METROLINX

- AND -

TORONTO TRANSIT COMMISSION

MASTER E-FARE COLLECTION OUTSOURCING AGREEMENT

DATED NOVEMBER 28, 2012

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MASTER E-FARE COLLECTION OUTSOURCING AGREEMENT

THIS MASTER AGREEMENT is made the 28th day of November, 2012

B E T W E E N:

METROLINX
an agency of the Government of Ontario under the *Metrolinx Act, 2006*
("**Metrolinx**")

– and –

TORONTO TRANSIT COMMISSION
a corporation existing under the *City of Toronto Act, 2006*
("**TTC**").

BACKGROUND:

A.   TTC operates a public transportation system in and about the City of Toronto pursuant to the *City of Toronto Act*, *2006*.

B.   Metrolinx is an agency of the Government of Ontario under the *Metrolinx Act, 2006*, charged with planning and delivering a multi-modal, integrated regional public transit network. In furtherance of such purpose, Metrolinx, through its PRESTO division, carries on the business of providing a centralized provincial electronic fare collection system based on smartcard technology, providing fare collection, settlement services and information management services.

C.   Metrolinx currently provides the services of this electronic fare collection system, known as PRESTO, to a number of Ontario transit service providers referred to as the SPs.

D.   TTC expressed an interest in using such PRESTO services provided that suitable funding arrangements could be made and the system could be modified to meet its business requirements.

E.   To better meet such business requirements and the needs of the other SPs who use the current PRESTO services, Metrolinx is in the process of modifying and enhancing that service to develop and implement a new generation fare collection solution, defined herein as PRESTO NG, that is based on an open architecture using industry standard tools, which will accommodate open loop financial cards, mobile applications and future technological innovations as further described in this Master Agreement and the Project Management Agreement.

F.   In keeping with the foregoing, TTC has decided to outsource to Metrolinx all non-cash based fare revenue collection and related services for its transit system, and cash-based fare revenue collection from, and related services with respect to, TTC

transit system fare vending devices on TTC property, on board TTC vehicles and, where necessary, on the street, but excluding any vehicle fare boxes. Such exclusive outsource services shall include (i) obtaining and maintaining the functionality described in a mutually agreed set of business requirements, (ii) obtaining and maintaining the equipment, software and network capability necessary for the operation of the PRESTO NG service, (iii) the implementation, operation, service, maintenance and repair of same, and (iv) such other services required to be performed to meet the TTC Business Requirements, defined herein collectively as the Managed Services.

G.   To facilitate the implementation, operation, service, maintenance and repair of PRESTO NG as part of the Managed Services, Metrolinx will provide the funding required for same with the expectation that it will be reimbursed for the advance of those funds through the collection of revenue under the Funding and Financial Reporting Agreement.

In consideration of the mutual covenants herein contained and for other good and valuable consideration (the receipt and sufficiency of which are acknowledged by both Parties), the Parties hereby covenant and agree with each other as follows:

ARTICLE 1
INTERPRETATION

1.1   Definitions

In this Master Agreement, unless the context otherwise requires, each capitalized term shall have the meaning attributed thereto in Schedule A.

1.2   Technical Terms

Any technical term used in this Master Agreement (including Schedule A and any definitions set out in an Ancillary Agreement or a project document) that is not defined in this Master Agreement will have the generally accepted industry or technical meaning given to such term.

1.3   Schedules & Attachments and Order of Priority

(a)   The following are the schedules and attachments to be annexed to and forming part of this Master Agreement:

Schedule	Description of Schedule
A	Definitions
B	Project Plan
C	Commercialization/Non-Fare Business
D	PRESTO Governance Schedule
E	Arbitration Rules and Procedures
F	Privacy

G	Security
H	Communications Policy
I	Data Collection and Use
J	Audit Rights
K	TTC Intellectual Property

Attachment	**Description of Attachment**
1	PRESTO Request for Change / Scope Management
2	TTC Business Requirements
3	PRESTO Business Continuity Plan

(b) In the event of any inconsistency between any of the provisions of this Master Agreement itself (excluding the Ancillary Agreements and the Schedules) and the terms of such Ancillary Agreements and Schedules, the inconsistency will be resolved by reference to the following descending order of priority:

(i) the terms of this Master Agreement, including Attachment 2 (TTC Business Requirements), Schedule 2.1(b) (RASCI for PRESTO System Development) and Schedule 2.1(c) (RASCI for Civil Works Requirements) to the Project Management Agreement, and Schedule 3.2(b) (RASCI- PRESTO System Operations) to the Operational Services Agreement and excluding the Ancillary Agreements and other Schedules;

(ii) the terms of the Funding and Financial Reporting Agreement;

(iii) each other Ancillary Agreement for its subject matter; and

(iv) the Schedules, excluding those Schedules set out in Subsection 1.3(b)(i) above, in equal priority, including Attachments thereto.

1.4   Headings

The division of this Master Agreement into Articles, Sections, Subsections and Schedules and the insertion of headings are for convenience of reference only and shall not affect the construction or interpretation of this Master Agreement. Except as expressly set out herein, references to an Article, Section, Subsection or Schedule refer to the applicable Article, Section, Subsection of, or Schedule to, the main body of this Master Agreement and not to any Article, Section or Subsection of any Ancillary Agreement or other Schedule to this Master Agreement. The Background shall not form part of this Master Agreement.

1.5   Extended Meanings

(a) In this Master Agreement, words in the singular include the plural and vice versa and words in one gender include all genders. "**Including**" means "**including without limitation**" and is not to be construed as limiting any general statement which it follows to the specific or similar items or matters immediately following it.

(b)   Unless otherwise specifically provided, all references to a Party's consent or approval shall be interpreted to mean and require that such consent or approval will not be unreasonably withheld or unduly delayed.

1.6   Business Days

Unless otherwise provided for in this Master Agreement, if any payment is required to be made or other action is required to be taken pursuant to this Master Agreement on a day that is not a Business Day, then such payment or action, as the case may be, shall be made or taken on the next Business Day.

1.7   Entire Agreement

This Master Agreement is one of a series of agreements that collectively with all their respective Schedules and Attachments, constitute the entire arrangement between the Parties pertaining to the subject matter hereof. Each Ancillary Agreement is to be read together with this Master Agreement to constitute the agreement between the Parties with respect to a particular facet of the arrangement. The Master Agreement and the Ancillary Agreements supersede all prior agreements, understandings, negotiations and discussions, whether oral or written, of the Parties (other than the memorandum of understanding with respect to the Current PRESTO Deployment) and there are no representations, warranties, conditions or other agreements between the Parties in connection with the subject matter hereof except as specifically set forth herein or therein.

1.8   Governing Law

This Master Agreement shall be governed by and construed in accordance with the laws of the Province of Ontario and the federal laws of Canada applicable therein.

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ARTICLE 2
PURPOSE AND SCOPE

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2.1   Purpose

The Parties in entering into this outsourcing arrangement hereby agree, that in accordance with the terms of this Master Agreement (including the Ancillary Agreements) (a) Metrolinx shall, be the exclusive provider of the Fare Collection Services (provided that prior to the cessation by TTC of the use of legacy fare collection media pursuant to Section 6.2, Metrolinx shall be the sole third party provider of Fare Collection Services rather than the exclusive provider of Fare Collection Services) and the TTC shall not enter into any alternative e-fare arrangement with any third party, and (b) Metrolinx will, in accordance with the TTC Business Requirements, provide a series of managed services to finance, implement, operate, service, maintain and keep in a state of good repair (including applicable refreshes) PRESTO NG for the non-exclusive use of same by the TTC as an SP. The Parties further agree that the Provincial PRESTO Service will be updated so as to be, upon the implementation of the applicable release(s) of PRESTO NG as set out in the Project Plan, an e-fare account-based payment system which: (a) provides the functionality and other attributes required by the TTC Business Requirements and in addition meets the Performance Requirements as provided in the

SLA; and (b) satisfies the established procedures and processes of the financial services and payments industries for an account-based customer fare payment system. Through the annual review process provided for in the Operational Services Agreement as well as pursuant to the governance process described in ARTICLE 3 and the PRESTO Governance Schedule, the Parties shall monitor and, as appropriate, modify the terms hereof (except the Metrolinx Fee) to adapt, improve and commercialize PRESTO NG.

2.2   Scope of Services To Be Provided

Without limiting the services to be provided by Metrolinx as set out in the TTC Business Requirements, the Parties intend that the Managed Services shall be conducted in accordance with the Project Plan and shall include, but not be limited to, of the following:

(a)   funding of the Managed Services in accordance with the Funding and Financial Reporting Agreement;

(b)   provision of the Implementation Services to the TTC in accordance with the Project Management Agreement including the necessary modifications and enhancements to produce PRESTO NG; and

(c)   provision of the Operational Services to TTC in accordance with the Operational Services Agreement and, with respect to the Fare Collection Services element of the Operational Services, in accordance with the Funding and Financial Reporting Agreement.

ARTICLE 3
PROJECT MANAGEMENT AND GOVERNANCE

3.1   Designated Representatives

Within 30 days of the date hereof, each Party shall nominate its Designated Representative who shall be responsible for the implementation, management and enforcement of this Master Agreement on behalf of that Party, including overall management of that Party's performance hereunder and for the first-level resolution of disputes between the Parties regarding the performance or non-performance of their obligations under this Master Agreement. Each Designated Representative shall make himself or herself reasonably available for consultation with the other Party's Designated Representative during regular business hours on Business Days. The authority of each Party's Designated Representative shall be equal to the scope of his or her responsibilities hereunder. Each Party shall have the right to rely upon the instructions and decisions received from the other Party's Designated Representative in writing with respect to all matters relating to this Master Agreement. Each Party shall have the right to change its Designated Representative provided that such Party shall notify the other Party in writing of any such change.

3.2   Performance Review and Measurement

(a)   With respect to the Implementation Services, each Party shall establish a project team to oversee, on behalf of the respective Party, the Project Plan and the

Implementation Services in accordance with the terms of the Project Management Agreement.

(b)   With respect to the Operational Services, following the implementation of PRESTO NG in the TTC Transit System in accordance with the Project Management Agreement, performance reviews and measurements of PRESTO NG as implemented in the TTC Transit System shall be conducted in accordance with the terms of the Operational Services Agreement.

3.3   Cooperation of the Parties

Each Party shall cooperate with the other in all matters relating to the performance of its respective obligations as provided for herein or in an Ancillary Agreement.

3.4   Project and PRESTO Governance

(a)   TTC acknowledges that the representatives of each of the SPs using the Provincial PRESTO Service form an Executive Client Committee and participate in the PRESTO governance structure as set out in the PRESTO Governance Schedule attached hereto as Schedule D. TTC agrees to participate in such governance process in accordance with the PRESTO Governance Schedule.

(b)   The Parties acknowledge and agree that the governance of their relationship through the implementation phase (being the term of the Project Management Agreement) shall be as set out in a project governance schedule attached to the Project Management Agreement. Subject to the terms and conditions of this Master Agreement, the PRESTO Governance Schedule shall govern the relationship between Metrolinx and the SPs generally, including, with respect to the TTC, governance during all stages after the implementation phase of this Master Agreement.

(c)   If Metrolinx exercises its prerogative under the PRESTO Governance Schedule, due to a lack of consensus concerning a matter put to the Executive Client Committee, and the TTC is of the view that the reasonable exercise of that prerogative will result in a material failure to meet the TTC Business Requirements and/or a material breach of any of Metrolinx's obligations under this Master Agreement or an Ancillary Agreement, Metrolinx agrees that the TTC shall have the right to refer the matter to arbitration in accordance with Article 14 of this Master Agreement.

ARTICLE 4
CHANGE MANAGEMENT

4.1   Amendments to Agreement

An Amendment to this Master Agreement or any Ancillary Agreement constituting a change to the legal contract between the Parties (and not just project or operational

aspects of the Managed Services) shall be negotiated and agreed upon by the Parties in keeping with Section 17.6.

4.2   Right to Request Changes to Project or Operational Aspects

Either Party shall have the continuing right to make a written request for a Change in accordance with this Section. In processing any such request, Metrolinx shall comply with the PRESTO Request for Change/Scope Management process incorporated herein as Attachment 1. TTC acknowledges that Metrolinx will consider the possible impact any proposed Changes by the TTC may have on other SPs in its review and acceptance of Changes.   TTC further acknowledges that Metrolinx may require Changes to address matters that affect other SPs or PRESTO NG generally.

4.3   Request for Change Process

The Parties acknowledge that once Final Design (as used in Schedule 2.1(b) (RASCI for PRESTO System Development) of the Project Management Agreement) has been signed off pursuant to Schedule 2.1(b) (RASCI for PRESTO System Development) of the Project Management Agreement, any further Changes shall be subject to this Request for Change process. Any Change shall be subject to the following procedures:

(a)   *TTC Request for Change* - To request a Change, TTC's Designated Representative shall deliver a Request for Change to the Metrolinx Designated Representative specifying the proposed Change and the purpose or objective sought with such proposed Change. Within 10 Business Days (or such other period as TTC's Designated Representative and Metrolinx's Designated Representative may agree) after receipt of the Request for Change, Metrolinx shall deliver to the TTC a Change Response which shall acknowledge receipt of the Request for Change and shall be one of the following:

(i)   a detailed Change Response which shall: (A) specify how the proposed Change could be implemented; (B) provide an impact assessment (including any possible impact on the performance of each Party's obligations under this Master Agreement or the timing for same); (C) describe the impact on the Term, if any, if such Change were to be implemented; (D) describe, subject to Section 4.3(e), the proposed change, if any, to the Metrolinx Fee and/or the additional charges, if any, that would result from the implementation of such Change, and (E) specify the proposed date or dates by which such Change would be implemented;

(ii)   where a detailed Change Response cannot be prepared within such ten (10) Business Day period, a preliminary Change Response that consists of an estimate of the time required to research and scope the Request for Change and provide a detailed Change Response with the details required in Section 4.3(a)(i); or

(iii)   a notice of rejection of the Request for Change, in which case such notice shall contain an explanation of the reason(s) why the Request for Change

has been rejected. Such rejection may be escalated in accordance with the PRESTO Governance Schedule and if not resolved or fully addressed at such level shall be addressed by way of escalation in accordance with the dispute resolution provisions of ARTICLE 14 of this Master Agreement.

(b) *Metrolinx Request for Change* - To request a Change, Metrolinx's Designated Representative shall deliver a Request for Change to the TTC Designated Representative specifying the proposed Change and the purpose or objective sought with such proposed Change. The Request for Change shall also:

(i) specify how the proposed Change could be implemented;

(ii) provide an impact assessment (including any possible impact on the performance of each Party's obligations under this Master Agreement or the timing for same);

(iii) describe the impact on the Term, if any, if such Change were to be implemented;

(iv) describe, subject to Section 4.3(e), the proposed change, if any, to the Metrolinx Fee and/or the additional charges, if any, that would result from the implementation of such Change; and

(v) specify the proposed date or dates by which such Change would be implemented.

Within 10 Business Days (or such other period as TTC's Designated Representative and Metrolinx's Designated Representative may agree) after receipt of the Request for Change, TTC shall deliver to Metrolinx a Change Response which shall acknowledge receipt of the Request for Change and shall either state that TTC will review the Request for Change in accordance with Section 4.3(c) or shall reject the Request for Change, in which case such notice shall contain an explanation of the reason(s) why the Request for Change has been rejected. TTC may request a reconsideration of any proposed Request for Change if it has reasonable grounds for believing that such request would have a negative material impact on customers, TTC operations, or results in a material increase in TTC capital or operating cost.

(c) Requests for Change (i) will be reviewed by the respective Designated Representatives of the Parties; or (ii) the Designated Representative of the Party to whom the Request for Change is submitted may refer the Request for Change to be reviewed and addressed either at regularly scheduled operational meetings/reviews; or (iii) the Metrolinx Designated Representative may notify TTC that such Change must be referred to the Executive Client Committee established under the PRESTO Governance Schedule for approval in accordance with Section 4.4 below. Change Orders signed by both Parties shall be deemed part of this Master Agreement and shall be implemented by the applicable Party responsible for implementing same in accordance with such Change Order. The

Parties acknowledge and agree that no Change can be approved or implemented unless there has been a Change Response submitted to a Request for Change and a Change Order has been approved by the Designated Representatives to authorize making such Change.

(d)   When the Parties agree on the terms and conditions of a Change Order, including the scheduling and prioritization of the Change, the Parties shall fully co-operate with each other (as well as with any third party vendors or suppliers) and diligently proceed to develop the proposed Change agreed to in the Change Order. If TTC and Metrolinx are unable to agree upon the fees or other amounts payable in respect of a Change requested by TTC, then the Dispute will be resolved in accordance with ARTICLE 14 (Dispute Resolution) of this Master Agreement.

(e)   If the proposed Change will result in additional costs, or is anticipated by either Party to result in an adjustment of the funding and reporting arrangements set out in the Funding and Financial Reporting Agreement, Metrolinx shall provide to TTC, either in its Request for Change in respect of a proposed Metrolinx Change or in its Change Response in respect of a proposed TTC Change, a written reasonably detailed explanation, with supporting documentation if appropriate, for the adjustment. If TTC accepts such proposed Change, TTC shall pay for the additional costs, charges, or anticipated adjustment associated with the proposed Change at the time that the Change is implemented unless Metrolinx agrees, acting reasonably, to accept payment for same by either extending the Initial Term over which the costs of the Managed Services are to be amortized in accordance with the Funding and Financial Reporting Agreement or by increasing the Metrolinx Fee.

(f)   In any event, TTC acknowledges and agrees that all Changes that are agreed to be made pursuant to this ARTICLE 4 shall be completed in accordance with Metrolinx's PRESTO NG release management plan. TTC acknowledges and agrees that an approved Change may not be implemented in the next scheduled release of PRESTO NG as all Changes shall be scheduled and carried out by Metrolinx, acting reasonably, having regard for the overall priorities of PRESTO NG and to minimize disruption for all SPs.

(g)   Each Party shall maintain a record of each Request for Change, Change Response and all other documentation relating to the Change Order Procedure.

(h)   The Parties acknowledge that day to day operational changes with respect to the provision and receipt of the Managed Services that are not material may be implemented in accordance with mutually agreed best practices with respect thereto, provided that each such operational change is disclosed to the other Party and is adequately documented in writing.

4.4   Changes to PRESTO NG by Other SPs

TTC acknowledges and agrees that other SPs may from time to time desire Changes to modify or introduce new functionality to PRESTO NG, including PRESTO Equipment and Services, and that Metrolinx requires SPs to raise such Changes with the Executive Client Committee to be considered by the other SPs (including the TTC) and Metrolinx. If an SP raises a Change to PRESTO NG at the Executive Client Committee, then the Parties acknowledge and agree that:

(a)   if such SP secures the consent of the SPs and Metrolinx to implement the Change to PRESTO NG at the Executive Client Committee, then the cost of such Change will be made at the expense of Metrolinx and the SPs collectively pursuant to the overall governance of PRESTO NG and shall be documented but will not require a Change Order under this Master Agreement in order to be implemented; and

(b)   if such SP fails to secure the consent of the SPs and Metrolinx to implement the Change to PRESTO NG at the Executive Client Committee but TTC desires that such Change be implemented, then such Change will be submitted to Metrolinx as a Request for Change pursuant to Section 3.4 and where agreed to be implemented as a Change Order shall be made at the expense of TTC as agreed in such approved Change Order.

ARTICLE 5
FUNDING

5.1   Project Funding

The funding for the Managed Services shall be provided in accordance with the terms of the Funding and Financial Reporting Agreement, and except as expressly stated in such Funding and Financial Reporting Agreement, or as expressly agreed to by the Parties in writing, there will be no other fees or charges payable by TTC to Metrolinx in respect of the Managed Services. Metrolinx agrees that, unless the Parties mutually agree, there will also be no additional fees or charges to TTC customers relating to or arising out of the Managed Services.

5.2   Sharing of Fare Revenues

The collection, tracking, reporting and sharing of E-Fare Revenue shall be in accordance with the Funding and Financial Reporting Agreement.

5.3   Audits

(a)   In accordance with the general PRESTO audit rights of SPs described in Schedule J (Audit Rights) Metrolinx shall, upon notice as set out in the TTC Business Requirements, allow auditors designated by TTC to have access to: (i) Metrolinx's internal auditors responsible for auditing the PRESTO division, and (ii) a copy of the annual Canadian Standard on Assurance Engagement 3416 Type II audit report (or its then-current equivalent) conducted by Metrolinx's Auditors

on behalf of Metrolinx; and TTC shall have the other audit rights described in Schedule J (Audit Rights) and the TTC Business Requirements.

(b) All such audits by or on behalf of the TTC shall be scheduled and conducted in such a manner as to minimize disruption to the day to day operations of Metrolinx and to have no material impact to any other SPs, unless otherwise agreed to by the SPs.

(c) The appropriate management personnel of the PRESTO division will meet with and provide appropriate documentation and/or reports as requested in writing by TTC auditors if such reports are available at no cost to TTC or Metrolinx and Metrolinx is not required to customize in any material respect its reporting capability in order to provide same, save and except if otherwise required in accordance with the TTC Business Requirements.

(d) A management level representative designated by the TTC shall be an official member of the PRESTO Audit Committee, which committee is chaired by Metrolinx's internal audit group and attended, where appropriate, by the Auditors engaged by Metrolinx to complete the annual Canadian Standard on Assurance Engagement 3416 Type II audit report (or its then-current equivalent), among others, in accordance with the PRESTO Governance Schedule.

(e) To permit TTC to verify the calculation of any surplus to be allocated to the Surplus Fund, the PRESTO, Vice-President Finance will, upon request, provide TTC with a certificate setting out the calculation and providing sufficient information to permit verification.

5.4 Fare Collection Records

Metrolinx shall make available to TTC the agreed upon reporting as set out in the TTC Business Requirements.

ARTICLE 6
PRESTO PROJECT OVERVIEW

6.1 Requirements of and Plan for the Implementation Services

(a) *TTC Business Requirements.* The TTC Business Requirements are attached as Attachment 2 to this Master Agreement.

(b) *Project Plan.* Within 90 days of the execution of this Master Agreement, Metrolinx will, in consultation with TTC, complete an initial Project Plan, to be further developed in accordance with the Project Management Agreement. Once agreed upon by the Parties, it shall be incorporated into this Master Agreement as Schedule B. The Parties shall regularly evaluate the progress of the development of such detailed Project Plan and shall report on their progress and update the Project Plan accordingly. The updated Project Plan shall be deemed to replace and supersede any previous Project Plan and thereafter all references to "Project

Plan" in this Master Agreement shall be deemed to be references to the most recent agreed upon detailed Project Plan.

6.2   Implementation

(a)   The latest version(s) of the system software forming part of PRESTO NG shall be deployed and implemented in accordance with the Project Management Agreement. The Project Management Agreement and Project Plan sets out the procedure and timing of the Parties' transition from management by TTC (including collection of rider fare revenue) of its existing legacy fare collection systems to the exclusive provision of the Fare Collection Services by Metrolinx. The Project Management Agreement also sets out the procedure and timing of Metrolinx's deployment of the PRESTO Equipment and Services pursuant to its implementation of PRESTO NG. The Parties shall implement Fare Collection Services in an orderly manner with a view to minimizing disruption to TTC's business operations.

(b)   With respect to the legacy fare collection media (save and except for the TTC Fare Collection Responsibility) including Metropasses (the TTC's existing pre-paid periodic fare card), tickets and tokens, the Project Plan shall provide the details of a plan to cease all use of such media by a date no later than six (6) months after the Full PRESTO Deployment and Implementation Date.   To achieve such milestone the TTC shall take all reasonable actions, including ceasing to promote the legacy fare collection media.

6.3   Provision of PRESTO Equipment and Services

Metrolinx shall provide the PRESTO Equipment and Services in accordance with the Project Plan. TTC acknowledges that Metrolinx shall own all right, title and interest in and to all PRESTO Equipment and Services. Procurement of PRESTO Equipment and Services shall be undertaken in a manner consistent with provincial procurement guidelines.

6.4   Full PRESTO Deployment & Implementation

The Parties acknowledge and agree that, owing to factors beyond the reasonable control of the Parties, it may not be possible to achieve full deployment of PRESTO NG (with full functionality) by the target date by which PRESTO NG is to be, in accordance with the Project Plan, deployed throughout the TTC Transit System. The Parties will therefore agree in the Project Plan on the Full PRESTO Deployment and Implementation Date. Without relieving either Party of its obligations to complete PRESTO Deployment, the Parties acknowledge and agree that PRESTO NG shall be deemed to be fully deployed upon the Full PRESTO Deployment and Implementation Date.

6.5   Operational Services

Upon the Operational Commencement Date, Metrolinx shall provide the Operational Services in accordance with the Operational Services Agreement.

6.6 **Service Level Agreements and Appropriate Compensation**

PRESTO NG will be implemented and the related Operational Services will be provided in accordance with an SLA. Failure by Metrolinx to achieve compliance with the Service Levels and Service Level Targets (as defined in the Operational Services Agreement) in the SLA will result in compensation being paid by Metrolinx to TTC in accordance with the terms thereof. The details of such SLA will be set out in Schedule 2.5 of the Operational Services Agreement.

ARTICLE 7
CONFIDENTIALITY

7.1 **General**

Metrolinx and TTC hereby acknowledge that:

(a) as public entities, both Parties regularly report to government and are subject to applicable freedom of information laws and reporting obligations; and

(b) certain documents, reports and other instruments may contain Confidential Information.

The Parties hereby agree to consider what information should remain confidential and to develop appropriate guidelines (and, if required, make appropriate changes to Schedule I (Data Collection and Use) before disclosing same to any government body or releasing it to the public.

All Confidential Information communicated to a Receiving Party by the Disclosing Party, whether before or after the Effective Date, has been and shall be received in confidence as set out herein and shall be used only for the purposes of this Master Agreement. Such information shall not be disclosed by the Receiving Party, its agents or employees, or used for any purpose other than the performance of the terms hereof without the prior written consent of the Disclosing Party. The terms of this Master Agreement shall be treated as confidential and only disclosed as required by Applicable Law.

7.2 **Maintenance of Security and Confidentiality**

The Receiving Party of any Confidential Information shall take all reasonable steps to maintain the security and confidentiality of the Confidential Information of the disclosing Party. Each Party further agrees:

(a) to take reasonable steps, no less rigorous than those taken to protect its own Confidential Information of a similar nature, to prevent any disclosure of the Disclosing Party's Confidential Information;

(b) to reproduce the Disclosing Party's Confidential Information only to the extent necessary to meet its obligations under this Master Agreement;

(c)   to notify the Disclosing Party immediately if Confidential Information is disclosed in violation of this Section or is otherwise lost or unaccounted for; and

(d)   to use reasonable efforts to limit the disclosing Party's Confidential Information to those of the Receiving Party's directors, officers, employees, professional advisors, third party service providers, consultants, subcontractors and contractors who have a need to know such information under this Master Agreement; *provided*, *however*, that any such person who is not one of the Receiving Party's directors, officers or employees shall have first executed a non-disclosure agreement reasonably satisfactory to the Disclosing Party governing the treatment of such information.

7.3   Return or Destruction

Upon any termination of this Master Agreement, or upon the request of the Disclosing Party the Receiving Party shall (a) return or destroy all tangible forms of such Confidential Information in its possession; (b) use all reasonable efforts to destroy all copies of all materials that incorporate or reflect such Confidential Information; and (c) certify to the Disclosing Party that such materials have been either returned or destroyed, in each case except as to executed original copies of any contractual documents or other materials customarily held by the Receiving Party as legal archival material.

7.4   Enforcement

The Parties agree that any actual or threatened disclosure or misappropriation of Confidential Information may cause the Disclosing Party immediate and irreparable injury, and therefore the Disclosing Party shall be entitled to apply to any court of competent jurisdiction for injunctive or other equitable relief. The foregoing shall be in addition to and without prejudice to such other rights as the Disclosing Party may have at law or in equity.

7.5   Employees and Agents

The receipt of Confidential Information under this Master Agreement shall not limit or restrict assignment or reassignment of employees, officers, agents and contractors of Metrolinx and TTC within or between the respective Parties and other agencies of their respective governments.

7.6   Third Party Information

In its dealings with third parties, the Parties agree to seek to limit Third Party Information marked as being proprietary and confidential to information that is Confidential Information. Any and all Third Party Information, if properly marked as being proprietary and confidential, is and shall remain proprietary to and confidential information of such third party. Each Party shall use Third Party Information solely in connection with such Party's performance of its obligations under this Master Agreement, and each Party may disclose Third Party Information only on a "need-to-know" basis to employees, agents and subcontractors of such Party, after appropriate non-disclosure agreements have been executed.

ARTICLE 8
DATA COLLECTION AND USE

8.1 Data Collection and Use Policy

The Parties agree that data shall be collected, retained and used in accordance with Schedule I (Data Collection and Use), attached hereto which sets out the policy for data collection, retention and use, in respect of the Managed Services, and in accordance with the TTC Business Requirements.

ARTICLE 9
PROPERTY AND THIRD PARTY RIGHTS

9.1 Metrolinx Property

(a) Subject to Section 8.1, TTC acknowledges and agrees that Metrolinx and/or its suppliers shall own all Intellectual Property Rights in PRESTO NG and in all PRESTO Equipment and Services, and all related Service Documentation, Hardware, Software, Marks, Confidential Information or other intellectual property (including non-TTC business rules and non-TTC business processes). Except as provided in Section 9.6, TTC agrees that it shall not have any right, title, claim, interest, security interest or lien in any Metrolinx Intellectual Property regardless of whether any such Metrolinx Intellectual Property constitutes a trade secret or is competitively sensitive, and TTC hereby disclaims any such right, title, claim, interest, security interest or lien that it might otherwise have in any of the Metrolinx Intellectual Property.

(b) Metrolinx retains ownership of all PRESTO Equipment and Services in accordance with Section 4.2 of the Project Management Agreement.

9.2 TTC Intellectual Property

The Parties acknowledge and agree that the description of TTC Intellectual Property, and the rights of Metrolinx or any others to use such TTC Intellectual Property shall be set out in the TTC Intellectual Property Schedule to be attached hereto as Schedule K.

9.3 TTC License to Use Data

Subject to Section 8.1, Metrolinx grants TTC a non-exclusive, royalty-free license (with the right to sub-license) to use TTC Data, which includes ridership, sales and transit-related data.

9.4 Interfaces to TTC Systems and Equipment

The Parties agree that any interfaces to TTC systems or equipment developed by Metrolinx shall be provided in a mutually agreed format, in accordance with the TTC Business Requirements.

9.5   **Trade-Marks**

(a)   Each Party hereby grants to the other a limited, royalty-free, non-transferable, non-exclusive right to use the granting Party's Marks solely for the purposes of performing the grantee's obligations under this Master Agreement. All such use shall comply with the guidelines and standards set by the granting Party and communicated to the other from time to time and shall include such notices as the granting Party may require from time to time, including notices indicating that such licensed Marks are used under license and are trade-marks of, or are registered in, the name of the granting Party or any other Person designated by same, as the case may be.

(b)   Each Party agrees that: (i) it shall not acquire any right, title or interest in or to the Marks of the other Party; (ii) any and all goodwill associated with such Marks shall enure exclusively to the benefit of the owner of such Marks; (iii) it shall not in any manner represent that it has any ownership interest in the Marks of the other Party or in any applications or registrations thereof; (iv) it shall not dispute or contest for any reason whatsoever, directly or indirectly, the validity, ownership or enforceability of the Marks of the other Party, and it shall not, directly or indirectly, attempt to dilute the value of the goodwill associated with such Marks, nor counsel, procure or assist anyone else to do any of such acts; (v) it shall not directly or indirectly oppose any application by the other Party or any other Person designated by such Party to register the Marks of the other Party in any jurisdiction or any application to extend any registration for such Marks;

(c)   Each Party shall promptly notify the other Party of: (i) any improper use or infringement which comes to its attention involving the Marks of the other Party; or (ii) any use involving a confusingly similar mark by any Person not authorized by the other Party. The Party to whom the Marks belong shall have the right, in its discretion, to settle any dispute with any Person regarding the unauthorized use of its Marks. The Parties waive the provisions of section 50(3) of the Trade-marks Act.

9.6   **Third Party Rights and Licenses**

Metrolinx shall obtain from third parties all rights and licenses required to perform the Managed Services. With respect to all technology used and to be used by Metrolinx to perform the Managed Services hereunder, whether proprietary to Metrolinx or known to be proprietary to any other Person, Metrolinx hereby grants and agrees to grant to TTC, or shall cause to be granted by the licensor thereof, as the case may be, without additional charge, such licenses and sublicenses as may be necessary in order for TTC, and its authorized representatives (including third-party service providers), to use, or receive the benefit of the use by Metrolinx of, such technology in connection with the Managed Services.

ARTICLE 10
PRIVACY AND SECURITY

10.1   Protection of Personal Information

The Parties shall comply with applicable Privacy Laws for the purposes of this Master Agreement and all Ancillary Agreements, and shall comply with the obligations set out in Schedule F (Privacy).

10.2   Security Policies and Protection Tools

The Parties shall adhere to such Ontario provincial standards related to data treatment and security as are applicable. Metrolinx shall also meet the applicable TTC Business Requirements and adhere to such best practices as it is required to adhere to by the applicable Canadian payment industry body in order to be permitted to operate and interface as a merchant with applicable banking and/or credit card issuers who are members of such Canadian payment industry body. Metrolinx shall also maintain such certification as required to permit acceptance (at all sales channels), clearance, and settlement of payment transactions. In addition, Metrolinx shall adopt, maintain and enforce internal security and back-up policies in the manner set out in Schedule G (Security).

ARTICLE 11
USE OF FACILITIES AND COMPLIANCE WITH POLICIES

11.1   Compliance

While on the other Party's premises, each Party will comply with reasonable requests, policies, standard rules and regulations of such Party communicated to such Party, including those related to health and safety regulations, and conduct when on such premises; and otherwise conduct themselves in a professional and businesslike manner.

ARTICLE 12
REPRESENTATIONS AND WARRANTIES

12.1   By Metrolinx

Metrolinx represents and warrants, and acknowledges that TTC is relying thereon, as follows:

(a)   Organization. Metrolinx is an agency of the Her Majesty the Queen in Right of Ontario under the *Metrolinx Act, 2006*, duly organized and validly existing under such Act;

(b)   Authorization. Metrolinx has full corporate power and authority to execute and deliver this Master Agreement and to perform its obligations hereunder and carry out the transactions contemplated hereby. The execution, delivery and performance by Metrolinx of this Master Agreement have been duly authorized and no additional corporate authorization or action on its part is required in

connection with the execution, delivery and performance by Metrolinx of this Master Agreement or the consummation by Metrolinx of the transactions contemplated hereby;

(c)   Approvals. Metrolinx has obtained, or shall promptly obtain upon execution of this Master Agreement, all regulatory and governmental approvals necessary or desirable in connection with Metrolinx's entry into this Master Agreement and the Ancillary Agreements and performance of the Managed Services hereunder;

(d)   Enforceable. This Master Agreement constitutes a valid and binding obligation of Metrolinx, enforceable against Metrolinx in accordance with its terms subject to the following qualifications:

    (i)   specific performance, injunction and other equitable remedies are discretionary and, in particular, may not be available where damages are considered an adequate remedy; and

    (ii)   enforcement may be limited by bankruptcy, insolvency, liquidation, reorganization, reconstruction and other similar laws generally affecting the enforceability of creditors' rights.

(e)   No Breach of Applicable Laws. The execution and performance of this Master Agreement and the Ancillary Agreements by Metrolinx shall not violate any law, statute, or regulation and shall not breach any agreement, covenant, court order, judgment, or decree to which Metrolinx is a party or by which it is bound;

(f)   Government Authority. Metrolinx has, and promises that it shall maintain in good standing, all licenses, registrations, permits and other governmental authorizations necessary to perform and, as applicable receive, the Managed Services and to otherwise operate its business;

(g)   Conflicting Agreements. Metrolinx is free of any contractual obligation that would prevent it from entering into this Master Agreement and the Ancillary Agreements or prevent or hinder it in any way from fulfilling its obligations under this Master Agreement and the Ancillary Agreements;

(h)   Litigation. There is no pending or anticipated civil or criminal litigation in any judicial forum that involves Metrolinx or subcontractors that may adversely affect Metrolinx's ability to perform its obligations under this Master Agreement or any Ancillary Agreement. Metrolinx shall notify TTC, within 10 Business Days of Metrolinx's knowledge of its occurrence, of any such pending or anticipated civil or criminal litigation. Metrolinx shall notify TTC, within 48 hours in the event process is served on Metrolinx in connection with this Master Agreement or any Ancillary Agreement, including any subpoena of Metrolinx's records, and shall send a written notice of the service together with a copy of the same to TTC within 72 hours of such service.

(i) <u>Infringement.</u> At no time during the term of this Master Agreement or any Ancillary Agreement shall the use of any services, techniques, or products provided or used by Metrolinx infringe upon any third party's patent, trademark, copyright, or other intellectual-property right, nor make use of any misappropriated trade secrets.

(j) <u>Industry Standards.</u> Without limiting its obligation to comply with the TTC Business Requirements, Metrolinx will ensure that PRESTO NG employs appropriate security features and functionality that meet industry standards for payment systems.

12.2   By TTC

TTC represents and warrants, and acknowledges that Metrolinx is relying thereon, as follows:

(a) <u>Organization.</u> TTC is a corporation under the *City of Toronto Act, 2006*, duly organized and validly existing under such Act;

(b) <u>Authorization.</u> TTC has full corporate power and authority to execute and deliver this Master Agreement and to perform its obligations hereunder and carry out the transactions contemplated hereby. The execution, delivery and performance by TTC of this Master Agreement have been duly and validly authorized and no additional corporate authorization or action on its part is required in connection with the execution, delivery and performance by TTC of this Master Agreement or the consummation by TTC of the transactions contemplated hereby;

(c) <u>Approvals.</u> TTC has obtained, or shall promptly obtain upon execution of this Master Agreement, all regulatory and governmental approvals necessary or desirable in connection with Metrolinx's performance of the Managed Services hereunder or TTC's use of the Managed Services;

(d) <u>Enforceable.</u> This Master Agreement constitutes a valid and binding obligation of TTC, enforceable against TTC in accordance with its terms subject to the following qualifications:

  (i) specific performance, injunction and other equitable remedies are discretionary and, in particular, may not be available where damages are considered an adequate remedy; and

  (ii) enforcement may be limited by bankruptcy, insolvency, liquidation, reorganization, reconstruction and other similar laws generally affecting the enforceability of creditors' rights.

(e) <u>No Breach of Applicable Laws.</u> The execution and performance of this Master Agreement and the Ancillary Agreements by TTC shall not violate any law, statute, or regulation and shall not breach any agreement, covenant, court order, judgment, or decree to which TTC is a party or by which it is bound;

(f)   Government Authority. TTC has, and promises that it shall maintain in good standing, all licenses, registrations, permits and other governmental authorizations necessary to perform and, as applicable receive, the Managed Services and to otherwise operate its business;

(g)   Conflicting Agreements. TTC is free of any contractual obligation that would prevent it from entering into this Master Agreement and the Ancillary Agreements or prevent or hinder it in any way from fulfilling its obligations under this Master Agreement and the Ancillary Agreements;

(h)   Litigation. There is no pending or anticipated civil or criminal litigation in any judicial forum that involves TTC or subcontractors that may adversely affect TTC's ability to perform its obligations under this Master Agreement or any Ancillary Agreement. TTC shall notify Metrolinx, within 10 Business Days of TTC's knowledge of its occurrence, of any such pending or anticipated civil or criminal litigation. TTC shall notify Metrolinx, within 48 hours in the event process is served on TTC in connection with this Master Agreement or an Ancillary Agreement, including any subpoena of TTC's records, and shall send a written notice of the service together with a copy of the same to Metrolinx within 72 hours of such service.

(i)   Infringement. At no time during the term of this Master Agreement or any Ancillary Agreement shall the use of any services, techniques, or products provided or used by TTC infringe upon any third party's patent, trademark, copyright, or other intellectual-property right, nor make use of any misappropriated trade secrets.

ARTICLE 13
LIMITATION OF LIABILITY

13.1   Exclusion of Warranties

Other than the express warranties set out in this Master Agreement or any Ancillary Agreement, there are no warranties or conditions, express or implied, statutory or otherwise, including the implied warranties or conditions of merchantability or fitness for a purpose, whether arising hereunder, through course of dealing or usage of the trade.

13.2   Limitation of Liability

(a)   Metrolinx will be liable to the TTC for breach by Metrolinx of its obligations under this Master Agreement or the Ancillary Agreements, as the case may be, provided that such liability shall be limited to TTC's direct damages and in an amount that will not, in the aggregate, exceed sixty (60) million dollars; provided that in the case of personal injury (including bodily injury) or death, liability is subject to an additional limitation of ten (10) million dollars per occurrence.

(b)   Sections 13.2(a) will not apply to limit:

(i) the liability of Metrolinx for its breach of its obligations under ARTICLE 7 (Confidentiality);

(ii) Metrolinx's liability or obligations under Article 10 (Privacy); or

(iii) Metrolinx's liability or obligations under Subsection 12.1(i) (Intellectual Property Infringement).

(c) Metrolinx shall not be liable to the TTC for any damages, losses, costs or liabilities to the extent arising from the acts or omissions of the TTC or any person for whom the TTC is responsible at law, including any liability arising from a TTC Dependency.

(d) Metrolinx and TTC expressly acknowledge that the limitations contained in this Section apply to any and all claims by the TTC under this Master Agreement or under any Ancillary Agreement without duplication. The limitations have been the subject of negotiation between the Parties and represent the Parties' agreement based upon an agreed upon allocation of risk associated with the performance of their respective obligations under this Master Agreement. The directors, members, officers, employees, agents, representatives, subcontractors and suppliers of a Party shall be deemed to be included as part of such Party for purposes of this Section 13.2.

13.3 Indirect Damages

In no event shall either Party be liable for any indirect, incidental or consequential damages arising in connection with this Master Agreement or any Ancillary Agreement even if advised of the possibility thereof. The Parties acknowledge and agree that amounts properly owing under the Funding and Financial Reporting Agreement but not paid shall be considered to be a form of direct damages.

ARTICLE 14
DISPUTE RESOLUTION

14.1 Dispute Resolution

Metrolinx and the TTC acknowledge and agree that all Disputes in connection with or arising out of this Master Agreement or any Ancillary Agreement shall be subject to the Dispute resolution procedure set out in this ARTICLE 14 as of the Effective Date unless otherwise expressly provided for. The Parties further agree:

(a) In the event of any Dispute with respect to any operational matter with respect to the Managed Services (e.g., a technical failure generating an incident report under the Operational Services Agreement), this Master Agreement, or any Ancillary Agreement, such Dispute shall be resolved, if possible, using the incident/problem management procedure set out in the Operational Services Agreement. If it is not possible to resolve such Dispute in the manner set out in the Operational Services

Agreement, the dispute resolution mechanism set out in this ARTICLE 14 shall apply.

(b) In the event of a Dispute with respect to the interpretation of any provision of this Master Agreement or any Ancillary Agreement, any amounts due hereunder or the performance of the Parties hereunder or thereunder (other than those resolved pursuant to Subsection 14.1(a)), each Party's Designated Representative shall meet to attempt to resolve the Dispute or to negotiate for an adjustment to any provision of this Master Agreement. Each Party acknowledges that it is in their mutual interest to have their respective Designated Representative resolve all matters by mutual agreement and each agrees to act reasonably and in good faith to permit and encourage their respective representatives to do so. If such Designated Representatives are not able to resolve any Dispute referred to them within 15 Business Days, the matter shall be referred to the following senior representatives for the respective Parties: for Metrolinx, the President and Chief Executive Officer, and for the TTC, the Chief Executive Officer, each of whom shall be fully briefed on the matter and shall have the authority to negotiate on behalf of and bind their respective Party, provided that the Parties acknowledge that certain material matters may require additional approval(s) or may require the approval of, with respect to Metrolinx, the Metrolinx Board of Directors, and, with respect to TTC, the Toronto Transit Commission.

(c) If such senior representatives are not able to resolve any Dispute referred to them within thirty (30) Business Days of such referral, or such longer period as the Parties may mutually agree to, then the Dispute shall be referred to the Chairs of the respective Parties, namely: for Metrolinx, the Chair of Metrolinx, and for the TTC, the Chair of the TTC, each of whom shall be fully briefed on the matter and shall have the authority to negotiate on behalf of and bind their respective Party, provided that the Parties acknowledge that certain material matters may require the approval of, with respect to Metrolinx, the Metrolinx Board of Directors, and, with respect to TTC, the Toronto Transit Commission.

(d) If such Chairs of the respective Parties are not able to resolve any Dispute referred to them within ninety (90) Business Days of such referral, for such longer period as the Parties may mutually agree to, then the Dispute shall be referred to arbitration pursuant to Section 14.2 hereof.

14.2 Arbitration

If the Parties do not reach a resolution pursuant to Section 14.1(c) within the period stated therein, the Dispute shall be referred to arbitration in accordance with the provisions of Schedule E (Arbitration Rules and Procedures). Judgment upon the award rendered in any such arbitration may be entered in any court having jurisdiction thereof, or application may be made to such court for a judicial acceptance of the award and an enforcement, as the law of such jurisdiction may require or allow.

14.3 **No Termination or Suspension of Managed Services**

Notwithstanding anything to the contrary contained herein, and even if any Dispute arises between the Parties and regardless of whether it requires at any time the use of the Dispute resolution procedures described above, in no event nor for any reason shall Metrolinx interrupt the provision of Managed Services to TTC or any obligations related to transition, disable any hardware or software used to provide the Managed Services to TTC, or perform any other action that prevents, impedes, or reduces in any way the provision of the Managed Services to TTC or TTC's ability to conduct its activities, unless: (i) authority to do so is granted by TTC or conferred by a court of competent jurisdiction; or (ii) this Master Agreement has been terminated or has expired pursuant to ARTICLE 15 hereof and a Termination/Expiration Transition satisfactory to TTC has been completed.

