	Aug-18	15.04%	11,539,413			
2	Sep-18	0.04%	34,413			
3	Oct-18	3.04%	2,331,289	13,905,115		
4	Nov-18	0.04%	34,413			
5	Dec-18	0.04%	34,413			
6	Jan-19	3.04%	2,331,289	2,400,115		
7	Feb-19	0.04%	34,413			
8	Mar-19	3.04%	2,331,289			
9	Apr-19	0.04%	34,413	2,400,115		
10	May-19	0.04%	34,413			
11	Jun-19	0.04%	34,413			
12	Jul-19	3.04%	2,331,289	2,400,115		
13	Aug-19	5.04%	3,865,289			
14	Sep-19	0.04%	34,413			
15	Oct-19	0.04%	34,413	3,934,115		
16	Nov-19	0.04%	34,413			
17	Dec-19	0.04%	34,413			
18	Jan-20	0.04%	34,413	103,239	550,000	653,239
19	Feb-20	0.04%	34,413			
20	Mar-20	0.04%	34,413			
21	Apr-20	0.04%	34,413	103,239		
22	May-20	0.04%	34,413			
23	Jun-20	4.50%	3,451,728			
24	Jul-20	3.50%	2,684,728	6,170,869		
25	Aug-20	3.50%	2,684,728			
26	Sep-20	3.50%	2,684,728			
27	Oct-20	3.90%	2,992,609	8,362,065		
28	Nov-20	0.04%	34,413			
29	Dec-20	3.50%	2,684,728			
30	Jan-21	2.31%	1,769,386	4,488,527		
31	Feb-21	8.02%	6,154,675			
32	Mar-21	4.97%	3,812,241			
33	Apr-21	5.26%	4,038,025	14,004,941		
34	May-21	5.26%	4,038,025			
35	Jun-21	3.40%	2,610,932			
36	Jul-21	3.40%	2,610,932	9,259,889	550,000	9,809,889
37	Aug-21	3.11%	2,385,148			
38	Sep-21	3.81%	2,918,813			
39	Oct-21	0.00%	0	5,303,961		
40	Nov-21	0.34%	260,197			
41	Dec-21	2.04%	1,568,413			
42	Jan-22	0.00%	0	1,828,610	550,000	2,378,610
43	Feb-22	0.00%	0			
44	Mar-22	0.00%	0			
45	Apr-22	0.00%	0	0		
46	May-22	0.00%	0			
47	Jun-22	0.00%	0			
48	Jul-22	2.65%	2,035,087	2,035,087	500,000	500,000

Contingency 2.15 M (2.8%)

76,700,000 **78,850,000**

EXHIBIT H

DENVER INTERNATIONAL AIRPORT

CERTIFICATE OF SUBSTANTIAL COMPLETION

(CONTRACT, TASK ORDER, or MILESTONE)

CONTRACT / TASK ORDER NAME: _____

CONTRACT / TASK ORDER NUMBER: _____

MILESTONE: _____

CONTRACTOR: _____

DATE/TIME: _____

This Certificate is for Substantial Completion for the above noted Contract/Task Order as defined in the Contract documents.

The date of Substantial Completion, per the Contract Documents, is ___ days after NTP. NTP was issued on ___. The Substantial Completion date, as extended by executed Change Order Number / Task Change Order Number ____ is therefore required to be on ___.

Issue of Substantial Completion does not waive any rights the City may have under the Contract including, NON-PERFORMANCE DEDUCTIONS.

CITY AND COUNTY OF DENVER AND DESIGNER OF RECORD CERTIFICATION:

I hereby certify that for the purpose only of abating Non-Performance deductions applicable to this contract after Substantial Completion:

a) This Certificate is not intended to constitute evidence of Final Acceptance of the Contract, or any portion of the Contract Work.

b) All remaining work, including punch list items, is subject to provisions of the Contract including, but not limited to, Exhibit C Special Provisions, Exhibit D Technical Specifications, and Exhibit E Project Management Provisions.