ARTICLE 15
TERM AND TERMINATION

15.1 **Term**

This Master Agreement shall commence on the Effective Date and shall continue for the Term. In particular, the Operational Services Agreement shall have an initial term of fifteen (15) years, subject to any extension in accordance with this Master Agreement or any Ancillary Agreement, commencing on the Effective Date, and shall provide for renewal in two stages as follows:

(a) Renewal in the sole discretion of Metrolinx for a one (1) year term in accordance with the Operational Services Agreement; and

(b) automatic renewal for one (1) subsequent four (4) year term in accordance with the Operational Services Agreement unless either Party gives the other Party twenty-four (24) months prior notice of its desire not to renew.

Either Party may notify the other Party that it desires to review the terms and conditions (other than the Metrolinx Fee) of this Master Agreement, the Operational Services Agreement or the Funding and Financial Reporting Agreement, provided that (a) at least half of the then current term for the Operational Services Agreement has expired and (b) at least 25 months of such Term remain. In any such review, the Parties shall jointly consider such changes in good faith but neither party shall be obligated to consent to any changes to the Agreements and such refusal to consent shall not be subject to the dispute provision as set out in ARTICLE 14 of this Master Agreement.

15.2 **Termination for Cause**

(a) In no event, may TTC terminate this Master Agreement or any Ancillary Agreement during the first five (5) years following the Effective Date. This period is intended to permit Metrolinx to develop and implement PRESTO NG.

(b) Upon its determination that a Terminable Condition exists, TTC may provide Metrolinx a written notice of its intent to terminate. Such notice of intent to

terminate shall set out in sufficient detail the basis for its determination that a Terminable Condition exists. Within 48 hours of receipt of any such notice, Metrolinx shall provide its acknowledgement of receipt. Metrolinx shall promptly develop a remedial plan to remedy all material defects identified in the notice of termination within a reasonable period and shall seek TTC's consent to such remedial plan, which shall not be unreasonably withheld or unduly delayed. If the Parties are unable to agree upon such remedial plan within 60 days of its delivery to the TTC, TTC may provide a written notice of termination.

(c)   Termination under this Section 15.2 shall be exercised by the TTC in good faith and as a last resort, and shall only occur if:

(i)   Metrolinx has been given ample opportunity to remedy any defects in implementation or operation;

(ii)   the TTC has cooperated, if applicable, with Metrolinx in attempting to resolve the Terminable Condition;

(iii)   the Terminable Condition is not due to a TTC Dependency; and

(iv)   the Terminable Condition is not the result of Force Majeure.

15.3   Orderly Transition

(a)   In connection with the expiration or termination of this Master Agreement, Metrolinx shall comply with TTC's reasonable directions to give effect to the Termination/Expiration Transition. TTC and its employees and agents shall cooperate in good faith with Metrolinx in connection with Metrolinx's obligations under this Section and TTC shall perform its obligations under the transition plan (described below). Metrolinx's obligations under this Section shall consist of the following as well as such other obligations as may be contained in the transition plan and as may be otherwise agreed upon by Metrolinx and TTC:

(i)   Metrolinx and TTC shall work together to develop a transition plan and timeline setting forth the respective tasks to be accomplished by each Party in connection with the orderly transition and a schedule pursuant to which the tasks are to be completed including with respect to data migration and other transaction and information management tasks and duties;

(ii)   Metrolinx agrees to sell to TTC (or a third party designated by TTC) and TTC may agree to purchase, or to cause a third party designated by TTC to purchase, at fair market value any physical assets within the control of TTC then being used exclusively for the benefit of TTC and to the extent permitted, accept assignment of any maintenance or other agreements related exclusively to such physical assets;

(iii)   Metrolinx shall take such steps as may be reasonably expected to minimize disruption or interruption of the TTC transit service to riders; and

(iv)   Metrolinx will work with TTC to organize an orderly transfer of data (including TTC Personal Information) from Metrolinx to TTC in accordance with the data policy established pursuant to Section 8.1. After an agreed upon reasonable period of time, Metrolinx will destroy copies of such data still within its possession in accordance with Applicable Laws or as set out in Schedule I (Data Collection and Use), as applicable.

(b)   For so long as this Master Agreement remains in effect and during the Termination/Expiration Transition, Metrolinx shall continue to provide the Managed Services then being performed under this Master Agreement, and Metrolinx shall continue to collect its fees for such Managed Services in accordance with the terms hereof. In addition Metrolinx shall perform the services set forth in this Section 15.3. If the termination assistance provided by Metrolinx under this Section 15.3 requires Metrolinx resources in excess of the Metrolinx resources required to deliver the Managed Services during the period of the Termination/Expiration Transition, TTC shall pay Metrolinx for such additional resources at Metrolinx's then current reasonable industry rates.

(c)   The Termination/Expiration Transition shall proceed for such period of time as the Parties may agree but is not to exceed twelve (12) months from the commencement of the Termination/Expiration Transition.

ARTICLE 16
FORCE MAJEURE

16.1   Force Majeure

(a)   If and to the extent that a Party's performance of any of its obligations pursuant to this Master Agreement is materially prevented, hindered or delayed by reason of a Force Majeure Event, then the non-performing, hindered or delayed Party will be excused for such non-performance, hindrance or delay, as applicable, of those obligations to the extent that they are affected by the Force Majeure Event for as long as such Force Majeure Event continues and such Party continues to use its commercially reasonable efforts to re-commence performance whenever and to whatever extent possible without delay, including through the use of alternate sources, workaround plans or other means.

(b)   The Party claiming the benefit of a Force Majeure Event will promptly notify the other Party of the circumstances creating the failure or delay and provide sufficient documentation to establish to the reasonable satisfaction of the other Party the impact of such Party's failure or delay.

(c)   Notwithstanding the foregoing, neither Party will be entitled to relief under Section 16.1(a) to the extent that any event otherwise constituting a Force

Majeure Event results from the negligence, fault or intentional wrongdoing of such Party. If a Party claims the benefit of a Force Majeure Event, the other Party will likewise be excused from performance of its obligations hereunder on a day-for-day basis, but only to the extent that such Party's obligations are affected due to the other Party's delayed performance.

(d)   The Parties acknowledge and agree that the Term may be extended if a Party's performance of any of its obligations is prevented, hindered or delayed by reason of a Force Majeure Event, in accordance with Section 5.1(b) of the Operational Services Agreement.

(e)   For greater certainty, each Party's obligations under this Master Agreement include the obligation to maintain continuous provision of PRESTO NG and the Managed Services to the extent that same can reasonably be addressed by the implementation of, with respect to Metrolinx, the PRESTO Business Continuity Plan and, with respect to TTC, the TTC's business continuity plan and to take any other prudent back-up and recovery measures and procedures that might reasonably be required by such Party. Further, the Parties shall work together, acting reasonably, upon any such occurrence to minimize any potential outage, and return as expeditiously as possible to normal PRESTO NG service.

(f)   The TTC acknowledges and agrees that an act by the City of Toronto constitutes an event outside the reasonable control of Metrolinx, and may constitute a Force Majeure Event if Metrolinx's performance of any of its obligations pursuant to this Master Agreement is prevented, hindered or delayed by reason of an act of the City of Toronto.

(g)   This ARTICLE 16 applies to each Ancillary Agreement.

ARTICLE 17
GENERAL PROVISIONS

17.1   Notice

Any notice, demand or other communication (in this Section 17.1, a "**notice**") required or permitted to be given or made hereunder shall be in writing and shall be sufficiently given or made if:

(a)   delivered in person during normal business hours on a Business Day and left with a receptionist or other responsible employee of the relevant Party at the applicable address set forth below;

(b)   sent by prepaid first class mail; or

(c)   sent by any electronic means of sending messages, including facsimile transmission, which produces a paper record (in this Section 17.1, **"Electronic Transmission"**) during normal business hours on a Business Day charges prepaid and confirmed by prepaid first class mail;

in the case of a notice to Metrolinx, to:

PRESTO
130 Adelaide Street West, Suite 1500
Toronto, ON M5H 3P5
Fax No.:   416 874 5901

Attention: Metrolinx Designated Representative for PRESTO/TTC

With a copy to:

Metrolinx
20 Bay Street, Suite 600
Toronto, ON M5J 2W3

Attention: General Counsel

and, in the case of a notice to TTC, to:

Toronto Transit Commission
1900 Yonge Street
Toronto, ON M4S 1Z2
Fax No.: -416-393-2068

Attention: Chief Financial and Administration Officer

With a copy to:
Toronto Transit Commission
1900 Yonge Street
Toronto, ON M4S 1Z2
Fax No.: -416-338-0117

Attention: TTC General Counsel

Each notice sent in accordance with this Section shall be deemed to have been received:

(a)   on the day it was delivered;

(b)   at start of business on the third Business Day after it was mailed (excluding each Business Day during which there existed a general interruption of postal services due to strike, lockout or other cause); or

(c)   on the same day that it was sent by Electronic Transmission or at the start of business on the first Business Day thereafter if it was sent after 5:00 pm or if the day on which it was sent was not a Business Day.

Either Party may change its address for notice by giving notice to the other Party (as provided in this section).

17.2   **Further Assurances**

Each Party shall do such acts and shall execute such further documents, and shall cause the doing of such acts and shall cause the execution of such further documents as are within its power, as the other Party may in writing at any time and from time to time reasonably request be done and or executed, in order to give full effect to the provisions of this Master Agreement, such acts and executions of documents not to be unreasonably delayed or withheld.

17.3   **Communications Policy**

TTC shall be responsible for general communications to TTC Customers (as defined in the TTC Business Requirements), including those that refer to PRESTO NG and Metrolinx agrees that the TTC may include such Metrolinx Marks as licensed for use by the TTC hereunder in such communications in accordance with this Master Agreement and TTC shall provide a copy of each such communication to Metrolinx prior to its release. Schedule H (Communications Policy) to this Master Agreement sets out Metrolinx's communications policy. This policy deals with such matters as advertising, written sales promotion, press releases and other publicity matters relating to this Master Agreement in which the other Party's name or Mark is mentioned or language from which the connection of said name or Mark may be inferred or implied. Neither Party shall publish or use media releases, public announcements or public disclosures relating to this Master Agreement or the subject matter of this Master Agreement, including promotional or marketing material (but not including any announcement intended solely for internal distribution at TTC or Metrolinx, as the case may be, or any disclosure required by legal, accounting or regulatory requirements beyond the reasonable control of TTC or Metrolinx) except in accordance with such policy. The Parties agree that their respective representatives responsible for such communications shall meet to plan and coordinate the synchronized communication of those events that require substantial communications activities, such as new PRESTO Equipment and Services roll outs and the addition of material new functionality to PRESTO NG product launches. Metrolinx acknowledges that the foregoing does not prohibit TTC from reporting to the Toronto Transit Commission with respect to this Master Agreement.

17.4   **Time of the Essence**

Time shall be of the essence hereof.

17.5   **Invalidity**

If any of the provisions or part thereof contained in this Master Agreement is invalid, illegal or unenforceable in any respect, the validity, legality or enforceability of the remaining provisions or parts thereof contained herein shall not be in any way affected or impaired thereby.

17.6   No Amendment

No supplement, modification or termination of this Master Agreement shall be binding unless executed in writing by the Party to be bound thereby.

17.7   No Waiver

No waiver of or consent to depart from the requirements of any provision of this Master Agreement shall be binding against either Party unless it is in writing and is signed by the Party giving it. Such waiver or consent shall be effective only in the specific instance and for the specific purpose for which it has been given and shall not be deemed or constitute a waiver of any other provisions (whether or not similar) nor shall such waiver constitute a continuing waiver unless otherwise expressly provided. No failure on the part of either Party to exercise, and no delay in exercising, any right under this Master Agreement shall operate as a waiver of such right. No single or partial exercise of any such right shall preclude any other or further exercise of such right or the exercise of any other right. No investigations made by or on behalf of either Party at any time shall waive, diminish the scope of or otherwise affect any representation or warranty made by the Parties in this Master Agreement.

17.8   Assignment

Neither Party shall assign any of its rights or obligations under this Master Agreement not specifically transferable by its terms without the prior written consent of the other Party, such consent not to be unreasonably withheld, provided that each Party may without such consent assign its rights and obligations under this Master Agreement, in whole or in part, (a) as part of a corporate reorganization, or (b) in the case of the TTC, to the purchaser of all or substantially all of the assets of the TTC, or in the case of Metrolinx, the purchase of all or substantially all of the assets of the PRESTO division of Metrolinx.

17.9   Enurement

This Master Agreement shall enure to the benefit of and be binding upon each of the Parties and their respective successors (including by amalgamation or statutory arrangement) and permitted assigns.

17.10   Survival

The provisions of Sections 5.3, 5.4, 9.1, 15.3 and ARTICLE 1, ARTICLE 7, ARTICLE 8, ARTICLE 10, ARTICLE 12, ARTICLE 13, ARTICLE 14, ARTICLE 16 and ARTICLE 17 shall remain in effect after the termination of this Master Agreement, until such time as the Parties mutually agree to the release of the obligations contained therein. No termination of this Master Agreement by any Party shall affect the rights and obligations of any Party which have accrued as of the date of such termination.
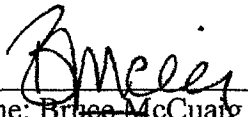
17.11   Counterparts

This Master Agreement may be executed in any number of counterparts. Either Party may send a copy of its executed counterpart to the other Party by facsimile transmission

instead of delivering a signed original of that counterpart. Each executed counterpart (including each copy sent by facsimile transmission) shall be deemed to be an original; all executed counterparts taken together shall constitute one agreement.
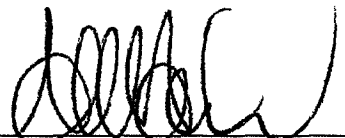
[Signature Page Follows]

IN WITNESS WHEREOF this Master Agreement has been executed by the Parties as of the Effective Date.

METROLINX

By: _____

Name: Bruce McCuaig

Title: President and Chief Executive Officer

Date: November 28, 2012

TORONTO TRANSIT COMMISSION

By: _____

Name: Andy Byford

Title: Chief Executive Officer

Date: November 28, 2012

SCHEDULE A
DEFINITIONS

"**Amendment**" means a change to this Master Agreement or any Ancillary Agreement other than a change to a project or operational schedule.

"**Ancillary Agreements**" means the Funding and Financial Reporting Agreement, the Project Management Agreement, and the Operational Services Agreement.

"**Applicable Law**" means any law, rule, statute, regulation, by-law, order, ordinance, protocol, code, guideline, treaty, policy, notice, direction or judicial, arbitral, administrative, ministerial or departmental judgment, award, decree, treaty, directive, or other requirement or guideline published or in force at any time during the Term which applies to, requires mandatory compliance with and that governs or regulates any Person (including either or both Parties), property, transaction, activity, event or other matter, including any rule, order, judgment, directive or other requirement or guideline issued by any Governmental or Regulatory Authority.

"**Auditors**" means an independent auditing firm retained and paid for by Metrolinx.

"**Business Day**" means any day, other than a Saturday, Sunday, statutory or civic holiday in Toronto, Ontario.

"**Change Order Procedure**" means the process for initiating, reviewing, and approving/rejecting Changes as set out in Attachment 1 hereto.

"**Change Order**" means a written approval by the Designated Representative of each Party to a Change Response to authorize making the Change set out in the applicable Change Response as set out in the Change Order Procedure.

"**Change Response**" means a written response to a Request for Change.

"**Changes**" means, once the Final Design (as used in Schedule 2.1(b) (RASCI for PRESTO System Development) to the Project Management Agreement) has been approved: material changes, modifications or enhancements to (a) the Project Plan; (b) the Managed Services; (c) the TTC Business Requirements; or (d) any other project or operational aspect of this Master Agreement that would materially affect the Provincial PRESTO Service.

"**Commercialization/Non-Fare Business**" is to be developed by the Parties in accordance with Schedule C.

"**Confidential Information**" of a Party means any operational or financial material and/or information of such Party or licensors (the "**Disclosing Party**") which has or will come into the possession or knowledge of the other Party (the "**Receiving Party**") in connection with or as a result of entering into this Master Agreement that is by its nature sensitive information, the disclosure of which would materially and adversely affect the ability of the Disclosing Party to perform its obligations hereunder or under any Ancillary Agreement, including information concerning operational requirements, system or data security or integrity. For the purposes of

this definition, "information" and "material" includes know-how, trade secrets, processes, business rules, tools, designs, formulae, financial, or programming materials, equipment configurations, system access codes and passwords, drawings, diagrams, studies, works in progress, in oral, written, graphic, electronic, or any other form or medium. Notwithstanding the foregoing, "Confidential Information" does not include information or material:

(a)   which is publicly available when it is received by or becomes known to the Receiving Party or which subsequently becomes publicly available through no fault of the Receiving Party (but only after it becomes publicly available);

(b)   which is already known to the Receiving Party at the time of its disclosure to the Receiving Party and is not known by the Receiving Party to be the subject of an obligation of confidence of any kind;

(c)   which is independently developed by the Receiving Party without any use of or reference to the Confidential Information of the Disclosing Party and which independent development can be established by evidence that would be acceptable to a court of competent jurisdiction;

(d)   which is required to be disclosed by Applicable Law, competent regulatory authority or an order of a court of competent jurisdiction; or

(e)   which is received by the Receiving Party in good faith without an obligation of confidence of any kind from a third party who the Receiving Party had no reason to believe was not lawfully in possession of such information free of any obligation of confidence of any kind, but only until the Receiving Party subsequently comes to have reason to believe that such information was subject to an obligation of confidence of any kind when originally received.

"**Content**" means works, data, text, information, audio, video, graphics, routing scripts, advertisements, graphical user interface elements and designs, photography, and other works, in any form or medium whatsoever.

"**Contract Year**" means a twelve (12) month period between either the Effective Date and the twelve (12) month anniversary of the Effective Date, or between an anniversary date of the Effective Date and the next subsequent anniversary date of the Effective Date.

"**Current PRESTO Deployment**" means, as of the Effective Date, the Provincial PRESTO Service fare collection devices currently installed at TTC stations.

"**Designated Representative**" means the representative of a Party who shall be responsible for the implementation, management and enforcement of this Master Agreement on behalf of that Party, including overall management of that Party's performance hereunder and for the first-level resolution of disputes between the Parties regarding the performance or non-performance of their obligations under this Master Agreement. The initial Designated Representatives of the Parties are identified in Section 3.1.

"**Dispute**" means any dispute or disagreement between the Parties, including with respect to operational matters with respect to the Managed Services or with respect to the interpretation of any provision of this Master Agreement or any Ancillary Agreement.

"**Documentation**" means instructions, manuals, drawings, notes, charts and other information relating to the development, use, installation, implementation, integration, configuration, operation, modification, maintenance or support of Hardware or Software.

"**E-Fare Revenue**" means all revenue in respect of TTC fares collected by Metrolinx through the Managed Services, regardless of channel.

"**e-fare**" means electronic fare.

"**Effective Date**" means the date of this Master Agreement, as set out on the first page hereof.

"**Executive Client Committee**" means the executive client committee formed by the SPs using the Provincial PRESTO Service or PRESTO NG as further described in the PRESTO Governance Schedule.

"**Fare Collection Services**" means the collection and processing on an exclusive basis of TTC rider fares, save and except for the TTC Fare Collection Responsibility, for the TTC Transit System, including all E-Fare Revenue and non-revenue transaction, (such as transfers, TTC employee transactions, and other zero-fare transactions) and all cash fare revenues from fare vending devices and the servicing of such devices.

"**Force Majeure Event**" means an event of fire, flood, earthquake, explosion, casualty, strike, lockout, power or telecommunications failure or accident or act of God, war or other violence (including any act of terrorism), or other event outside the Party's reasonable control, and such non-performance, hindrance or delay could not have been prevented by execution of, with respect to Metrolinx, the PRESTO Business Continuity Plan and, with respect to TTC, the TTC's business continuity plan.

"**Full PRESTO Deployment and Implementation Date**" means the date on which the Project Plan is deemed to have achieved Full PRESTO NG Functionality.

"**Full PRESTO NG Functionality**" means, at any point in time, the achievement of substantial completion of the deployment and implementation of the applicable phase of PRESTO NG, in accordance with TTC Business Requirements and as mutually agreed as part of the Project Plan with agreed-upon metrics.

"**Funding and Financial Reporting Agreement**" is the funding and financial reporting agreement between the Parties dated the Effective Date.

"**Governmental or Regulatory Authority**" means: (i) any government, including the Government of Ontario or the City of Toronto, governmental department, agency, commission, board, tribunal, bureau, any official or minister of any government, Crown corporation or any court or other law, rule or regulation-making entity; and (ii) any regulatory authority, or other

entity having jurisdiction over TTC, Metrolinx or any Person, property, transaction, activity, event or other matter related to this Master Agreement.

"**Hardware**" means hardware, equipment, devices, mainframes, personal computers, servers, client/server stations, network equipment, routers, semi-conductor chips, embedded software, communication lines, cabling and any other assets purchased, licensed to, leased or otherwise made available to Metrolinx which are used by Metrolinx from time to time during the Term in providing the Managed Services.

"**Implementation Services**" has the meaning as set out in Section 2.1 of the Project Management Agreement.

"**Initial Term**" means the initial fifteen (15) year term of the Operational Services Agreement.

"**Intellectual Property Rights**" means any and all proprietary rights provided under: (i) patent law; (ii) copyright law (including moral rights); (iii) trade-mark law; (iv) design patent or industrial design law; (v) semi-conductor chip or mask work law; or (vi) any other statutory provision or common law principle applicable to this Master Agreement, including trade secret law, which may provide a right in hardware, software, documentation, Confidential Information, ideas, formulae, algorithms, concepts, inventions or processes, or the expression or use of same; any and all applications, registrations, licenses, sub-licenses, franchises, agreements or any other evidence of a right in any of the foregoing; and all licenses and waivers and benefits of waivers of the intellectual property rights set out herein.

"**Managed Services**" means all services to be provided by Metrolinx to the TTC under this Master Agreement and the Ancillary Agreements in accordance with the TTC Business Requirements.

"**Marks**" means trade-marks, service marks, designs, logos, trade names, domain names, meta-tags or other distinguishing features.

"**Master Agreement**" means this Master E-Fare Collection Outsourcing Agreement between Metrolinx and the Toronto Transit Commission.

"**Metrolinx Fee**" has the meaning ascribed thereto in the Funding and Financial Reporting Agreement.

"**Metrolinx Intellectual Property**" means Intellectual Property Rights owned by Metrolinx and/or its suppliers as they relate to PRESTO NG or any components or modifications thereof, now existing or to be developed, or any specifications, designs, plans, drawings, software, computer systems, prototypes or other technical or business information forming part of, or developed in connection therewith, by or on behalf of Metrolinx or developed by Metrolinx, by themselves or jointly with others (including TTC) in connection with this Master Agreement whether now existing or to be developed, including all derivatives and developments of the foregoing. For greater certainty, TTC Intellectual Property and TTC Business Requirements will not become Metrolinx Intellectual Property.

"**Metrolinx Personal Information**" means Personal Information collected by Metrolinx, other than TTC Personal Information.

"**Operational Commencement Date**" means the dates that the Fare Collection Services commence, in accordance with the Project Plan, following the deployment of PRESTO NG. For greater certainty, this date will be the first day of operation of the first PRESTO NG device with Full PRESTO NG Functionality for the initial phase, as set out in the Project Plan.

"**Operational Services Agreement**" is the operational services agreement between the Parties dated the Effective Date.

"**Operational Services**" means the provision of (a) the Fare Collection Services to be provided pursuant to the Funding and Financial Reporting Agreement; (b) such PRESTO Equipment and Services as are required to be provided to the TTC for use in the TTC Transit System *after* the Operational Commencement Date, including such new versions of, and replacements for, previously deployed PRESTO Equipment and Services, and (c) such other services as are described in the Operational Services Agreement, in each case as more particularly described in the Operational Services Agreement and the TTC Business Requirements.

"**Party**" means either Metrolinx or the TTC, and "**Parties**" means both of them.

"**Performance Requirements**" has the meaning ascribed to it in the Operational Services Agreement.

"**Person**" means any individual, partnership, corporation, governmental body, crown corporation, governmental agency, or unincorporated organization.

"**Personal Information**" means information about an identifiable individual or other information that is subject to any Privacy Law.

"**PRESTO Business Continuity Plan**" means the Metrolinx business continuity plan for the Provincial PRESTO Service and PRESTO NG, a description of which is attached as Attachment 3 to this Master Agreement, as amended from time to time, in accordance with this Master Agreement.

"**PRESTO Equipment and Services**" means the equipment (including in-system fare vending devices), networks and services required for the operation and support of PRESTO NG as described in an Attachment to the Operational Services Agreement, including any new equipment, networks and services provided pursuant to the Project Management Agreement and all equipment, networks and services provided as replacement or additional equipment, networks or services by Metrolinx for the operation of PRESTO NG in the TTC Transit System from time to time.

"**PRESTO Governance Schedule**" means the schedule describing the governance of the Provincial PRESTO Service and PRESTO NG generally and attached as Schedule D (as opposed to the Project Governance Schedule attached to the Project Management Agreement).

"**PRESTO NG**" means the Provincial PRESTO Service as modified and enhanced through a series of periodic releases in accordance with the Project Plan to become an e-fare account-based payment system with an open architecture using industry standards, which will accommodate open loop financial cards, mobile applications and future technological innovations and which: (a) provides the functionality and other attributes required to meet the TTC Business Requirements; (b) meets the Performance Requirements; and (c) satisfies the established procedures and processes of the financial services and payments industries for an account-based customer fare payment system.

"**Privacy Laws**" means any federal, provincial or other applicable statute, law or regulation of any Governmental or Regulatory Authority in Canada, applicable to the Managed Services and relating to the collection, use, storage and/or disclosure of information about an identifiable individual, including the *Municipal Freedom of Information and Protection of Privacy Act* (Ontario) and the *Freedom of Information and Protection of Privacy Act* (Ontario).

"**Project Management Agreement**" is the project management agreement between the Parties dated the Effective Date.

"**Project Plan**" means the overall plan for (a) the design of the additional functionality required pursuant to the Project Management Agreement to be incorporated in PRESTO NG, (b) the modification of PRESTO NG, (c) the Managed Services, and (d) the implementation of PRESTO NG, in each case for the operation of PRESTO NG in the TTC Transit System pursuant to this Master Agreement, which plan shall be attached herein as Schedule D, as amended from time to time, including in accordance with Section 6.1(b).

"**Protection Tools**" means end-to-end system and device protection and monitoring tools including fraud detection capability, such as anti-virus protection, white listing, tokenization, PCI-DSS scans, vulnerability testing, access control management, user access monitoring, data log tools, and database monitoring, as set out in Schedule G (Security).

"**Provincial PRESTO Service**" means Metrolinx's centralized provincial e-fare system based on smartcard technology, providing fare collection, settlement services and information management services including (a) the PRESTO Equipment and Services and all other hardware, software and services forming part of such system, (b) all business rules and business processes with respect to such system, and (c) all modifications, additions, derivatives, developments, improvements and changes thereto.

"**Request for Change**" means a written notice to the other Party's Designated Representative specifying a proposed Change and the purpose or objective sought with such proposed Change.

"**Service Areas**" has the meaning ascribed to it in the Operational Services Agreement.

"**Service Documentation**" means all Content and Documentation provided by Metrolinx in connection with the use, operation, support or maintenance of the Managed Services including the PRESTO Equipment and Services, or any part thereof, and all amendments to such Documentation made in accordance with this Master Agreement. Service Documentation includes the Managed Services training materials.

"**SLA**" has the meaning ascribed to it in the Operational Services Agreement.

"**Software**" means scripts, programs, macros, computer programs, application programming and other interfaces, tools and other instructions and sets of instructions for Hardware to follow, including SQL and other query languages, hypertext markup language and other computer mark-up languages.

"**SPs**" means the service providers that use the Provincial PRESTO Service, and, after the Effective Date, PRESTO NG which, as of the Effective Date, includes GO Transit, Brampton Transit, Burlington Transit, Durham Region Transit, Hamilton Street Railway, Mississauga Transit, Oakville Transit, York Region Transit, and TTC with the City of Ottawa OC Transpo to follow in 2012. The transit service providers included in the scope of the "SPs" may change from time to time.

"**Surplus Fund**" has the meaning ascribed to it in the Funding and Financial Reporting Agreement.

"**Term**" means the period commencing on the Effective Date and terminating on the date that the last Ancillary Agreement in effect terminates or expires and is not renewed.

"**Terminable Condition**" means that the TTC is prevented from operating all or substantially all of its transit system efficiently and effectively due to the fundamental failure of PRESTO NG to operate in accordance with the TTC Business Requirements.

"**Termination/Expiration Transition**" means orderly transition and migration to TTC, or a third party designated by TTC, from Metrolinx of responsibility for such terminated Fare Collection Services and other Operational Services as are then being performed by Metrolinx or which Metrolinx is then responsible for performing under this Master Agreement.

"**Third Party Information**" means information belonging or relating to any third party.

"**TTC Business Requirements**" means the business requirements as attached as Attachment 2 to this Master Agreement.

"**TTC Data**" means all data, including metadata, text and information (including "tap" information, and all information, data sets, data files defined in the Data Universe (as defined in the TTC Business Requirements) of the Data Mart (as defined in the TTC Business Requirements) in tangible or electronic from relating to TTC, or TTC Customers (as defined in the TTC Business Requirements) or employees.

"**TTC Dependency**" has the meaning ascribed to it in the Operational Services Agreement.

"**TTC Fare Collection Responsibility**" means the collection of (a) cash fare payments in fare boxes on TTC surface vehicles, and (b) prior to cessation by TTC of legacy fare media pursuant to Section 6.2 of this Master Agreement fare payments from TTC riders using any form of legacy payment media.

"**TTC Intellectual Property**" means Intellectual Property Rights owned by TTC and/or its suppliers as more fully set out in Schedule K (TTC Intellectual Property).

"**TTC Personal Information**" means Personal Information collected by TTC or by Metrolinx on behalf of TTC, as a result of performing Metrolinx's obligations hereunder.

"**TTC Transit System**" means the transit system and services provided by the TTC in existence from time to time, including buses, streetcars, light rail vehicles, Wheel-Trans, rapid transit, and subway. . For greater clarity, the TTC Transit System shall include the Toronto-York Spadina Subway Extension once it is constructed and becomes operational.

SCHEDULE B
PROJECT PLAN

Preliminary PRESTO TTC Project Plan

To be developed and inserted pursuant to Section 6.1(b) of this Master Agreement.

SCHEDULE C
COMMERCIALIZATION/NON-FARE BUSINESS

The Parties will develop a plan for the commercialization and non-fare business use of PRESTO NG based on the following principles:

Key Principle: The Parties must be able to take advantage of other opportunities (both transit and non-transit) that the PRESTO NG system provides.

Approach:

1. The Parties will act reasonably when doing business together.

2. The expansion of PRESTO NG to other Public Sector entities in the City of Toronto would be based on:

   (a) No requirement to pay an "entrance fee" or "membership fee" to Metrolinx; and

   (b) Any new revenues (net of full costs incurred by Metrolinx to implement/support the specific initiative) will be shared with the TTC based on negotiations, the specifics of each opportunity and the relative cost contribution of each Party.

3. The expansion of PRESTO NG to any commercial or public for-profit venture would be reviewed on a case by case basis and based on:

   (a) Potential requirement for new commercial or public for-profit ventures to pay a reasonable "entrance fee" or "membership fee" to Metrolinx;

   (b) Any new revenues would first be used to offset the full costs incurred by Metrolinx to implement/support and operate the specific initiative; and

   (c) Surplus revenues will be shared with TTC based on negotiations, the specifics of each opportunity, and the relative contribution of each Party.

4. Section 3 does not include work done for the "Public Sector" as defined below.

   "**Public Sector**" means and includes any ministry, agency or corporation which is a part of or controlled by any of the Government of Canada, the government of any province, territory, region, or municipality, and includes municipal organizations, transit agencies in Ontario, school boards and publicly-funded academic, health, and social service entities, and includes any projects which are funded, in whole or in part, by any of the foregoing entities;

SCHEDULE D
PRESTO GOVERNANCE SCHEDULE

1.   Governance function and structure

1.1   Purpose

This Schedule describes the objectives, guiding principles, framework and processes for the management of the working relationships between SPs and Metrolinx, in relation to the Provincial PRESTO Service**.**

This Schedule is as of the date of this Master Agreement, and may be subject to change.

1.2   Objectives and Guiding Principles

The objectives of the governance function and structure as set forth in this Schedule are to facilitate:

(a)   common understanding among stakeholders as to expectations, business strategy, goals, initiatives and priorities;

(b)   communication, reporting and other critical aspects of the relationship and contract compliance;

(c)   timely and effective escalation and resolution of issues, concerns or disputes; and

(d)   an arrangement that meets the stakeholders' goals and objectives.

Nothing in this Schedule is intended to relieve any party from responsibility for performance of its obligations under any agreement between Metrolinx and an SP.

1.3   Committees

Metrolinx will, together with the TTC, engage several committees in accordance with this Schedule.

Each committee will hold meetings to address strategic and/or operational issues as described herein and as otherwise appropriate for such committee. At a minimum, the following committees will be constituted:

- PRESTO Executive Client Committee ("**ECC**");

- PRESTO Business Process & Transformation Committee; ("**BPTC**")

- PRESTO Operations and Deployment Committee ("**ODC**");

- PRESTO Finance Committee ("**FC**"); and

- PRESTO Audit Committee ("**PAC**").

These committees will have the following mandates:

(a)   The mandate of ECC is to advise and provide counsel on the strategic direction for the Provincial PRESTO Service, while supporting efficient operations. The ECC will provide resolutions for escalated issues and problems relating to business/strategy, operations, and finance. The ECC will serve as a forum for SPs to discuss significant issues and proposed changes regarding operations, finance, and risk management and make collective decisions regarding the future direction of PRESTO. In addition, the ECC will review audit reports, recommend actions as needed, and provide input regarding approval of audit. The ECC may make binding decisions with regard to (i) the use of SP funds, individually or in aggregate; (ii) changes to the Provincial PRESTO Service business, operations and financial models; (iii) appointment of independent auditors and approval of resulting annual audit reports; (iv) process changes that impact the Provincial PRESTO Service; and (v) use of transit data, except anonymous data used in aggregate, provided that no such use policy is to adversely affect the data licence granted to the TTC in this Master Agreement.

(b)   The mandate of the BPTC is to recommend process improvement / business direction for the Provincial PRESTO Service. The BPTC also needs to ensure that the business needs of SPs are being met, while assessing the impact on the strategic business direction of the Provincial PRESTO Service. The BPTC is accountable to the ECC, and may occasionally investigate elements of business or product strategy for the ECC.

(c)   The mandate of the ODC is to monitor and provide feedback on the operations of the Provincial PRESTO Service and to provide input to and concur with the schedule of operations, including: deployment and implementation, incident management, defect management, performance management, and production change management. The ODC is accountable to the ECC for the oversight of business continuity of the Provincial PRESTO Service.

(d)   The mandate of the FC is to provide recommendations on Provincial PRESTO Service financial issues as they impact the finances of SPs. The FC will also support all PRESTO financial processes (e.g., reconciliation and settlement). The FC is accountable to the ECC.

(e)   The mandate of the PAC is to review all material aspects of the internal control, risk, financial reporting and audit function of the Provincial PRESTO Service. The PAC is to inform and recommend approaches and strategies on audit issues to the ECC.

Each committee may form working groups as required to address a matter within the purview of that committee, and subject to oversight by that committee.

1.4   Committee Chair, Vice-Chair, Secretary

Each committee will have a Chair and a Vice-Chair as specified below. Each Chair shall be accountable for the fulfilment of the responsibilities of his or her committee in a manner consistent with the objectives and guiding principles set out in Section 1.2 of this Schedule. If a Chair is absent from a meeting, the applicable Vice-Chair will assume the roles and responsibilities of that Chair in respect of that meeting.

Each committee will have a Secretary. The Secretary will be responsible for publishing agendas, distributing materials, recording the minutes and distributing same and following up on any action items of the applicable committee, under the general oversight of the corresponding Chair.

1.5   Membership

Each committee shall be composed of certain Metrolinx personnel and SP representatives.

Each SP shall designate its representative(s) to each committee by sending a written notice of the name, title and contact information of same to the Chair of the applicable committee.

Each representative designated by a SP shall be: (i) sufficiently qualified, trained, experienced and knowledgeable to participate in that committee's activities; (ii) of a consistent level of seniority as the representatives of other SPs on that committee; and (iii) available for and capable of performing the tasks contemplated for such committee in a timely and effective manner.

All committee members need to be active participants in meetings, and need to be prepared to discuss all items on the agenda. All committee members, as representatives of Metrolinx or a SP, need to disseminate key information and action items to the organization that they represent.

1.6   Meetings

The following provisions shall apply to all committee meetings, subject to the committee-specific provisions.

(a)   *Timing*. Each committee may determine its own meeting schedule, provided that the frequency of meetings corresponds to the timing set out in the applicable terms of reference. In the event that a stakeholder requests a meeting in addition to a particular committee's regular meetings, the other members of that committee shall use reasonable efforts to agree on a date and time for the requested meeting as close as practicable to the date requested by the requesting stakeholder.

(b)   *Format*. Each committee meeting will be held in person at a reasonable location determined by the Chair, or by teleconference, unless otherwise agreed by the Chair of that committee. Each committee meeting will be a forum for committee members to discuss matters within the purview of that committee, with discussion facilitated by the Chair.

(c)   *Agenda and Meeting Materials*. Within a specified number of Business Days prior to each committee meeting (as set out in the applicable terms of reference),

the Chair of the applicable committee shall: (i) settle an agenda for the meeting, which agenda shall list the matters to be considered at the meeting; and (ii) ensure that the Secretary provides to each committee member the agenda and any materials that are required for the meeting.

(d)   *Attendance*.   Each stakeholder shall use reasonable efforts to cause each of its applicable committee representatives to attend each applicable committee meeting (whether in person, where the meeting is in person, or by telephone, where the meeting will be held by teleconference) or have a suitable delegate attend on their behalf (unless a delegate is not permitted according to the applicable terms of reference).

(e)   *Quorum.*   Quorum for a meeting is achieved when at least 60% of the voting members of that committee are present either in person or by telephone. If quorum is not reached, any items that require voting will be postponed to the next duly called meeting of that committee (and such items may be voted upon even if quorum is not achieved for that meeting).

(f)   *Voting*.   Each voting member of a committee has one vote, and voting members must be present in person or by telephone to vote.

(g)   *Guest Speakers, Experts.*   If   committee member invites a guest speaker or subject matter expert to speak to an agenda item, he or she must provide notice to the Chair of the applicable committee no less than 48 hours prior to the scheduled meeting date of: (i) the name and credentials of that individual; and (ii) the agenda item to which that individual will speak.

1.7   Consensus, Disputes and Escalation

Decisions of a committee will be made by a consensus of voting members. If, after exercising reasonable, good faith efforts, the voting members of a committee (other than the ECC) have not reached a consensus, the Chair of that committee shall refer the issue to the ECC for resolution. In that case, the Chair of the referring committee shall attend and participate at meetings in which the issue is discussed, and shall otherwise provide the ECC with such information, as requested by the ECC, in connection with the ECC's resolution of the issue. The Chair will be required to articulate each committee member's position to the ECC.

If a committee is considering a matter or change that will only affect a limited number of SPs, only the voting representatives from Metrolinx and the affected SPs shall be considered when seeking consensus.

SCHEDULE E
ARBITRATION RULES AND PROCEDURES

The following rules and procedures shall apply with respect to any matter to be arbitrated between Parties under the terms of the Master Agreement and any Ancillary Agreement.

1. **INITIATION OF ARBITRATION PROCEEDINGS**

(a) If either Party to this Master Agreement wishes to have any matter arbitrated in accordance with the provisions of this Master Agreement, it shall give notice (an "**Arbitration Notice**") to the other Party specifying particulars of the matter or matters in Dispute and proposing the name of the individual it wishes to be the single arbitrator. Within 20 Business Days after receipt of the Arbitration Notice, the other Party shall give notice to the first Party advising whether such other Party accepts the arbitrator proposed by the first Party. If such notice is not given by the other Party within such 20 Business Day period, the other Party shall be deemed to have accepted the arbitrator proposed by the first Party. If the Parties do not agree upon a single arbitrator within such 20 Business Day period, any Party may apply to a judge of the Ontario Superior Court of Justice under the *Arbitration Act, 1991*, S.O. 1991, chap. 17, (the "**Arbitration Act**") for the appointment of a single arbitrator (the "**Arbitrator**").

(b) The individual selected as Arbitrator shall be qualified by education and experience to decide the Dispute. The Arbitrator shall be at arm's length from the Parties and shall not be a member of the audit or legal firm or firms, who advise any Party, nor shall the Arbitrator be an individual who is, or is a member of a Person, otherwise regularly retained by any of the Parties.

2. **SUBMISSION OF WRITTEN STATEMENTS**

(a) Within 30 Business Days of the appointment of the Arbitrator, the Party initiating the arbitration (the "**Claimant**") shall send the other Party (the "**Respondent**") a statement of claim ("**Statement of Claim**") setting out in sufficient detail the facts and any contentions of law on which it relies, and the relief that it claims.

(b) Within 30 Business Days of the receipt of the Statement of Claim, the Respondent shall send the Claimant a statement of defence ("**Statement of Defence**") stating in sufficient detail which of the facts and contentions of law in the Statement of Claim that the Respondent admits or denies, on what grounds, and on what other facts and contentions of law the Respondent relies.

(c) Within 15 Business Days of receipt of the Statement of Defence, the Claimant may send the Respondent a statement of reply ("**Statement of Reply**").

(d) All Statements of Claim, Defence and Reply shall be accompanied by copies, or, if they are especially voluminous, lists, of all essential documents on which the

Party concerned relies and which have not previously been submitted by any Party, and (where practicable) by any relevant samples.

(e)   After submission of all of the Statements of Claim, Defence and Reply, the Arbitrator will give directions for the further conduct of the arbitration.

3.   **MEETINGS AND HEARINGS**

(a)   Any arbitration herein shall be held in the City of Toronto unless the Parties otherwise agree. The arbitration shall be conducted in English unless otherwise agreed by the Parties and the Arbitrator. Subject to any adjournments which the Arbitrator allows, the final hearing will be continued on successive Business Days until it is concluded.

(b)   All meetings and hearings will be in private unless the Parties otherwise agree.

(c)   Any Party may be represented at any meetings or hearings by legal counsel.

(d)   Each Party may conduct an examination-in-chief and re-examine its own witnesses and cross-examine the opposing Party's witnesses at the arbitration.

4.   **THE DECISION**

(a)   The Arbitrator will make a decision in writing and, unless the Parties otherwise agree, will set out written reasons for his decision.

(b)   The Arbitrator will send the decision to the Parties as soon as practicable after the conclusion of the final hearing, but in any event no later than 45 Business Days thereafter, unless that time period is extended for a fixed period by the Arbitrator on written notice to each Party because of illness or other cause beyond the Arbitrator's control.

(c)   Subject to the court's jurisdiction to set aside an award pursuant to Section 46 of the *Arbitration Act*, an award by the Arbitrator shall be final and binding upon the Parties and there shall be no appeal from the award of the Arbitrator on a question of law or on any other question.

5.   **JURISDICTION AND POWERS OF THE ARBITRATOR**

(a)   By submitting to arbitration under the Arbitration Rules, the Parties shall be taken to have conferred on the Arbitrator the following jurisdiction and powers, to be exercised at the Arbitrator's discretion subject only to the Arbitration Rules and the relevant law, with the object of ensuring the just, expeditious, economical and final determination of the Dispute referred to arbitration.

(b)   Without limiting the jurisdiction of the Arbitrator at law, the Parties agree that the Arbitrator shall have jurisdiction to:

(i)   determine any question of law arising in the arbitration;

(ii)   determine any question as to the Arbitrator's jurisdiction;

(iii)   determine any question of good faith arising in the Dispute;

(iv)   make such procedural rules as the Arbitrator determines are appropriate with respect to the conduct of the proceedings;

(v)   determine the nature and extent of discovery, if any;

(vi)   proceed in the arbitration notwithstanding the failure or refusal of any Party to comply with the Arbitration Rules or with the Arbitrator's orders or directions, or to attend any meeting or hearing, but only after giving that Party written notice that the Arbitrator intends to do so;

(vii)   order any Party to furnish further details of that Party's case, in fact or in law;

(viii) receive and take into account such written or oral evidence tendered by the Parties as the Arbitrator determines is relevant, whether or not strictly admissible in law;

(ix)   hold meetings and hearings, and make a decision (including a final decision) in Toronto, Ontario or elsewhere with the concurrence of the Parties thereto;

(x)   order the Parties to produce to the Arbitrator, and to each other for inspection, and to supply copies of, any documents or classes of documents in their possession or power which the Arbitrator determines to be relevant;

(xi)   order the preservation, storage, sale or other disposal of any property or thing under the control of any of the Parties;

(xii)   make one or more interim awards;

(xiii) to make an award of interest in respect of any amount determined to be owing;

(xiv) make an award as to costs of the arbitration; and

(xv)   make interim orders to secure all or part of any amount in dispute in the arbitration.

6.   **COSTS OF ARBITRATION**

Pending determination by the Arbitrator, the Parties to an arbitration shall share equally and be responsible for their respective shares of all costs relating to the Arbitrator and the

arbitration. However, the Arbitrator may make an award of costs upon the conclusion of the arbitration making one or more Parties to the Dispute liable to pay a part or all of the costs of another Party to the Dispute. When the Arbitrator has rendered a decision on the Dispute, a Party who has made a settlement offer that was not accepted, may advise the Arbitrator of the time, nature and amount of the settlement offer. In awarding costs the Arbitrator may take into account the making of such settlement offer.

SCHEDULE F
PRIVACY

1. Subject to paragraph 5 (below), each Party (in this Schedule, the "**Personal Information Recipient**") will collect, use, store, disclose, dispose of and otherwise handle, the Subject Personal Information (in this Schedule, the "**Subject Personal Information**" means, as applicable, with respect to Metrolinx, the TTC Personal Information, or with respect to the TTC, the Metrolinx Personal Information):

    (a)   in accordance with all policies of the other Party (in this Schedule, the "**Personal Information Holder**") relating to privacy matters (provided same have been provided to the Personal Information Recipient in writing), and

    (b)   solely for the purpose of performing or receiving the Managed Services, or any other purpose for which the Personal Information Holder provides prior express written consent.

2. In addition to the obligations set forth in paragraph 1 (above), if a Personal Information Holder is dependent on the performance by the Personal Information Recipient of an obligation in order for the Personal Information Holder to comply with any Privacy Law, then, at the Personal Information Holder's direction, the Personal Information Recipient will perform such obligation in a manner that will enable the Personal Information Holder to comply with such Privacy Law.

3. The Personal Information Recipient will restrict access to the Subject Personal Information to those of its personnel (or the personnel of Authorized Subcontractors) who have a legitimate business need for such Subject Personal Information for the purpose of fulfilling the Personal Information Recipient's obligations to the Personal Information Holder under this Master Agreement and any Ancillary Agreement, and who have agreed to handle such Subject Personal Information in accordance with the terms of this Master Agreement and any Ancillary Agreement.

4. The Personal Information Recipient will provide the Personal Information Holder with reasonable access to its Hardware, Software, Systems and facilities in accordance with this Master Agreement and any Ancillary Agreement to enable the Personal Information Holder to comply with its obligations under Applicable Law with respect to the Subject Personal Information.

5. Subject paragraph 3 (above), without limiting paragraphs 1 or 2 (above), and except as required by Applicable Law, the Personal Information Recipient will not provide access to, or otherwise make available to any Person, Subject Personal Information under the care or control of, or accessible by, the Personal Information Recipient, without the Personal Information Holder's prior consent. If the Personal Information Recipient is required to disclose Subject Personal Information in connection with any judicial proceeding or government investigation, then the Personal Information Recipient will, to the extent permitted by Applicable Law, promptly notify the Personal Information Holder and allow a reasonable time before such disclosure is required for the Personal

Information Holder to seek a protective order from the appropriate Governmental or Regulatory Authority. Thereafter, the Personal Information Recipient may disclose Subject Personal Information but only to the extent required by Applicable Law and subject to any applicable protective order.

6. The Personal Information Recipient will refer to the Personal Information Holder all requests for access to Subject Personal Information and will respond to any such request only by making reference to such referral. If the Personal Information Holder is required by any Privacy Law to provide Subject Personal Information that is in the Personal Information Recipient's possession or control to an individual, at the Personal Information Holder's direction and cost, and provided that the Personal Information Holder has provided the Personal Information Recipient with reasonable prior notice, the Personal Information Recipient will provide such Subject Personal Information and will meet any reasonable deadlines communicated to the Personal Information Recipient in writing for such provision required to enable the Personal Information Holder to comply with any deadlines applicable under such Privacy Law to the provision of such Subject Personal Information. The Personal Information Recipient will promptly notify the Personal Information Holder if it is unable to meet any deadline, in order to allow the Personal Information Holder to seek relief from such deadline. In addition, at the Personal Information Holder's direction, the Personal Information Recipient will update, correct or delete Subject Personal Information within 5 Business Days from the date upon which the direction was given by the Personal Information Holder.

7. Without limiting the obligations contained in paragraphs 1 and 3 (above) and Article 7 (Confidentiality) (of the Master Agreement), the Personal Information Recipient will store and protect Subject Personal Information from loss, theft, unauthorized access, copying, modification, use or disclosure during utilization, preparation for transmission and storage using technology, physical protection measures, processes and standards of practice that are consistent with the industry accepted practices used or observed by comparable suppliers of data management services for the financial services and/or payment card industry in North America. In the event any loss, theft or unauthorized access, copying, modification, use or disclosure occurs, the Personal Information Recipient will immediately notify the Personal Information Holder of the nature and details of such loss, theft or unauthorized access, copying, modification, use or disclosure, and will respond to such event as directed by the Personal Information Holder.

8. the Personal Information Recipient will, at the Personal Information Holder's written direction and cost, cooperate and comply with any requests or instructions issued by any privacy or data protection authority, including the Ontario Information and Privacy Commissioner and any other Governmental or Regulatory Authority applicable to the Personal Information Holder or Subject Personal Information.

9. Upon completion of the Personal Information Recipient's required use of Subject Personal Information, or upon the Personal Information Holder's written direction, the Personal Information Recipient will return or destroy all Subject Personal Information in accordance with the Personal Information Holder's instructions. If the Personal

Information Holder directs the destruction of any Subject Personal Information, then the Personal Information Recipient will complete the destruction directed and provide the Personal Information Holder with written confirmation of the actions taken within 5 Business Days of receipt of the Personal Information Holder's written instructions or such other reasonable time as required based on the nature of the instructions. In carrying out the foregoing destruction direction, the Personal Information Recipient will: (i) use the secure destruction methods requested or authorized by the Personal Information Holder, including shredding or burning or electronic erasure; (ii) protect the confidentiality of Subject Personal Information during the destruction process; and (iii) provide the Personal Information Holder with a record confirming which Subject Personal Information has been destroyed along with the time, place and method of destruction. Any additional charges for carrying out such instructions will be determined in accordance with the Change Order Procedures.

10.   The Personal Information Recipient and the Personal Information Holder will mutually agree on an employee of the Personal Information Recipient who will be responsible for all Subject Personal Information in the Personal Information Recipient's possession or under its control and for ensuring that the Personal Information Recipient complies with the terms of this Schedule.

11.   The Personal Information Recipient will ensure that all the Personal Information Recipient personnel engaged in the performance of the Managed Services that may have access to Subject Personal Information have been trained in the privacy compliance processes referred to in this Schedule.

12.   The Parties acknowledge that this Schedule shall not apply to Subject Personal Information that has been rendered anonymous or "sanitized" such that it is not reasonably foreseeable that the subject individual can be re-identified.

SCHEDULE G
SECURITY

1.   **Metrolinx Security Policies**

(a)   The applicable Metrolinx security policies are summarized/described in Exhibit 1 to this Schedule. This Schedule shall supplement but, to the extent that the security provided for herein is less than that required in the TTC Business Requirements, shall not restrict or limit the TTC Business Requirements to govern the security of data collected or used in the Managed Services. Wherever possible, where one or more policies or standards apply, Metrolinx shall follow the more stringent standard and policies for the protection and security of data.

(b)   Metrolinx will review and update (each in the normal course), and maintain and enforce, and will cause all applicable Metrolinx subcontractors to review and update (each in the normal course), and maintain and enforce, internal security and back-up policies (including policies in respect of collecting and handling currency) sufficient to protect the ongoing delivery of the Managed Services, any fees collected through the Managed Services and all Confidential Information of TTC which is provided to Metrolinx or any applicable Metrolinx subcontractor, including industry best practice risk analysis and threat assessment policies. Without limiting the generality of the foregoing, Metrolinx will, and will ensure that each applicable Metrolinx subcontractors will, comply with the policies of Metrolinx and TTC set forth in Exhibit 1 to this Schedule, and if either Metrolinx or the applicable Metrolinx subcontractor's standards are higher, then with its own standards, respectively.

(c)   Metrolinx acknowledges that nothing in paragraph 1(a) (above) will be construed to relieve Metrolinx from any of its obligations to perform the Managed Services in accordance with this Master Agreement and the Ancillary Agreements, as applicable, or from any liability for failure to perform such obligations, which will continue to apply whether or not Metrolinx has complied with the obligations set forth in paragraph 1(a) (above).

(d)   If an individual user accesses PRESTO NG improperly, or in a manner that is not authorized by this Master Agreement and the Ancillary Agreements, and if such unauthorized access will have a material adverse effect on the ability of Metrolinx to provide the Managed Services, then:

(i)   Metrolinx may immediately take steps to suspend such individual user's access to PRESTO NG;

(ii)   Metrolinx will use its best efforts to provide advance notice to TTC of any such suspension or, if advance notice is not possible, Metrolinx will notify TTC as soon as Metrolinx is able to do so.

(e)   If such unauthorized access relates to TTC, at TTC's request Metrolinx will provide to TTC details relating to the unauthorized access by the individual user that led to the suspension and the reasons that Metrolinx decided that the suspension was necessary.

(f)   Metrolinx will, at its cost, conduct, and will cause all applicable Metrolinx subcontractors, at no cost to TTC, to conduct, security audits of or pertaining to the Managed Services in such manner and at such times as is best practice in the financial payments industry and, in any event, with no less frequency than is contemplated in Metrolinx's internal policies. Forthwith upon the completion of any such audits, Metrolinx will, or will cause all applicable Metrolinx subcontractors to, provide written results of such audits to TTC.

2.   **Protection Tools**

Without limiting Metrolinx's compliance with paragraph 1 (above), Metrolinx will use Protection Tools commensurate with industry best practices to monitor and test PRESTO NG and related system, and components thereof on an ongoing basis, and to protect PRESTO NG.

3.   **Maintenance of Systems**

Metrolinx will ensure that, unless specifically contemplated in this Master Agreement, any Ancillary Agreement, or otherwise agreed by TTC in writing, at all times during the Term:

(a)   PRESTO NG and any PRESTO Equipment and Services and facilities used by Metrolinx or any applicable Metrolinx subcontractors to maintain or process any information or data comprising or relating to Confidential Information of TTC will be located and treated in accordance with applicable Privacy Laws; and

(b)   all Confidential Information of TTC in Metrolinx's or in a Metrolinx subcontractor's possession or control (including any back-ups and other copies of Confidential Information of TTC or such other information or data) will be stored and processed in accordance with sufficient physical and electronic security measures as are required to secure the confidentiality of such Confidential Information.

EXHIBIT 1 TO SCHEDULE G

PRESTO Information Management
A set of Information Management policy principles across various information Management topics. It defines specific parameters and addresses particular subjects of concern for the management of information.

PRESTO Acceptable Use of Information Technology (IT) Resources Policy
This policy was developed to direct employees and contractors (hereafter referred to as users) on the acceptable use of and authorized access to PRESTO IT resources. This policy also supports the goals of improving service delivery and providing timely access to information.

PRESTO Information Security Policy
This policy relates to the protection of this system and the information used by it through a comprehensive information security program designed to provide an acceptable balance between PRESTO's operational needs and requirements, and the need to protect this system and information from unacceptable risk.

PRESTO Guidelines for Integrating Security into the SDLC
Addresses the inclusion of security considerations throughout the entire Systems Development Life Cycle (SDLC) at PRESTO, with the aim of reducing the organization's overall risk to accepted levels.

PRESTO Third Party Management Standard
A governance process to effectively manage the security of third party connections to ensure the integrity and availability of the PRESTO security **infrastructure** is maintained.

PRESTO Privacy and Data Protection Standard
Privacy and data protection requirements that PRESTO must meet in order to protect the privacy of persons and maintain the confidentiality, integrity and availability of their data have already been defined in the PRESTO Privacy Policy, and government legislation that PRESTO is subject to: MFIPPA, and FIPPA.

PRESTO Malicious Program and Vulnerability Management
A common set of Malicious Program & Vulnerability Management standards that are to be embedded in current and future information technology projects to ensure exposures are minimized or eradicated.

PRESTO Identity and Access Management Standard
Standards related to Identity and Access Management (IAM) which allow PRESTO to manage electronic identities, govern access to systems, and maintain the Identity Lifecycle in a manner suited to industry best practices.

PRESTO Directive for Inclusion of Information Security in Change Management
Defines information security requirements to be considered as part of PRESTO's formal change management processes to ensure controls are maintained or enhanced as the solution matures.

PRESTO Directive for Inclusion of Information Security in Configuration Management
Specifically governs the management of Secure Configurations for all PRESTO IT Assets through PRESTO's formal configuration management process and within the PRESTO Configuration Management Database (CMDB) as part of the baseline configuration for an IT Asset.

PRESTO Directive for Malware Free Devices
Defines information security requirements to be followed by all business units, partners, and service providers involved in, or a part of, the lifecycle of any device, server, or service participating in the PRESTO Solution to ensure Assets are free of malicious code before being promoted into a Production status.

PRESTO Operating Policy for Access Management
Requirements for restricting logical access to PRESTO IT Assets while balancing with business needs for efficiency and effectiveness of business processes.

PRESTO Operating Policy for IT Asset Management
Policy for the implementation of tools and organizational procedures for the appropriate management of IT Assets.

PRESTO Directive for Patch Management
Defines requirements for identification, testing and implementation of OS and related patches and supports the PRESTO Malicious Program and Vulnerability Management Policy.

PRESTO Process for Secure Destruction of PKI SAM
Clear directives on the accepted procedures for the destruction of sensitive SAM database material to ensure there are no unauthorized disclosures of information.

SCHEDULE H
COMMUNICATIONS POLICY

GENERAL

1.   Pursuant to the Master Agreement between Metrolinx and the TTC, Metrolinx is responsible for delivering the Managed Services.

2.   Metrolinx, together with the TTC and, where appropriate, the Province of Ontario, agree to undertake communication activities that will:

   (a)   enhance opportunities for open, transparent, effective and pro-active communications with the public;

   (b)   recognize the contribution of the Parties under this Master Agreement; and

   (c)   foster and maintain positive and constructive relationships with the public, including communities that are impacted by this project.

METROLINX-TTC COMMUNICATIONS WORKING GROUP

3.   Metrolinx and the TTC will appoint at least one representative, and other staff as required, to   support all communications and public information activities related to the project to form a Metrolinx-TTC communications working group (the "**Communications Working Group**"). The Communications Working Group will be a sub-committee of the ODC (as defined in Schedule D).

4.   The Communications Working Group will function as a communications coordinating body.

5.   The Communications Working Group will meet as required at least to discuss media coverage (if applicable), communications milestones and construction updates. A staff member from each of the Metrolinx and the TTC shall be designated as the point person for day-to-day work.

6.   The Communications Working Group will develop and adhere to a RASCI for communications to allocate roles and responsibilities for communications to the public respecting the Managed Services, which outlines all key projects, milestones, approvals and any associated communications materials that need to be developed and approved in accordance with the master project rollout.

7.   The Communications Working Group may develop joint information kits, brochures, public reports and website material to inform private-sector interest groups, contractors and the public about the infrastructure project(s). Any such information developed will follow the same project branding as required for joint communications materials, will recognize the contribution of the Parties, and will be reviewed by both Parties before release.   Where applicable, communications materials will include an organizational

explanation statement with regard to construction, ownership, operation and funding of the project.

8. The Communications Working Group is responsible for an advertising or public information campaign related to the project, the costs of which will be allocated between the Parties based upon agreed upon sharing arrangements.

9. The Communications Working Group will develop a protocol for issues management to share information and coordinate messaging to ensure the public is well-informed. The Issues Management Protocol will be reviewed periodically to ensure it is effective.

10. The Communications Working Group will work together to develop standard messaging on the roles and responsibilities of all of the Parties to be included in media releases and announcements and used throughout the duration of the project.

11. The Communications Working Group will collaborate in organizing media conferences, announcements and official ceremonies and shall respect the mutually agreed order of precedence for speakers and guests.

12. Designated spokespersons will be identified by each party for major announcements, issues management, media interviews and social media opportunities.

13. The Parties shall mutually agree on the use of quotes from the designated representatives of Metrolinx, the Province of Ontario and the TTC.

14. The Communications Working Group will provide advice and recommendations regarding logistical arrangements for media announcements.

ROLES AND RESPONSIBILITIES

The roles and responsibilities of the Parties under this Communications policy shall be set out in the RASCI for communications, to be agreed to by the Parties and attached hereto.

SCHEDULE I
DATA COLLECTION AND USE

1.   **Overview:**

This Schedule I (Data Collection and Use) outlines Metrolinx data usage and ownership policies with respect to the Provincial PRESTO Service and will supplement but, to the extent that the data use provided for herein is less than that required in the TTC Business Requirements, shall not restrict or limit the TTC Business Requirements to govern the handling of Data during the Initial Term and any renewal terms. Such data usage and ownership policies include relevant rules applicable to each party's access to, use or disclosure of Data to ensure that:

(a)   the integrity and quality of the Data is maintained;

(b)   the privacy of employees, contractors, consultants, agents, customers and suppliers (as applicable) is respected;

(c)   any Personal Information forming part of the Data is protected and treated in compliance with Privacy Laws; and

(d)   the information applications and Data are maintained/handled with the security concepts (availability, confidentiality, and integrity), required to meet the TTC Business Requirements as referenced in Exhibit 1 to Schedule G – Security.

2.   **Definition of "Data"**

"**Data**" means

- all data (including all information whether or not contained in or on any database or electronic information storage system or media owned by or in the custody or control of Metrolinx, TTC or a Designated Representative) and metadata of any kind and in any form relating to the Managed Services;

- all data that is created, developed, generated, prepared or produced pursuant to delivering the TTC Business Requirements under this Master Agreement and the Ancillary Agreements, including TTC Data;

- all data and metadata that is created, developed, generated, prepared or produced as a result of any compilation of (whether combined or compiled with other data or not) or developments or modifications to the data described above, but where one Party's data is combined or compiled with other data with the other Party's prior written consent; and

does not include (a) data that is proprietary to a Party either immediately prior to the Effective Date, or (b) data that is not first created or produced in the performance of any work under this Master Agreement or any Ancillary Agreement.

3. **Classification Framework**

Metrolinx employs an established information classification framework, which:

     (a)   standardizes and simplifies the handling of all information assets;

     (b)   defines specific handling rules for each classification level for: confidentiality; integrity/quality; availability; and retention;

     (c)   assigns each information asset the appropriate classification levels;

     (d)   clearly defines control objectives and controls to monitor and enforce information handling compliance.

4. **Data Protection Policies for Personnel**

     (a)   All Metrolinx and TTC employees, contractors, and temporary staff with access to Confidential Information must sign a non-disclosure agreement before any work commences.

     (b)   All Metrolinx and TTC employees, contractors, and temporary staff who use or work in areas where computer(s), related devices and information are located, must safeguard the computer and information assets and protect them against:

          (i)   unauthorized or inappropriate use;

          (ii)   disclosure of information to persons and/or third parties, whether internal or external to the TTC or Metrolinx;

     (c)   Electronic Confidential Information cannot be stored on external media unless it is encrypted (no un-encrypted USB, no external hard drives, no CDs, no DVDs). It can be stored on a secured sharepoint, encrypted USB, or locked computer.

     (d)   Physical embodiments of Confidential Information must not leave the designated workspaces (Metrolinx, TTC or any location authorized for Program execution) and must be securely stored or disposed of when not in use.

     (e)   All computers used to provide the Managed Services must be running anti-virus, personal firewall, hard disk encryption, and have all operating system update software installed. Computers must be locked when unattended.

     (f)   Physical access of individuals to the designated workspaces (Metrolinx, TTC or any location authorized for Program execution) must be governed. No unauthorized access.

     (g)   All individuals leaving the engagement (program or operations) must return all Data to their applicable supervisor, and to securely destroy copies of Data.

(h)   Storage of or access to Personal Information outside of Canada must be reviewed by legal counsel and may not proceed without approval of legal counsel. This does not apply to Confidential Information.

5.   **Data Access**

TTC shall not have access to Data generated on another SP's transit system except with the express approval of the SP whose Data has been requested, and for inter-SP Data. If there is a need to access Data generated on another SP's system (such as inter-SP transfers) then access to that Data shall be provided in accordance with business rules and agreements between the affected SPs and Metrolinx.

SCHEDULE J
AUDIT RIGHTS

This Schedule J (Audit Rights) outlines Metrolinx audit policies with respect to the Provincial PRESTO Service and will supplement, but, to the extent that the audit rights provided for herein is less than that required in the TTC Business Requirements, shall not restrict or limit the TTC Business Requirements to govern the handling of audits across the entire lifecycle of the engagement.

1.   **Annual Audit**

   (a)   The Auditors shall conduct an annual audit. The audit shall be conducted in accordance with Canadian Standard on Assurance Engagements (CSA3416 Type I in the first year of the Term, and thereafter CSA3416 Type II) for third party services (or its then-current equivalent) and may involve such other periodic checks and procedures as required by the auditors' scope of work, which are generally required by such auditors in support of such annual audits. In making the report to Metrolinx, the Auditors shall be deemed for all purposes to be acting as experts and not arbitrators and the determination of the Auditors shall be final and shall not be disputed by either Party unless shown to be manifestly in error within thirty (30) days of such determination.

   (b)   Metrolinx will undertake an annual audit at its cost in accordance with the above provisions and bring the audit report to Executive Client Committee for approval.

   (c)   Subject to compliance with Exhibit C of the TTC Business Requirements, the audit report shall be in such format and address such issues as determined by Metrolinx in its sole discretion

2.   **Maintenance of Records by Metrolinx**

During the Initial Term, every renewal term and for a period of seven (7) years following the termination or expiry of this Master Agreement, Metrolinx shall, at its cost and expense, retain and maintain in Canada, in an organized, accessible mode, all books, records and documentation relating to the Managed Services, in accordance with all generally accepted accounting principles and Metrolinx's record retention policies. Metrolinx, TTC or any Person, on behalf of Metrolinx or TTC, conducting any audits, shall have access to all relevant premises, sites, books, records, and documentation relating to the Managed Services and be entitled to access such books of account, records, reports and other papers, and to take extracts therefrom pursuant to discussion and agreement with Metrolinx, such agreement shall not be unreasonably withheld. Metrolinx shall make available or cause to be made available such reasonable information and material as may be required and otherwise give such cooperation as may be required.

3.   **Period for Keeping Records**

(a)   Metrolinx shall monitor compliance with contract provisions to keep and maintain in an organized and accessible mode and manner records and documentation for a period of seven (7) years from the date this Master Agreement has expired or is terminated.

(b)   All records will be maintained under the provisions of Schedule I (Data Collection and Use).

4.   **Spot Audits**

(a)   Metrolinx or TTC shall be entitled, at any time, to perform audits specifically to investigate the suspected fraud or breach of privacy, to perform spot audits of all financial and operational controls, systems, databases, all operations, transaction clearings, books, records and documentation relating to the Managed Services, including, without limitation, clearing and settlement, handling of exception items, write-offs, transfer of funds between accounts, and any other processes, to validate the accuracy and efficacy of such processes and Metrolinx agrees to cooperate with such audit; provided that:

(i)   Metrolinx working with the Executive Client Committee co-ordinates all spot audits;

(ii)   the total number of spot audits requested by TTC in any twelve (12) month period shall not exceed two;

(iii)   the Executive Client Committee is responsible for approving the process by which spot audits are completed against a set of standard criteria; and

(iv)   any spot audit requires at least seventy-two (72) hours' prior notice to Metrolinx, except where Metrolinx or TTC has reasonable grounds to believe that a fraud or breach of privacy has occurred in which case no prior notice is required.

(b)   The Parties will use reasonable efforts to minimize any disruption to business operations in carrying out such audits.

(c)   Metrolinx and TTC shall each bear their own respective costs of such spot audits if the final audit report indicates a variance within five million ($5,000,000) dollars of the number or numbers relating to the issue or issues giving rise to such audit in the systems-generated financial reports or any existing audit with respect to the same time period ("**Variance**"). Metrolinx shall bear the costs of both Parties in conducting a spot audit if (i) the Variance disadvantages TTC and is greater than five million ($5,000,000) dollars with respect to financial information, or (ii) a material breach by Metrolinx of any security, privacy or confidentiality provisions of this Master Agreement is shown to have occurred. If the spot audit indicates an overpayment or underpayment by a Party, the Parties

shall arrangement for any applicable payment or set off and effect same within thirty (30) days of date of the final audit report.

(d)   Metrolinx shall ensure that Metrolinx Representatives provide access to any Person, as authorized by TTC, to request information and cooperate fully with any audit(s) related to the provision of the Managed Services under this Master Agreement.

(e)   The annual audit reports (an audit requested by Metrolinx) shall be the property of Metrolinx and the spot audit reports (an audit requested by Metrolinx or TTC) shall be the property of the Party on whose behalf the spot audit is conducted.

(f)   The Party requesting a spot audit shall promptly provide the other Party with a copy of any spot audit report.

SCHEDULE K
TTC INTELLECTUAL PROPERTY

1. For the purposes of this Master Agreement or any Ancillary Agreement, TTC Intellectual Property shall consist of Intellectual Property Rights owned by TTC and/or its suppliers as they relate to: vehicle designs, concept and processes of operations, TTC Business Requirements, subway station designs, route information, and TTC interfaces or any components or modifications thereof, now existing or to be developed, or any specifications, designs, plans, drawings, software, computer systems, prototypes or other technical or business information forming part of, or developed in connection therewith, by or on behalf of TTC or developed by TTC, by themselves or jointly with third parties whether now existing or to be developed, including all derivatives and developments of the foregoing. For greater certainty, TTC Intellectual Property shall not include Metrolinx Intellectual Property.

2. Subject to Section 8.1 of the Master Agreement, Metrolinx acknowledges and agrees that TTC and/or its suppliers shall own the TTC Intellectual Property.

3. TTC hereby grants Metrolinx and its sub-contractors a non-exclusive, non-assignable, royalty-free license to use TTC Intellectual Property solely to the extent necessary to provide the Managed Services.

ATTACHMENTS

ATTACHMENT 1
PRESTO REQUEST FOR CHANGE/SCOPE MANAGEMENT

This Attachment is a summary of the current PRESTO Request for Change/Scope Management Process, modified to incorporate the TTC, and may be amended from time to time. The process set out herein is subject to Section 4.3 of this Master Agreement.

1.   **Principles:**

    (a)   Metrolinx will address all requested TTC changes or new requirements based on TTC acceptance of the solution and funding and in accordance with Article 4 of the Master Agreement.

    (b)   TTC will be required to sign-off prior to executing any Change Order requested by TTC or that would impact TTC business operations.

    (c)   TTC will sign-off on any Changes where those changes represent a change to the TTC' Business Requirements.

2.   **Overview:**

    (a)   The Change process will be used to manage requirements additional to those included in this Master Agreement.

    (b)   This process will gather perceived requirements for changes & enhancements in a controlled and standardized manner.

    (c)   Change requests may have a significant impact on project scope, cost, and timelines.

    (d)   All project stakeholders, including TTC, have the opportunity to request changes

    (e)   Relevant expertise and knowledge is applied to change requests to accurately determine the optimal approach, projected effort/cost, and implications.

    (f)   A Change Order as agreed and implemented is a legally binding extension to this Master Agreement.

ATTACHMENT 2
TTC BUSINESS REQUIREMENTS

Attached hereto are the TTC Business Requirements. In the event of any inconsistency between the Exhibits to Attachment 2 and any other provision of this Master Agreement (excluding the Schedules thereto), the terms of this Master Agreement shall take precedence over the Exhibits to Attachment 2.

EXHIBIT 1 TO ATTACHMENT 2
TTC BUSINESS REQUIREMENTS

TTC Fare Card Group

Exhibit B

TTC Business Requirements

System

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Document Version History

Page	Ver.	Version Date	Details
NA	Draft 1.0	110916	Includes the following sections: • 110915 - Cash Customer Rev 1.1 • 110915 - Cross Boundary Service Rev 1.1 • 110915 - Distribution Equipment Rev 1.1 • 110915 - General Equipment Specifications Rev 1.1 • 110915 - Installation of PRESTO Field System Rev 1.1 • 110915 - LUM on Bus Dispensers Rev 1.1 • 110915 - Reader Assemblies Rev 1.1 • 110915 - Transit Expansion Operations Rev 1.1 • 110915 - TTC Customer Service Centre Rev 1.1 • 110916 - AVM Rev 1.1 • 110916 - Estimated Operating Equipment Rev 1.1 • 110916 - FMVD Rev 1.1 • 110916 - General Sales and Reload Device Specifications Rev 1.1 • 110916 - Off-Board SRVM Rev 1.1 • 110916 - Onboard SRVM Rev 1.1 • 110916 - Handheld POS Equipment Rev 1.1 • 110916 - Point of Sale Equipment Rev 1.1
NA	Draft 1.1	110919	Added the following Sections: • 110919 - Open Payments Rev 1.1 • 110919 - Parking Rev 1.0 • 110919 - Third Party Network Rev 1.1 • 110919 - Wheel-Trans Rev 1.1
NA	Draft 1.2	110921	Added the following Sections: • 110921 - PRESTO System Rev 1.1 • 110921 - PRESTO-TTC Test Lab Rev 1.2 • Appendix
NA	Draft 1.3	110923	Added the following Section: • 110923 – TTC Fare Rules and Policy Rev 1.1
NA	Draft 1.4	111013	Added / Modified the following Specifications • References to the Concept of Operations • RAS-24.2, RAS-24.3, RAS-24.5, GSR-45.13, GSR-45.14 • New Section – Wireless Design Constraints – IOF-29, IOF-30, IOF-31, IOF-25, IOF-26, IOF-32
NA	Draft 1.5	111028	Added / Modified the following Specifications • GES-35, GES-37,GES-70, RAS-25.2, RAS-51, RAS-135, GSR-3, GSR-17.1,GSR-45.14, GSR-46, FMV-32, AVM-7.1, AVM-22, AVM-41, OBS-2, OBS-35, HHP-5, HHP-7, FRP-9, FRP-43, FRP-184, FRP-250, FRP-252, FRP-257, CBD-21, CBD-24, CBD-41, TEO-4, TEO-8, TEO-11, TEO-13, PRK-11 • Note that Open Payments Specifications for the PRESTO System have been removed from this Schedule and placed in Schedule G as per OPY-1
NA	Draft 2.0	120221	• Intermediate files – TTC/PRESTO requirements process
NA	Draft 3.0	120327	• Incorporated PRESTO/TTC changes from the PRESTO/TTC Business Requirements review process • Changed format of the Requirements as per Format section. • Added Cross Reference table at the end of the document to map TTC IDs to PRESTO IDs.
NA	Draft 4.0	120420	• Removed FMV-23.9.1, FMV-23.9.2, FMV-23.9.3, FMV-23.11.1, FMV-23.11.2, OBS-50, • Remove most "Rational(e)" within specifications: HHP-16, RAS-20.2, RAS-20.4, RAS-110.1, HHP-8, HHP-17

NA	Draft 5.0	120619	- Changed MA to NF / F (non-functional / functional) - Removed the MA Reference – changed it to Cross Reference - Cross Reference table has been changed to include F/NF, whether the requirement is in the Device RFP and if so the Device Spec IDs are listed. - Change the Format of the TTC Specification slightly - NF with the PRESTO reference means it is a nonfunctional specification - If a functional specification is part of the PRESTO Device RFP it is highlighted with a green Y next to the PRESTO NG release number - RAS-44 – Changed back to the original TTC requirement to clarify TTC business need. PRESTO to raise issue if this is not acceptable. - TED-12 – To be left as functional pending. - ONS-12, 13, changed to reflect onboard SRVM width change to 420mm max - Added GES-74.1 – 785N vertical force, Added GES-74.2 – shrouded PRESTO equipment - Checked to ensure all cross references were updated - Moved all Cross Boundary requirements to accepted.
NA	Draft 6.0	120815	- Modified OBS-1, 31,32,34.3.1, 47.2 as per SRVM accepting tokens CR - Modified ONS-1, 22 as per SRVM accepting tokens CR - Modified OBS-31, ONS-10 as per no RS485 Interface between the SRVM and Ticket Validator - Deleted (marked as such) OBS-33, 34, 34.1,34.2 34.3, 34.3.1, 34.4,47.2, ONS-22 as per no RS485 interface between the SRVM and Ticket Validator
NA	Draft 7.0	121026	- Modified **GES-40** to reflect devices may be updated for language and content without major re-working or re-certification. - Modified **RAS-56** which deals with the Concession Indication System (CIS) - Modified RAS-56.1 – CIS now controlled by the Turnstile Interface Board (TIB). - Deleted **RAS-57,58,59,60,61 & 62**. The Concession Indication System is now controlled by the Turnstile Interface Board. - Added **RAS-138, RAS-138.2, RAS-138.3**. These requirements deal with Reader Assembly Mounting and Power and Communications connections. **Added GES-47.5**. This requirement clarifies that device displays need to be designed to withstand the normal everyday usage. Note impact of Displays is covered in GES-47.4
NA	Draft 8.0	121116	- Deleted CAC-5, CAC-6, CSC-22, CSC-23, FMV-56, GES-13,GES-56.2, GES-73, IOF-1, IOF-22, IOF-23, POS-13, RAS-105, RAS-106, RAS-128.3, RAS-134, SYS-3,TEO-XX (all), TTL-10, WTS-11, WTS-12 - Modified NFRs via mutual agreement with PRESTO - Requirements in Transit Expansion Operations (TEO) section have been removed. Transit Expansion will now be addressed in the Master Agreement. - Changed the format of the document to remove any reference to RFP - Change Specifications to TTC Business Requirements
NA	FRC 9.0	121201	- Modified RAS-51 – Customer throughput targets 60ppm and actual ppm will be determined via the PRESTO System Design Process - Deleted all references to 400 millisecond transaction time. This requires deletion of RAS-25.2 - Changed name of document to Exhibit – now aligns with Master Agreement. - Changed draft to FRC (Final Release Candidate)

NA	Final 10.0	121210	• Added approved F to RAS-138, RAS-138.2, RAS-138.3,RAS-139, GES-47.5 • Added PID GES-47.5/1 to GES-47.5 • Changed version to Final and increased release number.

Table of Contents

List of Tables

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Format

Each TTC Business Requirement has the following format:

TTC ID	Name of TTC Business Requirement	Status	Type
Description			

Definitions

TTC ID: Unique TTC Business Requirement Identification Number

Name of Specification: Name of TTC Business Requirement

Status: Review status of the TTC Business Requirement:

Approved: TTC and PRESTO mutually agreed on TTC Business Requirement

Pending: TTC and PRESTO are currently developing a mutually agreeable TTC Business Requirement

Type: **F**: functional; **NF**: Non-Functional

Description: Description of the Requirement including figures, charts, tables etc. if used in defining and describing the TTC Business Requirement.

Additionally, the cross-reference table at the end of the document will include the additional information:

TTC Area: Three letter identification code for the TTC Area the TTC Business Requirement applies to.

PLA: PRESTO Logical Area (PLA) the TTC Business Requirement applies to as determined by PRESTO.

PID: PRESTO Identification Number

TYPE[1]: **NF**: nonfunctional Requirement
F: functional Specification

Release[2]: PRESTO NG release number

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[1] As classified by PRESTO
[2] PRESTO to provide PRESTO NG release information

Document Order of Specifications

Requirements in this document (including the cross reference table at the end of the document) are presented in their TTC logical order. Logical order here means:

- Related requirements are grouped by document sections;
- Sections that deal with overall or general requirements are presented first;
- Within each section, general / overall requirements are presented first with detailed requirements following;
- Requirements are hierarchal (i.e. requirements that are presented later in the document are dependent on earlier presented requirements); and
- Requirements can refer to other requirements or document sections (i.e. named sections and all the requirements contained therein).

Note that TTC ID numbering does not necessarily reflect the document order of how the TTC requirements are presented.

1 PRESTO System

REQ-SYS-1	Role of PRESTO	Approved	NF

PRESTO will fund, acquire, install, operate, repair, refresh and maintain the PRESTO System for TTC Customer fare payment as per the Agreements between PRESTO and TTC.

REQ-SYS-2	PRESTO System / Services Components	Approved	F

Some of the PRESTO System /services will include a Customer web site, Customer service call centre, fare payment processing, system monitoring and management, Data Mart reporting/Business Intelligence services, Revenue Collection / Servicing and maintenance.

REQ-SYS-4	Independence From Current Fare System	Approved	F

The PRESTO System must operate independently of TTC's Current System unless specifically noted in TTC's specifications.

REQ-SYS-4.1	Layered On	Approved	F

All components, systems, business and operating solutions comprising the PRESTO System shall be installed to be Layered On to TTC's in-place physical infrastructure for its Current System.

REQ-SYS-4.2	Coexistence During Transition	Approved	F

The PRESTO System shall coexist with TTC's existing fare collection system (the Current System) for an initial transition period and, with the exception of acceptance of cash at fare-boxes, subsequently replace use of the Current System.

REQ-SYS-5	PRESTO System Support for TTC Products	Approved	F

Support the use of PRESTO Cards and LUM with TTC transit products (consistent with TTC Specifications) in the PRESTO System.

REQ-SYS-5.1	Flexible Fare Processing Options	Approved	F

Ensure that the system will be flexible to allow for additional functionality such as permitting time, distance and direction based trips.

For example, PRESTO will ensure that fare and processing options to be made available and implemented on demand include: non-calendar-based, or "rolling" passes; and discounting options such as "best fare", which would be based on achieving pre-determined usage thresholds within time parameters set by TTC.

REQ-SYS-6	Support for Open Payments	Approved	F

The PRESTO System will be capable of supporting open payments.

REQ-SYS-6.1	Support for Open Payments-2	Approved	F

Ensure Customers can use their Open Payments Media as the contactless media for fare payment at all Reader Assemblies.

REQ-SYS-6.2	Support for Open Payments-3	Approved	F

Support both PAYG and/or Pre-Funded TTC transit products using credit or Debit Cards. The PRESTO System will use account based architecture for their open payments.

REQ-SYS-7	Data Mart	Approved	F

Provide a complete raw transaction history of all PRESTO System activity and fare payment transactions in the Data Mart.

Reporting and Business Intelligence services using this Data Mart enables, among other things, Service Level reporting for all business functions required by TTC, including planning purposes, audits, generation of tax receipts, financial reconciliation, and ad hoc report generation for business and analytical purposes.

REQ-SYS-7.1	Access of Data	Approved	F

TTC will rely on a Data Mart provided, operated, maintained and updated by PRESTO to access data and generate reports. TTC will provide specific examples of report formats that it requires to ensure that the Data Mart is capable of satisfying TTC's business requirements.

REQ-SYS-7.2	Data Universe	Approved	F

PRESTO will define data sets and comprehensive Data Universe cooperatively with TTC in order to meet the business requirements of TTC. PRESTO will program the Data Mart to query the data sets in a manner mutually agreed to by PRESTO and TTC.

REQ-SYS-7.3	Identification of Data Elements	Approved	F

Of primary importance will be the identification by TTC, with aid and cooperation from PRESTO, of essential financial and transit data elements required for the Data Mart and business Intelligence function. All data sets and data elements, whether unique or derived, will be identified, reviewed, and finalized prior to Final Design.

REQ-SYS-8	Revenue Accountability	Approved	F

The PRESTO System will track all fare and financial transactions to fulfill revenue accountability.

PRESTO will be accountable for all revenue generated by the PRESTO System.

REQ-SYS-8.1	Fare Transaction Tracking	Approved	F

Track all fare transaction activities involving purchase, reload, and use at Reader Assemblies, and at any other point of acceptance, sale, reload, initialization, or other activity related to the required functionalities of the PRESTO System of PRESTO Media, LUM and other devices used in connection with the PRESTO System.

REQ-SYS-8.2	Revenue Tracking	Approved	F

Track revenue in real-time for all sales channels.

REQ-SYS-8.3	Accountability	Approved	F

Capture data in a manner that permits TTC, PRESTO, and an authorized independent auditor to reconstruct, track, and analyze all elements in the transaction process from initiation by a Customer through completion of the exchange of funds between a Customer, PRESTO and TTC.

REQ-SYS-9	Compliance and Certifications	Approved	NF

PRESTO will be responsible for maintaining all compliance and certifications with all applicable and evolving standards and regulations.

REQ-SYS-9.1	Compliance to Financial Payment Standards	Approved	F

PRESTO will ensure that the PRESTO System, including but not limited to the CBO, and all devices distributed for sales and reload of transit products that accept financial payment bank cards (e.g.

FMVD, AVM, SRVM etc.), will, at a minimum, comply with the following Standards for payment processing and exchanges of data for the purpose of electronic transfers of funds:

- American ExpressSM
- ANSI Standard-General Purpose Plastic Cards
- ANSI X9.2 and 8 PIN Pad Unique Key and Encryption
- BSIS 7799:2002
- Canadian Banking Association
- Canadian Department of Finance
- Canadian Bankers Association
- Discover Zip
- Security (3DES, AES, Master/Session, SSL, etc.)
- Interac
- ISO/IEC7811
- ISO/IEC7813
- ISO/IEC7816
- ISO/IEC8584
- ISO/IEC 15693-1 (NFC)
- EMV Level 1 and Level 2 along with EMV Contactless (supporting SDA, DDA and CDA protocols)
- ISO/IEC14443, Parts 1-4
- ISO/IEC10373
- ISO18092/ECMA-340-NFCIP-1
- ISO 27001
- J Smart
- MasterCard EMV MChip
- MasterCard PayPass
- MasterCard PayPassMStripe
- Mifare
- NCITS 322-2002
- NFC ECMA-352
- PCI (all applicable standards such as PCI DSS, PCI PED, PA-DSS etc.)
- VISA PayWave
- VISA PayWave MSD
- VISA EMV PayWave (qVSDC)

REQ-SYS-9.2	Responsibility for Initial Financial Certification	Approved	NF

PRESTO will be responsible (time, effort, costs etc.) for all initial financial certifications for all parts of the PRESTO System. This includes all field devices, networks, processes, backend systems (including Data Mart if so required).

REQ-SYS-9.3	Responsibility for Ongoing Payments Compliance	Approved	F

PRESTO will be responsible for, and pay for all ongoing and evolving security standards, audits, system checks, and other functionalities, as required by the financial payments industry/Canadian banking regulations.

REQ-SYS-9.3.1	Lapse in Certification	Approved	NF

Any lapse in the financial payment certification will be immediately communicated to TTC.   PRESTO will be responsible for all costs (time, effort etc.) including any penalties as a result of the lapse and sub-sequent re-certification.

REQ-SYS-9.4	Responsibility for Government Regulations	Approved	NF

PRESTO will be responsible and bear all expenses for achieving and/or establishing compliance with all Federal, Provincial, and Municipal Government regulations related to the PRESTO System.

REQ-SYS-9.5	Responsibility of Certification and Compliance Changes	Approved	NF

Any PRESTO System process, hardware, software, etc. changes, modifications, adjustments etc. required to meet required certifications and the costs incurred for those changes are the responsibility of PRESTO.

REQ-SYS-10	Upgrades and Evolutionary Improvements	Approved	F

Once the PRESTO System is fully operational and accepted for revenue service, PRESTO shall ensure that the PRESTO System, and in particular the PRESTO field equipment will readily support upgrades emerging from market-driven, evolutionary improvements in Smart Card and Open Payments Media, devices, processes, equipment and standards.

REQ-SYS-10.1	Upgrade, Improve, Refresh Plan	Approved	F

PRESTO shall provide a detailed plan that discusses its approach to ensuring that necessary upgrades, improvements, and refreshes to the PRESTO System to occur in a manner that ensures the viability and continued business and operational effectiveness of the PRESTO System during the term of the operating agreement and, going forward, in a manner that ensures the continued sustainability of the PRESTO System beyond the term of the agreement.

REQ-SYS-11	Business Continuity	Approved	F

PRESTO shall ensure that the PRESTO System fully supports TTC business continuity, and will be redundant, resilient, and capable of fully supporting automatic fall over and other functionalities and processes.

REQ-SYS-11.1	Business Continuity Plan	Approved	F

PRESTO shall submit a complete business continuity/disaster recovery plans for the PRESTO System to be reviewed and approved by TTC.

REQ-SYS-12	Performance	Approved	F

The PRESTO System shall meet all performance measures as specified in Schedule A.

2   Concept of Operations

2.1   LRV Concept of Operations

The Concept of Operations for the LRV is detailed in the document **110928 LRV POP Concept of Operations - Draft 1.5**.

2.2   Subway Concept of Operations

The Concept of Operations for the LRV is detailed in the **110929 Subway Concept of Operations - Draft 1.1**.

2.3   LRT - Concept of Operations

Currently under review.

3 Field System

3.1 Field Equipment

3.1.1 General Equipment Specifications

These specifications will be common across all PRESTO field equipment.

3.1.1.1 Overview

REQ-GES-1	General Design of Equipment	Approved	F

PRESTO equipment shall remain in operation and withstand the unique challenges (environmental, operational,) of the transit environments (outside, buses, LRV, platforms, bus depots,) the City of Toronto and in the Greater Toronto Area.

REQ-GES-2	Ergonomic	Approved	F

All equipment shall be ergonomic, free of safety hazards, and easy to use.

REQ-GES-2.1	Ergonomic-2	Approved	F

The branding of all equipment shall be review and validated by the TTC to ensure the devices are visually appealing.

REQ-GES-3	AODA Compliant	Approved	F

All equipment designed by PRESTO for use of TTC Customers shall be fully compliant with AODA standards.