Project Manager

Designer of Record – Company Name

Designer of Record – Authorized Representative Signature and Date

CERTIFICATE OF SUBSTANTIAL COMPLETION

Contract / Task Order Name: _____ **Contract / Task Order Number:** _____

CONTRACTOR ACCEPTANCE:

I, as the Authorized Representative of the Contractor on this Contract, agree to:

a) Complete unfinished or partially finished contract work and required correction whether noted in this certificate or at a later date prior to Final Completion and Acceptance of the Work.

b) Abide by responsibilities for security, maintenance, damage to work and to satisfactorily address punch list items in the time noted below by the Project Manager:

Security: _____

Maintenance: _____

Property Insurance Premiums: _____

Damage to Work: _____

Water, Heat and Utilities (City is responsible unless noted otherwise per General Conditions Title 1903): N/A

c) Punch list items and Time-to-Fix items (list may be attached): Punch-list attached to be completed

Contractor Company Name	**Contractor Authorized Representative Name (print)**
Contractor Authorized Representative - Signature / Date	

CITY AND COUNTY OF DENVER AND FUNDING AGENCY RECOMMENDATION:

I recommend approval of this Certificate of Substantial Completion:

Director O&M Contract Admin-OPS	**Date**
Sr. Director-OPS	**Date**
Sr. Vice President-OPS Development	**Date**

cc: Finance

EXHIBIT I

DENVER INTERNATIONAL AIRPORT

CERTIFICATE OF FINAL COMPLETION AND ACCEPTANCE OF WORK

CONTRACT / TASK ORDER NAME: _____

CONTRACT / TASK ORDER NUMBER: _____

CONTRACTOR: _____

DATE OF FINAL COMPLETION AND ACCEPTANCE OF THE WORK: _____

This Certificate is for Final Completion and Acceptance of the Work described in Contract/Task Order Number _____ as defined in Contract # TBD, and is established as of the date listed above.

CCD AND CONTRACTOR CERTIFICATION:

I hereby certify that for the purpose of establishing the date of Final Completion and Acceptance of the Work for this Contract/Task Order:

a) This Contract/Task Order has been fully completed in accordance with the contract documents and all modifications as of _____; i.e., the work is fully complete such that final application for payment can be submitted by the Contractor, advertisement of Contract/Task Order closeout and final payment can be published by the City and County of Denver and final payment can be made to the Contractor.

b) All punch list items from the Certificates of Substantial Completion and from Final Inspections have been corrected by the Contractor to the satisfaction of the Project Manager.

c) Final cleanup by the Contractor has been completed in accordance with Technical Specifications, to the satisfaction of the Project Manager.

d) Contract Record Documents have been submitted by the Contractor in accordance with Technical Specifications, and Contract Documents, to the satisfaction of the Project Manager.

e) A Final Statement of Accounting has been submitted by the Contractor in accordance with Contract Documents, to the satisfaction of the undersigned.

f) All quantities have been agreed to and all Change Orders (Directives) / Task Orders (Directives) have been executed.

DENVER INTERNATIONAL AIRPORT

Certificate of Final Completion and Acceptance of the Work
Contract / Task Order Name: _____
Contract / Task Order Number _____

(name)
Project Manager, DEN
(Signature and Date)

Designer of Record – Company Name

Designer of Record
Authorized Representative
(Signature and Date)

(name)
Sr. Director-OPS
(Signature and Date)

(name)

Sr. Vice President-OPS

(Signature and Date)

CONTRACTOR ACCEPTANCE:

I, as the Authorized Representative of the Contractor on this Contract/Task Order, agree:

a) That the Contractor has provided to the City and County of Denver written certification of Final Completion of the Contract/Task Order, per Contract Requirements.

b) That the Contractor has provided to the City and County of Denver written notification that all punch list items are complete, all clean-up has been done, all warranties have been provided, all training is complete, all spare parts have been turned over to the City, all testing and start-up has been performed, and all submittals required by the Contract Documents have been made and accepted.