REQ-GES-4	Accessibility Standards	Approved	F

PRESTO equipment shall compliant to other applicable accessibility standards such as:

 - CAN/CSA B 651.1 - Accessible design for Automated Banking Machines;

 - CAN/CSA B 651.2 - Accessible design for Self Service Interactive Devices. This will apply to all PRESTO Sales and Reload devices such as FMVD, AVM, and SRVMs; and

 - ICC/ANSI A117.1-2009 - Standards regarding Tactile lettering and symbols, Braille, and Variable Message Signage

REQ-GES-5	Safe Secure Easy Access	Approved	F

Equipment provided by PRESTO shall allow authorized personnel safe, secure, and easy access for the performance of their duties (e.g. maintenance, revenue servicing,)

REQ-GES-6	Modification Upgrading and Amending of Equipment	Approved	F

Modify, upgrade, or amend PRESTO equipment, its business and operating support systems and all other aspects of the PRESTO field system (including PRESTO support devices and services) for TTC to whatever extent necessary to ensure ongoing complete compliance with all applicable laws, standards and regulations.

REQ-GES-7	Compliance to Payment Standards and Certifications	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall comply with all required payment standards and certifications required for the Canadian market.

REQ-GES-8	Responsibility of Certification and Compliance Changes to Equipment	Approved	F

PRESTO is responsible for all Hardware/Software changes, modifications, and adjustments required to meet certification.

REQ-GES-9	Responsibility for Vandalism	Approved	F

PRESTO is responsible and liable for all vandalism to PRESTO Devices caused by all individuals, with the exception of TTC employees.

REQ-GES-9.1	Responsibility for Vandalism-2	Approved	F

Promptly repair any vandalism as stated in the physical protection from vandalism and fraud section of this schedule.

REQ-GES-10	Deployment Subject to TTC Review	Approved	F

All equipment deployment will be subject to TTC's review and will be mutually agreed to by PRESTO and TTC.

REQ-GES-11	Design Review of Field Equipment	Approved	F

PRESTO shall submit for TTC's review and approval all technical drawings and specifications for all PRESTO System field equipment.

REQ-GES-12	Working Prototypes	Approved	F

As part of the Design Review process, PRESTO will be required to provide working prototypes for all PRESTO field devices that are to be deployed at TTC.

3.1.1.2 Design

REQ-GES-14	Adhere to a Common Set of Design Features	Approved	F

All equipment and components, including PRESTO Support equipment, installed as part of the PRESTO System shall adhere to a common set of design features.   These are outlined in this section.

REQ-GES-15	Modern Design	Approved	F

All PRESTO fields device shall be functional and clearly indicative of the technical advances offered by the PRESTO System.

REQ-GES-16	In-field Upgradeable	Approved	F

Provide a secure and remote means of upgrading both the firmware and Software of all in-field devices.

REQ-GES-16.1	In-field Upgradeable-2	Approved	F

Provide a rollback feature that will allow the field device to revert to its current operating Software in the advent of an upgrade failure or at the request of TTC.

REQ-GES-17	Extensible	Approved	F

Ensure that all field devices are Software and firmware extensible, allowing new functionality and services to be downloaded though the upgrade mechanism.

REQ-GES-18	Multiple Application Capable	Approved	F

Provide field devices that are capable of storing multiple applications and executing (bypassing) the application selected by the PRESTO System.

For example, this bypass functionality will allow Reader Assemblies to execute a selected application without downloading new firmware.   This functionality can be used in conjunction with the remote upgrade functionality..

REQ-GES-19	Design for TTC's Environment	Approved	F

All field devices shall be designed for a physical operating environment at least as severe as TTC's and that found in the Greater Toronto Area. Environmental standards and guidelines are provided in the Environmental Standards and Guidelines Section.

REQ-GES-20	Robust and Reliable	Approved	F

All field devices shall be robust and reliable; capable of fault tolerances and speedy recovery from interruptions in power, component failures, communications, and Software malfunctions. Further details are provided in the Equipment Reliability Section.

REQ-GES-21	Consistent with Principles of Modular Design	Approved	F

Ensure all field devices are modular in design and:

REQ-GES-21.1	Consistent with Principles of Modular Design-2	Approved	F

 - are designed using, COTS components whenever possible

REQ-GES-21.2	Consistent with Principles of Modular Design-3	Approved	F

 - allow easy accessibility and "plug-and-play

REQ-GES-21.3	Consistent with Principles of Modular Design-4	Approved	F

 - allow in-field replacement of defective components effectively minimizing Mean Time To Repair

REQ-GES-21.4	Consistent with Principles of Modular Design-5	Approved	F

 - allow in-field upgrading of components

REQ-GES-22	Use Standard Input / Output for Interfacing	Approved	F

All field devices shall use standard I/O interfaces such as RS232, USB, Bluetooth, IRDA, and other, when interfacing to TTC equipment (e.g., when interfacing to TTC turnstiles and Concession Indicator System)

REQ-GES-23	Designed for Finger-Tip Maintenance	Approved	F

All field devices shall be consistent with designs that support "Finger-Tip" maintenance, requiring minimal use of tools for access to and release of components requiring removal and replacement; and having colour-coding and keying of components, wiring and harnesses, plugs and connectors that support single-orientation and positioning for correct installation.

REQ-GES-24	Consistent with Open Architecture Design	Approved	F

All field devices shall be consistent with principles of Open Architecture system for design, development, interface, implementation, and operation.

REQ-GES-25	Maintenance, Remote Monitoring and Test Mode	Approved	F

Equip all in-field devices with maintenance, remote monitoring, and test mode functionality. Further details are provided in the Device Management and Monitoring Section of the TTC Specifications.

REQ-GES-26	AODA for Customer and Servicing and Maintenance	Approved	F

All field devices shall be designed according to principles of human factor engineering and AODA (in terms of design, functionality, fabrication, installation,) in order to maximize the acceptance and utility of equipment intended for TTC Customer use and for service personnel (e.g. Revenue Collection /Servicing, Maintenance).

REQ-GES-27	Safe Use and Operation	Approved	F

All field devices shall be designed to be free from all safety hazards and to comply with all TTC and other applicable safety standards and codes.

REQ-GES-28	Vandal Resistant	Approved	F

All field devices shall be equipped with vandal-resistant features that discourage and minimize the effects of vandalism attempts and fraudulent access to or removal of equipment. Further details are provided in the Physical Protection from Vandalism and Fraud Section of this Schedule.

REQ-GES-29	Security Features	Approved	F

All field devices shall be equipped with physical security features, in addition to technical, operational, and administrative security features required by INTERAC, PCI-DSS, PCI PTS, and PCI-PA where applicable, as well as Tokenization and End-to-End Encryption.

REQ-GES-30	Use of SAMs	Approved	F

Ensure all PRESTO Devices will use Hardware SAMs as the security mechanism for protecting PRESTO System sensitive data such as Software security keys for the PRESTO System, device management keys and card keys.

REQ-GES-31	Protection of Sensitive Data	Approved	F

Ensure all field devices use relevant and robust security features (such as tamper resistant, trip sensors) for the protection of sensitive transaction data that prevent unauthorized access to and/or removal of equipment and data.

REQ-GES-32	Device Life Cycle	Approved	F

Incorporate a security and device life cycle process/end-to-end life cycle management protocol to store, initialize, track, manage, and audit all devices in the field.

For example, this includes all financial payment procedures and resources to support secure bank key injections for field devices that take Customer payments such as AVMs, FMVDs

REQ-GES-33	Manufactured For Industry Standards	Approved	F

All field devices shall meet all required industry manufacturing standards for installation on TTC property and be shown that they are designed according to the specifications outlined in this Agreement. Further details are provided in the Standards for Manufacture of Equipment Section of this Schedule.

REQ-GES-34	Canadian Marketplace Approvals	Approved	F

All PRESTO Devices including power supplies, and PRESTO support equipment shall have the appropriate certifications, approvals and markings such as CSA, RoHS, and RF device for use of such devices within the Canadian marketplace.

REQ-GES-35	Applicable Standards and Codes for Vehicles	Approved	F

All PRESTO field devices shall be manufactured to conform with all applicable electrical standards, codes, and procedures applicable and specific to the type of vehicle (e.g. bus, LRV) and/or location on which it is installed.

REQ-GES-36	Use of Metal Stand-offs	Approved	F

All PRESTO Devices shall avoid the need to use concrete installation pads. If required, elevated pads shall be metal stand-offs, made from appropriate material that will be suitable for the TTC environment.

REQ-GES-37	Dry Fitting During Design Review	Approved	F

PRESTO shall fabricate full scale models of proposed designs of field equipment and work with TTC personnel to execute a dry fitting on each model in TTC's surface fleet and turnstile type, and all other PRESTO field device locations where applicable.

REQ-GES-38	Device Finishes	Approved	F

The external structure and finishes of all PRESTO Devices shall be free and clean of any projections, sharp edges or corners that could result in personal injury via Incidental contact with the device. All exterior finishes will resist corrosion, abrasion, and scratching, as well as be free of any physical manifestations of the manufacturing process, such as weld marks, irregularities, discoloration, distortion, and cracks.

REQ-GES-39	Paint and Colouring of Field Devices	Approved	F

All PRESTO Device surfaces not constructed using stainless steel, aluminum, or plating shall be painted using corrosion-resistant paint.

REQ-GES-39.1	Paint and Colouring of Field Devices-2	Approved	F

All PRESTO Device painted final finishing's shall be a hardened, enamel finish that is free from all application defects.

REQ-GES-39.2	Paint and Colouring of Field Devices-3	Approved	F

PRESTO, in accordance with AODA and other applicable requirements, shall determine the colours used for painting of exposed surfaces on PRESTO Field Devices.

REQ-GES-40	Multi-Language	Approved	F

Ensure that all devices support multiple languages and that changes to the language type, content or format may be easily made without requiring extensive re-working, redesign or re-certification.

REQ-GES-41	Separation of Financial and Operating Data	Approved	F

PRESTO Devices that accept bank cards as payment instruments will operate and store (if need be) this data securely and separately both within the device and in the PRESTO System CBO.

3.1.1.3 Environmental Standards and Guidelines

REQ-GES-42	Minimum Environment Factors	Approved	F

All PRESTO Devices that will be deployed across all modes of transportation shall meet TTC's performance standards and adhere to at a minimum the following environmental factors:

- Intrusion of Contaminants
- Electromagnetic Interference and Compatibility
- Climate Conditions
- Physical Stress
- Electrical Discharges/Shock
- Corrosive Elements

REQ-GES-43	Intrusion of Contaminants	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall comply to an IP54 rating.

REQ-GES-43.1	Protection from Dust	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall be protected from dust, (e.g. brake dust in subways, airborne and diesel dust/soot on buses) so that dust does not enter into the devices in any sufficient quantity to interfere with its operation.

REQ-GES-43.2	Protection from Water	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall be protected from water splashing against the device enclosure from any direction (e.g. subway station washing).

REQ-GES-43.3	Protection from Foreign Substances	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall be protected from other foreign substances such as pop, coffee, tea, being spilled on them and from foreign objects such as paper, metal, and gum.

REQ-GES-43.4	Allowance for Device Equipment Holes	Approved	F

Device equipment holes required for the operation of the equipment, such as Coin System inlet, banknote system inlet, EFT-POS inlet, buzzer holes, and lock shall be allowed as long as components within the equipment are adequately protected from dust and water intrusion and that the device equipment meets all required standards and certifications including financial payment standards and certifications.

REQ-GES-43.5	Protection of Open Payment Components	Approved	F

Devices that take Customer payments from bank cards (e.g. AVM, FMVD ...) shall have financial payment certified components that comply with Open Payments standards and Open Payment Intrusion Protection ratings. Specifically, the PIN Pad component of the device shall be IP65 compliant.

REQ-GES-44	Electromagnetic Interference and Compatibility	Approved	F

All PRESTO field devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall be designed to comply with all required EMI and EMC standards.

Note that this compliance will vary on mode of transportation. For example, LRV and new buses must comply to at a minimum EN61000 and EN50121, EN55024/22, EN60950-1, and FCC Class B or equivalent standards.

REQ-GES-45	Climate Conditions	Approved	F

All PRESTO field devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall be designed to operate within the following climate conditions:

REQ-GES-45.1	Temperature Range(s)	Approved	F

All PRESTO fields device shall operate in the temperature range by mode of transportation:

 - field Equipment in subway stations shall typically need to operate in the range of -32 to +55 Centigrade.
 - Exposed equipment for surface operations shall be required to operate in the -32 to +55 Centigrade range.

REQ-GES-45.2	Relative Humidity	Approved	F

All PRESTO fields device shall operate in relative humidity (a range of 5-95%, non-condensing).

REQ-GES-45.3	Rain, Snow & Ice	Approved	F

All PRESTO fields device shall operate in exposure to rain, snow and ice;

REQ-GES-45.4	Sunlight and Solar Radiation	Approved	F

All PRESTO fields device shall operate in full exposure to sunlight and solar radiation.

REQ-GES-45.5	Wind	Approved	F

All PRESTO fields device shall operate in exposure to Wind.

REQ-GES-46	Use of Heaters and Fans	Approved	F

For those locations and climate conditions where the temperature ranges stated above (GES-45.1) are exceeded, additional heaters/fans independent of the General Sales and Reload equipment shall be specified and used.

REQ-GES-46.1	Use of Heaters and Fans-2	Approved	F

General sales and Reload device heaters/coolers shall fit within the PRESTO Equipment /Cabinet and are the responsibility of PRESTO to maintain and service.

REQ-GES-47	Physical Stress Specifications	Approved	F

All PRESTO field devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall be designed to withstand the following physical stress conditions:

REQ-GES-47.1	Vibration	Approved	F

All PRESTO field devices shall withstand vibration and structure borne-stresses;

REQ-GES-47.2	Inclination of Equipment	Approved	F

All PRESTO field devices shall withstand inclination of equipment for all PRESTO equipment (including reader Assemblies) except FMVDs;

REQ-GES-47.3	Integrity Against Deflection	Approved	F

All PRESTO field devices shall withstand deflection forces (such as impacts, blows,) to ULC50 standard, forces applied in pounds and direction of force, acceptable degrees of deflection, or IK09 - 10 joules impact resistance;

REQ-GES-47.4	Shock Resistant	Approved	F

All PRESTO Onboard fare devices and components shall comply with the EN50155 shock (transient), vibration, and UV protection standard, or the Canadian equivalent.

REQ-GES-47.5	Protection of Device Displays	Approved	F

Device displays (e.g. LCD, touch screen) shall be designed to withstand everyday usage and shall be scratch and damage resistant from such things as user finger nails, and in general from objects that may through the course of normal use come in contact with the display (e.g. purses, handbags, knapsacks, keys, rings).

REQ-GES-48	Fire Retardant	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall comply to applicable fire retardant standards i.e. NFPA standards i.e. NFPA F16-101, -102 , DIN5510 for low toxicity and low smoke.

REQ-GES-49	Antenna Shock Protection	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property that have antennas exposed to open air shall be protected against high voltage/high current faults according to all applicable Canadian standards.

REQ-GES-50	Corrosion Protection	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property that are exposed including antennas shall comply to all applicable Canadian standards (for example MIL-F-14072D).

REQ-GES-51	Use of Moisture Seals	Approved	F

PRESTO Devices shall use moisture seals on all components and wiring harnesses to preclude the intrusion of water directed at them (for example during station power washing).

REQ-GES-52	Venting	Approved	F

PRESTO Field Devices that require vents shall have venting on the bottom, back panel or top for air flow as long as they are designed to minimize foreign containments from entering the device.

These vents must be kept clear of any other devices or mounting obstructions.

REQ-GES-53	RoHS Compliant	Approved	F

All fare devices and equipment shall be RoHS compliant.

REQ-GES-54	Certifications for Equipment on Vehicles	Approved	F

All PRESTO equipment installed on new vehicles shall be certified to EN50155 or equivalent;   this

includes:

- Environmental Testing - cooling, dry heat, vibration, shock and bump testing
- EMC Testing - EN50121-3-2, EN50121-4
- Safety Testing - Electrical Insulation
- Performance Testing - variations in voltage, supply change over, supply over voltage, supply interruption of voltage supply

REQ-GES-55	Additional Equipment Standards	Approved	NF

Further details regarding applicable equipment standards will be provided during Design Review.

REQ-GES-56	Certification of Performance Levels of Equipment	Approved	F

At a minimum, PRESTO will demonstrate and certify performance levels in each of the categories and sub-categories cited in this section that are indicative of the robustness of the equipment that PRESTO will provide and that can ensure achievement of the operating and business performance requirements detailed in this Agreement.

REQ-GES-56.1	Proof of Environment Compliance	Approved	NF

During Testing and Acceptance, PRESTO will provide TTC with documentation of independent test results of all components for vibration, water intrusion, electrical interference, etc.

REQ-GES-56.3	Field Conditions at Installation Locations	Approved	F

PRESTO shall ensure that actual field conditions at installation locations are accounted for and reflected in the specifications and capabilities of all equipment manufactured and deployed for the PRESTO System.

REQ-GES-119	Active Detection of Operating Temperatures	Approved	F

PRESTO field devices will have the capability of detecting and measuring the current environment temperature and take the appropriate and necessary actions in order to ensure that the device operates within device tolerances.   For example, if the environment temperature is below the minimum allowable temperature for correct device operation, the device will activate its internal heater and will not become fully functional until the device has reach its allowable operating temperature.

3.1.1.4 Equipment Reliability

REQ-GES-57	Reliability Standards	Approved	F

All PRESTO Devices and components of those devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property where applicable, the Reliability of the devices and components will be tracked, monitored and reported (MCBF/MTBF) as outlined in Schedule A.

REQ-GES-58	Monitoring of MCBF and MTBF	Approved	F

The MCBF and MTBF for all PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property will be monitored, tracked and recorded by the PRESTO System Management Monitoring System.   This includes the MTBF and MCBF of components of PRESTO Devices as outlined in Schedule A.

These measures will take into consideration the mobile nature of surface vehicles and their operational characteristics and operating environment.

REQ-GES-59	Availability of MCBF and MTBF Reports	Approved	F

Provide MCBF and MTBF calculations, results and reports at regular intervals and upon request.

3.1.1.5 Physical Protection from Vandalism and Fraud

REQ-GES-60	Vandalism and Fraud Protection	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall be hardened against vandalism, unauthorized intrusion and fraudulent modifications.

REQ-GES-61	Absence of Pry Points	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall have an absence of pry points.

REQ-GES-62	Tamper-Proof Mounting Hardware and Fasteners	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall have tamper-proof mounting Hardware and fasteners.

REQ-GES-63	Hardened Drill and Pry Resistant Locks	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall have locks made of hardened, drill and pry resistant materials.

REQ-GES-64	Active - Passive Tamper Mechanisms	Approved	F

Ensure all PRESTO devices shall have active/passive tamper mechanisms that when triggered, automatically and completely delete all stored data, bank keys, private data, and other transaction information in a manner to ensure compliance with PCI, all other financial and non-financial standards and in general reduce the risk of fraud.

REQ-GES-65	Concealed Design Features	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall have concealed design features for all locks, hinges, and potential access points, so as to resist use of unauthorized access with the assistance of tools.

REQ-GES-66	Industrial Grade Security Locks	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall have industrial grade security locks with profile catches and key capture mechanisms, which are active when doors and access panels are in the open position.

REQ-GES-67	Reinforced Areas	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall have reinforcement of areas vulnerable to vandalism and attempts at forced entry.

REQ-GES-68	Tamper Evident and Resistant Surfaces	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall have device surfaces (e.g. key pads, LCD display, Contactless Smart Card readers, contact Smart Card readers, and device enclosures) that are tamper resistant and tamper evident.

REQ-GES-69	Other Countermeasures	Approved	F

Ensure all devices, especially those that accept bank cards for purchases will have added safe guards against potential fraud and vandalism. These may include,

 - location monitoring (for devices with GPS);
 - network monitoring;
 - over/under voltage protection;
 - temperature variation detection.

REQ-GES-69.1	Other Countermeasures-2	Approved	F

Ensure that when suspect activity is detected on a device the monitoring service will automatically generate the appropriate alerts and notifications by email and/or SMS, and/or web page.

The device monitoring personnel will be able to remotely at least,

 - query the alerted device,
 - shut off the alerted device

REQ-GES-70	Integration with Security Monitoring	Approved	F

PRESTO shall implement a system to monitor all devices for vandalism, abuse or simple observation (e.g. CCTV system).

REQ-GES-70.1	Integration with Security Monitoring-2	Approved	F

PRESTO monitoring system shall not be capable of focusing in on keypads on Sales and Reload devices.

PRESTO will be responsible for the implementation, operation and monitoring of any CCTV system deemed necessary by PRESTO to support the PRESTO System.   This includes the capability to match CCTV footage with fraud (financial or transit payment) and vandalism.

3.1.1.6   Standards for Manufacture of Equipment

REQ-GES-71	Safety and Technical Standards	Approved	F

All PRESTO Devices intended for deployment on TTC vehicles and other vehicles providing transportation services in connection with or under contract for TTC, or intended for deployment on TTC property shall be manufactured to meet:

 - Applicable safety and technical standards required by laws and regulations of Canada; and

 - All safety, technical, and performance standards applicable to manufacturers of equipment that are used by the general public including but not limited to Open Standards payment devices, equipment, and Hardware intended for deployment in Canada.

REQ-GES-72	Responsibility for Fit for Purpose	Approved	F

PRESTO shall ensure that all equipment provided for the PRESTO System will meet all business, technical, operating, and TTC Customer service requirements in the specific physical operating environment of TTC's transportation system across all modes of service delivery and vehicles, facilities, and environments where TTC Customers board and use TTC's transportation services.

REQ-GES-74	Field Device Housing Specifications	Approved	F

PRESTO shall work in conjunction with TTC in determining minimum requirements for fabrication of housings and other components of PRESTO Field Devices.

REQ-GES-74.1	Vertical Loading	Approved	F

PRESTO equipment (including PRESTO mountings) shall be capable of withstanding a sustained vertical force of 785N.

REQ-GES-74.2	Shrouding of Equipment	Approved	F

PRESTO equipment (including PRESTO mountings) shall have sufficient/ adaptable shrouding that prevents pinch and catch points.   In particular, PRESTO shall ensure that the installation of Reader Assemblies (stanchion or panel mounted) on LRVs or at other locations (subway, bus, etc.) shall not:

- result in any pinch points (fingers, toes, etc.) or
- catch points (clothing, backpacks, etc.).

Additional, adaptable shrouds or covers that are part of the Reader Assembly or mounting mechanism shall be used to accomplish this.

3.1.1.7 Device Management and Monitoring

REQ-GES-75	Device Management and Monitoring	Approved	F

Provide a Maintenance Management System that will fully manage and monitor all devices as defined in Schedule C.

REQ-GES-76	Real time Status Monitoring	Approved	F

Monitor all devices that have real time connections to the PRESTO System in real-time.

REQ-GES-77	Off-Line Monitoring	Approved	F

Upload the stored alerts, status, states and data of all non-real-time devices to the PRESTO System when connectivity is present.

REQ-GES-78	Alert and Alarm Generation	Approved	F

Generate alerts and alarms for all PRESTO Devices in accordance with applicable SLAs.

REQ-GES-78.1	Alert and Alarm Generation-2	Approved	F

Send all generated alerts and alarms to the Maintenance Management System.

REQ-GES-78.2	Alert and Alarm Generation-3	Approved	F

Send generated alerts and alarms to the Maintenance Management System in real-time for real-time devices.

REQ-GES-78.3	Alert and Alarm Generation-4	Approved	F

Send stored generated alerts and alarms to the Maintenance Management System when a connection is established.

REQ-GES-79	Reporting of all Status Conditions	Approved	F

Record all status conditions of devices in connection with the operations of the PRESTO System.

REQ-GES-79.1	Reporting of all Status Conditions-2	Approved	F

Forward all status data to the central processor for reporting purposes, as described in the device management and monitoring section of this agreement.

REQ-GES-80	Equipment Usage Counts	Approved	F

Ensure that equipment deployed on TTC property will track, record and send to the PRESTO System CBO all equipment and component usage counts required as per Schedule A.

REQ-GES-81	Equipment Maintenance Status	Approved	F

Ensure that equipment deployed on TTC property will track, record and send to the PRESTO System CBO all equipment and Preventative Maintenance status and maintenance conditions.

REQ-GES-82	Capture of Authorized Servicing	Approved	F

Ensure PRESTO Devices on a daily basis are capable of capturing and forwarding data regarding authorized servicing of the devices for maintenance activities and other authorized purposes to the Central Processor and the Data Mart.

REQ-GES-83	Service Record Contents	Approved	F

Ensure that service records for authorize and unauthorized Device Maintenance include the following information:

REQ-GES-83.1	Service Record Contents-2	Approved	F

- a secure access code of the authorized individual accessing the Reader Assembly

REQ-GES-83.2	Service Record Contents-3	Approved	F

- a date and time stamp

REQ-GES-83.3	Service Record Contents-4	Approved	F

- a unique identifier for the Reader Assembly and the unique TTC asset number

REQ-GES-84	Consumables Monitoring	Approved	F

Monitor and generate alerts in the following formats to the appropriate personnel when device consumables need replenishing or maintenance:

REQ-GES-84.1	Consumables Monitoring-2	Approved	F

- Email

REQ-GES-84.2	Consumables Monitoring-3	Approved	F

- SMS

REQ-GES-84.3	Consumables Monitoring-4	Approved	F

- web page notifications

REQ-GES-84.4	Consumables Monitoring-5	Approved	F

Monitor and generate alerts for all of the following consumables:

| REQ-GES-84.5 | Consumables Monitoring-6 | Approved | F |

- paper rolls

| REQ-GES-84.6 | Consumables Monitoring-7 | Approved | F |

- paper jams

| REQ-GES-84.7 | Consumables Monitoring-8 | Approved | F |

- battery (real-time clock)

| REQ-GES-84.8 | Consumables Monitoring-9 | Approved | F |

- printer (thermal or ink) replacement

| REQ-GES-84.9 | Consumables Monitoring-10 | Approved | F |

Ensure notification thresholds for consumables are adjustable to allow them to be replaced before they physically run out.

| REQ-GES-85 | Data for SLA Calculations and SLAM System | Approved | F |

Ensure that PRESTO Devices capture all required data, status, and alerts for calculating SLAs as stated in Schedule A and as performed by the PRESTO service level agreement maintenance system.

| REQ-GES-86 | Device Management and Monitoring Design Review | Approved | F |

PRESTO will provide details regarding the operation of the device management and monitoring system, along with use cases that illustrate all aspects of device capabilities for review and approval by TTC.

3.1.1.8 Device Maintenance and Servicing

| REQ-GES-87 | Equipment Facilitation of Maintenance | Approved | F |

All equipment deployed on TTC property shall be designed to facilitate all corrective and preventive maintenance tasks.

| REQ-GES-88 | Equipment Automatic Self Tests | Approved | F |

Ensure that all equipment will have automatic, self-test and trouble-shooting routines designed to speed diagnosis of problems and identify appropriate components for replacement.

Features of the design will permit easy identification, inspection, removal, replacement, and adjustment of components in support of the testing routines.

| REQ-GES-89 | Self-Diagnostic Capability | Approved | F |

All field devices shall be equipped with operational self-diagnostic capability.

| REQ-GES-89.1 | Execution of Self-Diagnostics | Approved | F |

All field device self-diagnostics shall be executed:

- on startup (power on) of the Device;
- on command by local, authorized personnel;
- Periodically throughout the revenue service day such that it does not interfere with normal PRESTO Device operations; and

- On command from the PRESTO System Central Back Office.

REQ-GES-89.2	Automatic Detection of Field Device Issues	Approved	F

Ensure the system will automatically detect a loss of communication between all PRESTO Devices and the CBO by:

REQ-GES-89.2.1	Automatic Detection of Field Device Issues-2	Approved	F

- PRESTO Devices sending periodic status updates to the PRESTO System CBO

REQ-GES-89.2.2	Automatic Detection of Field Device Issues-3	Approved	F

- the PRESTO System CBO sending periodic queries to the specific field devices

REQ-GES-89.2.3	Automatic Detection of Field Device Issues-4	Approved	F

- the PRESTO System CBO monitoring network services independent of any field device

REQ-GES-89.2.4	Automatic Detection of Field Device Issues-5	Approved	F

- the PRESTO System CBO analysis of any real-time data collection showing usage spikes in certain field devices

REQ-GES-89.2.5	Automatic Detection of Field Device Issues-6	Approved	F

- analysis of the PRESTO System Maintenance Management System device usage, MCBF and MTBF show probably failure or end of life

REQ-GES-89.2.6	Automatic Detection of Field Device Issues-7	Approved	F

Provide an automatic message using the following mediums to service personnel upon detection or suspected detection of a field device issue:

REQ-GES-89.2.7	Automatic Detection of Field Device Issues-8	Approved	F

- SMS/text message

REQ-GES-89.2.8	Automatic Detection of Field Device Issues-9	Approved	F

- Email

REQ-GES-90	Equipment Facilitates Replacement of Parts	Approved	F

Ensure the components of the PRESTO equipment:

REQ-GES-90.1	Equipment Facilitates Replacement of Parts-2	Approved	F

- maximize the use of commercially available parts, configurations, and physical features

REQ-GES-90.2	Equipment Facilitates Replacement of Parts-3	Approved	F

- contain markings that assist maintenance personnel in orientation and easy installation of parts in the replacement process

REQ-GES-91	Equipment Designed for Finger Tip Maintenance	Approved	F

Ensure that all equipment is designed to enable "Finger-Tip" maintenance to the fullest extent possible.

| REQ-GES-91.1 | Equipment Designed for Finger Tip Maintenance -2 | Approved | F |

Ensure that all preventive maintenance tasks can be completed by a single maintainer without the need to remove the equipment from the field or in-service operation.

| REQ-GES-91.2 | Equipment Designed for Finger Tip Maintenance -3 | Approved | F |

Preventative maintenance will be done in accordance with Schedule A.

| REQ-GES-92 | Maximum Weight for Equipment Components | Approved | F |

All PRESTO Device individual equipment components shall weigh no more than 10 kilograms in order to facilitate transport by a single maintainer.

| REQ-GES-93 | Maintenance and Service Guidelines | Approved | F |

During Design Review PRESTO will provide guidelines developed on the basis of Schedule A - SLAs for On-Property Servicing of Equipment.

| REQ-GES-94 | Review of Equipment Maintenance and Service Guidelines | Approved | F |

PRESTO shall review maintenance and service procedures at least once per year; any changes to procedures will be subject to mutual PRESTO and TTC review and approval.

| REQ-GES-94.1 | Review of Equipment Maintenance and Service Guidelines-2 | Approved | F |

PRESTO shall not reasonably refuse to include a TTC request for a change in maintenance and service procedures.

| REQ-GES-95 | Revenue Servicing | Approved | F |

Ensure sales and reload devices are designed to facilitate Revenue Collection / Servicing operations in the following ways:

| REQ-GES-95.1 | Revenue Servicing-2 | Approved | F |

- secure, ease of access to cash boxes and Bill Vaults

| REQ-GES-95.2 | Revenue Servicing-3 | Approved | F |

- components that are keyed to fit only in only one way

| REQ-GES-95.3 | Revenue Servicing-4 | Approved | F |

- quick paper receipt replacements

| REQ-GES-95.4 | Revenue Servicing-5 | Approved | F |

Revenue collection / servicing will be the responsibility of PRESTO.

3.1.1.9 Inventory and Device Tracking

| REQ-GES-96 | Inventory and Tracking | Approved | F |

Inventory, track and associate all PRESTO Devices with their installed location and/or vehicle number.

| REQ-GES-96.1 | Inventory and Tracking-2 | Approved | F |

Ensure inventory data will be available to the TTC in the Data Mart.

REQ-GES-97	Unique Identification Number	Approved	F

Affix all equipment and all equipment components with a unique identification number (serial number) in both an alphanumeric and bar code format.

REQ-GES-98	Use of Alphanumeric IDs	Approved	F

Ensure that all equipment and all equipment components are clearly and permanently marked with unique serial numbers in both alphanumeric and bar code formats for tracking and auditing purposes.

REQ-GES-99	Component Identification	Approved	F

The same PRESTO identification number will be affixed to each major component of the Reader Assembly so that components can be matched with the complete field device unit as delivered by PRESTO.

REQ-GES-100	Use of Tamper Resistant Tags	Approved	F

Ensure all identification tags attached to field devices and components are tamper resistant.

REQ-GES-101	Association with TTC Asset Number	Approved	F

Associate all vending device (Reader Assemblies, FMVD, AVM, and SRVM) unique identification numbers with TTC asset numbers.

 - Unique TTC Turnstile asset numbers will be paired with the unique Reader Assembly Identification Number installed on that turnstile.

 - Unique TTC vehicle numbers will be paired with the unique Reader Assembly Identification Number installed on that vehicle. If multiple Reader Assemblies are installed on a single vehicle, then both of those unique Reader Assemblies will be associated with the vehicle number along with any other information that may distinguish where those Reader Assemblies are installed on the vehicle (i.e. front or back doors)

 - Unique LRV numbers and door locations (i.e. which passenger flow location) will be paired with unique Reader Assemblies installed on an LRV.

 - Standalone Pedestal Readers will be associated with their installation position such as stop location, GPS coordinates, subway location etc.

 - All PRESTO vending device IDs (e.g. FMVD, AVM, SRVM etc.) will be associated with unique TTC location identifiers.

REQ-GES-102	Automatic Device Registration	Approved	F

The PRESTO System will support an automatic device registration when PRESTO Devices are installed or replaced in the field.

Ensure that installed or replaced devices automatically register all their IDs with the CBO upon installation to eliminate manual entry into the system.

REQ-GES-103	Use of TTC unique ID in Reporting	Approved	F

The unique TTC asset number, location, and id associated with a unique PRESTO ID can be used by the PRESTO System Business Intelligence service and the Maintenance Management System and in general all services of the PRESTO System for all report generation, status and alert monitoring.

Ensure that all identification numbers (PRESTO Device, turnstile, vehicle, stop, subway) are

searchable, sortable and useable for all report generation, status monitoring, and alert monitoring in the PRESTO Business Intelligence system to ensure consistent reporting across TTC modes of transportation without the complication arising from the potential changing PRESTO Device IDs when devices are swapped out or installed with new IDs.

To be clear, this does not preclude the above PRESTO System services from not using the PRESTO Device unique ID; rather it allows consistent reporting across TTC modes of transportation without the complication arising from the potential changing PRESTO Device IDs when devices are swapped out, installed with new IDs etc.

3.1.1.10 Device Performance

REQ-GES-104	Revenue Service	Approved	F

All devices shall be fully functional during Revenue Service as defined in Schedule A.

REQ-GES-105	PRESTO Device Performance	Approved	F

All PRESTO Devices shall perform to the applicable SLA levels specified in Schedule A - SLA Specifications.

REQ-GES-106	Availability as a Measure of Performance	Approved	F

All PRESTO Devices will be monitored and measured on the availability that the device is operational and fully functional for Customers to use during the course of a revenue service day.   Availability will be a key performance metric and is fully defined in Schedule A.

3.1.1.11 Time and Date Functionality

REQ-GES-107	Equipment Time and Date Functionality	Approved	F

Ensure that all PRESTO field equipment has an internal time and date clock.

REQ-GES-108	Synchronization of Fare Transactions	Approved	F

Synchronize the time and date on all devices with the time and date maintained at the PRESTO System CBO.

This synchronized time will be used for all field equipment operations including but not limited to the time/date stamp on every tap transaction, logging of alerts, status, etc., tracking maintenance, revenue collection and servicing.

REQ-GES-109	Frequency of Clock Synchronization	Approved	F

Synchronize all device times to the PRESTO System CBO such that clock jitter does not exceed one (1) second / day throughout all seasons of the year.

REQ-GES-110	Financial Acquirer Time	Approved	F

Ensure the financial payments processor is used for tracking financial payments transactions for all PRESTO equipment. The time on the financial payments receipt may be the time from the Acquirer.

3.1.1.12 Operations Impact

REQ-GES-111	Minimal Operations Impact	Approved	F

Ensure that PRESTO Devices, their functionality, and how they interact with the transit environment will not adversely impact TTC operations whether or not those operations are directly or indirectly related to fare collection.

REQ-GES-111.1	Minimal Operations Impact-2	Approved	F

Design Reader Assemblies on-board buses such that they do not impact start-up times or contravene TTC idling rules.

REQ-GES-111.2	Minimal Operations Impact-3	Approved	F

Ensure PRESTO Device downloads do not impact the operation of turnstiles.
Rules and operational impacts will be approved by TTC.

3.1.1.13 Installation

REQ-GES-112	Installation of Equipment	Approved	F

Follow all TTC installation standards and processes when installing equipment on TTC property as outlined in the installation of PRESTO field equipment section of this schedule.

REQ-GES-113	Installation Locations	Approved	F

Submit detailed drawings showing proposed installation locations for all field equipment at all TTC locations.

REQ-GES-114	Installation Test	Approved	F

Conduct a full power and communication test of the PRESTO network and field system power supply at each installation point (including vehicles) to ensure all power and communications systems correctly installed.

REQ-GES-115	Performance Test	Approved	F

Test the performance of power, communications and devices under electrical load.

3.1.1.14 Open Payments

REQ-GES-116	Acceptance of Open Payments at Reader Assemblies	Approved	F

The PRESTO System shall be capable of accepting fare payment at reader Assemblies using Open Payments media such as contactless Credit / Debit cards, and NFC enabled phones.

REQ-GES-116.1	Acceptance of Open Payments at Reader Assemblies-2	Approved	F

The PRESTO System shall be capable of accepting both PAYG and Pre-Funded TTC Fare Products based on Open Payments Media at all reader Assemblies

REQ-GES-117	Purchase and Reload of TTC Products	Approved	F

Enable Customers to purchase transit products using open payment media at all sales and reload devices.

REQ-GES-118	Enforcement of Open Payment Use	Approved	F

Ensure the PRESTO HHPOS and the PRESTO System is capable of querying Open Payments Media and verification of a Customer payment.

3.1.2 Reader Assemblies

3.1.2.1 General Reader Assembly Specifications

These specifications will be common across all Reader Assemblies.

REQ-RAS-1	Overview	Approved	F

General Reader Assembly specifications stated in this section, apply to all types of Reader Assemblies across all modes of operations and service.

REQ-RAS-2	Inclusion of General Equipment Specifications	Approved	F

All Reader Assemblies, across all modes of operation and service will comply with all specifications listed in the General Equipment Specifications of TTC Specifications

REQ-RAS-3	Reader Assembly Components	Approved	F

Reader assembly units refer to all PRESTO field devices that accept fare payment from PRESTO Media. Reader assemblies must be comprised of the following components:

REQ-RAS-3.1	Reader Assembly Components-2	Approved	F

 - Contactless Reader - the physical contactless media reader containing the 'antenna' and the low-level contactless communication standards, such as ISO14443, NFC and MiFare.

REQ-RAS-3.2	Reader Assembly Components-3	Approved	F

 - a main processing unit - the unit that contains the PRESTO application(s) and processes all TTC fare rules and policies

REQ-RAS-3.3	Reader Assembly Components-4	Approved	F

- a communications unit (i.e. modem, Ethernet)

REQ-RAS-3.4	Reader Assembly Components-5	Approved	F

- a power supply

REQ-RAS-4	Fare Acceptance	Approved	F

Ensure that Reader Assemblies will accept PRESTO Media as the form of payment for transit.

REQ-RAS-4.1	Acceptance of all PRESTO Media	Approved	F

Ensure that all Reader Assemblies in the PRESTO System at TTC accept all PRESTO Media, including LUM.

REQ-RAS-4.2	Acceptance of all Concessions	Approved	F

Ensure that all Reader Assemblies in the PRESTO System at TTC accept all TTC Concessions on PRESTO Media.

REQ-RAS-4.3	Acceptance of all TTC Non-Revenue Products	Approved	F

Ensure that all Reader Assemblies in the PRESTO System at TTC accept all TTC private fare cards.

REQ-RAS-4.4	Acceptance of all TTC Fare Rules, Products and Policy	Approved	F

Ensure that all Reader Assemblies apply all of TTC's fare rules, product and policies as outlined in this agreement.

REQ-RAS-5	Non-directional Orientation of Smart Card on Tap	Approved	F

Ensure that the PRESTO System Reader Assemblies allow all PRESTO Media to be tapped to the Reader Assembly without the PRESTO Media being oriented in any special direction.

REQ-RAS-6	Compliance with all Applicable Standards	Approved	F

Comply with all applicable security and privacy standards for transmission and exchanges of data originating with Reader Assemblies used in fare payment processing and reporting.

REQ-RAS-7	ISO14443 Compliant	Approved	F

Ensure that all Reader Assemblies include a COTS, non-proprietary Contactless Reader capable of reading and writing PRESTO Media. The Contactless Reader will be at a minimum ISO 14443, Type A and B compliant.

REQ-RAS-8	NFC Compliant	Approved	F

Ensure that all Reader Assemblies include a COTS, non-proprietary Contactless Reader capable of communicating with NFC enabled devices and media.

REQ-RAS-9	Upgradeable Contactless Reader	Approved	F

Ensure that all Reader Assemblies include a COTS, non-proprietary Contactless Reader that can be upgraded or replaced with minimal cost in order to facilitate repair and/or replaced in order to support new, evolving contactless standards.

REQ-RAS-10	Reader Assembly Table Driven Parameters	Approved	F

Ensure Reader Assemblies are equipped with Software and configurable, table-driven parameter settings that will allow TTC to set parameters controlling fare rules and policies.(among other things).

REQ-RAS-11	Tap and Go Functionality	Approved	F

Ensure Reader Assemblies for PRESTO at TTC have "Tap and Go" functionality:

- A Customer taps their PRESTO Media (including LUM) to the Reader Assembly;
- The Reader Assembly determines if the tap has resulted in an accepted fare payment (or transfer);
- The Reader Assembly illuminates a coloured light indicating an accepted fare payment;
- Simultaneously the Reader Assembly produces a tone indicating an accepted fare payment;
- The Customer proceeds through the Point of Entry.

REQ-RAS-11.1	Tap and Go Functionality-2	Approved	F

Ensure that the Reader Assembly will illuminate a different coloured light and produce a different tone for a denied fare payment.

REQ-RAS-11.2	Tap and Go Functionality-3	Approved	F

Ensure that at turnstiles the Reader Assembly will send a message to the TTC turnstile interface controller which will in turn release the turnstile gate.   It only unlocks the gate when a valid fare payment is made.

REQ-RAS-12	Collection of Accepted and Denied Fare Transactions	Approved	F

Ensure that all Reader Assemblies capture and record all fare transactions regardless of whether or not they are accepted or denied.

To be clear, accepted transactions must be captured and recorded distinct from denied transactions.

REQ-RAS-13	General Reader Assembly Data Capture	Approved	F

Ensure all Reader Assemblies are capable of capturing, recording and forwarding, at a minimum the following data to the PRESTO System CBO:

REQ-RAS-13.1	General Reader Assembly Data Capture-2	Approved	F

- TTC Fare Product used for fare payment

REQ-RAS-13.2	General Reader Assembly Data Capture-3	Approved	F

- type of PRESTO Media

REQ-RAS-13.3	General Reader Assembly Data Capture-4	Approved	F

- PRESTO Card number

REQ-RAS-13.4	General Reader Assembly Data Capture-5	Approved	F

- LUM number

REQ-RAS-13.5	General Reader Assembly Data Capture-6	Approved	F

- date and time stamp

REQ-RAS-13.6	General Reader Assembly Data Capture-7	Approved	F

- unique identifier for the Reader Assembly

REQ-RAS-13.7	General Reader Assembly Data Capture-8	Approved	F

- unique identifier for the tap transaction

REQ-RAS-13.8	General Reader Assembly Data Capture-9	Approved	F

- stop/station/route/GPS location

REQ-RAS-13.9	General Reader Assembly Data Capture-10	Approved	F

- type of transaction (e.g. payment, transfer, update, Autoload trigger)

REQ-RAS-13.10	General Reader Assembly Data Capture-11	Approved	F

- changes in the status of the Reader Assembly or any component therein

REQ-RAS-13.11	General Reader Assembly Data Capture-12	Approved	F

- changes to configuration

REQ-RAS-13.12	General Reader Assembly Data Capture-13	Approved	F

- alerts or tamper Incidents

REQ-RAS-13.13	General Reader Assembly Data Capture-14	Approved	F

- communication failures

REQ-RAS-13.14	General Reader Assembly Data Capture-15	Approved	F

- power failures and restorations

REQ-RAS-13.15	General Reader Assembly Data Capture-16	Approved	F

 - any information required for full accountability and audit of all interactions between the Reader Assembly and Customers

Finalization of the requirements outlined in the aforementioned list will be completed during Design Review.

REQ-RAS-14	Store and Forward	Approved	F

Ensure that when no connectivity to the PRESTO System CBO is available the Reader Assembly shall Store and Forward all captured data.

REQ-RAS-14.1	Store and Forward Capacity	Approved	F

Ensure the Store and Forward feature has the capacity to store a minimum of seven days of fare payment transaction and related data for Reader Assembly status reports.

REQ-RAS-14.2	Transparency of Store and Forward	Approved	F

Ensure the Reader Assembly's performance of the Store and Forward function neither interrupts nor impedes normal transaction processing.

REQ-RAS-14.3	Unique Store and Forward Memory	Approved	F

Provide unique, secure memory for the Store and Forward functionality for the Reader Assembly such that accumulation of data in the Store and Forward memory will not diminish or impact the memory used for the local hot list.

REQ-RAS-14.4	Secure Storage in Off-Line Mode	Approved	F

Ensure that all fare transactions at the Reader Assembly, including for example records of activities at the turnstile, are recorded and stored in secure non-volatile memory within the Reader Assembly and in compliance with all applicable standards.

REQ-RAS-14.5	Completion of Store and Forward Function	Approved	F

Ensure that the Reader Assembly is capable of completing the Store and Forward function as soon as connectivity is restored.

REQ-RAS-14.6	Reaching Data Storage Limits	Approved	F

Ensure that in the event that the data storage memory limit is reached the Reader Assembly conducts an orderly shutdown and remains out of service until data in the non-volatile memory can be automatically sent to the PRESTO System CBO.

REQ-RAS-14.7	Recovery of Data Storage	Approved	F

Ensure that the Reader Assembly will have the capability to have data resident in its memory downloaded at PRESTO's maintenance facility within 24 hours.

REQ-RAS-14.7.1	Recovery of Data Storage-2	Approved	F

Various methods may be used to recover this data securely; however the first method should always consist of reinitializing wireless connectivity between the Reader Assembly and the central processor while the Reader Assembly is at the maintenance facility of PRESTO.

REQ-RAS-14.8	Fallback Data Retrieval	Approved	F

Provide Reader Assemblies with a fallback or alternative data retrieval mechanism.

REQ-RAS-14.8.1	Fallback Data Retrieval-2	Approved	F

Ensure data retrieval is done by authorized personnel at either a secure location, maintenance facility or on site, within two Business Days.

REQ-RAS-14.9	Security and Standards Requirements at Maintenance Facility	Approved	F

PRESTO will be responsible for TTC devices that reside within maintenance facilities

PRESTO will implement protocols and procedures for the secure handling of all data that is downloaded from Reader Assemblies at the maintenance facility.

REQ-RAS-14.9.1	Security and Standards Requirements at Maintenance Facility-2	Approved	F

Ensure that the PRESTO maintenance facility is certified as PCI-DSS compliant.

REQ-RAS-14.10	Equipment for Data Recovery	Approved	F

Provide all necessary data retrieval / recovery Hardware, Software, systems as part of the PRESTO System.

REQ-RAS-15	Reader Assembly State Control	Approved	F

Provide the capability to control all Reader Assembly states.

REQ-RAS-15.1	Control of Reader Assembly States	Approved	F

Ensure the system is capable of setting the Reader Assembly state locally or remotely.

REQ-RAS-15.1.1	Control of Reader Assembly States-2	Approved	F

Ensure that modes within all states, except for the emergency state, are automatically determined by the operational status of the PRESTO System.

REQ-RAS-15.1.2	Control of Reader Assembly States-3	Approved	F

In an Emergency State, provide the ability to set the direction/mode of turnstiles (Exit Only, or Exit-Entry).

REQ-RAS-15.2	Efficient Remote Setting of Reader Assembly States	Approved	F

Design the remote setting of the Reader Assembly states to be efficient, fast and robust. The PRESTO System may use a system-wide broadcast message for setting states.

REQ-RAS-15.3	Local Setting of Reader Assembly States	Approved	F

Ensure the Reader Assembly state is set by performing a secure and simple interaction with the Reader Assembly (this can only be done by personnel with authorized access to TTC equipment.).

REQ-RAS-15.4	Independent Reader Assembly Setting of Open or Closed States	Approved	F

Ensure that every Reader Assembly in the TTC system may be set to the open or closed states independently.

To be clear this means, individual Reader Assemblies on the same bus or LRV, or turnstile bank, may be set to a Open or Closed state.

REQ-RAS-15.5	Management of Reader Assembly Status	Approved	F

Manage and record the state and mode of all Reader Assemblies and report on these states and modes.

REQ-RAS-15.6	Persistence of States	Approved	F

Ensure that all Reader Assemblies will continue to operate in their set state until they are explicitly commanded (locally or remotely) otherwise. This includes the continuance of the state after a power off reset of the Reader Assembly.

REQ-RAS-15.7	Automatic Mode Switching in Open State	Approved	F

Ensure that in the open state, the Reader Assembly automatically switches between on-line and off-line modes and vice versa without any manual or remote input.

REQ-RAS-15.7.1	Automatic Mode Switching in Open State-2	Approved	F

Record the times of all mode switches by the Reader Assembly and use them for calculating performance measures as outlined in Schedule A.

REQ-RAS-16	Recording and Tracking of Service Status	Approved	F

Record, track, report and use service status indicators to calculate performance measures as detailed in Schedule A.

REQ-RAS-17	Display of PRESTO Media Status on Reader Assembly	Approved	F

Display the status of the Reader Assemblies to Customers on the Reader Assembly LCD display when tapped. TTC will determine whether or not this will be implemented.

REQ-RAS-17.1	Display of PRESTO Media Status on Reader Assembly-2	Approved	F

Ensure that the status of the PRESTO Media (including LUM) includes:

REQ-RAS-17.2	Display of PRESTO Media Status on Reader Assembly-3	Approved	F

- the amount left on the PRESTO Media

REQ-RAS-17.3	Display of PRESTO Media Status on Reader Assembly-4	Approved	F

- the valid duration of the pass

REQ-RAS-17.4	Display of PRESTO Media Status on Reader Assembly-5	Approved	F

- how many tickets/trips left

REQ-RAS-18	Programmable Media Status	Approved	F

Provide the ability to remotely enable/disable the function that displays status messages (per RAS-17) on the Reader Assemblies LCD.

TTC will determine whether the status of the Customer's PRESTO Media will be displayed.

REQ-RAS-19	Reader Assembly Display	Approved	F

Ensure Reader Assemblies shall contain a LCD and LED display.

REQ-RAS-19.1	Uses of Reader Assembly Display	Approved	F

Ensure the Reader Assembly display may be used for:

REQ-RAS-19.1.1	Uses of Reader Assembly Display -2	Approved	F

- diagnostics

REQ-RAS-19.1.2	Uses of Reader Assembly Display -3	Approved	F

- tests

REQ-RAS-19.1.3	Uses of Reader Assembly Display -4	Approved	F

- maintenance

REQ-RAS-19.2	Display Parameters	Approved	F

Ensure Reader Assembly display parameters include:

REQ-RAS-19.2.1	Display Parameters-2	Approved	F

- contrast / intensity control

REQ-RAS-19.2.2	Display Parameters-3	Approved	F

- backlight control (for LCD Displays)

REQ-RAS-19.3	Automatic Setting of Display Parameters	Approved	F

Ensure the system is capable of setting all display parameters:

REQ-RAS-19.3.1	Automatic Setting of Display Parameters-2	Approved	F

 - across all Reader Assemblies

REQ-RAS-19.3.2	Automatic Setting of Display Parameters-3	Approved	F

 - to individual Reader Assemblies

REQ-RAS-19.3.3	Automatic Setting of Display Parameters-4	Approved	F

 - to all Reader Assemblies used for a particular mode of transportation. This allows the display characteristics to be optimized for the mode of transportation, taking into consideration the variance in the ambient light levels associated with the mode of transportation.

REQ-RAS-19.4	Manually Adjusted Display Parameters	Approved	F

Provide the ability for authorized personnel (PRESTO or TTC) to locally (manually) adjust the display parameters of any Reader Assembly on any mode of transportation without the use of a special tool.

REQ-RAS-19.4.1	Manually Adjusted Display Parameters-2	Approved	F

Provide the necessary security on board the Reader Assembly so that only authorized personnel (TTC or PRESTO) will be able to make display parameter adjustments. The process for changing the display parameters at the Reader Assembly should take no more than 20 seconds to complete.

REQ-RAS-19.4.2	Manually Adjusted Display Parameters-3	Approved	F

Ensure that the process for changing the display parameters at the Reader Assembly takes no more than 20 seconds to complete.

REQ-RAS-20	Audible Sound Generation	Approved	F

Ensure that the Reader Assembly emits audible tones to indicate the results of transaction processing while also complying with AODA standards.

REQ-RAS-20.1	Multiple Sounds	Approved	F

The Reader Assembly shall be capable of emitting multiple sounds with a distinct pitch, tone and duration corresponding to (at a minimum):

- An adult/full fare transaction approval; and
- a fare transaction denial.
- transfers
- non-revenue cards,

REQ-RAS-20.2	Decibel Level	Approved	F

The reader Assemble decibel level of the sounds emitted shall be capable of being heard and distinguished up to 20 meters away (i.e. both the TTC Customer and nearby TTC personnel of the results of the fare transaction.)

REQ-RAS-20.2.1	Decibel Level-2	Approved	F

Reader Assemble sound level shall comply with both AODA and TTC standards.

REQ-RAS-20.3	Optimized for the Environment	Approved	F

The Reader Assembly acceptance and denial sounds shall be optimized for the uniqueness of the TTC transit system.

To be clear, these sounds will be distinct from any environment ambient noise present such as subway train noise, vehicle noise while at the same time being relatively pleasing to the ear.

REQ-RAS-20.4	Automatic Setting of Sound Tone and Level	Approved	F

The PRESTO System shall be capable of setting the sound and sound level automatically:

- across all reader Assemblies;
- to individual reader Assemblies;
- To all reader Assemblies used for a particular mode of transportation.

Sound characteristics can be optimized for the mode of transportation, taking into consideration the variance in the ambient noise levels associated with the mode of transportation.

REQ-RAS-20.5	Manually Adjusted Sound Level	Approved	F

Authorized TTC or PRESTO personnel shall be capable of locally (manually) adjusting the sound level of at any Reader Assembly on any mode of transportation.

Note: No special tool will be required for this manual procedure. However the Reader Assembly will have the necessary security and processes in place so that only authorized personnel (TTC or PRESTO) will be able to make this adjustment.

REQ-RAS-20.5.1	Manually Adjusted Sound Level-2	Approved	F

Authorized TTC or PRESTO personnel will be capable of locally (manually) adjusting the sound level of any Reader Assembly with-in 20 seconds.

REQ-RAS-20.6	Upgradeable Tones	Approved	F

The PRESTO System shall be capable of downloading new sounds to reader Assemblies in the field:

- Across all reader Assemblies;
- To individual reader Assemblies;
- To all reader Assemblies used for a particular mode of transportation.

REQ-RAS-20.7	Sounds on Power Up	Approved	F

The ability of reader Assemblies to emit audible tones will be included as part of initialization and automated self-diagnostic check performed each time the Reader Assembly is powered up.

Note: The sequencing, number and sound for all power up states and sequences will be determined during Design Review.

REQ-RAS-21	Reader Assembly Tap Lights	Approved	F

Reader Assemblies shall have lights to indicate acceptance or denial of a fare payment made with PRESTO Media.

REQ-RAS-21.1	Reader Assembly Light Colours	Approved	F

The light colours on the Reader Assembly that represent acceptance or denial or a fare payment shall be distinct, clearly visible to the Customer and meet AODA standards. Reader assemblies should use colours that are already familiar to Customers

REQ-RAS-21.2	Reader Assembly Light Shape	Approved	F

The shape of the Reader Assembly Tap Lights shall vary depending on mode of transportation.

For example, for reader Assemblies on turnstiles, the acceptance light may be a green arrow pointing in the direction the Customer is to proceed, while the denial light may be a red X. This will be determined in Design Review.

REQ-RAS-21.3	Reader Assembly Light Duration	Approved	F

The ON duration of the Reader Assembly Tap Lights shall vary depending on mode of transportation.

For example, for reader Assemblies on turnstiles,

 - The acceptance light will be ON until the turnstile release mechanism is released and a Customer has proceeded (or partially proceeded) through the gate;
 - The denial light, on the other hand may be on for a shorter period of time.

Note: Duration for all Reader Assembly lights will be determined in Design Review.

REQ-RAS-21.4	Automatic Setting of Tap Light Intensity	Approved	F

The PRESTO System shall be capable of setting the Tap Light intensity,

 - Across all reader Assemblies;
 - To individual reader Assemblies;
 - To all reader Assemblies used for a particular mode of transportation.

This last point allows the display characteristics to be optimized for the mode of transportation, taking into consideration the variance in the ambient light levels associated with the mode of transportation.

REQ-RAS-21.5	Manually Adjusted Tap Light Intensity	Approved	F

Authorized TTC or PRESTO personnel will be capable of locally (manually) adjusting the tap light intensity at any Reader Assembly on any mode of transportation.

No special tool will be required for this manual procedure. However the Reader Assembly will have the necessary security and processes in place so that only authorized personnel (TTC or PRESTO) will be able to make this adjustment. The process for changing the tap light intensity at the Reader Assembly can be completed within 20 seconds.

REQ-RAS-22	List Processing	Approved	F

All Reader Assemblies will process PRESTO System lists on the tap of a Customer's PRESTO Media. The lists will include Hotlists and auto load of all TTC applicable TTC transit products (including add value). Other lists such as white lists (which may be used by the PRESTO System for non-revenue categories).

REQ-RAS-22.1	Hot List Size	Approved	F

The Reader Assembly Hotlist shall be capable of holding an aggregate of at least 100,000 unique PRESTO IDs.

REQ-RAS-22.1.1	Updating of the Hot List-2	Approved	F

Update hot lists to non-real time connected Reader Assemblies as soon as a Reader Assembly establishes a connection to the PRESTO System, or within 90 minutes.

REQ-RAS-22.1.2	Hot List Size-2	Approved	F

The Reader Assembly shall have non-volatile memory capacity dedicated solely to the Hotlisting function.

REQ-RAS-22.2	Updating of the Hot List	Approved	F

Update the Reader Assembly hot list to all real time connected Reader Assemblies within 20 minutes.

REQ-RAS-22.3	Optimization of Hot List Updates	Approved	F

Optimize the PRESTO Device hot list by only adding changes to the prior version already resident in the Reader Assembly.

REQ-RAS-22.4	Add Value List Size	Approved	F

Ensure that the memory on-board the Reader Assembly for the purpose of adding value is sufficiently large enough on all Reader Assemblies so that Customers will be capable of picking their add value up on tap at any Reader Assembly in the TTC.

REQ-RAS-22.5	Updating the Add Value List	Approved	F

Update the Reader Assembly add value list to all real-time connected Reader Assemblies within 20 minutes.

REQ-RAS-22.5.1	Updating the Add Value List-2	Approved	F

Update the load value list to non-real time connected Reader Assemblies as soon as the Reader Assembly establishes a connection to the PRESTO System, or within 90 minutes.

REQ-RAS-22.6	Design Review of List Processing	Approved	F

PRESTO will provide details regarding PRESTO System list processing for review, and approval by TTC. This will include such things as: how long an add value remains on a Reader Assembly; how the fraud detection and analysis system is used to add PRESTO Media IDs to the hot list; policies surrounding hot list additions.

REQ-RAS-23	Fare Payment Data	Approved	F

Reader Assemblies shall capture all transaction data (i.e. both acceptance and denial) from all PRESTO Media containing all TTC Fare Products (including TTC Private Fare Cards).

REQ-RAS-23.1	Reader Assembly Data Integrity and Loss Prevention	Approved	F

Ensure that all Reader Assemblies are designed using Hardware, Software, processes, and methods in order to prevent any loss or degradation of fare payment information or files. PRESTO will: - review all aspects of the PRESTO System designed to prevent information loss and degradation - detail all aspects of the Reader Assembly design that ensures no information is lost or degraded

REQ-RAS-23.1.1	Reader Assembly Data Integrity and Loss Prevention-2	Approved	F

PRESTO will ensure that data integrity is preserved and file loss is minimized throughout the PRESTO System and that SLAs ensuring this are adhered to.

REQ-RAS-23.2	Storage of Un-aggregated Data	Approved	F

Store all fare transaction data collected from Reader Assemblies as individual fare transactions, un-aggregated to the Data Mart.

REQ-RAS-23.3	Reader Assembly Data Traceability and Auditability	Approved	F

Ensure that all individual fare tap transactions captured by Reader Assemblies are:

 - end-to-end uniquely identified and

- traceable,

 at a minimum by time, place, payment type and Concession.

| REQ-RAS-23.3.1 | Reader Assembly Data Traceability and Auditability-2 | Approved | F |

Store all tap transactions (accepted or denied) captured by Reader Assemblies in the Data Mart.

| REQ-RAS-23.3.2 | Reader Assembly Data Traceability and Auditability-3 | Approved | F |

Ensure that all fare transaction records in the Data Mart can be examined, compared and reconciled to Customer purchases and use of TTC Fare Products.

| REQ-RAS-24 | Passback Control | Approved | F |

Ensure that the Reader Assembly will include a Passback control feature..

This feature will allow TTC to control the use of unlimited ride fare products, such as passes, by limiting the number of concurrent trips within a specified time, and will provide a "time-out" functionality to ensure Customers do not inadvertently pay twice.

| REQ-RAS-24.1 | Table Driven Parameter for Passback | Approved | F |

Ensure the time period during which a Passback is not permitted will be a table driven parameter setting.

| REQ-RAS-24.2 | Remote setting of Passback Timeout | Approved | F |

Provide the ability to remotely control the Passback setting(s) for Reader Assemblies from the PRESTO System CBO.

| REQ-RAS-24.3 | Flexible Setting of Passback Parameters | Approved | F |

Provide the ability to set unique Passback parameters based on the mode of transportation.

| REQ-RAS-24.4 | PRESTO Design for Passback | Approved | F |

PRESTO will submit details of its proposed Passback solution for review and approval by TTC.

| REQ-RAS-24.5 | Enforcing Passback | Approved | F |

The PRESTO System will be capable of enforcing Passback for the following Cases:

 - for all Surface vehicles;
 - for all Subway stations;
 - for a surface route; and
 - for a subway turnstile bank.

In Case 1, and Case 2 a Customer who taps their PRESTO Media on a Reader Assembly will be prevented from re-tapping their PRESTO Media on all Points of Entry according to the Passback timeout parameter for that mode of transportation where the first tap was made.

In Case 3, a Customer who boards a surface vehicle is locked out of making any further taps on all Reader Assemblies on that particular surface vehicle. Other surface vehicles will not recognize the Passback.

In Case 4, a Customer who taps their PRESTO Media on a Reader Assembly at a turnstile will have that entire bank of turnstiles, and only that bank of turnstiles, recognize the Passback timeout. Other turnstile banks within the same station will not recognize the Passback timeout.

REQ-RAS-25	Performance	Approved	F

PRESTO shall ensure that all reader Assemblies meet all applicable performance specifications as defined and detailed in Schedule A - SLA Specifications. These SLA specifications are briefly outline below for clarity only; how they are measured, calculated and enforced is detailed in Schedule A. Note that this list may not be exhaustive of Schedule A, and that Schedule A takes precedence. It is the responsibility of PRESTO to ensure all SLAs in Schedule are met.

REQ-RAS-25.1	Reader Assembly Sales Availability	Approved	F

Reader assembly sales Availability is measured as the total Uptime reader Assemblies are fully functional enabling the Customer to conduct all transactions and receive all services for which the Reader Assembly was designed over the revenue service day and is fully defined in SLA EQ-7 in Schedule A.   PRESTO shall ensure a Reader Assembly Sales Availability of greater than 99.99%.

REQ-RAS-25.3	Usage Tap to Fare Gate Releases	Approved	F

PRESTO shall achieve a Usage Tap to fare gate ratio of greater than 99.9% as stated in SLA BO-6 in Schedule A - SLAs.

REQ-RAS-25.4	Reader Assembly Hot List Refresh Rate	Approved	F

PRESTO shall achieve a Reader Assembly Hotlist Refresh Rate greater than 99.9% as stated in SLA DM-3 in Schedule A - SLAs.

REQ-RAS-25.5	Reader Assembly Orphan Mode File Loss Ratio	Approved	F

PRESTO shall achieve a Reader Assembly Orphan (or Standalone) file loss ratio of less than 0.0001% as stated in SLA DM-4 in Schedule A - SLAs.

REQ-RAS-25.6	Reader Assembly File Loss Ratio	Approved	F

PRESTO shall achieve a Reader Assembly file loss ratio of less than 0.0001% as stated in SLA EQ-6 in Schedule A - SLAs.

REQ-RAS-25.7	Card Read Error Rate	Approved	F

PRESTO shall achieve a Reader Assembly card (PRESTO Media) read error rate of less than 0.01% as stated in SLA TX-2 in Schedule A - SLAs.

REQ-RAS-51	Customer Throughput	Approved	F

Customer throughput at all Reader Assembly Point of Entries will target sixty (60) Customers per minute.   Actual Customer throughput obtainable at Points of Entry will be determined via the PRESTO System Design Process.

REQ-RAS-135	Measurement of Customer Throughput	Approved	NF

Customer throughput at Reader Assembly Point of Entries will be measured during Acceptance Testing and from time to time during PRESTO System operations to ensure the throughput specification (REQ-RAS-51) is met.   Customer throughput will be tested on the live production PRESTO System according to a mutually agreed upon set of tests that will include but not be limited to,

- testing Reader Assembly at Turnstiles;
- testing Pedestal Reader Assemblies;
- testing surface Reader Assemblies;
- using 'live' known PRESTO Media that contain a variety of products (e-Pass, e-Purse, transfers, single ride etc);
- using 'live' known PRESTO Media that require Reader Assemblies to add value/update products as they are tapped;

- using 'live' known Open Payments Media (mixed and/or exclusively);
- testing cross-boundary functionality; and
- testing SP interface points (e.g. GO to TTC at Union Station);

Issues such as Customer presentation of their payment media (PRESTO or Open Payments) will be addressed in design of the throughput tests.

REQ-RAS-26	Power Interruption Functionality	Approved	F

In the event of a power interruption, the Reader Assembly shall be provided with an alternative battery source (e.g. UPS, battery, storage capacitor,) to permit normal shutdown of the Reader Assembly, . Normal shutdown means the shutdown of a Reader Assembly that occurs when power is switched off.

REQ-RAS-27	Network Connectivity for Reader Assemblies	Approved	F

Reader assembly connectivity may vary by Reader Assembly installation location and mode of transportation.

REQ-RAS-27.1	Network Connectivity for Reader Assemblies in Subway	Approved	F

The reader Assemblies installed in subway stations shall have real-time, always on, connectivity to the PRESTO System Central Back Office and all of its services required to support the PRESTO field system.

This real time always on connectivity may be achieved in a variety of ways as long as all performance measures and SLAs are achieved as outlined in this Schedule and in Schedule A - SLAs.

For example, Reader Assemblies may use local wireless access between the Reader Assembly and an in-station Wireless Access Point. The WAP in turn may be hardwired to the PRESTO System. Alternatively, Reader Assemblies may use hard-wired connections to the PRESTO System. Any combination of wired and wireless connectivity is allowed as long as all of TTC Requirements are met.

REQ-RAS-27.2	Network Connectivity for Reader Assemblies on Surface Vehicles	Approved	F

The reader Assemblies installed on Surface Vehicles may use a variety of connectivity technologies as long as all performance metrics as stated in this Schedule and Schedule A are met. For example, reader Assemblies on surface vehicles may be:

- real-time, always on, connectivity to the PRESTO System Central Back Office and all of its services required to support the PRESTO field system use 3G or better wireless data networks; or

- local area connectivity such as WiFi (802.11) with access points at garages, stops, platforms Note that this type of connectivity will rely on the Reader Assembly to use Store and Forward functionality.

REQ-RAS-28	Network Connectivity Effect on Functionality	Approved	F

Reader Assemblies shall work identically on-line or off-line from the Customers perspective.

There shall be no indication to the Customer of the status of the network connection.

REQ-RAS-29	Action on Power Interruption	Approved	F

At the detection of a power outage, the Reader Assembly shall:

- Ensure that all fare transactions are completed;
- Attempt to upload all transaction data to the PRESTO Back Office; and
- then activate the "Closed" visual indication, which shall remain on until power from the battery source is exhausted.

REQ-RAS-30	Support for Multiple Entries using a Single PRESTO Media	Approved	F

All reader Assemblies on all modes of transportation shall include additional functionality to support TTC Fare Products that could allow multiple entries from a single PRESTO Media.

REQ-RAS-31	Similar Customer-Facing Appearance	Approved	F

Reader Assemblies on all modes of transportation including Pedestal reader Assemblies shall have a similar Customer-facing appearance.

REQ-RAS-32	Reader Assembly Graphics for Customer Usage	Approved	F

PRESTO shall ensure that permanent graphics to instruct TTC Customers on PRESTO Media usage is consistent throughout the PRESTO System at TTC and may be mounted either on the exterior or adjacent to the Reader Assembly.

REQ-RAS-33	Reader Assembly Design Material	Approved	F

PRESTO shall provide reader Assemblies intended for installation at all TTC locations and vehicles that are manufactured using materials, structures, and finishes that will withstand all environmental conditions present.

REQ-RAS-34	Reader Assembly Durability Duration	Approved	F

PRESTO will provide reader Assemblies intended for installation at all TTC locations and vehicles that will be durable for at least five (5) years beyond the term of TTC's agreement with PRESTO for the provision and operation of the PRESTO System.

REQ-RAS-138	Mounting Mechanisms	Approved	F

A single type of Reader Assembly will be capable of using different mounting mechanisms. Different mounting mechanisms will allow the single type of Reader Assembly to be mounted at different locations such as stanchions, flat surfaces, turnstiles and pedestals.

REQ-RAS-138.2	Power and Communications Termination	Approved	F

The Reader Assembly mounting mechanism will provide a termination point for vehicle or station power and communications cables independent from the Reader Assembly power and communications connection.

REQ-RAS-138.3	Removal or Replacement	Approved	F

The Reader Assembly may be removed or replaced from its mounting without disconnecting and reconnecting the vehicle or station side of the power and communications cables. The only exception to this is at the first time installation of the Reader Assembly mounting mechanism.

REQ-RAS-139	Reader Assemblies by Mode	Approved	F

All Reader Assemblies installed on a particular mode of transportation (e.g. bus, LRV, subway, Wheel Trans, current streetcar,) shall use the same Reader Assembly.

REQ-RAS-35	Final Physical Design	Approved	F

Final details of mounting of reader Assemblies, and light colours, patterns, audio signals, for reader Assemblies will be addressed during Design Review and will remain subject to TTC's approval.

3.1.2.1.1   Operation During Transition

REQ-RAS-36	Transition Period	Approved	F

TTC anticipates a transition period during which both TTC's Legacy fare collection system and the PRESTO System will operate side-by-side.

REQ-RAS-37	No Interference with Current Fare Collection System	Approved	F

The Release of the Turnstile by the reader Assemblies shall be accomplished without interfering with the normal operation of TTC's current fare collection system.

REQ-RAS-38	PRESTO System Failure during Transition	Approved	F

In the event of a PRESTO System equipment failure or other condition that prevents payment of fares via the PRESTO System during the transition period when both TTC's Legacy fare payment system is still in operation, implementation of the Closed setting of the PRESTO Reader Assembly shall not interfere with or interrupt the normal operation of TTC's Legacy fare payment system.

The Reader Assembly will display a unique visual message, distinct from those used for fare payment to indicate that the Faregate is closed for acceptance of PRESTO Media only.

REQ-RAS-38.1	PRESTO System Failure during Transition-2	Approved	F

In the event of a PRESTO System equipment failure or other condition that prevents payment of fares via the PRESTO System during the transition period when both TTC's Legacy fare payment system is still in operation, implementation of the Closed setting of the PRESTO Reader Assembly shall display a unique visual message, distinct from those used for fare payment to indicate that the Faregate is closed for acceptance of PRESTO Media only.

The Reader Assembly will not interfere with or interrupt the normal operation of TTC's legacy fare payment system.

3.1.2.2 Reader Assemblies at Turnstiles

3.1.2.2.1 General

REQ-RAS-39	Inclusion of General Reader Assembly Specifications	Approved	F

All reader Assemblies at Turnstiles shall comply to all specifications listed in the General Reader Assembly Specifications Section.

REQ-RAS-40	Reader Assemblies at Turnstiles	Approved	F

PRESTO shall ensure that for the PRESTO System at TTC, all turnstiles that currently accept legacy payment of fares will be interfaced with new, PRESTO Reader Assembly Hardware to be used in accepting fares from PRESTO Media.

REQ-RAS-41	Current Turnstile Dimensions	Approved	F

Included with this Schedule are dimensional drawings of a typical turnstile deployed in TTC system (Appendix D) that PRESTO shall interface new, PRESTO reader Assemblies to. See appendix in this schedule.

REQ-RAS-42	Location of the PRESTO Reader Assembly	Approved	F

It is envisioned at TTC that the Reader Assembly will be located outside, in front of and aligned with the Turnstile housing. The PRESTO Reader Assembly is therefore separate or independent from the Turnstile, interfacing to the Faregate via standard communications and power connectors and cabling.

REQ-RAS-43	Number of Reader Assemblies	Approved	F

One (1) Reader Assembly shall be required per turnstile at each station.

REQ-RAS-44	Replacement of Free-Wheeling Turnstiles	Approved	NF

PRESTO will provide replacement turnstiles equipped with Reader Assemblies, for the freewheeling turnstile adjacent to the collector booth in the subway. Replacement of these turnstiles will include the civil works associated with this replacement. For clarity, there is no expectation that PRESTO will be required to reconfigure the existing fare lines. TTC and PRESTO will mutually agree on the number and location of the freewheeling turnstiles that need to be replaced.   TTC will provide the specifications for the replacement turnstiles.

REQ-RAS-45	Detailed Review of Each Turnstile Type	Approved	F

A detailed review of each turnstile type that will be interfaced to new, PRESTO reader Assemblies will occur during Design Review. This detailed review will include:

 - Location and a description of the power supply in the turnstile;

 - The recommended location for installing the Reader Assembly; and

 - Other locations available for installation of additional components to support the Turnstile Reader Assembly such as cabinets, conduit, routers, wireless hubs

REQ-RAS-46	Reader Assembly Independence from Turnstile Functionality	Approved	F

All functionality required of the Reader Assemblies shall be accomplished independently from the functionality of the turnstile.

REQ-RAS-47	Special Consideration for Brake Dust	Approved	F

Reader Assemblies located in the subway station shall be designed to minimize the effects that brake dust may have on their functionality.

3.1.2.2.1.1   Functionality

REQ-RAS-48	Tap and Go at the Turnstile	Approved	F

Reader Assemblies at turnstiles will have Tap and Go Functionality as described in RAS-11 (repeated below for clarity) with additional functionality required to release the turnstile gate and signal the Concession Indication System. In short,

 - A Customer taps their PRESTO Media to the Reader Assembly;

 - The Reader Assembly determines if the tap has resulted in an accepted fare payment (or transfer);

 - The Reader Assembly illuminates a coloured light indicating and accepted fare payment;

 - Simultaneously the Reader Assembly produces a tone indicating an accepted fare payment;

 - The Reader Assembly composes a short message which includes the results of the tap as well as the product and Concession type;

 - The Reader Assembly sends this message to the TTC turnstile interface controller via a serial port;

 - The TTC Turnstile interface controller receives this message and releases the gate for acceptance

taps;

 - The Customer proceeds through the turnstile;

 - The TTC Turnstile interface controller acknowledges the Reader Assembly message by sending an acknowledge message back to the Reader Assembly;

 - The Reader Assembly receives the acknowledge message and sets it's state and functionality (including lights) to allow the next Customer to tap their PRESTO Media.

If the transaction is denied, the TTC Interface Board will not release the gate.

REQ-RAS-49	Record of Faregate Releases	Approved	F

Enable Reader Assemblies to provide a record of releases of the gate mechanism (for reporting and auditing purposes). The record shall associate the gate mechanism release with the PRESTO Card ID used to pay the fare.

This association of the gate mechanism release with the PRESTO Card ID may be obfuscated via Tokenization for privacy and security reasons.

REQ-RAS-49.1	Record of Faregate Releases-2	Approved	F

Obfuscate the association of the gate mechanism release with the PRESTO Card ID for privacy and security.

REQ-RAS-50	Record of Faregate Release Information	Approved	F

The record of gate releases shall consist of at least the following:

- The PRESTO Media ID used for payment;
- A date and time stamp;
- A unique identifier for the Reader Assembly and Faregate; and
- TTC Fare Product, Category of the PRESTO Media used for fare payment (e.g. Concession, Concession type, LUM)

3.1.2.2.1.1.1   States of Operation

REQ-RAS-52	States of Operation	Approved	F

The Reader Assembly shall enable the turnstile to operate in the following states:

 - Open;
 - Closed and
 - Emergency.

REQ-RAS-53	Open State	Approved	F

In the Open State the Reader Assembly shall allow appropriate entries based on fares paid using PRESTO Media.

The Open State is the normal operating state of the turnstile. This is also the default state of the turnstile where the Reader Assembly and the Turnstile work as outlined in RAS-10.

REQ-RAS-53.1	Open State-2	Approved	F

In Open State (In-Service) the Reader Assembly shall support two modes:

 - On-Line Mode; and
 - Off-Line Mode.

REQ-RAS-53.2	Open State, On-Line Mode	Approved	F

In Open State, On-Line Mode, the Reader Assembly shall:

- be a fully functional Reader Assembly;
- have full communications with the PRESTO System;
- have real time device management and monitoring;
- downloading of PRESTO Media update files;
- downloading of lists (Hotlists);
- updating of operating parameters;
- uploading of fare transaction files.

REQ-RAS-53.3	Open State, Off-Line Mode	Approved	F

The Open State, Off-Line Mode is the exception mode for the Open State of the turnstile.   In this mode, the Reader Assembly is fully functional and can communicate with the TTC Interface Board; however it cannot communicate with the PRESTO Central System due to communications failure (or partial failure). In this mode, the Reader Assembly will, among other things,

 - be fully functional (independent of the PRESTO System) apart from the functionality dependent on communications;

 - provide the same Customer and Operations experience as if communications was present;

 - locally store all fare transactions files, alerts, in a secure manner for uploading when communications is restored.

REQ-RAS-53.3.1	Telecommunications Outage	Approved	F

In the event of a telecommunications service interruption, the Reader Assembly shall continue operations in off-line mode.

REQ-RAS-53.3.2	Optimization of Hot List	Approved	F

Ensure that the Reader Assembly hot list is optimized for the open state off-Line mode to reduce the chance of fraud.

REQ-RAS-53.3.2.1	Optimization of Hot List-2	Approved	F

Use the hot list in conjunction with the fraud detection and analysis capabilities of the PRESTO System to analyze usage patterns, trends etc. to decrease the likelihood of a fraudulent card being used.

REQ-RAS-53.3.2.2	Utilize Store and Forward	Approved	F

In off-line mode, the Reader Assembly shall utilizes Store and Forward functionality as defined in the General Reader Assembly Specifications Section of this Schedule..

REQ-RAS-54	Emergency State	Approved	F

In the Emergency State the Reader Assembly shall put the turnstile in either one of the following modes:

- Exit Only Mode;
- Entry and Exit Mode;

In this state the Reader Assembly may illuminate its lights in a configuration that clearly indicates Emergency State.

REQ-RAS-54.1	Emergency State - Exit Only Mode	Approved	F

In Emergency State - Exit Only mode, the Reader Assembly shall permit exit only and deny all entry at the turnstile.

REQ-RAS-54.2	Emergency State - Exit-Entry Mode	Approved	F

In Emergency State - Exit-Entry mode, the Reader Assembly shall permit "free-wheeling" or unlimited unpaid entry as well as exiting at the turnstile.

REQ-RAS-54.3	Authority to Set Emergency State	Approved	F

Ensure TTC will have authority to set the emergency state (and mode).

REQ-RAS-54.3.1	Authority to Set Emergency State-2	Approved	F

Ensure that the emergency state can be set either locally or remotely via the PRESTO System back office.

REQ-RAS-54.3.2	Authority to Set Emergency State-3	Approved	F

Ensure the emergency state can be set only by authorize TTC personnel without the use a special tools.

REQ-RAS-54.3.3	Authority to Set Emergency State-4	Approved	F

The Reader Assembly will have the necessary security and processes in place so that only authorized personnel will be able to make this adjustment. This setting of Emergency State and return to Open State, must be able to be accomplished quickly and efficiently.

REQ-RAS-55	Closed State	Approved	F

In the Closed State (Out-Of-Service) the Reader Assembly is out of service and shall:

 - Disallow entry through the turnstile

 - Display, using its lights (Reader assembly Lights) that it is out of service (e.g. the Reader Assembly could enable it's Denial Light for the entire time the turnstile is in Closed State);

 - Not perform fare transactions for any PRESTO Media if Customers continue to tap the Reader Assembly (i.e. will not take fares off the Customer's PRESTO Media);

 - May respond with a Out of Service sound if a Customer taps their PRESTO Media;

 - Never display it's Acceptance Light, or emit it's acceptance sound.

REQ-RAS-55.1	Closed State Modes	Approved	F

Reader Assemblies shall not have Closed State Modes.

3.1.2.2.2   Interfaces to TTC Equipment

3.1.2.2.2.1   Concession Indication System

REQ-RAS-56	Concession Indication System	Approved	F

TTC's Concession Indication System used at turnstiles shall be physical independant of the Reader Assembly on the turnstile.

REQ-RAS-56.1	Concession Indication System-2	Approved	F

The control of the Concession Indcation System lights and sound shall be performed by the TTC Turnstile Interface Board (TIB) based on the information receiced by the TIB from the Reader Assembly as defined in the Turnstile Interface Board Specification (RAS-63 to RAS-67 inclusive).

REQ-RAS-57	Concession Indication Lights	Approved	F

Deleted. The Concession Indication System is now controlled by the Turnstile Interface Board.

REQ-RAS-58	Concession Indication System Audio	Approved	F

Deleted. The Concession Indication System is now controlled by the Turnstile Interface Board.

REQ-RAS-59	Concession Indication System Modes	Approved	F

Deleted. The Concession Indication System is now controlled by the Turnstile Interface Board.

REQ-RAS-60	Interface to Appropriate Legacy Indicators	Approved	F

Deleted. The Concession Indication System is now controlled by the Turnstile Interface Board.

REQ-RAS-61	Design Review	Approved	F

Deleted. The Concession Indication System is now controlled by the Turnstile Interface Board.

3.1.2.2.2.2 Concession Indication System Interface

REQ-RAS-62	Communications Interface	Approved	F

Deleted. The Concession Indication System is now controlled by the Turnstile Interface Board.

3.1.2.2.2.3 TTC Interface Board Interface

REQ-RAS-63	Serial Interface	Approved	F

Ensure the serial interface between the Reader Assembly and the turnstile Interface board is:

 - bi-directional (not multi-drop)
 - asynchronous
 - half-duplex

REQ-RAS-63.1	Serial Interface-2	Approved	F

Ensure the serial interface uses a protocol with noise immunity for the subway environment such as RS-485 (i.e. twisted pair).   The serial interface will adhere to the serial standard chosen and will not be modified.

REQ-RAS-63.2	Serial Interface-3	Approved	F

If required, dedicated serial protocol converters between the Reader Assembly and the TTC interface board may be used as long as they do not affect the functionality of the interface. Further details regarding the protocol (including start, stop, data bits) will be mutually agreed upon during Design Review

REQ-RAS-64	Use of Standard Serial Connectors	Approved	F

Ensure that the serial interface between the Reader Assembly and TTC interface board is not hardwired. This interface will use off the shelf connectors with a latch or locking mechanism allowing the Reader Assembly to be quickly connected or disconnected to the TTC interface board.

REQ-RAS-65	Message Contents	Approved	F

The Reader Assembly shall include the following information in the message sent to the TTC Interface Board:

 - Result of the PRESTO Media tap (Acceptance / Denial);
 - TTC Fare Product Type (pass, ticket, LUM,);
 - TTC Concession type;
 - TTC Private Fare Card Type;
 - Faregate Mode (open, closed, emergency);

REQ-RAS-65.1	Message Contents-2	Approved	F

The message design sent to the TTC interface Board from the Reader Assembly shall be mutually agreed to by PRESTO and TTC.

Message contents may be suitable encoded for optimization, efficiency and robustness to errors. Message design and contents will be mutually agreed upon.

REQ-RAS-66	Message Protocol	Approved	F

The Reader Assembly and TTC Interface Board shall communicate using a simple send/receive protocol.

(i.e. The Reader Assembly sends the message described above to the TTC Interface Board;
The TTC Interface Board replies, at the appropriate time, to the Reader Assembly with an acknowledge message.)

All messages received by the TTC Interface Board are acknowledged. The acknowledge message may use a standard serial acknowledge signal instead of a message.
All messages sent by the Reader Assembly will use timeouts.

Although this messaging protocol is simple, it is meant to be robust. PRESTO along with TTC will ensure Software best practices such as using protocol state machines when implementing this protocol.

Further details concerning the message protocol, timeouts will be determined during Design Review.

REQ-RAS-67	When to Send Messages	Approved	F

The Reader Assembly at the turnstile shall always send a message to the TTC Interface Board when PRESTO Media is tapped to the Card reader. Note that this includes taps that result in denials.

3.1.2.2.2.4   Power

REQ-RAS-68	Reader Assembly Power Source	Approved	F

The Reader Assembly shall derive its power from the current power available in the turnstile.

REQ-RAS-69	Power Connection	Approved	F

The power connection between the Reader Assembly and turnstile shall not be hardwired.

REQ-RAS-69.1	Power Connection-2	Approved	F

Power connection interface between the Reader Assembly and turnstile shall use off the shelf

connectors with a latch or locking mechanism.

This will allow the Reader Assembly to be quickly connected or disconnected to the turnstile power for repair, replacement servicing

3.1.2.2.3 Design Criterion for Reader Assemblies on Turnstiles

| REQ-RAS-70 | No alterations to TTC Faregates | Approved | F |

No alterations of the functionality or physical design of the Faregates shall be required or permitted, except as described in this Schedule or as mutually agreed between TTC and PRESTO, in order to enable the installation of new reader Assemblies.

| REQ-RAS-71 | No Impact to Current Faregate Operation | Approved | F |

Payment of fares with reader Assemblies shall have the same effect on the operation of Faregates as payment with TTC's Current System fare media.

| REQ-RAS-72 | No Impact During Data Uploads/Downloads | Approved | F |

Reader assembly shall not in any manner impact the operation of the TTC turnstiles during Reader Assembly data uploads/downloads, and remote diagnostics.

| REQ-RAS-73 | Maximum Width | Approved | F |

The Reader Assembly at the Turnstile shall be no wider and no higher than the TTC Turnstile. This design constraint does not exclude the Reader Assembly at the turnstile from meeting AODA standards.

| REQ-RAS-74 | Maximum Available Power | Approved | F |

The maximum available power available to the Reader Assembly at a turnstile is 2.5A at 115VAC. This maximum power includes all PRESTO support equipment, communications modules (wireless or wired), fans, heaters that the PRESTO System may require in addition to the actual Reader Assembly.

| REQ-RAS-75 | Installation of Power | Approved | F |

PRESTO shall be responsible for the installation of power to all TTC turnstiles that are currently un-powered according to TTC standards and policies.

| REQ-RAS-76 | Communications Network | Approved | F |

PRESTO shall install a wired or wireless communications network that links the PRESTO System to each and every Turnstile Reader Assembly in the subway. To be clear, there is no communications network, wired or wireless, currently at the Turnstiles.

| REQ-RAS-76.1 | Wireless Design Constraints | Approved | F |

Optional - Turnstile reader Assemblies if required shall use wireless communications 3G (or better), 802.11 as their link to the PRESTO System as long as all TTC standards for the use of wireless communications within the subway station are met.

| REQ-RAS-76.2 | Wired Design Constraints | Approved | F |

Optional - Turnstile reader Assemblies if required shall use wired communications as their link to the PRESTO System as long as all TTC standards for the use of wired communications within the subway station are met.

3.1.2.3 Reader Assemblies on Surface Vehicles

Reader Assemblies on surface vehicles refer to all surface vehicles in the TTC fleet. This includes, buses, LRVs, streetcars and Wheel-Trans.

3.1.2.3.1   General

REQ-RAS-77	Inclusion of General Reader Assembly Specifications	Approved	F

All reader Assemblies on Surface Vehicles shall comply with all specifications listed in the General Reader Assembly Specifications Section.

REQ-RAS-78	Reader Assemblies on TTC Surface Vehicles	Approved	F

PRESTO shall procure and install new reader Assemblies on TTC's surface vehicle fleets.

REQ-RAS-79	Scope of Surface Vehicles	Approved	F

TTC surface vehicles that shall have PRESTO reader Assemblies installed include:

 - buses;
 - streetcars; and
 - LRVs.

Note: Wheel Tran Vehicles are considered in the Wheel Trans Section of this Schedule.

REQ-RAS-80	Common Functionality	Approved	F

All PRESTO reader Assemblies on TTC Surface Vehicles shall have the same functionality.

REQ-RAS-81	Surface Reader Assembly Design	Approved	F

PRESTO reader Assemblies for surface vehicles shall be suitable and adaptable for installation on a broad range of different surface vehicles with different design constraints.

For example, maximum physical dimensions for the Reader Assemblies on LRVs are known, as well as type of communication and power connectors. Although the physical dimensions of the PRESTO Reader Assemblies on surface vehicles may vary across LRVs and Buses, all surface reader Assemblies must present the exact same look and feel to the Customer; and operate in exactly the same manner.

Further differences between Bus and LRV Reader Assemblies are defined in the Design Constraints Section for Surface Reader Assemblies presented in this Schedule.

REQ-RAS-82	Placement for Contactless Reader Interface	Approved	F

Reader assembly shall enable installation of the Contactless reader interface, and the operator interface is in an optimal position for use by TTC Customers and TTC operators on any surface vehicle currently in service at TTC.

REQ-RAS-83	No Interference with Operator	Approved	F

PRESTO proposed design of the Reader Assembly shall enable installation of the Reader Assembly in a manner that does not interfere with the normal operation of surface vehicles and the required activities of Operators while performing their driving responsibilities. The ergonomics of the installation must be approved by TTC.

REQ-RAS-84	Installation on Future Vehicle Fleets	Approved	F

The proposed design of the Reader Assembly shall enable minimal adaptation of the Reader Assembly to permit installation on future additions to TTC's surface vehicle fleets.

REQ-RAS-85	Plug and Play on Surface Vehicles	Approved	F

The proposed design of the Reader Assemblies for surface vehicle shall enable full replacement of the Reader Assembly components in a "plug-and-play" manner.

Maintenance of reader Assemblies for Surface Vehicles cannot impact TTC operations. Schedule A contains further details on times, timing and other specifications for maintenance of field equipment.