DENVER INTERNATIONAL AIRPORT

Certificate of Final completion and Acceptance of the Work
Contract / Task Order Name: _____
Contract / Task Order Number _____

Contractor Company Name

Contractor Authorized Representative Name (print)

Contractor Authorized Representative - Signature / Date

CCD AND FUNDING AGENCY (FAA, TSA, CDOT, etc.) ACCEPTANCE:

I recommend approval of this Certificate of Final Completion and Acceptance of the Work.

Sr. Vice President
Signature / Date

Funding Agency

Funding Agency Authorized Representative
(Signature and Date)

cc: **Accounting Supervisor**
Asset Management Team

EXHIBIT J

Federal Aviation Administration Required Contract Provisions

ALL CONTRACTS – NON-AIP FUNDED

Federal laws and regulations require that recipients of federal assistance (Sponsors) include specific contract provisions in certain contracts, requests for proposals, or invitations to bid.

Certain provisions must be included in all Sponsor contracts, regardless of whether or not the contracts are federally-funded. This requirement was established when a sponsor accepted the Airport Improvement Program (AIP) grant assurances.

As used in these Contract Provisions, "Sponsor" means The City and County of Denver, Department of Aviation, and "Contractor" or "Consultant" means the Party of the Second Part as set forth in Contract Number **PLANE 201841190**.

GENERAL CIVIL RIGHTS PROVISIONS

The contractor agrees to comply with pertinent statutes, Executive Orders and such rules as are promulgated to ensure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision binds the contractor and subtier contractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required of Title VI of the Civil Rights Act of 1964.

Compliance with Nondiscrimination Requirements

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts And Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Nondiscrimination Acts And Authorities on the grounds of race, color, or national origin.

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

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:

    a. Withholding payments to the contractor under the contract until the contractor complies; and/or

    b. Cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the sponsor to enter into any litigation to protect the interests of the sponsor. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

Title VI List of Pertinent Nondiscrimination Acts and Authorities

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination In Federally-Assisted Programs of The Department of Transportation—Effectuation of Title VI of The Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);

- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq*.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq*.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part time workers.

The [*contractor* | *consultant*] has full responsibility to monitor compliance to the referenced statute or regulation. The [*contractor* | *consultant*] must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division

EXHIBIT J

Federal Aviation Administration Required Contract Provisions

ALL CONTRACTS – NON-AIP FUNDED

OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. Contractor must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The Contractor retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (20 CFR Part 1910). Contractor must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

CITY AND COUNTY OF DENVER
INSURANCE REQUIREMENTS FOR THE DEPARTMENT OF AVIATION

Certificate Holder Information:

CITY AND COUNTY OF DENVER
Attn: Risk Management, Suite 8810
Manager of Aviation
Denver International Airport
8500 Peña Boulevard
Denver CO 80249

If you are awarded the contract, your ACORD forms must be submitted electronically to:
contractadmininvoices@flydenver.com.
HARD COPIES will not be accepted.
All ACORD forms must have the project number in the Description of Operations section.

CONTRACT NAME & NUMBER TO WHICH THIS INSURANCE APPLIES: 201841190 AGTS Train Car Replacement Program

I. PRIMARY COVERAGE

Colorado Workers' Compensation and Employer Liability

Minimum Limits of Liability (In Thousands) $100, $500, $100

1. Contractor expressly represents to the City, as a material representation upon which the City is relying in entering into this Agreement, that none of the Contractor's officers or employees who may be eligible under any statute or law to reject Workers' Compensation Insurance shall effect such rejection during any part of the term of this Agreement. Any such rejections previously effected, must have been revoked as of the date Contractor executes this Agreement.