REQ-RAS-86	No integration with Legacy Fare System	Approved	F

PRESTO reader Assemblies on surface vehicles shall not be integrated / interfaced with any other on-board legacy fare equipment.   This includes:

 - No integration/interfacing with fare boxes on buses;

 - No integration /interfacing with any legacy fare equipment that may be installed on LRVs such as Token Acceptors or Ticket Validators.

REQ-RAS-87	Communication with PRESTO System	Approved	F

Reader Assemblies (and any other PRESTO equipment) on surface vehicles shall initiate communication with the PRESTO System automatically, without vehicle Operator intervention, whenever they are within communication range of a communications access point (e.g. when the surface vehicle is within communications range of a WiFi access point, at a bus garage or carhouse, the Reader Assembly will automatically communicate with the PRESTO System).

REQ-RAS-87.1	Communications are Independent of Vehicle State	Approved	F

Onboard PRESTO Devices (as long as they are powered up) shall automatically communicate with the PRESTO System when they are within range of a Wireless Access Point, regardless of the operational state of the vehicle. (e.g. the can be moving, stationary, starting up, shutting down, etc.).

REQ-RAS-88	Preference for No Driver Control Unit	Approved	F

TTC prefers no Driver Control Unit on any surface vehicle. To be clear, this includes buses and LRVs. For LRVs, there is no interaction between the Operator and Customers or the fare collection system. TTC prefers an automatic solution that minimizes or eliminates Operator input.

REQ-RAS-88.1	Operator Input via Reader Assembly	Approved	F

All required Operator input shall be done through the Reader Assembly, or a simple interface (such as a serial port) to the Reader Assembly using Operator Cards, keypads, and Card reader (as in the LUM activation interface).

REQ-RAS-88.2	Use of Standard Interfaces	Approved	F

All required interfacing to TTC equipment and data (such as route, stops) shall be done via standard interfaces and protocols to the Reader Assembly.

REQ-RAS-88.3	Data integration	Approved	F

Integrate data (such as route and stop information) via the PRESTO System CBO or in the Data Mart.

REQ-RAS-88.4	PRESTO Solutions Design Review	Approved	F

PRESTO shall propose a solution(s) for reader Assemblies on surface vehicles that do not require the use of a Driver Control Unit.

3.1.2.3.2   Functionality

REQ-RAS-89	Tap and Go on a Surface Vehicle	Approved	F

Reader Assemblies at on surface vehicles shall have the same Tap and Go Functionality as described in RAS-11.

The Reader Assembly on the bus will produce the same signals as the Reader Assembly at the Turnstile including the signal to open the turnstile gate; however it will be used here for diagnostic and possibly an additional Concession indicator system similar to the one used in subway stations.

REQ-RAS-89.1	Tap and Go on a Surface Vehicle-2	Approved	F

The Reader Assembly on the bus shall produce the same signals as the Reader Assembly at the Turnstile including the signal to open the turnstile gate; however it will be used here for diagnostic and possibly an additional Concession indicator system similar to the one used in subway stations.

Reader Assemblies at on surface vehicles will have the same Tap and Go Functionality as described in RAS-11.

REQ-RAS-90	Revenue Service Operation	Approved	F

Reader Assemblies on surface vehicles shall have the capability to only operate while the vehicle (e.g. bus, LRV,) is in Revenue Service mode as defined in TTC SLAs.

REQ-RAS-91	Location Capability	Approved	F

Reader Assemblies located on all TTC surface vehicles shall have GPS location capability.

REQ-RAS-91.1	GPS Equipment	Approved	F

GPS equipment shall be either

 - built internal to the Reader Assembly or
 - A standalone GPS module interfaced to the Reader Assembly via a standard serial connection.

REQ-RAS-91.1.1	GPS Equipment-2	Approved	F

Reader Assemblies that use a standalone GPS module shall be located in the vehicle to facilitate GPS location quality.

REQ-RAS-91.2	Determining Revenue Service	Approved	F

Optional - reader Assemblies located on all TTC surface vehicles shall use their GPS Location capability, along with other information or input, to determine whether or not the vehicle is in Revenue Service.

REQ-RAS-91.3	Interface to Bus Stop Location System	Approved	F

Reader Assemblies shall interface to existing on-board route/stop location data and ensure TTC fare rules and policies are properly executed.

REQ-RAS-91.4	Automatic Determination of Reader Assembly Location	Approved	F

Reader Assemblies located on all TTC surface vehicles shall use their GPS Location capability along with stop, route and other on-board information to:

- determine location, and
- correct execution of fare rules and policies.

REQ-RAS-92	Clear Indication of In/Out of Service	Approved	F

Reader Assemblies shall clearly indicate that they are In Service or Out of Service to the TTC Customer and vehicle operator via light/LED indicators mounted integrally to the reader.

REQ-RAS-93	Local Setting of In/Out of Service	Approved	F

Reader Assemblies on surface vehicles shall have the capability to be switch to In Service/Out of service by surface vehicle operators when a surface vehicle enters and exits Revenue Service.

Service Status is a reportable item.

REQ-RAS-94	Design Review for Reader Assemblies on Surface Vehicles	Approved	F

PRESTO shall describe all use cases inherent in the proposed functionality of the Reader Assembly design for installation on TTC's surface vehicle fleet and Wheel-Trans vehicles.

3.1.2.3.2.1   Bus and Streetcar Specific Functionality

REQ-RAS-95	Operator Interaction	Approved	F

Bus and streetcar Operators will have a role in the PRESTO System as they are present when Customers board.   There will be no Operator interaction regarding fare payments on LRVs as the Operator is physically separated from Customers.

REQ-RAS-96	Clear View of Operator Reader Assembly Displays	Approved	F

PRESTO shall ensure that its proposed designs of the Reader Assembly shall enable Operators to have an unobstructed view required for collecting fares and operating the vehicle.

REQ-RAS-97	LUM Activation Process	Approved	F

The activation of a LUM will be accomplished by the vehicle operator.

 - The vehicle Operator removes an un-activated LUM from the LUM on bus Dispenser;
 - The vehicle Operator taps the LUM to the Reader Assembly to activate it as a transfer LUM;
 - The vehicle Operator hands the activated LUM to the Customer;

REQ-RAS-97.1	No Customer Activation of Transfer LUMs	Approved	F

Ensure that only the vehicle operator can activate the LUM.   An un-activated transfer LUM tapped by the Customer, to the same or any other Reader Assembly in the PRESTO System will not be activated.

REQ-RAS-97.2	Additional Equipment for Transfer LUM Activation	Approved	F

Optional - If required, reader Assemblies on buses and streetcars shall use additional equipment in order to meet the Transfer LUM activation specifications. For example,

 - an additional Contactless Surface may be plugged into the Reader Assembly on the bus via a standard serial port. This additional contactless surface would be designed to only activate transfer LUM and will only be accessible to the bus Operator or,

 - an activation button, only accessible to the bus operator is pushed before the LUM is tapped to the Reader Assembly.

REQ-RAS-98	Inclusion of a Cheater Button	Approved	F

Reader Assemblies on buses shall include a driver operated cheater button. For clarity, this button will be used by the vehicle Operator when Customers fail to pay or a Concession has been falsely used.

REQ-RAS-98.1	Inclusion of a Cheater Button-2	Approved	F

The Reader Assembly shall collect, record and send cheater counts to the PRESTO System Central Back Office where they will be forward to the Data Mart.

REQ-RAS-99	Inclusion of Cross Boundary Function	Approved	F

Ensure Reader Assemblies support the cross-boundary solution.

3.1.2.3.2.2   States of Operation

REQ-RAS-100	Reader Assembly Power On	Approved	F

Reader Assemblies on Surface Vehicles shall have an Initialization stage on Power Up.

REQ-RAS-100.1	Start of Initialization Stage	Approved	F

The Reader Assembly shall begin an initialization process as soon as the surface vehicle engine is running or when the surface vehicle propulsion system is engaged.

REQ-RAS-100.2	No Operator Intervention	Approved	F

The Reader Assembly Wake-Up and Initialization process shall begin and continue through to completion without any personnel intervention.

REQ-RAS-100.3	Perform Self Diagnostics	Approved	F

The Reader Assembly initialization process shall entail a self-diagnostics protocol that at a minimum:

 - checks all components in the Reader Assembly;
 - perform security protocol checks (e.g. application signature checks and key checks);
 - initiate live communications with the PRESTO System, if a connection is available; and
 - indicate its operational status.

REQ-RAS-100.4	Completion of Initialization Process	Approved	F

At the completion of the Initialization process, the Reader Assembly shall relay its status to the PRESTO System Central Back Office when there is connectivity to the PRESTO System Central Back Office.

REQ-RAS-100.4.1	Completion of Initialization Process-2	Approved	F

At the completion of the Initialization process, the Reader Assembly shall store its status when there is no connectivity to the PRESTO System Central Back Office and relay it when communications are restored.

REQ-RAS-100.5	Local Indication of Status	Approved	F

The Reader Assembly shall clearly indicate its status at the end of the initialization stage by indicating whether or not it is In Service or Out of Service.

REQ-RAS-100.5.1	Local Indication of Status-2	Approved	F

The Reader Assembly shall be fully operational when an In-Service indication is display and will be able to accept all taps from all PRESTO Media containing all TTC Fare Products..

REQ-RAS-100.6	Maximum Initialization Time	Approved	F

The end-to-end initialization process (i.e. from the start of the surface vehicle, to final status indication) shall take no longer than 120 seconds to complete.

REQ-RAS-100.7	Re-Initialization	Approved	F

Reader Assemblies re-initialization process shall begin when:

 - Restarting of the surface vehicle engine, or
 - Turning on of the surface vehicle propulsion system

REQ-RAS-101	Vehicle Power Off	Approved	F

When the surface vehicle engine is not running, or the surface vehicle propulsion system is off, the Reader Assembly will be capable of detecting the loss of power from the surface vehicle electrical system, complete any pending transaction and perform all the necessary technical housekeeping required before shutting down. This includes, but is not limited to, securely authenticating and storing all status, files, records, and configurations in non-volatile memory.

REQ-RAS-102	States of Operation	Approved	F

The Reader Assembly for surface vehicles shall operate in the following states:

 - Open; and
 - Closed;

No emergency state is required for surface vehicles as no barrier or gate is controlled by the Reader Assemblies on buses or LRVs.

REQ-RAS-103	Open State	Approved	F

In the Open State (normal operating mode) ,the Reader Assembly on vehicles shall signify appropriate entries based on fares paid using PRESTO Media.

REQ-RAS-103.1	Open State-2	Approved	F

In Open State, the Reader Assembly shall support two modes:

 - On-Line Mode; and
 - Off-Line Mode.

Either On-Line Mode or Off-Line Mode may be the normal operating state of Reader Assemblies on surface vehicles as this is dependent on the PRESTO designed network architecture.

Open State will be referred to, and is the same as, In-Service.

REQ-RAS-103.2	Open State, On-Line Mode	Approved	F

In the Open State, On-Line Mode the Reader Assembly shall at a minimum:

 - have real time device management and monitoring;
 - downloading of PRESTO Media update files;
 - downloading of lists (Hotlists);
 - updating of operating parameters and
 - uploading of fare transaction files.

REQ-RAS-103.3	Open State, Off-Line Mode	Approved	F

In the Open State, off-line Mode the Reader Assembly shall at a minimum:

 - be fully functional (independent of the PRESTO System) apart from the functionality dependent on communications;

- provide the same Customer and Operations experience as if communications was present;

- locally store all fare transactions files, alerts, in a secure manner for uploading when communications is restored (i.e. use Store and Forward functionality)

REQ-RAS-103.3.1	Telecommunications Outage	Approved	F

In the event of a telecommunications service interruption, the Reader Assembly shall operate in off-line mode.

REQ-RAS-103.3.2	Optimization of Hot List	Approved	F

In Open State off-line mode the Reader Assembly shall process Hotlists which have been optimized for Open State Off Line Modes.

REQ-RAS-103.3.3	Utilize Store and Forward	Approved	F

In off-line mode the Reader Assembly shall utilizes Store and Forward functionality.

REQ-RAS-104	Closed State	Approved	F

In the Closed State the Reader Assembly on surface vehicles is out of service. In this state the Reader Assembly shall:

- Display, using its lights (Reader assembly Lights) that it is out of service (e.g. the Reader Assembly could enable it's Denial Light for the entire time the Reader Assembly is in Closed State);

- Not perform fare transactions any PRESTO Media if Customers continue to tap the Reader Assembly (i.e. will not take fares off the Customer's PRESTO Media);

- May respond with an Out of Service sound if a Customer taps their PRESTO Media;

- Never display its Acceptance Light, or emit it's acceptance sound.

REQ-RAS-104.1	Close State Modes	Approved	F

Reader Assemblies shall not have any Closed State Modes.

3.1.2.3.3   Interfaces to TTC Equipment

REQ-RAS-107	Use of Standard Hardware Interfaces for Communications	Approved	F

Reader assembly interfacing to the TTC equipment shall use standard Hardware interfaces (e.g. RS232, RS485, etc., Ethernet) using Hardware connectors approved for Vehicle use.

REQ-RAS-107.1	Use of Standard Hardware Interfaces for Communications-2	Approved	F

Reader assembly shall not have hardwired connections between TTC equipment and PRESTO Field devices.

3.1.2.3.4   Design Criterion for Reader Assemblies On Buses and Streetcars

REQ-RAS-108	No impact to Current Fare Collection	Approved	F

Reader Assemblies on buses and streetcars shall not impact:

- the use of the current fare boxes,
- the vehicle Operators ability to see the Customer's deposited cash as well as,
- the Customer's ability to place cash in the fare box.

REQ-RAS-109	Location of Reader Assembly on Bus and Streetcar	Approved	F

The Reader Assembly on the bus and streetcar shall be located at the front of the vehicle. The specific location will be determined and approved by TTC and PRESTO.

REQ-RAS-110	Number of Reader Assemblies on Bus and Streetcar	Approved	F

Buses or Streetcar shall have one (1) Reader Assembly at the front of the vehicle.

REQ-RAS-110.1	Number of Reader Assemblies on Bus and Streetcar-2	Approved	F

Buses if required shall have a second Reader Assembly mounted at the rear doors. A second Reader Assembly may be required to support cross boundary service.

REQ-RAS-111	Maintenance Constraints by Vehicle Type	Approved	F

Ensure maintenance protocols for buses and streetcars take into consideration specific requirements and TTC operational constraints that vary by vehicle type.

For clarity, constraints for maintenance are outlined in Schedule A.

3.1.2.3.5   Design Criterion for Reader Assemblies on LRVs

This section includes specifications that have been used in initial discussions with the LRV manufacturer.   They will be confirmed in discussion with the manufacturer of the LRV's and TTC.

REQ-RAS-112	No Impediment to Customer Flow	Approved	F

Reader Assemblies shall not impede Customer flow into (or out of) the LRV.

REQ-RAS-112.1	No Impediment to Customer Flow-2	Approved	F

Reader Assemblies, including their mounting Hardware shall not restrict or impede Customer flows by extending into the door way space.

REQ-RAS-113	Location of LRV Reader Assemblies	Approved	F

Reader Assemblies for LRVs shall be located:

- To the side of the door as close to the door entrance as possible.
- At the appropriate height for Customers to easily tap their Smart Card on entry to the vehicle.

For example, the centre of the Smart Card tap on the Door Smart Card reader will be consistent with applicable accessibility standards and policies.

REQ-RAS-114	Number of Reader Assemblies on LRV	Approved	F

LRVs shall have six (6) reader Assemblies (one (1) Reader Assembly for each Customer stream or entrance).

Double doors would therefore have two streams and would require a separate Reader Assembly for each of the two streams.

REQ-RAS-115	Allowable Weight	Approved	F

The Reader Assembly for LRVs shall weigh no more than 5kg (+/- 1kg).

REQ-RAS-116	Maximum Allowable Dimensions	Approved	F

Reader Assemblies doors on LRV shall not exceed the following dimensions:

 - width = max 161 mm
 - depth = max. 105 mm
 - height = max 300 mm

Note: These dimensions do not include any mounting Hardware required.

REQ-RAS-117	Orientation of Reader Assemblies	Approved	F

The Reader Assembly shall be oriented such that the tap surface is approximately perpendicular to the LRV doors and will not impede Customer flow through the LRV doors.

REQ-RAS-118	Orientation of Contactless Reader Tap Surface	Approved	F

The Contactless reader or tap surface of the Reader Assembly may be slightly outward facing,(i.e. tilted along the vertical axis toward the LRV doors) allowing Customers to visually see the tap surface from the street side as they board, while at the same time minimizing accidental contact from Onboard Customers standing next to the Reader Assembly.

REQ-RAS-119	Mounting	Approved	F

Where required, the Reader Assembly shall be secured to the LRV via one (1) stanchion or mounted directly to the LRV vehicle. Stanchion mounting shall occupy more door space that direct mounting, but shall afford easier install and service access. There should be some variance in mounting height designed in (for example, 900 mm to 1170 mm range) to allow for flexibility in the final height determination.

REQ-RAS-120	No Pedestal Mounting	Approved	F

No pedestal type mounts (i.e. Reader Assembly on a stand that is mounted to the floor) shall be permitted on the LRV.

REQ-RAS-121	Space Allowances	Approved	F

The Reader Assembly will have sufficient space allowance for maintenance, servicing and repair of the device.   In situ, access to the Reader Assembly may be done through the device front / side cover. This front cover (which may include the sides) should be kept clear of any additional Onboard equipment in order to permit in the field service.

REQ-RAS-122	Minimization of MTTR	Approved	F

Reader Assemblies mounting shall be designed in order to minimize the MTTR. Reader Assemblies may either be serviced in situ, or quickly replaced in the allotted time stated in Schedule A.

REQ-RAS-123	Infield Service Access	Approved	F

Infield service access to the Reader Assembly shall be done through the front panel / cover as highlighted in the Space Allowances requirement (RAS-121).
Infield service for Reader Assemblies may include such things as:

 - battery replacement.
 - SAM replacement

For clarity, in-field devices will be designed to allow internal device access that will minimize the

MTTR.

REQ-RAS-124	Maximum Power Allowance	Approved	F

Each Reader Assembly shall be required to operate with the following power allowance:

 - 24V DC, (+/- 20%)
 - 1A (maximum)

REQ-RAS-125	Heating	Approved	F

If required the Reader Assembly shall accommodate an internal heater when mounted by the doors of the LRV.

The maximum power allowance is inclusive of an internal heater if required.

REQ-RAS-126	Cooling	Approved	F

The Reader Assembly shall not require cooling fans (internal or external) .

The Reader Assembly is located in a free air flow environment and may be internally cooled through the use of vents, fins etc. located on the device itself.

REQ-RAS-127	Venting	Approved	F

If required, Reader Assembly requiring vents shall have vents on the bottom, back panel or top for air flow.

REQ-RAS-127.1	Venting-2	Approved	F

These vents must be kept clear of any other devices or mounting obstructions. If the Reader Assembly is mounted directly to the Legacy LRV vehicle, adequate space between the back of the device and the mounting surface must be made in order to allow for air flow.

REQ-RAS-128	Use of Onboard Network	Approved	F

LRV reader Assemblies shall use if possible a Onboard Ethernet network that is a 10/100BaseT Ethernet ring that communicates to the outside world via an Onboard central router/ Wireless Access Point (802.11 based).   This must be mutually agreed upon between TTC and PRESTO.

REQ-RAS-128.1	Onboard LRV Network Protocols Supported	Approved	F

The Onboard LRV Network shall have the following characteristics, and shall support the following protocols:

 - IEEE 802.3 compatible

 - Ring based network

 - 10/100 BaseT, half/full duplex with auto negotiation

 - Supports protocols: TCP/IPv4 (IP6 not supported), UDP, DHCP,DHCP relay, DNS, QoS, RSTP/STP, FRNT ring recovery protocol, FTP, FTPS, HTTP, HTTPS, Telnet, SSH, SSL, SNMP.

Further details with regards to the Onboard LRV Ethernet network will be discussed in Design Review.

REQ-RAS-128.2	Non-Disruption of Onboard IP Services during LRV operation	Approved	F

Reader Assemblies shall used if needed TCP, UPD, IP and other network protocols during LRV operation as long as they do not interrupt, impede or limit any Onboard LRV services or communications.

REQ-RAS-128.4	Communication with PRESTO System CBO	Approved	F

Reader Assemblies shall establish communications with the PRESTO System Central Back Office when the Onboard Wireless Access Point is within communications range when the LRV is in the carhouse, or at other to be determined established points along the service line (when required).

REQ-RAS-129	Alternative Communications Networks	Approved	F

PRESTO may propose an alternative communications network for reader Assemblies to communicate with the PRESTO System Central Back Office. These may include:

 - Each Reader Assembly communicating directly with the Central Back Office via WiFi when in range;
 - Each Reader Assembly communicating directly with the Central Back Office via a cellular network;
...

In all cases,

 - No extra external antenna will be allowed to be installed on the LRV (i.e. reader Assemblies will need to use built in Antennas like they are in cell phones).

 - No additional networking architecture will be allowed to be installed on LRVs (i.e. no cabling within and between LRV cars will be allowed) Communications with the PRESTO System Central Back Office occurs automatically when in range to a Wireless Access Point.

Alternative proposals will be reviewed in Design Review. All proposals must meet all specifications in this agreement.

REQ-RAS-130	Electrical Connections	Approved	F

The reader Assemblies shall use approved (i.e. meet all vehicle standards, locking, dust and vibration resistant) vehicle power and communications connectors.

REQ-RAS-130.1	Electrical Connections-2	Approved	F

Reader assembly connectors shall allow the readers to be easily installed and/or replaced in the field.

REQ-RAS-130.2	Electrical Connections-3	Approved	F

Reader Assemblies shall use M12 (or equivalent type) connectors for their Onboard Ethernet connection to the Ethernet switch located on the LRV.

The mounting stanchions may be used as the conduit for these connections.

3.1.2.4   Pedestal Reader Assemblies

REQ-RAS-131	Pedestal Reader needs	Approved	F

Pedestal reader Assemblies may be utilized if required for:

- subway cross boundary service and
- Transit Expansion Service.

REQ-RAS-132	Inclusion of General Reader Assembly Specifications	Approved	F

All Pedestal Mounted reader Assemblies shall comply to all General Reader Assembly requirements.

REQ-RAS-133	Inclusion of Reader Assemblies on Surface Vehicles	Approved	F

All Pedestal Mounted reader Assemblies shall comply to all specifications listed in the reader Assemblies on Surface Vehicles with the following caveats listed below (i.e. requirement RAS-133).

REQ-RAS-133.1	Real Time Always On Connectivity	Approved	F

Pedestal reader Assemblies shall have real-time (always on) connection (wired or wireless) to the PRESTO System.

REQ-RAS-133.2	No Operator Interaction	Approved	F

Pedestal reader Assemblies shall have no Operator Interaction (i.e. like reader Assemblies on an LRV).

REQ-RAS-133.3	No Installation on Vehicles	Approved	F

Pedestal reader Assemblies shall not be installed on vehicles.

REQ-RAS-133.4	Specific Use and Functionality	Approved	F

Pedestal reader Assemblies in certain locations shall have the ability to have very specific functionality.

For example, they may be used for tapping off on the subway cross boundary service to ensure that only a single fare rather than a double fare is charged to eligible Customers.

REQ-RAS-133.5	Identical Use and Functionality	Approved	F

Pedestal reader Assemblies in certain locations shall have the ability to have identical functionality to reader Assemblies on surface vehicles (for example they may be used for Transit Expansion POP), that PRESTO will clearly communicate to Customers.

3.1.3   Sales and Reload Equipment

3.1.3.1   General Sales and Reload Device Specifications

These specifications will be common across all PRESTO Sales and Reload devices.

REQ-GSR-1	Sales and Reload Equipment Definition	Approved	F

The PRESTO System will include field devices that will allow Customers to purchase and/or reload PRESTO Media.

REQ-GSR-2	Types of Sales and Reload Equipment	Approved	F

The PRESTO System shall use the following types of Sales and Reload equipment:

- Fare Media Vending Device;
- Add Value Machine;
- LRV Onboard Single Ride Vending Machine and
- LRV Off-board Single Ride Vending Machine.

REQ-GSR-3	General Locations of Sales and Reload Devices	Approved	F

Sales and reload equipment will be located in at least the follow locations:

 - FMVD - subway stations, (some) LRT stations
 - AVM - subway stations, bus platforms (at subway stations), LRT stations
 - On-board SRVM - Onboard LRV
 - Off-board SRVM - on street at LRV stops

- LRT stations
- Point of Sale - TTC Customer service centre

REQ-GSR-4	Inclusion of General Equipment Specifications	Approved	F

All PRESTO Sales and Reload field equipment shall comply to the specifications listed in the General Equipment Specifications Section of this Schedule.

REQ-GSR-5	PRESTOs Responsibilities	Approved	F

Develop, test, manufacture, install, and operate all sales and reload equipment for the PRESTO System. This responsibility includes performing all Revenue Collection / Servicing and maintenance (both corrective and preventive) for all sales and reload devices installed on TTC property at all locations. As part of this service, reports, services, and analysis will be provided to TTC at an agreed upon regular basis. Additional reports may be requested by TTC.

REQ-GSR-6	Evolutionary Improvements Driven by Market	Approved	F

Once the transition to the PRESTO System is complete, PRESTO will ensure that the Sales and Reload equipment will easily and economically undergo the market-driven, evolutionary improvements that would be available to any retail Merchant accepting Open Standards, account-based Contactless Media and Devices for payment.

REQ-GSR-7	Design Review	Approved	F

As part of Design Review, PRESTO will provide detailed documents that describe the physical and functional characteristics of the Sales and Reload Equipment. Documentation will enable TTC to confirm capabilities and functionalities of the equipment as well as include certification of compliance with financial service and standards.

3.1.3.1.1   General Design Features

These General Design Feature specifications will be common across all PRESTO Sales and Reload devices.

REQ-GSR-8	Sales and Reload Devices as Standalone Payment Devices	Approved	F

All Sales and Reload Devices shall accept financial bank cards (credit and/or debit) as the instrument for payment thus they will all be considered to be first and foremost as standalone (self-serve) financial payment devices (e.g. ATMs). All security, accessibility requirements, standards, certifications (e.g. INTERAC, PCI, EMV, etc.) required for standalone financial payment devices will apply to these PRESTO Devices.

REQ-GSR-8.1	Financial Standards	Approved	F

All PRESTO Sales and Reload devices shall be:

- PCI compliant and certified (PCI-PED, PCI-DSS);
- EMV (1&2) compliant and certified;
- Interac compliant and certified;
- Certified to work with the chosen Acquirer and Bank; and
- All other required financial standards and certifications.

REQ-GSR-8.2	PCI POS-B Compliant	Approved	F

Sales and Reload devices shall be PCI POS-B certified.

REQ-GSR-8.3	Multi-Acquirer Capable	Approved	F

Sales and Reload devices shall be capable of connecting to more than one Acquirer.

REQ-GSR-8.4	Responsibility for Maintaining Standards	Approved	F

Provide and maintain all financial payment standards for the duration of the operating agreement and will assume any losses in fraud or penalties assessed by the payments industry, due to the lapse in maintaining these standards.

REQ-GSR-9	Usability	Approved	F

Sales and Reload equipment shall meet all required usability standards specified by the TTC. Note that this does not preclude compliance with AODA. For example, the TTC usability guidelines may include,

 - ISO/IEC 11581: Icon symbols and functions
 - ISO 13406: Ergonomic requirements for work with visual displays based on flat panels
 - ISO 18789: Ergonomic requirements and measurement techniques for electronic visual displays

REQ-GSR-9.1	Usability Constraints	Approved	F

For General Sales and Reload Devices mandatory financial payment security requirements shall take precedence over usability requirements.

This will be the case when PCI/INTERAC compliance and certification is required.

For example, the shape, size, layout and colouring of the PIN Pad component will be specified by PCI and INTERAC standards.   Furthermore, PIN Pad key shielding and the general functional flow of the financial transaction for re-loading will also be specified.

REQ-GSR-9.2	Usability and PRESTO Card Reloads	Approved	F

The Sales and Reload devices shall be "Customer friendly" and minimize confusion.
For example,

 - the FMVD Software may pictorially show where to place the various cards;

 - the FMVD Software may use appropriate prompts, alerts and sounds for updating the PRESTO Card (financial cards are governed by PCI;

 - the FMVD may provide a holder for the Customers PRESTO Card to be placed in while a re-load is taking place. Note that this PRESTO Card holder cannot be in confused by the Customer as the location for their bank card to process the payment; and

 - additional visual clues should be included in the FMVD to provide visual feedback that a card has been updated successfully.

Consultation with Customers, operations staff and vending device manufacturers would aid the design process and help determine the best usability design.

REQ-GSR-10	Use of Menu Options	Approved	F

Ensure that Customer transactions will be accomplished through a series of menu options.

REQ-GSR-10.1	Selection of Menu Options	Approved	F

Menu options shall be displayed on the device LCD display which can be selected by the TTC Customer either by:

 - selecting an item on the LCD Display touch screen or,

 - through a series of buttons along the sides of the LCD display which align with a menu selection on the display;

| REQ-GSR-10.2 | Flow of Menu | Approved | F |

Provide sequential menu options that allow Customers to complete transactions.

| REQ-GSR-10.3 | Scope of Menu Options | Approved | F |

Provide the following menu options:

 - All fare media sales
 - Reload
 - Queries
 - Information Requests
 - Selection of PRESTO Media options

| REQ-GSR-10.4 | Consistent Menus | Approved | F |

Design menus and the sequencing of menu steps shall be consistent across all Hardware for similar functions and will be intended to ease understanding of the transaction process and expedite steps required to complete transactions.

| REQ-GSR-10.5 | Compliant to Financial Payments | Approved | F |

Menus and sequencing of steps shall also be compliant with Acquirer specifications for various transaction types permitted under applicable rules and procedures of the financial services and payments industry.

| REQ-GSR-10.6 | Finalization of Menu and Transaction Flow | Approved | NF |

Screen flows will be finalized during Design Review and must be mutually approved by PRESTO and TTC.

| REQ-GSR-11 | Instructional Graphics | Approved | F |

PRESTO shall ensure that the front of the Sales and Reload devices will be equipped with space for static information to be displayed. TTC will provide the content of this information.

| REQ-GSR-11.1 | Contents of Instructional Graphics | Approved | F |

The size and placement of the display space for instructional graphics shall permit posting of instructions on:

 - how to operate the equipment,
 - information on how to contact PRESTO Customer service in the event of a equipment malfunction, and
usage options.

| REQ-GSR-11.2 | Guidelines for Instructional Graphics | Approved | F |

PRESTO may use as an acceptable guideline the approach used for displaying instructional information on ATMs and other automated devices designed for the financial services and payments industry.

| REQ-GSR-12 | Use of Sound | Approved | F |

All selections made at Sales and Reload equipment shall use sound (e.g. tones, buzzers etc) as audible feedback for the Customer.

| REQ-GSR-12.1 | Use of Sound-2 | Approved | F |

Sales and Reload equipment sounds shall comply with all AODA requirements as well as all financial payment standards.

REQ-GSR-12.2	Use of Sound-3	Approved	F

Sales and Reload equipment volume controls for sound shall be capable of being controlled both locally and remotely (from the PRESTO System Central Back Office).

REQ-GSR-13	Time Out Settings	Approved	F

Ensure that all sales and reload equipment is equipped with time-out settings.

REQ-GSR-13.1	Time Out Settings Use	Approved	F

Time Out settings shall govern steps in the Customer's use of the Sales and Reload Device.

For example a financial transaction process that is initiated by the TTC Customer will time out after X seconds (to be determined) if a Customer walks away or if there is no response from the device.

REQ-GSR-13.2	Programmable Time Outs	Approved	F

Provide ability for TTC to control all configurable device time-out settings through a series of table driven parameters. Settings will be determined in consultation with TTC.

REQ-GSR-14	Use of Table and Rule Driven Parameters	Approved	F

All PRESTO Sales and Reload devices will use table/rule driven parameters as the means for configuring various device parameters.   These tables/rules will also include variables for Effective Dates and times a particular table/parameter set is active.

REQ-GSR-15	Some Table Driven Parameters	Approved	F

Make the following sales and reload device parameters available to the TTC:

REQ-GSR-15.2	Some Table Driven Parameters-2	Approved	F

 - Customer category and fare rates

REQ-GSR-15.2.1	Customer Category	Approved	F

Enable TTC to set parameters for Customer category and fare rates, as defined by TTC fare policy.

REQ-GSR-15.3	Some Table Driven Parameters-3	Approved	F

 - peak and off-peak fares

REQ-GSR-15.3.1	Peak and Off-peak Fares	Approved	F

Enable TTC to set parameters for peak and off-peak fares.

REQ-GSR-15.4	Some Table Driven Parameters-4	Approved	F

 - service mode

REQ-GSR-15.4.1	Service Mode	Approved	F

Enable TTC to set parameters by service mode and individual route or combination of routes.

REQ-GSR-15.5	Some Table Driven Parameters-5	Approved	F

 - times of activation and deactivation

REQ-GSR-15.5.1	Time and Duration	Approved	F

Enable TTC to set parameters for time and duration of activation and deactivation in terms of hours, specific dates and specific time periods.

REQ-GSR-15.6	Some Table Driven Parameters-6	Approved	F

- transfer rules

REQ-GSR-15.6.1	Fare Rules	Approved	F

Enable TTC to set parameters for all TTC transfer rules

REQ-GSR-15.7	Some Table Driven Parameters-7	Approved	F

- reload and purchase limits

REQ-GSR-15.7.1	Reload and Purchase Limits	Approved	F

Devices will always have the latest re-load and purchase value limits (maximum and minimum) for all PRESTO Card products (in a table format). Note that this may be presented to the PRESTO Card Customer in different formats.

e-Purse limits will be presented as a monetary value while pre-paid products will be displayed as the total dollar value of the product. Each product shall be on a separate line along with the corresponding value.

Note that minimum values for re-loads and purchases may be enforced as part of the financial business rules and fees associated with various credit and debit payments. Limits for re-loads and purchases may be different.

These limits correspond to individual products. If more than one product is being purchased or updated during a single financial transaction, then the limits apply to each product separately.

REQ-GSR-15.7.2	Financial Payment Parameters	Approved	F

Ensure that financial table parameters include:

REQ-GSR-15.7.3	Financial Payment Parameters-2	Approved	F

- financial card table updates

REQ-GSR-15.7.4	Financial Payment Parameters-3	Approved	F

- financial prompt table updates

REQ-GSR-15.7.5	Financial Payment Parameters-4	Approved	F

- BIN table updates

REQ-GSR-15.7.6	Financial Payment Parameters-5	Approved	F

- bank card fraud list updates

REQ-GSR-16	Equipment Operating Status	Approved	F

The status of all Sales and Reload devices shall be displayed on the equipment display (or with lights) so that TTC Customers can know the devices readiness to function in advance.

REQ-GSR-16.1	Status Messages	Approved	F

Ensure that displayed status messages identify all modes of degraded operation as well as the comprehensive "Out of Service" message indicating that no use of the equipment is possible.

REQ-GSR-16.1.1	Status Messages-2	Approved	F

Conform to standard rules regarding messaging for the financial services and payments industries for sales and reload devices that accept bank card payments.

REQ-GSR-17	Risk Management Processes	Approved	F

Ensure that sales and reload devices will be capable of supporting all risk management processes available to standard retail devices that accept Credit Cards for payment.

REQ-GSR-17.1	Financial Card Checks	Approved	F

Ensure risk management and fraud detection processes are in place (such as online PIN verification; Velocity Checks and spending limit checks).

REQ-GSR-17.2	Certified Hardware and Software	Approved	F

All devices (Hardware, Software, firmware) that comprise a Sales and Reload device, that accept bank cards as payment instruments, shall be PCI-DSS, PCI-PED, INTERAC, EMV, VISA, MasterCard, and all other applicable banking standards, compliant and certified.

REQ-GSR-17.3	Limited Number of Items Purchased	Approved	F

The total number of items (PRESTO Media or products) purchased in a single transaction via credit/Debit Card shall be programmable (it will be determined by PRESTO for e-Purse transactions, and by TTC for the purchase of TTC prepaid products in accordance with TTC fare policy).

REQ-GSR-17.4	Validation of Currency	Approved	F

Sales and Reload devices that accept currency (i.e. SRVMs, FMVDs) shall be equipped to check the validity of both paper and coin currency in real time when the currency is deposited into the device as applicable.

REQ-GSR-17.4.1	Validation of Currency-2	Approved	F

Invalid currency deposited into Sales and Reload devices that accept currency (i.e. SRVMs, FMVDs) shall be rejected and the device will display a message stating to please deposit money into the machine.

Due to the nature of bill and coinage validation, the validation mechanism in the device may reject valid currency.   Messages generated by the device should never imply any of the rejected currency is invalid; rather it should simply state that the currency either cannot be validated or that it could not be validated and that the Customer should try to deposit the money again.

REQ-GSR-17.4.2	Validation of Currency-3	Approved	F

At any time, the Customer will have the option of cancelling the transaction.

REQ-GSR-18	On Line Communications	Approved	F

All PRESTO Sales and Reload devices shall communicate in real-time with the PRESTO System Central Back Office and financial Acquirers.   An off-line or degraded operating mode for Sales and Reload devices is also supported; however in this mode, no financial transactions with bank cards is allowed.

REQ-GSR-19	Connectivity Security	Approved	F

Ensure that all sales and reload devices meet all required security for networking and data messaging over networks.

REQ-GSR-20	Automated Reporting	Approved	F

Automate reporting on cash box contents, media inventory and activation history in order to support reporting on performance standards and SLAs.

REQ-GSR-20.1	Cash/Coinage Box Contents Reporting	Approved	F

Provide a report on cash boxes to with the following information:

 - total dollar value and contents by bill denomination and /or coin value
 - unique identification number of the cash box
 - time it was inserted and removed
 - unique identification number of the individual performing maintenance and revenue servicing

REQ-GSR-20.2	PRESTO Media Inventory Reporting	Approved	F

Monitor the count of pieces of PRESTO Media for FMVDs and SRVMs.

REQ-GSR-20.3	Activation History Reporting	Approved	F

The PRESTO System will monitor and report on all activity performed by the Sales and Reload device. This will vary depending on the device; however a partial list across devices will include:

REQ-GSR-20.3.1	Activation History Reporting-2	Approved	F

 - sales and reloads activity

REQ-GSR-20.3.2	Activation History Reporting-3	Approved	F

 - "said-to-contain" status of cash boxes

REQ-GSR-20.3.3	Activation History Reporting-4	Approved	F

 - entries to the device for revenue and maintenance servicing

REQ-GSR-20.3.4	Activation History Reporting-5	Approved	F

 - tamper events

REQ-GSR-20.3.5	Activation History Reporting-6	Approved	F

 - connection/outage events

REQ-GSR-20.3.6	Activation History Reporting-7	Approved	F

 - mean times between Failure (MTBF) counts, as well as details of the activities performed during those entries

REQ-GSR-20.3.7	Activation History Reporting-8	Approved	F

 - errors that occurred in date order

REQ-GSR-20.3.8	Activation History Reporting-9	Approved	F

 - inactivity or failures of systems that support normal operations

REQ-GSR-20.3.9	Activation History Reporting-10	Approved	F

 - activities will be date and time stamped

REQ-GSR-20.4	Consumable Level Monitoring	Approved	F

Monitor and report on all sales and reload device consumable levels.

REQ-GSR-20.4.1	Consumable Level Monitoring-2	Approved	F

Provide early warning alerts to ensure consumables are replenished before they run out.

REQ-GSR-21	Remote Payment Acceptance Options	Approved	F

All PRESTO Sales and Reload devices shall have the capability to implement changes to payment acceptance options (i.e., acceptance of currency (e.g., bills only, Credit or Debit Cards only) for the sales and reload of transit accounts.

REQ-GSR-22	Remote Loading of New Fare Products	Approved	F

All PRESTO Sales and Reload devices shall have the capability to implement new fare purchase options, products and new pricings via remote instructions initiated from the PRESTO System Central Back Office.

REQ-GSR-23	Remote Fare Purchase Options by Location	Approved	F

All PRESTO Sales and Reload devices shall be capable of remote configuration with new fare purchase options or new fare pricing options based on TTC defined Fare Groups.

REQ-GSR-24	Determination of Fare Purchase Options and Pricing	Approved	F

Only TTC, or its designated authorized representative, will make policy that determines fare purchase options and fare pricing.

REQ-GSR-25	Initiation of Fare Changes	Approved	F

Only TTC will have the capability to authorize a change that affects available fare purchase options or pricing of fares at TTC locations and throughout the entire network that sells TTC Fare Products.

REQ-GSR-26	Power Interruption Functionality	Approved	F

In the event of a power interruption, Sales and Reload devices shall be provided with an alternative battery source such as a UPS, battery, or storage capacitor in order to permit normal shutdown of the device.

Normal shutdown means the shutdown of a Sales and Reload device is the same as when power is switched off.

REQ-GSR-27	Graceful Shutdown During Power Outage	Approved	F

The backup power shall be sufficient to operate a Sales and Reload device for at least the amount of time it takes for:

 - A Customer to complete their transaction (whether or not is credit/debit or cash, card returned to Customer if in device);

 - The Sales and Reload device completes all data transmissions to the Acquirer (if not possible it informs the Customer it must cancel the current transaction);

 - The Sales and Reload device completes all data transmissions to the PRESTO System Central Back Office (if not possible it stores the non-financial data locally);

 - The Sales and Reload device alerts the PRESTO System MMS of the power interruption (if possible); and

- The device then displays Out of Service, blocks all further Customer interactions and shuts down.

REQ-GSR-28	Network Communication Interruption Process	Approved	F

In the event of an interruption in communications resulting in no communication with the financial Acquirer, sales and reload transactions that use credit or Debit Cards, (i.e. not cash) shall not be accepted until communications are restored.

REQ-GSR-28.1	Network Communication Interruption Process-2	Approved	F

When there is no Network Communication to the financial Acquirer, the sales and reload device shall:

 - promptly display that it cannot accept bank cards for payment at this time;

 - promptly display that it cannot query a Customer's transit account, but can read their card; and

 - promptly display that it can accept cash (if applicable) for purchase and reload;

Note that PRESTO Media purchased or reloaded when the FMVD is in this 'cash acceptance' only state will work immediately on the PRESTO System.

REQ-GSR-29	Failure of Communications During a Transaction	Approved	F

Failure of communications during a, credit or debit transaction shall be handled according to banking rules, processes and as determined by the financial Acquirer in conjunction with financial institutions.

REQ-GSR-29.1	Failure of Communications During a Transaction-2	Approved	F

Failure of communications during a cash transaction will have no effect on the transaction and the transaction will carry through to completion.

3.1.3.1.2   General Customer Functionality

This Customer functionality will be common across all PRESTO Sales and Reload devices.

REQ-GSR-30	Retail Experience	Approved	F

PRESTO shall ensure that all aspects of presentment of contactless and non-contactless payment devices at Sales and Reload devices for sales and reload of PRESTO Media shall occur in a manner identical to presentment in a retail store.

REQ-GSR-31	Consistent Customer Experience	Approved	F

PRESTO shall develop logical sequences of steps and processes for the interaction between the TTC Customer and Sales and Reload devices to support acceptance of payment from the TTC Customer that are consistent with TTC Customer experiences in a retail environment and reflect the specific experience and requirements of sale and reload of TTC Fare Products through an automated vending machine.

REQ-GSR-32	Guidelines for Transaction Sequencing	Approved	F

The sequence of steps used for sales and reload shall be supported through a series of interactions between the TTC Customer and the device using screen displays and buttons,

 - must be clear and simple to understand;

 - must avoid confusing TTC Customers;

 - must minimize the number of interactions between the TTC Customer and the device; and

- must in every aspect of design and execution enhance and support the TTC Customer experience of using automated vending devices.

REQ-GSR-33	Payment Options by Sales and Reload Device	Approved	F

Payment Options by Sales and Reload devices shall be as follows for:

 - FMVDs - accept credit/debit (contact and contactless), coinage and bills;
 - SRVMs - accept credit/debit (contactless only), coinage; and
 - AVMs   - accept credit/debit (contact and contactless) only.

REQ-GSR-34	Bills Accepted	Approved	F

Sales and Reload devices that accept bills (FMVDs) shall accept Canadian currency in bill denominations of $5, $10, $20, $50, and $100,

REQ-GSR-35	Coins Accepted	Approved	F

Sales and Reload devices that accept coins (FMVDs and SRVMs) shall accept Canadian currency in denominations of $0.05, $0.10, $0.25, $1, $2.

REQ-GSR-36	PRESTO Media Available by Sales and Reload Device	Approved	F

PRESTO Media available by Sales and Reload Devices shall be as follows:

 - FMVD - PRESTO Card and LUM;
 - AVM - none; and
 - SRVMs - LUM only.

REQ-GSR-37	General Customer Actions by Sales and Reload Device	Approved	F

In general, the Customer shall be able to perform the following actions by Sales and Reload Device:

FMVD
 - PRESTO Card purchase
 - PRESTO Card reload
 - PRESTO Card query
 - Transit History query
 - LUM purchase
 - LUM query

AVM
 - PRESTO Card reload
 - PRESTO Card query
 - Transit History query
 - LUM query

SRVM
 - LUM purchase
 - LUM query

REQ-GSR-38	TTC Products Available by Sales and Reload Device	Approved	F

TTC Fare Products will vary by sales and reload devices:

REQ-GSR-38.1	TTC Products Available by Sales and Reload Device-2	Approved	F

Products at a FMVD:

 - TTC Publicly Available Fare Products including, but not limited to, Adult and Concession (e.g. Senior, Student, and Child);

- LUM products for Adult, and Concession (Senior, Student, Child).

REQ-GSR-38.2	TTC Products Available by Sales and Reload Device-3	Approved	F

Products at an AVM:

 - TTC Publicly Available Fare Products including, but not limited to, Adult and Concession (e.g. Senior, Student, and Child).

REQ-GSR-38.3	TTC Products Available by Sales and Reload Device-4	Approved	F

Products at a SRVM:

 - LUM products for Adult, and Concession (e.g. Senior, Student, and Child).

REQ-GSR-38.4	TTC Products Available by Sales and Reload Device-5	Approved	F

Not all TTC Fare Products available on a sales and reload device will be available to all Customers. TTC Fare Product availability is dependent on whether or not the Customer is purchasing a new TTC Fare Product or reloading a TTC Fare Product they already have on their PRESTO Media.

REQ-GSR-39	Customer Purchase and Reload Options on FMVDs	Approved	F

The following Customer purchase and reload options will be allowed for FMVDs:

REQ-GSR-39.1	Customer Purchase and Reload Options on FMVDs-2	Approved	F

For Customers purchasing a PRESTO Card Customers may purchase any TTC public fare products for adult only. No Concessions card purchases will be allowed.

REQ-GSR-39.2	Customer Purchase and Reload Options on FMVDs-3	Approved	F

 - enable any TTC adult public fare product purchase when Customer purchases a PRESTO Card

REQ-GSR-39.3	Customer Purchase and Reload Options on FMVDs-4	Approved	F

 - enable purchase of LUM products for adult or Concession

REQ-GSR-39.4	Customer Purchase and Reload Options on FMVDs-5	Approved	F

For Customers reloading a PRESTO Card with a valid Concession card then:

REQ-GSR-39.5	Customer Purchase and Reload Options on FMVDs-6	Approved	F

 - enable reload of the current Concession product already on their PRESTO Card

REQ-GSR-39.6	Customer Purchase and Reload Options on FMVDs-7	Approved	F

 - enable purchase / load any other public TTC Fare Product defined by TTC for that Concession

REQ-GSR-39.7	Customer Purchase and Reload Options on FMVDs-8	Approved	F

 - enable purchase / load any TTC public fare products for adults

REQ-GSR-39.8	Customer Purchase and Reload Options on FMVDs-9	Approved	F

Enable the purchase/load of any TTC public adult fare product on valid adult cards.

No Concessions reloads will be allowed on adult cards.

REQ-GSR-40	Customer Purchase and Reload Options on AVMs	Approved	F

The following Customer purchase and reload options will be allowed at AVMs for Customers reloading a PRESTO Card:

REQ-GSR-40.1	Customer Purchase and Reload Options on AVMs-2	Approved	F

 - for a valid Concession card enable reload of the current Concession product already on the PRESTO Card

REQ-GSR-40.2	Customer Purchase and Reload Options on AVMs-3	Approved	F

 - for a valid Concession card enable purchase / load any other public TTC Fare Product defined by TTC for that Concession

REQ-GSR-40.3	Customer Purchase and Reload Options on AVMs-4	Approved	F

 - for a valid Concession card enable purchase / load any TTC public fare products for adults

REQ-GSR-40.4	Customer Purchase and Reload Options on AVMs-5	Approved	F

Enable the purchase/load of any TTC public adult fare product on valid adult cards.

No Concession reloads will be allowed onto an adult card.

REQ-GSR-41	Customer Purchase and Reload Options on SRVMs	Approved	F

Enable purchase of LUM products for adult or Concessions on SRVMs.

REQ-GSR-41.1	Customer Purchase and Reload Options on SRVMs-2	Approved	F

Reloads do not occur on SRVMs and in general, for any LUM.

REQ-GSR-42	Immediate Use of PRESTO Media	Approved	F

Ensure all PRESTO Media purchased or reloaded with TTC Fare Products, including LUM from all sales and reload devices will be immediately usable for payment of TTC fares.   There will be no waiting period.

REQ-GSR-43	No Refunds	Approved	F

Ensure that PRESTO sales and load devices do not provide refunds.

REQ-GSR-44	No Registration at Devices	Approved	F

Ensure PRESTO Devices do not support PRESTO Card registration,

Customers who have purchased a PRESTO Card from an FMVD may become registered with the PRESTO System at any time after the purchase via the TTC / PRESTO registration process.

REQ-GSR-45	Transaction Receipts for Purchases	Approved	F

Ensure that financial receipts issued by sales and reload devices comply with all applicable financial institution regulations for credit and Debit Card receipts.

REQ-GSR-45.1	Printing of Receipts	Approved	F

Sales and Reload devices receipts shall be printed, upon request, and dispensed to a tray (the same tray used for depositing the PRESTO Media) in a time frame comparable to response times at ATMs and other automated devices used by the financial services and payments industries.

REQ-GSR-45.2	Receipts as Records of Transaction	Approved	F

Ensure that receipts contain information about the transaction, as noted in the General Sales and Reload Section, which will provide a detailed record of the transaction that took place and support PRESTO Customer inquiries in the event that further investigation is required

REQ-GSR-45.3	Itemized Receipts	Approved	F

Ensure that all sales and reload devices print itemized receipts. For example, if a Customer purchases a new PRESTO Card (from a FMVD) and adds both an e-purse and a TTC Monthly pass to the card, then the receipt would show those three items along with the cost of each one.

REQ-GSR-45.4	Availability of Receipts	Approved	F

Ensure that receipts are available for all transactions at sales and reload devices, including all possible cancelled transactions and cash transactions.

REQ-GSR-45.5	Receipt as a Customer Option	Approved	F

Ensure printed receipts are available to the Customer (as a selectable option) at the conclusion of the transaction sequence.

REQ-GSR-45.6	Receipt for Failed or Cancelled Transaction	Approved	F

Automatically dispense a receipt if a transaction has failed or was cancelled either by the TTC Customer or automatically by the sales and reload device

REQ-GSR-45.6.1	Receipt for Failed or Cancelled Transaction-2	Approved	F

Ensure that if no receipt stock is available at the sales and reload devices, this status will be displayed on the LCD screen and the overhead electronic display board.

REQ-GSR-45.7	Device Action when Receipts Cannot be Printed	Approved	F

Sales and Reload Devices shall display the status for the following actions on the LCD screen and the overhead electronic display board:

- no receipt stock is available
- failure with the receipt printer

REQ-GSR-45.8	Receipt Timing	Approved	F

At the successful conclusion of each purchase transaction, or at the conclusion of a TTC Customer inquiry, the Sales and Reload Devices shall provide the option to print a receipt.

REQ-GSR-45.9	Receipt Information	Approved	F

Ensure all receipts contain the details required by Canadian banking standards.

REQ-GSR-45.9.1	Receipt Information-2	Approved	F

Ensure all receipts contain purchase information.   This information will include:

REQ-GSR-45.9.2	Receipt Information-3	Approved	F

 - type of transaction

REQ-GSR-45.9.3	Receipt Information-4	Approved	F

 - fare option purchased

REQ-GSR-45.9.4	Receipt Information-5	Approved	F

- date, time and location of transaction

REQ-GSR-45.9.5	Receipt Information-6	Approved	F

- payment method

REQ-GSR-45.9.6	Receipt Information-7	Approved	F

- amount of payment

REQ-GSR-45.9.7	Receipt Information-8	Approved	F

- Authorization code

REQ-GSR-45.9.8	Receipt Information-9	Approved	F

- payment card account number in the appropriate format

REQ-GSR-45.9.9	Receipt Information-10	Approved	F

- UID of the PRESTO Card

REQ-GSR-45.9.10	Receipt Information-11	Approved	F

- type of financial transaction

REQ-GSR-45.10	Receipts for Queries	Approved	F

Ensure that FMVDs and AVMs are able to provide receipts to PRESTO Card Customers not performing financial transactions upon request. This receipt may contain:

REQ-GSR-45.10.1	Receipts for Queries-2	Approved	F

- PRESTO Card value

REQ-GSR-45.10.2	Receipts for Queries-3	Approved	F

- pass product status (number trips taken)

REQ-GSR-45.10.3	Receipts for Queries-4	Approved	F

- loyalty

REQ-GSR-45.10.4	Receipts for Queries-5	Approved	F

- UID of the PRESTO Card

REQ-GSR-45.10.5	Receipts for Queries-6	Approved	F

- date of the transaction

REQ-GSR-45.10.6	Receipts for Queries-7	Approved	F

- time of the transaction

REQ-GSR-45.10.7	Receipts for Queries-8	Approved	F

- location of the transaction

REQ-GSR-45.10.8	Receipts for Queries-9	Approved	F

- ID of the device that printed the transaction

REQ-GSR-45.10.9	Receipts for Queries-10	Approved	F

- Concession type

REQ-GSR-45.10.10	Receipts for Queries-11	Approved	F

- reloaded card type

REQ-GSR-45.10.11	Receipts for Queries-12	Approved	F

- TTC unique information (such as route etc.)

REQ-GSR-45.10.12	Receipts for Queries-13	Approved	F

Ensure any additional information is not personal or private (financial) data.

REQ-GSR-45.11	Receipts for Failed PRESTO Card Updates	Approved	F

Determine the correct way to handle a situation where a successful financial re-load transaction has occurred but the Customer has failed to properly present the PRESTO Card for re-load.

At the end of every transaction, failed or successful, the Sales and Reload Device will print a receipt.

REQ-GSR-45.11.1	Receipts for Failed PRESTO Card Updates-2	Approved	F

Ensure that all steps are taken on the sales and reload devices (design, Software, process) to ensure that the Customer PRESTO Card is updated successfully

REQ-GSR-45.12	LUM as Receipt	Approved	F

–If required, LUM dispensed from Sales and Reload devices that are intended to be used as receipts shall comply with all financial rules and regulations governing receipts.

REQ-GSR-45.13	Customer Action History	Approved	F

Sales and Reload Devices will provide Customers with data relevant and useful to the Customer. For example, these devices will be capable of providing information (on screen and/or receipt) outlining:

- the last N paid trips
- paid trips for the last week / month
- the last N reloads / card updates
- reloads / card updates for the last week / month
- products /value on the PRESTO Media

- any above combination

The Sales and Reload devices will display Customer actions (paid trips, card reloads) and not necessarily all the PRESTO System transactions that the PRESTO System stores to the Customer's PRESTO Media (e.g. all tap transactions, transfers etc.).

REQ-GSR-45.14	Customer Actions List Size	Approved	F

The number (N) of Customer Actions displayed on and/or printed at General Sales and Reload Devices shall vary by type of Sales and Reload device.

For instance:

- FMVDs that are on-line (i.e. have a live connection to the PRESTO System Central Back Office) will be capable of displaying / printing all the Customer Actions that have occurred in the past month;

- AVMS will only display/print the last five(5) Customer Actions; and

- SRVMs will only display the last Customer Action (trip) taken and remaining product (e.g. a Return trip).

REQ-GSR-46	All non-Cash Purchases are On-Line	Approved	F

All sales and reloads that are not purchased with cash shall require the Sales and Reload device to be on-line and interact with the financial Acquirer in real time.

REQ-GSR-46.1	All non-Cash Purchases are On-Line-2	Approved	F

Sales and Reload devices shall permit off-line EMV transactions if allowed and certified by the Acquirer and financial institution.

REQ-GSR-47	Bank Card Functionality	Approved	F

Ensure that only financial purchase type transactions are allowed on sales and reload devices that specifically result in the purchase or reload of a PRESTO and/or TTC Fare Products. No other type of bank financial functionality is allowed such as cash back, bank financial history or financial account transfers.

REQ-GSR-48	Cancellation of Transaction	Approved	F

Sales and Reload devices shall allow Customers to cancel a transaction by touching a defined area of the LCD or soft button.

REQ-GSR-48.1	Clearly Defined Cancel Button or Menu	Approved	F

Sales and Reload devices shall display a separate, clearly marked button or menu dedicated to the cancellation function which complies with Canadian banking standards.

REQ-GSR-48.2	Refunds for Inadvertent Purchases	Approved	F

Ensure Customers who inadvertently purchase the wrong fare product(s) from a FMVD, AVM or SRVM can receive a refund by following the refund process. As per GSR-43, Sales and Reload Devices will not provide refunds.

REQ-GSR-49	Customer Query of PRESTO Card	Approved	F

PRESTO Cards queried at FMVDs and AVMs shall display the following PRESTO Card usage information:

- PRESTO Media status - active, blocked, other;

- last N paid journeys;
- Boardings associated with those journeys;
- last N loads;
- whether or not Autoload is active;
- all TTC Fare Products installed on the card;
- active / dormant products;
- e-Purse amount; and
- Concession type;

where ("N") represents the number of transaction to be displayed to be determined by TTC and PRESTO.

REQ-GSR-50	Customer Query of LUM	Approved	F

Customers will be able to query their PRESTO LUM at all Sales and Reload devices. Sales and Reload devices shall display the following LUM usage information when a LUM is queried:

- PRESTO Media status - active, in-active;
- last N paid journeys;
- Boardings associated with those journeys;
- LUM product - single return, day pass, ticket, Transfer; and Concession type.

Where ("N") represents the number of transaction to be displayed to be determined by TTC and PRESTO.

REQ-GSR-57	Optimized e-Purse Reloads	Approved	F

FMVDs and AVMs will be designed to allow Customers to reload their e-purse with pre-defined amounts (e.g. $20, $50, $100, etc.) in addition to an amount determined by the Customer.

3.1.3.1.3   Common Sales and Reload Device Components

These device components and their specifications will be common across all PRESTO Sales and Reload devices.

REQ-GSR-51	Bank Card Reader	Approved	F

The Sales and Reload devices shall be equipped with a bank card reader.

REQ-GSR-51.1	Reader Capabilities	Approved	F

Sales and Reload Device bank card readers will accept all bank cards issued by financial institutions including but not limited to:

- Contactless Smart Cards (e.g. with Paypass, VisaWave, ...);
- Contact Smart Cards; (except for SRVMS); and
- Magnetic Stripe Cards

REQ-GSR-51.2	Compliance	Approved	F

Sales and Reload Device bank card credit/debit reader shall comply with all required banking standards and certifications for the Canadian market.

REQ-GSR-51.3	Modular Reader	Approved	F

Sale and Reload Device Credit/Debit Card reader shall be modular and upgradeable to permit upgrades for increased processing capabilities and maintenance of compatibility with financial services and payments industries standards, as well as applicable technical standards.

REQ-GSR-51.4	Card Jams	Approved	F

The EMV compliant bank card reader for Sales and Reload Devices shall be designed (or purchased as a COTS item) so that bank cards cannot get jammed into the reader mechanism for transactions using contact cards (chip and PIN).

REQ-GSR-51.5	ISO14443 Compliant	Approved	F

Sales and Reload devices shall include a commercial, COTS, non-proprietary Contactless reader capable of reading and writing all financial contactless cards and PRESTO Media (including LUM).

REQ-GSR-51.5.1	ISO14443 Compliant-2	Approved	F

Sales and Reload device Contactless reader shall be:

 - ISO 14443, Type A and B compliant;
 - have PayPass, VISA Wave, Interac FLASH, contactless EMV; and MiFARE

REQ-GSR-51.6	NFC Compliant	Approved	F

Sales and Reloaded Standalone Payment Devices shall include a commercial, COTS, non-proprietary Contactless reader capable of communicating with NFC enabled devices and PRESTO Media.

REQ-GSR-52	LCD Display	Approved	F

Sales and Reload Device shall display all information (e.g. Payment Transactions, TTC Transit Products, menus, instructions etc.) on a LCD colour display.

REQ-GSR-52.1	Size of LCD Display	Approved	F

General Sales and Reload device screen physical features shall be suited to the TTC operating environment and appear and perform in a manner that enables easy use by all TTC Customers including those with disabilities. The size of the screen will be mutually agreed to by TTC and PRESTO and will comply with AODA standards.

REQ-GSR-52.2	Key Features of LCD Display	Approved	F

Sales and Reload Device LCDs shall be equipped with:

 - anti-glare features and finishes;
 - programmable graphics; and
 - a minimum resolution of 1024x768 dpi.

REQ-GSR-52.3	Contrast and Brightness Control	Approved	F

Sales and Reload Devices shall have a default Brightness level and Contrast ratio that enables Customers to easily read messages and information under normal lighting conditions in TTC stations, as well as conditions where there is minimal or no additional light source. Brightness and contrast parameters shall be adjustable either locally or remotely.

REQ-GSR-52.4	AODA Compliant Messaging	Approved	F

Sales and Reload Device messaging and displays shall comply with all applicable AODA requirements.

REQ-GSR-52.5	Multi-Language Messaging	Approved	F

Sales and Reload Device Messaging and displays (including messaging on all screen savers) shall display messages and instructions, whether in visual or audible format, in multiple languages as defined in the Multi-Language Section of Schedule C.

REQ-GSR-52.6	Vandal and Abuse Resistant	Approved	F

Sales and Reload device displays shall be vandal-resistant and comply with UL certification testing for direct impact through utilization of protective overlays, or similar methodologies.

| REQ-GSR-52.6.1 | Vandal and Abuse Resistant-2 | Approved | F |

Sales and Reload device with LCD display protection features shall have 90% transmission of visible light.

| REQ-GSR-52.7 | Screen Saver | Approved | F |

The Sales and Reload device shall use a screen saver when it has been idle for a set period.

| REQ-GSR-52.8 | Table Driven Parameters for Screen Saver | Approved | F |

The screen saver function shall be parameter and table driven, so that

- the content,
- timing of screen changes,
- activation or deactivation

of the screen saver can be easily changed and accomplished remotely.

| REQ-GSR-52.9 | TTC Approved Content | Approved | F |

Ensure that the screen saver content for sales and reload devices deployed in TTC stations, on other TTC property, or intended to include information about TTC, its transportation service, or related messages is approved by PRESTO and the TTC.

| REQ-GSR-53 | Receipt Printer | Approved | F |

Sales and Reload Devices shall be equipped with a thermal receipt printer.

| REQ-GSR-53.1 | Printing Capabilities | Approved | F |

The Sales and Reload Device Receipt Printer shall be a direct thermal type; capable of printing alphanumeric characters (upper and lower case letters) and graphics.

| REQ-GSR-53.2 | Minimum height: As determined by TTC. | Approved | F |

Ensure the receipt printer is capable of printing characters that have the following characteristics:

| REQ-GSR-53.2.1 | Minimum height: As determined by TTC.-2 | Approved | F |

- minimum height

| REQ-GSR-53.2.2 | Minimum height: As determined by TTC.-3 | Approved | F |

- font type

| REQ-GSR-53.2.3 | Minimum height: As determined by TTC.-4 | Approved | F |

- height to width ratio

| REQ-GSR-53.2.4 | Minimum height: As determined by TTC.-5 | Approved | F |

- font density

| REQ-GSR-53.3 | Remotely Configurable | Approved | F |

Ensure the receipt printer is remotely configurable in a manner consistent with rules and regulations of the financial services and payments industries.

REQ-GSR-54	Communications Module	Approved	F

Ensure that sales and reload devices are equipped with a communications module.

REQ-GSR-54.1	Communications Type	Approved	F

Provide a communications module that is either wired or wireless as required by the PRESTO System design.

REQ-GSR-54.2	Modular Connectivity	Approved	F

Provide a communications module that is a separate component from the main control unit of the sales and reload device allowing for communications upgrades and swap out replacement for repairs.

3.1.3.1.4   Operation During Transition

TTC anticipates a transition period during which both TTC's Legacy fare collection system and the PRESTO System will operate side-by-side. These specifications for the operation of Sales and Reload devices during the transition period are common to all Sales and Reload devices.

REQ-GSR-55	No Interference with Current Fare Collection System	Approved	F

Ensure that all sales and reload equipment for the PRESTO System do not interfere with the normal operation of TTC's current fare collection system.

REQ-GSR-56	PRESTO System Failure during Transition	Approved	F

Ensure that in the event of a PRESTO System equipment failure or other condition that prevents payment of fares via the PRESTO System during the transition period when both TTC's legacy fare payment system is still in operation, implementation of the closed setting of the SRVM will not interfere with or interrupt the normal operation of TTC's legacy fare payment system other than Customers will not be able to receive a paper transfer when paying by token on the LRV system.

3.1.3.2   FMVD

3.1.3.2.1   General FMVD Specifications

REQ-FMV-1	FMVD Objective	Approved	F

PRESTO will ensure that the successful design for FMVDs encourages and supports reliance on automated vending machines for sale and/or reloads of PRESTO Media with TTC Fare Products.   The Full Service Vending Machines are intended to provide a range of services to all TTC Customers using the Transit system.   With the added benefit of dispensing LUM the FMVD will serve cash only Customers.   The FMVD compliments the AVM in all functionality with the added benefit of being able to use Canadian currency (cash and bills).

REQ-FMV-2	FMVD Functionality Overview	Approved	F

FMVDs are automated, self-service vending devices that will be installed in all TTC subway stations for use by TTC Customers to purchase, reload, and dispense PRESTO Media which will include both PRESTO Cards and LUM.

In general, functionality of the FMVD will include but not be limited to,

 - reloading all e-Purse and e-Pass (no LUM) including Concession card types (child, student, senior);
 - reloading of additional fare products such as parking or parking with e-Pass;

- reloading of new, as of yet undefined, fare products;
- querying all e-Purse and e-Pass fare cards, including all LUM products (including transfer only products);
- displaying trip history;
- displaying loyalty;
- processing fare card lists (Hotlists, value add lists, card function lists);
- purchase of adult e-Purse card (no Concessions);
- purchase of adult e-Pass card (no Concessions);
- purchase of all LUM including Concession LUM for (child, student, and senior); and
- accessing Customer transit accounts.

FMVD will not allow any form of fare card registration. Registration must be done through approved PRESTO Customer service channels including a Customer service centre, web site

REQ-FMV-3	Customer Access to Transit Accounts	Approved	F

FMVDs shall be equipped and configured to enable TTC Customers to access information about and manage their transit accounts via a portal to the web site.

REQ-FMV-4	FMVDs at Subway Entrance	Approved	F

PRESTO shall ensure that all subway system entrances are equipped with sufficient FMVDs to meet relevant SLAs. The specific locations within the stations will be determined by TTC during Design Review.

REQ-FMV-5	Inclusion of General Sales and Reload Device Specifications	Approved	F

All PRESTO FMVD field equipment shall comply to all specifications listed in the General Sales and Reload Device Specifications Section.

REQ-FMV-6	Single FMVD Design	Approved	F

PRESTO shall ensure that all FMVDs deployed in TTC stations will conform to a single design specific to FMVDs.

REQ-FMV-7	Performance	Approved	F

PRESTO shall ensure that all FMVDs meet all applicable performance specifications as defined in the SLA Specifications in Schedule A

REQ-FMV-7.1	FMVD Sales Availability	Approved	F

PRESTO shall achieve a Sales Availability for the collective of FMVDs of 95% or greater as specified in SLA EQ-3 of Schedule A. Any reason for the FMVD being down or in degraded mode counts as the FMVD being unavailable.

REQ-FMV-7.2	Customer Dwell Time	Approved	F

PRESTO shall ensure that FMVDs are designed and implemented to meet the median Customer dwell time of 180 seconds as specified in SLA EQ-8 in Schedule A.

3.1.3.2.1.1   Key FMVD Components

This section lists specific key FMVD components in addition to the common components listed in the General Sales and Reload Device Specifications Section in this Schedule.

REQ-FMV-8	PRESTO Card Dispenser	Approved	F

The FMVD shall dispense PRESTO Cards (i.e. plastic Smart Cards).

REQ-FMV-8.1	Designed for Quick Reloads	Approved	F

The FMVD PRESTO Card stacker shall be designed in such a fashion as to ensure PRESTO Cards are reloaded quickly with minimum probability of being dropped on the floor.

REQ-FMV-8.2	One Step Loading	Approved	F

PRESTO shall ensure that the FMVD Media Dispenser will permit the PRESTO Card to be loaded in a single step.

REQ-FMV-8.3	Capture of Media Errors	Approved	F

The PRESTO Card FMVD Dispenser shall be equipped to capture all media that failed to dispense due to:

- a processing error,
- media defect, or
- other event interfering with dispensing of a fully functioning PRESTO Card.

REQ-FMV-8.3.1	Capture of Media Errors-2	Approved	F

The PRESTO Card Dispenser shall capture failed dispensing event, along with records of all Dispenser activity, and shall send the events (data) to the PRESTO System CBO and the Data Mart.

REQ-FMV-8.4	PRESTO Card Capacity	Approved	F

The PRESTO FMVD Card Dispenser shall consist of at least two (2) media stackers, or other appropriate mechanisms, that are each capable of storing or dispensing from the FMVD at least six hundred (600) pieces of PRESTO Cards.

REQ-FMV-9	LUM Dispenser	Approved	F

FMVD devices shall have a LUM dispenser.

REQ-FMV-9.1	LUM Capacity	Approved	F

The LUM dispenser shall be capable of holding at least 1000 pieces.

REQ-FMV-9.2	LUM Printing	Approved	F

LUM dispensed by the FMVD shall be uniquely printed (as defined in the LUM requirements) at the time of purchase (i.e. after the product has been selected and paid for).

REQ-FMV-9.3	Configurable Printing	Approved	F

The FMVD LUM Dispenser shall have the ability to print down loadable content on the LUM.

REQ-FMV-9.3.1	Configurable Printing-2	Approved	F

For LUM product changes (e.g. special events 'Santa Claus Parade') the LUM Dispenser shall retrieve the content to print on the LUM from the PRESTO System Central Back Office (via the Sales and Reload device).). (e.g. 'Santa Claus Parade' etc. which will be displayed as an 'LUM product' on the Sales and Reload device display and printed on the LUM when purchased)

REQ-FMV-10	Bill Handling Unit	Approved	F

The FMVD bill handling unit shall accept and dispense bills for the purchase of PRESTO Media at a FMVD.

REQ-FMV-10.1	Orientation of Bill Acceptance	Approved	F

The FMVD Bill Acceptor shall be capable of four (4) way orientation of bill acceptance.

REQ-FMV-10.2	Denominations Accepted	Approved	F

The FMVD Bill Acceptor unit shall validate the following denominations of Canadian currency: $5, $10, $20, $50, and $100.

REQ-FMV-10.2.1	Denominations Accepted-2	Approved	F

The FMVD bill validation Software for the Bill Acceptor shall be capable of evaluating all versions of the accepted Canadian bill denominations that are in circulation.

REQ-FMV-10.3	New Canadian Currency	Approved	F

Initiate Hardware, Software, and configuration changes to Bill Acceptor Software to permit uninterrupted transition to acceptance of new Canadian currency. PRESTO is responsible to ensure that all updated Hardware, Software, and configurations are in place, tested, and fully operational before the issuance and circulation of any new Canadian currency.

REQ-FMV-10.4	Bill Acceptor Mechanism	Approved	F

The FMVD Bill Acceptor shall consist of a single entry slot with aperture or mechanical shutter that will automatically open when a sale or reload transaction is ready for insertion of currency for payment. The aperture or mechanical shutter will remain open until all currency has been received or until a table-driven time-out has been reached.

REQ-FMV-10.5	Remote Diagnostics	Approved	F

Components of the FMVD Bill System shall be capable of remote diagnosis of malfunctions, reporting of status at pre-determined intervals and on demand from a centralized location to support compliance with TTC's performance standards.

REQ-FMV-10.6	Initial Insertion	Approved	F

The FMVD Bill Acceptor shall have an initial insertion of > 95% acceptance of authentic currency.

REQ-FMV-10.7	Second Insertion	Approved	F

The FMVD Bill Acceptor shall have a second insertion of > 96% acceptance of authentic currency.

REQ-FMV-10.8	Third Insertion	Approved	F

The FMVD Bill Acceptor shall have a third insertion of > 98% acceptance of authentic currency.

REQ-FMV-10.9	Number of Escrow Bills	Approved	F

FMVD shall escrow up to a minimum of ten (10) Canadian bills.

REQ-FMV-11	Bill Validator	Approved	F

The FMVD Bill Validator shall be capable of rejecting all known counterfeit bills and foreign currency.

REQ-FMV-11.1	Configuration of Bill Acceptance Options	Approved	F

Bill acceptance options at FMVDs shall be capable of limiting bill denominations that are accepted though configuration.

REQ-FMV-11.1.1	Bill Validator-2	Approved	F

The FMVD Bill Acceptor shall capable of being programmable to reject new counterfeit bills.

| REQ-FMV-11.1.2 | Bill Validator-3 | Approved | F |

As new counterfeit bills are discovered by PRESTO or made known to PRESTO, PRESTO shall program the Bill Acceptor to reject those counterfeits.

| REQ-FMV-12 | Bill Vault | Approved | F |

PRESTO shall ensure that the FMVD will be equipped with a Bill Vault.

| REQ-FMV-12.1 | Storage Capacity | Approved | F |

The FMVD Bill Vault shall store validated currency.

| REQ-FMV-12.1.1 | Storage Capacity-2 | Approved | F |

The capacity of the FMVD Bill Vault shall be a minimum of 1,000 pieces of Canadian currency.

| REQ-FMV-12.2 | Maximum Weight of the Bill Vault | Approved | F |

The FMVD Bill Vault shall be constructed in a manner and with materials so that at capacity, the total weight of the vault is no more than 10 kilos and that no physical distortion occurs when the vault is fully loaded.

| REQ-FMV-12.3 | Impact Specification | Approved | F |

The FMVD Bill Vault shall be hardened to withstand impacts when dropped from a height of no less than one meter and still be fully operational and secure.

| REQ-FMV-12.4 | Action on Bill Vault Fault | Approved | F |

If the FMVD Bill Vault shall automatically switch to out of service if it's:

 - not installed;
 - not properly installed;
 - indicates a fault in the validation mechanism;

| REQ-FMV-12.5 | Installation Orientation | Approved | F |

The FMVD Bill Vault shall have keys an guides allowing it to be installed in only one orientation.

| REQ-FMV-12.6 | Bill Vault Monitoring | Approved | F |

The FMVD Bill Vault shall be fully monitored generating Bill Vault alerts, and status for the following events:

 - unauthorized access;
 - tamper detected;
 - level of Bill Vault; and
 - not present.

| REQ-FMV-12.7 | Action on Unauthorized Removal | Approved | F |

The Bill vault shall require keys, or other security devices for access to the Bill Vault. Any unauthorized removal of the Bill Vault will result in an alarm being generated.

| REQ-FMV-12.7.1 | Action on Unauthorized Removal-2 | Approved | F |

Unauthorized removal of the Bill Vault shall result in an alarm being generated.

REQ-FMV-13	Coin Handling Unit	Approved	F

The FMVD coin handling unit shall accept and dispense change for the purchase of PRESTO Media at a FMVD.

REQ-FMV-13.1	Change Accepted	Approved	F

The FMVD coin handling unit shall accept $0.05, $0.10, $0.25, $1, $2 coins.

REQ-FMV-13.2	Change Dispensed	Approved	F

The FMVD coin handling unit shall provide change in the following Canadian coin denominations: $0.05, $0.25, and $1.00. (4 tubes, 3 hoppers). This denomination combination will be configurable.

REQ-FMV-13.3	Coin Recycling	Approved	F

The coin handling unit shall recycle deposited coins as change to Customers to effect less frequency revenue service visits

REQ-FMV-13.4	Coin Escrow	Approved	F

The FMVD Coin handling unit shall be capable of Coin Escrow. Customers wishing to cancel their transaction will receive their coins (or equivalent sum in coins back).

REQ-FMV-14	Coin Validator	Approved	F

The FMVD coin validator shall validate all coins inserted into the device; accepting those that are valid and returning (to the Fare Media Tray) those that are rejected.

REQ-FMV-15	PIN Pad	Approved	F

The FMVD shall be equipped with a PIN Pad to support the acceptance of bank cards (credit/debit) as payment and perform additional means of Customer interaction with the device.

REQ-FMV-15.1	PCI - PED	Approved	F

The FMVD PIN Pad shall be PCI PED compliant and certificated.

REQ-FMV-15.2	INTERAC standards;	Approved	F

The FMVD PIN Pad shall compliant and certified to all INTERAC standards.

REQ-FMV-15.3	Master Session Key Management	Approved	F

The FMVD PIN Pad shall be enabled with all required key management schemes including Master Session.

REQ-FMV-15.4	EMV Certification	Approved	F

The FMVD PIN Pad shall be EMV Level 1 and EMV Level 2 compliant and certified.

REQ-FMV-15.5	Canadian Banking Standards Compliant	Approved	F

The FMVD PIN Pad shall be certified to all banking industry standards for data entry required to support Payment Transactions.

REQ-FMV-15.6	Design Standards	Approved	F

The FMVD PIN Pad shall be compliant to all relevant standards regarding the physical characteristics and durability of surfaces, such as wear, fade, spill, dust, and intrusion resistance.

REQ-FMV-15.7	Messaging Standards	Approved	F

The FMVD PIN Pad and its Software shall be compliant to all applicable standards of banks, Acquirers, and the financial services and payments industry regarding audible and visual messaging and screen flows that affirm acceptance and rejection of the Customers' interaction with the LCD display in completion of the transaction.

REQ-FMV-16	Coin Box	Approved	F

The FMVD shall be equipped with a Coin Box or Coin Boxes as required in order to achieve the performance levels for FMVD Availability as specified in Schedule A.

REQ-FMV-16.1	Storage Capacity	Approved	F

Each FMVD Coin Box storage capacity shall be such that the maximum weight of the full Coin Box does not exceed 10 kg.

REQ-FMV-16.2	Impact Specification	Approved	F

The FMVD Coin Box shall be hardened to withstand impacts when dropped from a height of no less than one meter and still be fully operational and secure.

REQ-FMV-16.3	Installation Orientation	Approved	F

The FMVD Coin Box shall have keys an guides allowing it to be installed in only one orientation.

REQ-FMV-16.4	Cash Box Monitoring	Approved	F

The FMVD Coin Box shall be fully monitored generating alerts and status for events that include:

 - unauthorized access;
 - tamper detected;
 - level of cash box(s); and
 - a non-present Coin Box.

REQ-FMV-16.5	Action on Unauthorized Removal	Approved	F

Keys or other security devices shall be required to access the FMVD Coin Box.

REQ-FMV-16.5.1	Action on Unauthorized Removal-2	Approved	F

Unauthorized removal of the FMVD Coin Box shall result in an alarm being generated.

REQ-FMV-17	Reader Assembly	Approved	F

FMVDs shall have the equivalent of a PRESTO Reader Assembly component as part of their design with the following functionality:

 - list processing,
 - adding value,
 - card queries,
 - card validations and
 - adding products to PRESTO Cards.

To be clear, Customers cannot pay a fare at an FMVD.

REQ-FMV-17.1	Read / Write Capabilities	Approved	F

This FMVD Reader Assembly shall be capable of reading and writing all TTC Fare Products to all PRESTO Media including LUM.

REQ-FMV-17.2	List Processing	Approved	F

The FMVD Reader Assembly shall be capable of processing PRESTO Add Value, Action and Hotlists provided by the PRESTO System Central Back Office.

REQ-FMV-17.3	Integrated Component	Approved	F

This FMVD Reader Assembly shall be integrated (as a component) into the FMVD (i.e. will not be a PRESTO Pedestal Reader Assembly interfaced to the FMVD).

REQ-FMV-17.4	Slot for PRESTO Media Updates	Approved	F

The FMVD Reader Assembly shall have a slot, sleeve or a mechanism (that act as a card holder) for a PRESTO Card in order to facilitate PRESTO Card updates, and decrease Card errors or erroneous updates of another Customers PRESTO Card. For example, Customers that reload, query PRESTO Cards will simply place their Card in this slot which will guarantee that the FMVD will be able to read/write it.

REQ-FMV-17.5	Option for PRESTO Reader Tap and Go	Approved	F

The FMVD PRESTO Reader Assembly shall also allow Tap and Go where the Customer would just tap their Card to the PRESTO Reader Assembly when prompted by the FMVD.

REQ-FMV-18	Fare Media Tray	Approved	F

The FMVD shall be equipped with a media tray for the deposit of newly purchased PRESTO Media.

REQ-FMV-18.1	Recessed Design	Approved	F

The FMVD Fare Media Tray shall utilize a recessed design.

REQ-FMV-18.2	Fare Media Tray Door	Approved	F

The FMVD Fare Media Tray shall be have a clear, durable, and scratch-resistant poly carbonate door that covers the entire opening of the tray; affixed in a manner that opens inward and returns to a normally closed position via mechanical action or gravity.

REQ-FMV-18.3	Minimizes Pinching Hazard	Approved	F

The FMVD Fare Media Tray shall be designed so as to minimize any pinching hazard to Customers while at the same time protects against any physical intrusions to the tray while the PRESTO Media is being dispensed.

REQ-FMV-18.4	Drainage of Liquids	Approved	F

The FMVD Fare Media Tray shall be designed to permit drainage of liquids in the tray to an area outside the FMVD.

REQ-FMV-18.5	Dispensed Light and Sound Indicator	Approved	F

At the moment a payment purchase is completed at the FMVD, the FMVD shall:

 - Deposit the PRESTO Media in the tray;

 - Produce a flashing light indicator in the Fare Media Tray for no less than 5 seconds, or until the PRESTO Media is retrieved.;

 - Emit a sound from the Fare Media Tray.

REQ-FMV-18.6	Action on Tray Blockage	Approved	F

If the tray becomes blocked, then the FMVD shall automatically take itself out of service, and enter a degraded mode.

3.1.3.2.2   Functionality

3.1.3.2.2.1   FMVD Specific Operations

REQ-FMV-19	Usage of any PRESTO Card	Approved	F

FMVDs shall accept all valid PRESTO Cards.

REQ-FMV-20	Manual or Automatic Payment Selection	Approved	F

When the FMVD prompts the Customer for the form of payment (cash, debit or credit); the FMVD shall automatically select the Customer's form of payment based on the Customer's action and what they have inserted into the FMVD.

REQ-FMV-21	Purchase of PRESTO Media	Approved	F

Customers shall be able to purchase PRESTO Media at FMVDs.

REQ-FMV-21.1	Purchase of PRESTO Card without TTC Products	Approved	F

Customers will be capable of purchasing a PRESTO Card without loading a TTC Fare Product or e-Purse from the FMVD. Only the fee associated with new PRESTO Card media will be charged to the Customer.

REQ-FMV-21.2	Purchase of PRESTO Card with TTC Product(s)	Approved	F

Enable Customers to purchase a PRESTO Card and load one or more TTC transit products (including e-Purse) in one transaction from the FMVD.

REQ-FMV-21.3	No Purchase of a LUM without a TTC Product	Approved	F

Require Customers purchasing LUM to simultaneously purchase a LUM product.

REQ-FMV-21.4	Fees with PRESTO Card Purchase	Approved	F

When Customers purchase TTC Fare Products (including e-Purse) along with a PRESTO Card, any fee associated with the purchase of the PRESTO Card will be clearly highlighted and displayed to the Customer (as a line item on the LCD Display for example).   The total summation of the TTC Fare Product and the PRESTO Card fee in this case will be presented to the Customer as the purchase price.

REQ-FMV-21.5	No PRESTO Card Fees Charged to Customers with Reloads	Approved	F

Determine reload fees in accordance with PRESTO policy for e-Purse reloads and TTC fare policy for TTC prepaid fare products.

REQ-FMV-22	Purchase of TTC Products	Approved	F

Enable Customers to purchase all TTC transit products via FMVDs; selection to be limited by PRESTO Media type.

REQ-FMV-22.1	Purchase of Multiple Products	Approved	F

Enable Customers to purchase multiple combinations of transit products (i.e. cards, LUM, or products) in a single transaction.

REQ-FMV-22.1.1	Purchase of Multiple Products-2	Approved	F

The FMVD shall calculate the total cost of a Customer's purchase and use that figure for one purchase transaction.

REQ-FMV-22.2	Mixed Concessions for Multiple LUM Purchases	Approved	F

Enable Customers to purchase any combination of adult and Concession LUM at FMVDs. To clarify this will only be allowed for LUMs.

REQ-FMV-23	Cash Transactions	Approved	F

The FMVD shall allow cash transactions using bills and /or coins for purchase and reload of all PRESTO Media and TTC Fare Products.

REQ-FMV-23.1	Use of a Common Transaction Flow	Approved	F

Customers using cash to pay for PRESTO Media and TTC Fare Products will, in general, experience the same menu / transaction flow as Customers using credit or debit. The FMVD will provide, within bank rules and regulations, a common experience, that will enable Customers to learn how to use the FMVD quickly and efficiently for all forms of payments and TTC Fare Product selection.

REQ-FMV-23.2	Selection of Cash Payment	Approved	F

The FMVD shall have a cash selection option for Customers to select when prompted by the FMVD during the course of a purchase.

REQ-FMV-23.3	Approval for a Cash Transaction	Approved	F

The FMVD shall provide approval for a cash transaction (bills or coins) once the correct amount of money in deposited.

REQ-FMV-23.4	Customer Cancellation of Cash Transactions	Approved	F

The FMVD shall provide an option to cancel cash transaction resulting in the return of escrow bills and/or coins.

REQ-FMV-23.5	Opportunity for Cancellation of Cash Payments	Approved	F

The FMVD shall allow Cash Payments to be cancelled at any moment up until the Customer select the final purchase option. For example,
 - The Customer selects Purchase TTC monthly pass;

 - The FMVD displays the cost of the monthly pass and asks the Customer to insert money;

 - Customer inserts sufficient (or insufficient) money into the machine and then changes their mind (i.e. no longer wishes to purchase the fare product);

 - Customer presses Cancel menu option.

 - FMVD returns the Customer's money.

 - FMVD ends the transaction.

REQ-FMV-23.6	Automatic Cancellation of Cash Transactions	Approved	F

The FMVD shall support the automatic cancellation of cash transactions due to the following time out reasons:

- A pre-programmed time-out has been reached prior to (or during) the insertion of any currency for payment.

- The programming of the time-out setting will be table driven.
- Failure of the fare media dispensing mechanism;

- Out of Change; and

- Hotlisted PRESTO Card (if the Customer is trying to update a Hotlisted Card).

REQ-FMV-23.7	Timeouts Due to Delay in Cash Input	Approved	F

In such cases where the reason for delay is an automatic timeout due to slow cash input, every opportunity, message, and/or prompt shall be given by the FMVD to the Customer to prompt the Customer to either continue with the transaction (e.g. add more money to the machine) or cancel the transaction by selecting the cancel option and have their cash returned to them.

REQ-FMV-23.8	Completion of Cash Transaction	Approved	F

Cash paying Customers that complete their transaction shall have the full amount of deposited currency loaded on to their PRESTO Media.

REQ-FMV-23.9	Insufficient Funds when Purchasing PRESTO Cards or TTC Product	Approved	F

If a TTC Customer

- uses cash and
- is purchasing any TTC Fare Product or PRESTO Card other than a LUM and
- the dollar value of currency deposited in the FMVD is less than the desired purchase, then

TTC Customer may either choose to

- Cancel the Transaction and have their bills and coins returned; or
- Choose a different TTC Fare Product that can be bought with the money deposited; or
- Choose to purchase an e-Purse of the value of the money deposited.

Note that if the Customer has insufficient funds to purchase a PRESTO Card, their escrow bills and coins will be returned to them when they press the cancel transaction key.

REQ-FMV-23.10	Insufficient Funds when Purchasing LUMs	Approved	F

The FMVD shall provide a Cancel option to the Customer when purchasing LUM whereby all of their escrow bills / coins are returned to them. There is no e-Purse option for LUM.

REQ-FMV-23.11	Overpaying for Purchase involving a PRESTO Card or TTC Product	Approved	F

If a TTC Customer

- uses cash and
- is purchasing any TTC Fare Product other than a LUM and
- the dollar value of currency deposited in the FMVD is greater than the desired and
- the product purchased is not a simple e-purse amount, then

The FMVD will prompt the Customer on whether or not they wish the extra funds,

- to be placed on a e-Purse on their card; or
- to be returned as change.

After the Customer has selected their choice, the FMVD will complete the purchase transaction according to the Customer selection.

REQ-FMV-23.12	Overpaying for a Purchase involving a LUM	Approved	F

Configure the FMDV to provide change if a Customer overpays for LUM.

REQ-FMV-24	Bank Card Transactions	Approved	F

The FMVD shall fully support all credit and Debit Cards issued by financial institutions.

REQ-FMV-24.1	Selection of Credit or Debit Payment	Approved	F

The FMVD shall have a Credit and a Debit selection options for Customers to select when prompted by the FMVD during the course of a purchase.

REQ-FMV-24.2	Approval for a Credit/Debit Transaction	Approved	F

An approval for a credit / debit transaction shall only be granted once the approval from the financial Acquirer has been received.

REQ-FMV-24.3	Manual Cancellation for Bank Card Payments	Approved	F

The FMVD shall support a manual cancellation for Bank Card Payments at any moment up until the Customer presses the final purchase option (menu or button).

For example,

 - The Customer selects Purchase TTC monthly pass;
 - The FMVD displays the cost of the monthly pass and asks the Customer to insert bank card;
 - Customer inserts bank card and FMVD asks Customer if they wish to complete the purchase;
 - Customer changes their mind and no longer wishes to purchase fare product;
 - Customer presses Cancel menu option;
 - FMVD returns Customer card; no financial payment transaction has taken place;
 - FMVD ends the transaction.

Once the final purchase option is selected by the Customer, there will be no further opportunity for the Customer to cancel the transaction.

REQ-FMV-24.4	Automatic Cancellation for Financial Reasons	Approved	F

Automatic cancellation at the FMVD for transactions using credit and debit shall occur in a manner that complies with Canadian banking rules and accepted practices of the financial services and payments industries.

REQ-FMV-24.4.1	Automatic Cancellation for Financial Reasons-2	Approved	F

Automatic cancellation process at the FMVD shall be similar to the one they experience in a retail environment, at ATMs, and other means of retail purchases.