2. If the contractor/consultant is a sole proprietor, Workers' Compensation is waived per State of Colorado law.

Commercial General Liability

Minimum Limits of Liability (In Thousands):

Each Occurrence:	$1,000
General Aggregate Limit:	$2,000
Products-Completed Operations Aggregate Limit:	$2,000
Personal & Advertising Injury:	$1,000

The policy must provide the following:
1. That this Agreement is an Insured Contract under the policy.
2. Defense costs are outside the limits of liability.
3. A severability of interests or separation of insureds provision (no insured vs. insured exclusion).
4. A provision that coverage is primary and non-contributory with other coverage or self-insurance maintained by the City.

Business Automobile Liability

Minimum Limits of Liability (In Thousands):

Combined Single Limit $1,000

The policy must provide the following:
1. Coverage applicable to all owned, hired and non-owned vehicles used in performing services under this Agreement.
2. If transporting wastes, hazardous material, or regulated substances, Contractor shall carry a pollution coverage endorsement and an MCS 90 endorsement on their policy.

II. ADDITIONAL COVERAGE

Excess/Umbrella Liability

Minimum Limits of Liability (In Thousands):

Umbrella Liability Controlled Area	Each Occurrence and aggregate	$9,000
Umbrella Liability Non-Controlled Area	Each Occurrence and aggregate	$1,000

The policy must provide the following:

1. Coverage must be written on a "follow form" or broader basis.
2. Any combination of primary and excess coverage may be used to achieve required limits.
3. If operations include unescorted airside access at DIA, then a $9 million Umbrella Limit is required.

Property Insurance

Coverage: All Risk Form Property Insurance, Replacement Cost basis

Contractor will maintain property insurance sufficient for the full replacement cost of the goods to be delivered under the Contract.

III. ADDITIONAL CONDITIONS

It is understood and agreed, for the benefit of the City, that the following additional conditions shall apply to all coverage specified herein:

1. For Commercial General Liability, Auto Liability and Excess Liability/Umbrella (if required), Contractor and subcontractor's insurer(s) shall include the City and County of Denver, its elected and appointed officials, employees and volunteers as additional insured.
2. All coverage provided herein shall be primary and any insurance maintained by the City shall be considered excess.
3. For all coverages required under this Agreement, Contractor's insurer shall waive subrogation rights against the City.
4. The City shall have the right to verify or confirm, at any time, all coverage, information or representations contained herein, and the insured and its undersigned agent shall promptly and fully cooperate in any such audit the City may elect to undertake.
5. The required insurance shall be underwritten by an insurer licensed or authorized to do business in Colorado and rated by A.M. Best Company as "A-"VIII or better.
6. For claims-made coverage, the retroactive date must be on or before the contract date or the first date when any goods or services were provided to the City, whichever is earlier
7. No changes, modifications or interlineations on this document shall be allowed without the review and approval of the Risk Administrator prior to contract execution.

NOTICE OF CANCELLATION

It is understood and agreed that should any Policy issued hereunder be cancelled or non-renewed before the expiration date thereof, or sustain any reduction in limits of insurance or addition of exclusions, the issuing company or its authorized Agent shall give notice to the Department of Aviation in accordance with policy provisions.

EXHIBIT P

CITY AND COUNTY OF DENVER
DEPARTMENT OF AVIATION

PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned _____
_____,
a corporation organized and existing under and by virtue of the laws of the State of _____,
hereafter referred to as the "Contractor", and _____,
a corporation organized and existing under and by virtue of the laws of the State of _____,
and authorized to transact business in the State of Colorado, as Surety, are held and firmly bound unto the CITY AND COUNTY OF DENVER, a municipal corporation of the State of Colorado, hereafter referred to as the "City", in the penal sum of **ONE MILLION FIVE-HUNDRED THOUSAND DOLLARS AND NO CENTS ($ 1,500,000.00)**, lawful money of the United States of America, for the payment of which sum, well and truly to be made, we bind ourselves and our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents;

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT:

WHEREAS, the above bounden Contractor has entered into a written contract with the City for furnishing all labor and tools, supplies, equipment, superintendence, materials and everything necessary for and required to do, perform and complete **CONTRACT NO. 201841190,** Denver, Colorado, and has bound itself to complete the project within the time or times specified or pay liquidated damages, all as designated, defined and described in the said Contract and Conditions thereof, and in accordance with the Plans and Technical Specifications therefore, a copy of said Contract being made a part hereof;

NOW, THEREFORE, if the said Contractor shall and will, in all particulars well and truly and faithfully observe, perform and abide by each and every Covenant, Condition and part of said Contract, and the Conditions, Technical Specifications, Plans, and other Contract Documents thereto attached, or by reference made a part thereof and any alterations in and additions thereto, according to the true intent and meaning in such case, then this obligation shall be and become null and void; otherwise, it shall remain in full force and effect;

PROVIDED FURTHER, that if the said Contractor shall satisfy all claims and demands incurred by the Contractor in the performance of said Contract, and shall fully indemnify and save harmless the City from all damages (liquidated or actual, including, but not limited to, damages caused by delays in the performance of the Contract), claims, demands, expense and charge of every kind (including claims of patent infringement) arising from any act, omission, or neglect of said Contractor, its agents, or employees with relation to said work; and shall fully reimburse and repay to the City all costs, damages, losses and expenses which it may incur in making good any breach or default based upon the failure of the Contractor to fulfill its obligation to furnish maintenance, repairs, services, or replacements for the full guarantee period provided in the Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect;

PROVIDED FURTHER, that if said Contractor shall at all times promptly make payments of all amounts lawfully due to all persons supplying or furnishing it or its subcontractors with labor and materials, rental machinery, tools or equipment used or performed in the prosecution of work provided for in the above Contract and that if the Contractor will indemnify and save harmless the City for the extent of any and all payments in connection with the carrying out of such Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect;

PROVIDED FURTHER, that if the said Contractor fails to duly pay for any labor, materials, team hire, sustenance, provisions, provender, gasoline, lubricating oils, fuel oils, grease, coal, or any other supplies or materials used or consumed by said Contractor or its subcontractors in performance of the work contracted to be done, or fails to pay any person who supplies rental machinery, tools or equipment, all amounts due as the result of the use of such machinery, tools or equipment in the prosecution of the work, the Surety will pay the same in any amount not exceeding the amount of this obligation, together with interest as provided by law;

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to contracts with others in connection with this project, or the work to be performed thereunder, or the Technical Specifications and Plans accompanying the same, shall in any way affect its obligation on this bond and it does hereby waive notice of any change, extension of time, alteration or addition to the terms of the Contract, or contracts, or to the work, or to the Technical Specifications and Plans.

IN WITNESS WHEREOF, said Contractor and said Surety have executed these presents as of this _____ day of _____, 20__.

_____
Contractor

Attest:

By:_____
President

_____
Secretary

_____
Surety

By:_____
Attorney-In-Fact

(Accompany this bond with Attorney-in-Fact's authority from the Surety to execute bond, certified to include the date of the bond).

APPROVED AS TO FORM:

KRISTIN M. BRONSON,
City Attorney for the City and County of Denver

By:_____
Assistant City Attorney

APPROVED FOR THE CITY AND COUNTY OF DENVER

By: _____
MAYOR

By: _____
CEO DEPARTMENT OF AVIATION

PERFORMANCE AND PAYMENT BOND
SURETY AUTHORIZATION
(SAMPLE)

FAX NUMBER: 303-342-2552
TELEPHONE NUMBER: 303-342-2540

Assistant City Attorney
Airport Office Building
8500 Pena Blvd. #9810
Denver, CO 80249-6340

RE: (Company name)

Contract No: «Contract_No»
Project Name: «Project_Name»
Contract Amount:
Performance and Payment Bond No.:

Dear Assistant City Attorney,

The Performance and Payment Bonds covering the above captioned project were executed by this agency, through _____ insurance company, on _____, 20__.

We hereby authorize the City and County of Denver, Department of Aviation, to date all bonds and powers of attorney to coincide with the date of the contract.

If you should have any additional questions or concerns, please don't hesitate to give me a call at _____.

Thank you.

Sincerely,