REQ-FMV-24.5	Scope for Automatic Cancellation	Approved	F

Automatic cancellations at the FMVD for credit/debit transactions shall include:

 - Financial reasons,

 - Non-financial reasons

- A pre-programmed (table driven)time-out has been reached prior to the insertion of any currency or presentment of a Credit or Debit Card for payment.

- A communication failure that interrupts full Authorization of a credit or debit transaction;

- The appearance of conditions described in BASE24 protocols during the course of a credit or debit transaction;

- Failure of the fare media dispensing mechanism;

- Empty PRESTO Media;

- Hotlisted PRESTO Card (if the Customer is trying to reload the card);

- insufficient funds; and

- Other failures in the FMVD or PRESTO System Central Back Office that impede the completion of the transaction.

REQ-FMV-24.6	Timeouts Due to Delay in User Response	Approved	F

In the event of an automatic timeout due to no user response the FMVD shall prompt the Customer to either continue with the transaction (e.g. respond) or cancel the transaction by pressing the Cancel option (button / menu) and have their transaction cancelled.

Prior to an automatic timeout, every opportunity should be given to prompt the Customer to continue the transaction" i.e. messages, prompts etc

REQ-FMV-24.7	Insufficient Funds when Using Bank Cards	Approved	F

Customers paying with credit or Debit Cards with insufficient funds will be handled in accordance with Canadian Banking rules. To be clear, the financial transaction will be cancelled regardless of the PRESTO Media and product they are trying to purchase.   There will be no selection of a TTC Fare Product of lesser value in this case.   If a Customer wishes to try their purchase again, they must initiate a new transaction at the FMVD.

REQ-FMV-24.8	No Overpayment when Using Credit/Debit	Approved	F

The FMVD shall not charge credit/Debit Card Customers more that the calculated price for the sum of all the Customer purchases (i.e. no overpayment) when using credit or Debit Cards.

REQ-FMV-25	No Split Sales	Approved	F

The FMVD shall not support Split sales (i.e. use of a combination of payment options, such as Canadian currency combined with a Credit or Debit Card; or a combination of two different payment cards, whether or not issued to or in the possession of a single TTC Customer).

REQ-FMV-26	Action on Purchasing PRESTO Card with TTC Product(s)	Approved	F

- Customer selects "Purchase Card" from FMVD Menu

- Customer selects "Add TTC Fare Product" from FMVD Menu
- FMVD treats the PRESTO Card as an Adult card (full fare) and only presents those products allowed for an Adult as per TTC fare rules and policy.   All other TTC Fare Products are not selectable and may be either dimmed out or not presented on the screen.

- Customer selects one or more TTC Fare Products for their PRESTO Card.   Each Pre-Funded product will be presented with a price displayed on the screen.

- After each selection of TTC Fare Product, the FMVD, ensures that only compatible products can coexist on the PRESTO Card. (to be determined in Design Review)

- Customer selects "No More Products"
- FMVD calculates total price and presents an itemized list on the LCD display consisting of the PRESTO Card, and each TTC Fare Product selected.

- FMVD prompts Customer to select payment option, or Customer simply inserts credit/Debit Card or bills into the FMVD

- On successful completion of transaction, the FMVD loads purchased TTC Fare Products onto PRESTO Card and verifies that the PRESTO Card and TTC Fare Products are good for use.

- FMVD deposits PRESTO Card in Fare Media Tray, along with any change if the Customer paid by cash.

- FMVD returns credit/Debit Card (if used) and prompts Customer to take it.

-FMVD prints itemized transaction receipt

- Customer takes PRESTO Card and receipt and proceeds to use PRESTO Card on TTC.

REQ-FMV-27	Action on Start of a Reload or TTC Product Purchase	Approved	F

- Customer selects "Add TTC Fare Products" from FMVD Menu

- FMVD prompts Customer to Place PRESTO Card in the PRESTO reader slot or tap the PRESTO reader.

- FMVD reads Customer's PRESTO Card

- FMVD apples PRESTO list processing to the PRESTO Card (i.e. Hotlist, add value list ....)

- FMVD determines the status of the card including Concession type.

- FMVD displays TTC Fare Products allowed for the PRESTO Card just read. For example if the card was a Concession card, all TTC Fare Products allowed for that Concession will be shown.

- FMVD will also display any products the Customer may already have on the card and ask if they wish to renew these products.

- Customer selects one or more TTC Fare Products for their PRESTO Card.   Each Pre-Funded product will be presented with a price displayed on the screen.

- After each selection of TTC Fare Product, the FMVD, ensures that only compatible products can coexist on the PRESTO Card. (to be determined in Design Review)

- Customer selects "No More Products"

- FMVD calculates total price and presents an itemized list on the LCD display consisting of the PRESTO Card, and each TTC Fare Product selected.

- FMVD prompts Customer to select payment option, or Customer simply inserts credit/Debit Card or bills into the FMVD

- On successful completion of transaction, the FMVD loads purchased TTC Fare Products onto the Customers PRESTO Card (still in the slot) and verifies that the PRESTO Card and TTC Fare Products are good for use.

- FMVD deposits any change from a cash payment (if requested by the Customer that they want their change back (FMV-23.7)

- FMVD returns credit/Debit Card (if used) and prompts Customer to take it.

- FMVD prints itemized transaction receipt

- Customer takes their PRESTO Card, and receipt and proceeds to use their PRESTO Card on TTC.

REQ-FMV-28	Action on Purchasing LUM	Approved	F

- Customer selects "Purchase LUM" from FMVD Menu

- FMVD presents all LUM products on the display along with their prices.   Note that this includes Concession LUM

- Customer selects one or more LUM to purchase. There is no restriction on the amount of LUM products a Customer may purchase. LUM products may be purchased with mixed Concessions.

- After each selection of LUM product, the FMVD ensures that there are sufficient LUM in the FMVD for the purchase. If there are not, the LUM alerts the Customer that no more can be purchased and prompts the Customer to purchase what they have already selected or to cancel the transaction.

- Customer selects "No More Products"

- FMVD calculates total price and presents an itemized list on the LCD display consisting of the PRESTO Card, and each TTC Fare Product selected.

- FMVD prompts Customer to select payment option, or Customer simply inserts credit/Debit Card or bills into the FMVD

- On successful completion of transaction, FMVD loads and initializes each purchase LUM and verifies that they are good for use.

- FMVD deposits LUM(s) in Fare Media Tray, along with any change if the Customer paid by cash.

- FMVD returns credit/Debit Card (if used) and prompts Customer to take it.

- FMVD prints itemized transaction receipt

- Customer takes LUM and receipt and proceeds to use PRESTO Card on TTC.

REQ-FMV-29	Action on PRESTO Media/TTC Product Validation Failure	Approved	F

Once a successful financial transaction transpires, the FMVD will encode/activate the fare card, validate the fare card, present the validation results to the Customer and dispense the fare card.   If, for some reason the fare card fails validation within the FMVD, the FMVD will discard the fare media and re-cycle through the encode/activate and validate process again.   Multiple failures at this stage may render the FMVD inoperable.   In all cases the Customer receipt shall show the status of the fare media dispensed and whether or not it was validated or not.   All validations, encodings and activations will be monitored and recorded.

REQ-FMV-30	PRESTO Media List Processing on FMVD	Approved	F

The FMVD shall be capable of processing all PRESTO Card lists (e.g. Hotlists, Add Value Lists, Transaction Lists).

REQ-FMV-30.1	Hot List Processing	Approved	F

The FMVD shall process the PRESTO Card Hotlist when a PRESTO Card is presented to the Reader Assembly.

REQ-FMV-30.1.1	Hot List Processing-2	Approved	F

If a PRESTO Card presented to the FMVD is on the Hotlist, the device shall display a message to the Customer that

 - the transaction cannot continue;
 - state the status of the card;
 - provide any extra information to the Customer such as contact numbers, what to do next; and
 - promptly end the transaction.

REQ-FMV-30.2	Hot List Size for FMVD	Approved	F

PRESTO shall determine the FMVD Hotlist size necessary to achieve the TTC's performance requirements and SLAs.

Since FMVDs are on-line, real time connected to the PRESTO System Central Back Office this should enable the possibility of near instantaneous Hotlist updates.

REQ-FMV-30.3	Add Value List Processing	Approved	F

The FMVD shall process the add value list when a PRESTO Card is presented to the Reader Assembly (when prompted by the device).

When the FMVD detects a PRESTO Card is on the add value list, the device shall:

 - Add value/product to the PRESTO Card
 - Display a message to the Customer what has been added to their card;
 - Display the status of the card and value;
 - Provide any extra information to the Customer (i.e. nature of the product added); and
 - ask the Customer if they wish to continue with their current transaction or cancel.

REQ-FMV-30.4	Add Value List Size for FMVD	Approved	F

PRESTO shall determine FMVDs Add Value list size necessary to achieve the SLAs.

FMVDs are on-line, real time connected to the PRESTO System CBO this should enable the possibility of near instantaneous add value list updates.

REQ-FMV-30.5	Other PRESTO System Features	Approved	F

As part of the list processing done by the FMVD, the FMVD shall also process any other Customer account information with regards to the Customer's PRESTO Media including:

- Informing the Customer when their product(s) is about to expire and
- informing the Customer when their PRESTO Card (or LUM) is about to expire.

This information may be displayed on the LCD display for the Customer's convenience.

REQ-FMV-31	Action on Tap and Go	Approved	F

Presenting a PRESTO Card to the FMVD Reader Assembly while the FMVD is not performing any other transaction shall always:

- Process the PRESTO Action list
- Perform any card loads,
- Block PRESTO when applicable

REQ-FMV-32	Trip History Reports on FMVD	Approved	F

The FMVD shall provide Customers with the option to obtain their trip history report.

FMVD trip histories will include both paid trips and transfers.

REQ-FMV-32.1	Trip History Reports on FMVD-2	Approved	F

The FMVD shall obtain the trip history report by extracting the information/data from the central system in near instantaneous updates.

REQ-FMV-32.2	Trip History Reports on FMVD-3	Approved	F

The FMVD shall display the trip history and print 1(one) month of relevant trip transaction on the Trip Report if desired.

REQ-FMV-32.3	Trip History Reports on FMVD-4	Approved	F

In the event that the FMVD has no connectivity to the central system the device shall:

- Notify the Customer that the full trip history functionality is not available
- Notify the Customer that only the trip history on their card may be printed.

Furthermore, Customer Actions (trips, loads etc.) will be displayed on the FMVD according to GSR-45.14.

FMVD trip histories will include both paid trips and transfers.

REQ-FMV-32.4	Access to Customer Account Information	Approved	F

FMVD shall provide TTC Customer support in the form of a secure on-line access to account information and transaction activity.

REQ-FMV-32.4.1	Access to Customer Account Information-2	Approved	F

Access to account information at the FMVD shall require TTC Customers to either present the contactless fare media or device to the reader located on the FMVD, or manually enter the account number on the key pad on the FMVD along with a Personal Identification Number (that was established in advance by the TTC Customer).

REQ-FMV-32.5	Process to Access Information	Approved	F

Access to account information will require TTC Customers to

- Customer selects "Trip History" from the FMVD Menu;
- The FMVD prompts the Customer to insert their PRESTO Card into the FMVD sleeve or slot;
- The FMVD reads the Customer's PRESTO Card, extracting the unique Card ID number;
- The FMVD prompts the Customer to input their PRESTO PIN number on the FMVD Keypad;
- Customer inputs their PRESTO PIN and the FMVD accesses the Card Trip History on the PRESTO System Central Back Office;
- The FMVD asks the Customer whether they wish the history displayed on the screen or printed and for a specified time period;
- Customer selects their choice and FMVD formats and prints/displays the Card trip history; and
- Customer receives information and selects "done" to end the transaction.

REQ-FMV-32.6	No Trip History Report for LUM	Approved	F

Trip history report for a LUM is not required.

3.1.3.2.2.2   FMVD States of Operation

REQ-FMV-33	States of Operation	Approved	F

The FMVD shall operate in the following states:

 - Open; and
 - Closed.

REQ-FMV-34	Open State	Approved	F

In the Open State the FMVD shall support two modes:

 - On-Line Mode; and
 - Off-Line Mode.

 Open State will be referred to, and is the same as, In-Service.

REQ-FMV-34.1	Open State, On-Line Mode	Approved	F

The Open State, On-Line Mode is the normal mode for the Open State of the FMVD.   In this mode, the FMVD has full real-time communications with the PRESTO System
In Open State, On-Line Mode the FMVD shall enable the following functionality:

 - purchasing PRESTO Cards,
 - purchasing LUM,
 - reloading PRESTO Card,
 - Querying transit account,
 - Querying trip history,
 - pay for purchases with credit or debit or cash.
 - real time device management and monitoring;
 - downloading of PRESTO Media update files;
 - downloading of lists (Hotlists);
 - updating of operating parameters;
 - updating TTC Fare Products;

REQ-FMV-34.2	Open State, Off-Line Mode	Approved	F

The Open State, Off-Line Mode is the exception mode for the Open State of the FMVD.   In this mode, the FMVD is in a degraded state with limited functionality as there is no communications with the PRESTO Central System due to communications failure (or partial failure). In Open State, off-line Mode the FMVD shall only enable the following functionality:

 - Accept cash for all sales and reload of TTC Fare Products;
 - allow Customers to query their PRESTO Media status;
 - locally store all cash and query transactions, and alerts in a secure manner for uploading to the PRESTO System Central Back Office when communications is restored.

REQ-FMV-34.2.1	Open State, Off-Line Mode-2	Approved	F

Off line mode shall count directly against the FVMD Sales Availability metric

REQ-FMV-34.2.2	Telecommunications Outage	Approved	F

In the event of a telecommunications service interruption the FMVD shall continue operations in off-line mode.

REQ-FMV-34.2.3	Optimization of Hot List	Approved	F

In Open State, off-line Mode the FMVD shall process Hotlists that have been optimized for this Mode.

REQ-FMV-34.2.4	Orderly Shutdown after Extended Off Line State	Approved	F

After an extended Off Line State the FMVD shall be capable of:

- Remaining in the current Off Line State; or
- Execute an orderly shutdown and enter into a closed state after a pre-determined (and programmable) length of time.

REQ-FMV-34.2.5	Orderly Shutdown after Extended Off Line State-2	Approved	F

In shutdown mode, or closed state, the FMVD shall exhibit a closed visual indicator.

REQ-FMV-35	Closed State	Approved	F

In the Closed State the FMVD will disallow any Customer usage. The FMVD is out of service and shall:

- Display, if possible, on its LCD Display, an Out of Service message;
- Not perform functionality even if Customers continue to press buttons, tap cards

REQ-FMV-35.1	Close State Modes	Approved	F

The FMVD shall not have Closed State Modes.

3.1.3.2.3   Interfaces to TTC Equipment

REQ-FMV-36	No Interface to TTC Equipment	Approved	F

FMVDs shall not interface with any TTC equipment or services.

3.1.3.2.4   Design Criterion

REQ-FMV-37	Minimum Number of FMVDs	Approved	F

PRESTO shall ensure that a minimum of

- two (2) FMVDs per staffed entrance and
- one (1) FMVD per unstaffed entrance

REQ-FMV-38	Number of FMVDs Required	Approved	F

Determine the quantity of FMVDs to be installed using the estimate provided in this schedule as a guideline.

REQ-FMV-39	Additional FMVDs	Approved	F

PRESTO shall provide and install necessary quantities of FMVD's at TTC stations in order to comply with TTC's performance standards as outlined in Schedule A.

REQ-FMV-40	Final Determination of FMVD Numbers	Approved	F

A final determination of the number and location of FMVDs will be mutually agreed to by PRESTO and TTC and based on TTC Customer demand and actual performance of PRESTO in meeting business and operational goals required under this Agreement.

REQ-FMV-41	Position and Location	Approved	F

All FMVDs are located within the subway station preferably in a location easily accessible to Customers.   FMVDs are located in relatively close proximity to subway entrance turnstiles though they do not impede, nor their usage by Customers block the flow of Customers through the turnstiles. For example, FMVDs should be oriented and located in such a manner that Customer line-ups to use the devices do not block Customers using the entrance turnstiles or other key Customer flows.

FMVD location must take into account a variety of additional constraints such as AODA access, maintenance access, service access, etc. FMVDs may be located near or against a wall of the subway station platform. They may be located adjacent to AVMs.

The position and location of the FMVDs will be determined by TTC and PRESTO during Design Review.

REQ-FMV-42	Dimensions	Approved	F

FMVDs shall have approximately the following dimensions:

 - Width ~ 914mm (36 in.)
 - Depth ~ 673mm (26.5 in.)
 - Height ~ 1800mm (76.2 in.)

The width and depth dimensions do not include any additional mounting pad requirements that may be needed.

REQ-FMV-43	Space Allowances	Approved	F

The FMVD will have sufficient space allowance for maintenance, servicing and repair of the devices. In situ, access to the interior of the FMVD for servicing, repair, consumables replenishment, coinage collection will be done through the device front panel.   This area should be kept clear of any additional Onboard equipment or obstructions.

The maximum swing of the access/front panel door is approximately 36 in. from the front of the FMVD (i.e. allowance must be made for at least a 90 degree angle.

REQ-FMV-43.1	Space Allowances-2	Approved	F

FMVD shall have a maximum access door dimensions of:

 - Width ~ 914mm (36 in.)
 - Height ~ 1800 mm (76 in.)

The maximum swing of the access/front panel door is approximately 36 in. from the front of the FMVD (i.e. allowance must be made for at least a 90 degree angle.

REQ-FMV-43.2	Space Allowances-3	Approved	F

If the FMVD has vents, the air vents must be located on the side, bottom, top or back panels.

REQ-FMV-43.3	Space Allowances-4	Approved	F

If the FMVD has vents, they can't be blocked or obstructed.... see SRVM comment.

REQ-FMV-44	Weight	Approved	F

The FMVD shall weigh approximately:

 - min. 100kg, max. 300kg,

REQ-FMV-45	Orientation	Approved	F

The FMVDs are oriented such that their front panel is easily accessible by all Customers, including those who use mobility devices, and service personnel. Customers accessing this device will not restrict Customer flow and access to either the FMVD or other devices in the subway station including entrance turnstiles.

REQ-FMV-46	Mounting	Approved	F

The FMVD will either be directly bolted to the subway station floor or use a metal standoff that is

directly bolted to the subway station floor.   Four or more bolts may be used to mount the FMVD. These bolts may be located inside the FMVD preventing unauthorized access (i.e. the FMVD is locked and secured from unauthorized access via a secure locking mechanism built into the FMVD).

Power and communications design and connections will need to be determined during Design Review.

Mounting should be designed in order to minimize the MTTR.

REQ-FMV-47	Power	Approved	F

The FMVD shall approximately require the following continuous power:

 - 120 VAC, (+/- 15%)
 - ~15A (maximum)

This estimate assumes that the FMVD will provide any required AC-DC conversion inside of the device. This estimate assumes that up to two (2) heaters may be required for the FMVD to operate effectively in the Toronto environment.

REQ-FMV-48	Operating Temperature	Approved	F

The FMVDs shall operation in the following temperature ranges:

 - -10C to +50C (without additional heating or cooling mechanisms)
 - extend the lower temperature range to -35C (with or without the use of internal heater(s)).

REQ-FMV-49	Heating	Approved	F

FMVD mounted at un-heated station or bus platforms shall require one (or two) internal heaters.

REQ-FMV-50	Cooling	Approved	F

If required FMVDs shall have internal cooling fans.   The power requirement for the FMVD includes the power of any internal fans that may be required.

REQ-FMV-51	Venting	Approved	F

FMVDs with vent shall have the vents in the top, sides, bottom and back panels for air flow.

REQ-FMV-51.1	Venting-2	Approved	F

FMVD vents shall be kept clear of any other devices or mounting obstructions.

REQ-FMV-52	Infield Service Access	Approved	F

Access to the FMVD shall be required for:

 - servicing and maintenance,
 - consumable replenishing (paper rolls, LUM, PRESTO Cards)
 - Bill and Coinage collection,
 - configuring, and
 - troubleshooting / testing,

REQ-FMV-52.1	Infield Service Access-2	Approved	F

Access to the internals of the FMVD shall be via the front panel.

REQ-FMV-52.2	Infield Service Access-3	Approved	F

The inside of the FMVD shall have multiple internal compartments allowing secure access to various components as needed (e.g. coin container, paper rolls, PRESTO Reader Assembly).

REQ-FMV-52.3	Infield Service Access-4	Approved	F

The FMVD location / position, and in particular the front door access shall not impede the access and servicing of any of these components.

REQ-FMV-53	Accessibility	Approved	F

The FMVD shall be compliant with AODA standards and other applicable accessibility standards for height and accessibility by disabled persons.

REQ-FMV-54	Installation of Power	Approved	F

PRESTO shall be responsible for the installation of power to all FMVDs in accordance with TTC standards and policies as specified in the Installation of PRESTO Field System Section. To be clear, PRESTO is responsible for installation of power conduits to PRESTO Devices installed in subway stations and surface vehicle platform areas) PRESTO will design, furnish, and install all conduit runs to FMVDs, as necessary and determined during Design Review.

REQ-FMV-55	Single Conduit for Co-Located Devices	Approved	F

Should it be determined during Design Review that FMVDs, and AVMs can be co-located, a single conduit run may be used. Individual FMVD and AVM power may be distributed at or near the deployment location for FMVDs and co-located AVMs.

REQ-FMV-57	Communications Network	Approved	F

PRESTO shall install a wired or wireless communications network that links the PRESTO System to all FMVDs in the system. There will be no use / integration with existing TTC networks

REQ-FMV-57.1	Wireless Design Constraints	Approved	F

FMVDs that utilize wireless communications shall use wireless communications 3G (or better) and 802.11 wireless as their link to the PRESTO System meeting all TTC's wireless communication, performance and availability standards.

REQ-FMV-57.2	Wired Design Constraints	Approved	F

FMVDs that utilize wired communications as their link to the PRESTO System shall meet all TTC standards for the use of wired communications.

REQ-FMV-58	Electrical Connections	Approved	F

The FMVD shall use approved power and communications connectors (i.e. meet all standards, locking, dust and vibration resistant)allowing the FMVDs to be easily installed and/or replaced in the field.

3.1.3.3   AVM

3.1.3.3.1   General AVM Specifications

REQ-AVM-1	AVM Objective	Approved	F

The Add value machines are intended to not only speed the fare card reload process and reduce queuing but also provide expanded convenience to Customers.   The ability of quickly re-load all fare type (except LUM) will greatly enhance flow through for Customers.

REQ-AVM-2	AVM Overview	Approved	F

Add value machines will only be used by a Customer who already has a PRESTO Card (i.e. not a LUM). At the AVM the Customer may,

 - add value to their card or
 - purchase a new TTC Fare Product to add to their card.

The key point here is that Add value machines are used by current PRESTO Card holders for re-loading value onto their PRESTO Card.

Both e-Pass and e-Purse cards may be re-loaded at the AVM with the noted exception that LUM cards cannot be reloaded.   All Concession cards (senior, child, and student) may be reloaded at the AVM.

AVMs only accept credit or Debit Cards.   These machines are financial card industry certified (PCI/Interac), EMV capable and interface with the PRESTO:

 - central system services;
 - device management and monitoring services; and
 - financial Acquirers.

AVMs will perform the same functionality as card readers, with the exception of not being capable of deducting fares from the PRESTO Card.   They will be capable of all fare card lists (e.g. Hotlist, value add, function) processing.

Customers will also be able to check the status of relevant Customer information related to their PRESTO Card, such as card balance, transaction history, and e-pass expiry date etc.

REQ-AVM-3	AVM Functionality Overview	Approved	F

The Added Value machines (AVMs) shall have the following functionality:

 - Reloading all e-Purse and TTC pass products (with the exception of any LUM product);

 - Reloading of additional fare products such as Parking

 - Accept configurations for newly defined fare products (to add to the devices product catalogue)

 - querying e-Purse and pass products on the PRESTO Cards, including all LUM products (including transfer only products);

 - displaying card trip history;

 - Displaying loyalty; and

 - processing fare card lists (Hotlists, value add lists, card function lists).

AVMs will not dispense or sell any fare media.

REQ-AVM-4	AVM locations	Approved	F

Infrastructure shall be updated to support AVMs at the following locations:

 - All subway stations,
 - On surface vehicle platforms,
 - Non-TTC locations (may be located elsewhere)

The TTC may locate AVM machines in other transit areas as it deems necessary during or after the PRESTO System is installed.

REQ-AVM-5	Inclusion of General Sales and Reload Device Specifications	Approved	F

All PRESTO AVM field equipment shall comply to all specifications listed in the General Sales and Reload Device Specifications Section.

REQ-AVM-6	Single AVM Design	Approved	F

PRESTO shall ensure that all AVMs deployed in TTC stations will conform to a single design specific to AVMs.   (Multiple designs for AVMs will not be allowed.)

REQ-AVM-7	Performance	Approved	F

PRESTO will ensure that all AVMs meet all applicable performance specifications as defined and detailed in Schedule A - SLA Specifications. Note that this list may not be exhaustive of Schedule A, and that Schedule A takes precedence. It is the responsibility of PRESTO to ensure all SLA performance measures for AVMs as described in Schedule A are met.

REQ-AVM-7.1	AVM Sales Availability	Approved	F

PRESTO shall achieve an AVM Sales Availability of 95% or greater for all installed AVMs on TTC Property (as specified in SLA EQ-11 of Schedule A).

REQ-AVM-7.2	Customer Dwell Time	Approved	F

PRESTO shall ensure that AVMs are designed and implemented to meet the median Customer dwell time of 180 seconds (as specified in SLA EQ-12 in Schedule A).

3.1.3.3.1.1   Key AVM Components

This section lists specific key AVM components in addition to the common components listed in the General Sales and Reload Device Specifications Section in this Schedule.

REQ-AVM-8	PIN Pad	Approved	F

Ensure the PIN Pad component used in the AVM will have the identical specifications as the PIN Pad unit used in the FMVD.

All requirements specified in FMV-15 and all FMV-15 sub-requirements (i.e. FMV-15.x) shall apply to the AVM PIN Pad.

REQ-AVM-9	Reader Assembly	Approved	F

Ensure the Reader Assembly component used in the AVM will have the identical specifications as the Reader Assembly unit used in the FMVD.

All requirements specified in FMV-17 and all FMV-17 sub-requirements (i.e. FMV-17.x) shall apply to the AVM Reader Assembly.

3.1.3.3.2   Functionality

3.1.3.3.2.1   AVM Specific Operations

REQ-AVM-10	No Fare Media Dispensed	Approved	F

AVMs shall not dispense any PRESTO Media; cards or LUM.

REQ-AVM-11	Payment Options	Approved	F

AVMs deployed by PRESTO shall only be capable of accepting the following payment options:

- Credit Cards
- Debit Cards

REQ-AVM-12	Customer Usage Requirements	Approved	F

Ensure the AVM will reload value and/or add a TTC transit product onto the PRESTO Card using a credit or Debit Card. Not for use with a LUM.

REQ-AVM-12.1	Customer Usage Requirements-2	Approved	F

PRESTO Card query and trip history can be done at the AVM (or FMVD) without requiring a bank card.

REQ-AVM-13	Usage of any PRESTO Card	Approved	F

All valid PRESTO Cards will be usable at an AVM.

REQ-AVM-14	Payment Selection	Approved	F

AVMs shall automatically detect card type (i.e. credit or debit) on insertion into the card reader.

REQ-AVM-15	Purchase of TTC Products	Approved	F

Enable Customers to purchase all TTC Fare Products for PRESTO Cards (not LUM) at AVMs.Their selection will be determined by their Concession type.

REQ-AVM-15.1	Purchase of Multiple Products	Approved	F

Enable Customers to load any combination of TTC transit product for which they are eligible on their PRESTO Cards.

REQ-AVM-15.1.1	Purchase of Multiple Products-2	Approved	F

Configure AVMs to calculate the total cost of a Customer's purchase and use that figure for one financial purchase transaction.

REQ-AVM-16	Bank Card Transactions	Approved	F

All requirements specified in GSR-28 and all GSR-28 sub-requirements (i.e. GSR-28.x) along with FMV-24 shall apply to AVM Bank Card Transactions

REQ-AVM-17	No Split Sales	Approved	F

AVMs shall not support split sales (i.e. a single payment transaction that splits the purchase price between two bank cards).

REQ-AVM-18	Action on Start of a Reload or TTC Product Purchase	Approved	F

- Customer selects "Add TTC Fare Products" from AVM Menu

- AVM prompts Customer to Place PRESTO Card in the PRESTO reader slot or tap the PRESTO reader.

- AVM reads Customer's PRESTO Card

- AVM applies PRESTO list processing to the PRESTO Card (i.e. Hotlist, add value list ....)

- AVM determines the status of the card including Concession type.

- AVM displays TTC Fare Products allowed for the PRESTO Card just read. For example if the card

was a Concession card, all TTC Fare Products allowed for that Concession will be shown.

 - AVM will also display any products the Customer may already have on the card and ask if they wish to renew these products.

 - Customer selects one or more TTC Fare Products for their PRESTO Card.   Each Pre-Funded product will be presented with a price displayed on the screen.

 - After each selection of TTC Fare Product, the AVM ensures that only compatible products can coexist on the PRESTO Card. (to be determined in Design Review)

 - Customer selects "No More Products"

 - AVM calculates total price and presents an itemized list on the LCD display consisting of the PRESTO Card, and each TTC Fare Product selected.

 - AVM prompts Customer to select payment option, or Customer simply inserts credit/Debit Card

 - On successful completion of transaction, AVM loads purchased TTC Fare Products onto the Customers PRESTO Card (still in the slot) and verifies that the PRESTO Card and TTC

 - Fare Products are good for use.

 - AVM returns credit/Debit Card (if used) and prompts Customer to take it.

 - AVM prints itemized transaction receipt

 - Customer takes their PRESTO Card and receipt and proceeds to use their PRESTO Card on TTC.

REQ-AVM-19	Action on TTC Product Validation Failure	Approved	F

Validate the TTC Fare Products written to the card are correct, once a successful financial transaction transpires

REQ-AVM-19.1	Action on TTC Product Validation Failure-2	Approved	F

Ensure that failed validation will result in a second attempted transaction.

REQ-AVM-19.2	Action on TTC Product Validation Failure-3	Approved	F

Ensure that a second failed transaction will result in: log entry; a printed receipt; a card failure error notification; instructions to visit a Customer service centre.

REQ-AVM-20	PRESTO Media List Processing on AVM	Approved	F

Ensure that the AVM PRESTO Media list processing specifications are identical to FMVD (FMV-30). Ensure all specifications listed in FMVD specific operations apply to the AVM.

REQ-AVM-21	Action on Tap and Go	Approved	F

The requirements specified in FMV-31 shall apply to the AVM Action on Tap and Go.

REQ-AVM-22	Trip History Reports on AVM	Approved	F

Ensure the AVM is capable of providing trip history reports for the last five Customer actions. (See GSR-45.14)

3.1.3.3.2.2   AVM States of Operation

REQ-AVM-23	States of Operation	Approved	F

The AMV shall operate in the following states:

- Open; and
- Closed.

REQ-AVM-24	Open State	Approved	F

In the Open State the AMVs shall support two modes:

 - On-Line Mode; and
 - Off-Line Mode.

Open State will be referred to, and is the same as, In-Service.

REQ-AVM-24.1	Open State, On-Line Mode	Approved	F

In the Open State, On-Line Mode (the normal mode) the AMV shall have full real-time communication with the PRESTO System enabling the following functionality:

 - Load value to a PRESTO's card e-Purse;
 - Load a new TTC Fare Product to the PRESTO Card;
 - Query PRESTO Card transit account / trip history;
 - Pay for purchases (i.e. loads) with credit / Debit Card;
 - Real time device management and monitoring;
 - Downloading of PRESTO Media update files;
 - Downloading of lists (Hotlists);
 - Updating of operating parameters;
 - Updating TTC Fare Products.

REQ-AVM-24.2	Open State, Off-Line Mode	Approved	F

In Open State, off-line Mode (exception mode) the AVM shall prominently display to TTC Customers that the AVM is in a degraded state and only certain functions are available.

In this mode, the AVM is in a degraded state with limited functionality as there is no communications with the PRESTO Central System due to communications failure (or partial failure).

REQ-AVM-24.2.1	Telecommunications Outage	Approved	F

The AVM shall operate in off-line mode, in the event of a telecommunications service interruption

REQ-AVM-24.2.2	Optimization of Hot List	Approved	F

Ensure that the hot list is optimized for open-state off-line mode to reduce fraud.

REQ-AVM-24.2.3	Orderly Shutdown after Extended Off Line State	Approved	F

After a pre-determined and programmable length of time in the Off Line State the AVM shall be capable of:

 - Remaining in the current Off Line State; or

 - Execute an orderly shutdown and enter into a closed state after a pre-determined (and programmable) length of time.

Once in shutdown mode, or closed state, the AVM will exhibit a closed visual indicator to TTC

Customers.

REQ-AVM-25	Closed State	Approved	F

In the Closed State (out of service) the AVM shall:

 - Disallow any Customer usage.

 - If possible, display an Out of Service message on it's LCD

REQ-AVM-25.1	Close State Modes	Approved	F

The AVM shall not have Closed State Modes.

3.1.3.3.3   Interfaces to TTC Equipment

REQ-AVM-26	No Interfaces to TTC Equipment	Approved	F

AVMs shall not be interfaced with any TTC equipment or services.

3.1.3.3.4   Design Criterion

REQ-AVM-27	Minimum Number of Devices	Approved	F

Ensure that subway stations have at least the following number of AVMs:

 - three (3) per attended entrance
 - one (1) per unattended entrance
 - two (2) per surface vehicle platform area

REQ-AVM-28	Additional AVMs	Approved	F

Provide additional AVMs that may be required to be installed at TTC stations in order for PRESTO to comply with TTC's performance standards as outlined in Schedule A.

REQ-AVM-29	Final Determination of AVM Numbers	Approved	F

A final determination of the number and location of AVMs will be mutually agreed to by PRESTO and TTC based on TTC Customer demand and actual performance of PRESTO in meeting business and operational goals required under this agreement.

REQ-AVM-30	Position and Location	Approved	F

All AVMs are located within the subway station preferably in a location easily accessible to Customers. AVMs are located in relatively close proximity to subway entrance turnstiles though they do not impede, nor their usage by Customers block the flow of Customers through the turnstiles.   For example, AVMs should be oriented and located in such a manner that Customer line-ups to use the devices do not block Customers using the entrance turnstiles or other key Customer flows.

AVMS may occupy substantial space within the subway station though should be smaller than AVMs. Their location must take into account a variety of additional constraints such as AODA access, maintenance access, service access, etc. AVMs may be located near or against a wall within a subway station. They may be located adjacent to FMVDs.

REQ-AVM-31	Dimensions	Approved	F

AVMs shall have approximately the following dimensions:

 - Width ~ 500mm

- Depth ~ 500mm
- Height ~ 1000mm (not including the standoff height)

REQ-AVM-32	Space Allowances	Approved	F

The AVM will have sufficient space allowance for maintenance, servicing and repair of the devices.   In situ, access to the interior of the AVM for servicing, repair, consumables replenishment, coinage collection will be done through the device front panel.   This area should be kept clear of any additional onboard equipment or obstructions.

REQ-AVM-32.1	Space Allowances-2	Approved	F

AVMs door dimensions shall be a maximum:

- Width ~ 500mm
- Height ~ 1000 mm

The maximum swing of the access/front panel door is approximately 500mm from the front of the AVM (i.e. allowance must be made for at least a 90 degree angle.
Additionally, AVMs may have air vents on the side, bottom, top or back panels. These vents cannot be blocked or obstructed. Space allowance between the cabinet and any adjacent walls or devices is required.

REQ-AVM-33	Weight	Approved	F

The AVMs shall weigh approximately:

- min. 50kg,
- max. 150kg,

REQ-AVM-34	Orientation	Approved	F

The AVMs are oriented such that their front panel is easily accessible by Customers and service personnel. Customers accessing this device will not restrict Customer flow and access to either the AVM or other devices in the subway station including entrance turnstiles.

REQ-AVM-35	Mounting	Approved	F

The AVM will be directly bolted to the subway station floor.   Four or more bolts may be used to mount the AVM.   These bolts may be located inside the AVM preventing unauthorized access (i.e. the AVM is locked and secured from unauthorized access via a secure locking mechanism built into the AVM).

Power and communications design and connections will need to be determined during Design Review. All power and communication connections come into the AVM vertically through the bottom of the AVM.

Mounting should be designed in order to minimize the MTTR.

REQ-AVM-36	Power	Approved	F

The AVM shall approximately require the following continuous power:

- 120 VAC, (+/- 15%)
- ~5A (maximum)

This estimate assumes that the AVM will provide any required AC-DC conversion inside of the device. It also assumes that up to two (2) heaters may be required for the AVM to operate effectively in the Toronto environment.

REQ-AVM-37	Operating Temperature	Approved	F

The AVMs shall operation in the following temperature ranges:

 - -10C to +50C (without additional heating or cooling mechanisms)
 - extend the lower temperature range to -35C (with or without the use of internal heater(s)).

REQ-AVM-38	Heating	Approved	F

AVM mounted at un-heated station or bus platform shall require one (or two) internal heaters.

REQ-AVM-39	Cooling	Approved	F

The AVMs may have internal cooling fans.   The power requirement for the AVM includes the power of any internal fans that may be required.

REQ-AVM-40	Venting	Approved	F

Ensure that any AVM that has vents, then those vents will be kept clear of any other devices or mounting obstructions.

REQ-AVM-41	Infield Service Access	Approved	F

Access to the AVM will be required for,

 - servicing and maintenance;
 - consumable replenishing (paper rolls);;
 - configuring; and
 - troubleshooting / testing.

Access to the internals of the AVM will be via the front panel. The inside of the AVM will have multiple internal compartments allowing secure access to various components as needed (i.e. paper rolls, PRESTO Reader Assembly,).   In general the AVM location / position, and in particular the front door access should not impede the access and servicing of any of these components

REQ-AVM-42	Accessibility	Approved	F

The AVM shall be compliant with AODA standards and all other applicable accessibility standards for height and accessibility by disabled persons.

REQ-AVM-43	Installation of Power	Approved	F

Design, furnish and install power and associated conduit runs to all AVMs according to TTC standards and policies as outlined in the installation of PRESTO field system section of this schedule.

REQ-AVM-44	Single Conduit for Co-Located Machines	Approved	F

Determine if FMVDs and AVMs can be co-located and make use of a single conduit run. Individual FMVD and AVM power may be distributed at or near the deployment location for FMVDs and co-located AVMs.

REQ-AVM-45	Optimization of Legacy Device Locations	Approved	F

There may be the opportunity to deploy FMVDs, and/or AVMs in locations that at present have legacy TTC vending machines deployed. TTC will work with PRESTO to develop deployment strategies that optimize the use of existing power conduit runs already designated for legacy TTC vending machines, provided that TTC deems the opportunities consistent with PRESTO's overall project plan.

REQ-AVM-46	Communications Network	Approved	F

Currently there is no communications network, wired or wireless, in the subway stations for AVMs.

REQ-AVM-46.1	Communications Network	Approved	F

Install a wired or wireless communications network that links the PRESTO System to all AVMs in the system.

REQ-AVM-46.2	Wireless Design Constraints	Approved	F

Ensure that if AVMs use wireless communications 3G (or better), 802.11 as their link to the PRESTO System that all TTC standards for the use of wireless communications within the subway station are met and all performance and availability specifications as outlined in Schedule A, are maintained.

REQ-AVM-46.3	Wired Design Constraints	Approved	F

Ensure that if AVMs use wired communications as their link to the PRESTO System as long as all TTC standards for the use of wired communications within the subway station are met.

REQ-AVM-47	Electrical Connections	Approved	F

The AVM shall use approved power and communications connectors (e.g.. meet all standards, locking, dust and vibration resistant) allowing the device to be easily installed and/or replaced in the field.

3.1.3.4   Off-Board SRVM

3.1.3.4.1   General Specifications

REQ-OBS-1	Off-Board SRVM Scope	Approved	F

Off-board SRVMs are PRESTO Devices that allow Customers to purchase a LUM Single or Return trip that is used as Proof Of Payment.   Customers may pay for their LUM using either coins or Credit/Debit bank cards. SRVMs do not provide change.

Additionally, during the Transition Phase, Customers may use TTC tokens at the SRVM. In this case, the SRVM will return a paper receipt as a proof of payment.

REQ-OBS-2	Off-board SRVM Location	Approved	F

Off-board SRVMs shall be located at certain LRV stops as specified by TTC and at LRT stations as specified by Transit Expansion.

REQ-OBS-3	Inclusion of General Sales and Reload Device Specifications	Approved	F

All PRESTO Off-board SRVM field equipment shall comply to all specifications listed in the General Sales and Reload Device Specifications Section of this Schedule.

REQ-OBS-4	Single Off-board SRVM Design	Approved	F

Off-board SRVMs deployed at LRV stops shall conform to a single design specific to Off-board SRVMs.

REQ-OBS-5	Facilitating Customer Throughput	Approved	F

SRVM shall be designed for quick, efficient use enabling relatively high Customer throughput (for both Onboard SRVMs and Off-board SRVMs).

REQ-OBS-5.1	Facilitating Customer Throughput-2	Approved	F

The SRVM shall facilitate the following efficiencies:

 - Tap and Go Contactless Payment (i.e. no PIN entry);

- off-line EMV payments (if allowed by the Acquirer);
- Optimization of the menu and TTC Fare Product selection;

REQ-OBS-6	Wireless Communications	Approved	F

PRESTO is responsible for all communications for Off-board SRVMs.

REQ-OBS-6.1	Wireless Communications-2	Approved	F

Off-board SRVMs shall use wireless communications for all communications. No wired communications will be available at LRV stop locations.

REQ-OBS-7	Size Constraints	Approved	F

The footprint and overall size of the Off-board SRVM will be smaller than the FMVD. PRESTO will ensure that foot print for Off-board SRMVs is as small as practically possible in order to ensure these devices will be accepted by the City of Toronto (which governs the street furniture) and complies with their guidelines.   Maximum sizes are provided in this Schedule.

REQ-OBS-8	Performance	Approved	F

PRESTO will ensure that all SRVMs meet all applicable performance specifications as defined and detailed in Schedule A - SLA Specifications. These SLA specifications are briefly outline below for clarity only; how they are measured, calculated and enforced is detailed in Schedule A. Note that this list may not be exhaustive of Schedule A, and that Schedule A takes precedence.   It is the responsibility of PRESTO to ensure all SLA performance measures for SRVMs as described in Schedule A are met.

REQ-OBS-8.1	SRVM Sales Availability	Approved	F

PRESTO shall achieve a Sales Availability for the collective of SRVMs of 95% or greater as specified in SLA EQ-4 of Schedule A.

REQ-OBS-8.2	Customer Dwell Time	Approved	F

SRVMs shall meet the median Customer dwell time of 30 seconds as specified in SLA EQ-9.

3.1.3.4.1.1   Key SRVM Components

This section lists specific key SRVM components in addition to the common components listed in the **Common Sales and Reload Device Components** Section in this Schedule.

REQ-OBS-9	LUM Dispenser	Approved	F

Off-Board SRVM devices shall have a LUM dispenser.

REQ-OBS-9.1	LUM Capacity	Approved	F

Off-Board SRVM LUM dispensers shall be capable of holding at least 1000 LUM.

REQ-OBS-9.2	LUM Printing	Approved	F

LUM dispensed by the Off-Board SRVM shall be uniquely printed (as defined in the LUM requirements) at the time of purchase.

REQ-OBS-9.2.1	LUM Printing-2	Approved	F

The content to be printed on the LUM shall occur (and printed as defined in the LUM requirements) after the Customer has chosen their desired product and after sufficient payment has been received at the Off-Board SRVM.

REQ-OBS-9.3	Configurable Printing	Approved	F

Off-Board SRVM LUM Dispenser shall have the ability to print downloadable content on the LUM which shall be retrieved from the PRESTO System Central Back Office (via the Sales and Reload device). (e.g. 'Santa Claus Parade' etc. which will be displayed as an 'LUM product' on the Sales and Reload device display and printed on the LUM when purchased)

REQ-OBS-10	Coin Handling Unit	Approved	F

Off-Board SRVM Coin Handling Unit shall consist of a Coin Acceptor, and coin hoppers to accept coins for the purchase of PRESTO Media at an SRVM.

REQ-OBS-10.1	Change Accepted	Approved	F

Off-Board SRVM Coin Handling Unit shall accept $0.05, $0.10, $0.25, $1, $2 coins.

REQ-OBS-10.2	Coin Escrow	Approved	F

Off-Board SRVM Coin Handling Unit shall be capable of Coin Escrow.

Customers wishing to cancel their transaction will receive their coins (or equivalent sum in coins back)

REQ-OBS-11	Coin Validator	Approved	F

Off-Board SRVM Coin Validator shall validate all coins inserted into the device; accepting those that are valid and returning (to the Fare Media Tray) those that are rejected.

REQ-OBS-12	PIN Pad	Approved	F

Off-Board SRVM shall be equipped with a PIN Pad.

To support acceptance of bank cards (credit/debit) as payment, as well as perform additional means of TTC Customer interactions with the SRVM.

REQ-OBS-12.1	PCI - PED	Approved	F

The Off-Board SRVM PIN Pad shall be PCI PED compliant and certificated.

REQ-OBS-12.2	INTERAC standards;	Approved	F

The Off-Board SRVM PIN Pad shall be compliant and certified to all INTERAC standards.

REQ-OBS-12.3	Master Session Key Management	Approved	F

The Off-Board SRVM PIN Pad shall be enabled with all required key management schemes including Master Session.

REQ-OBS-12.4	EMV Certification	Approved	F

The Off-Board SRVM PIN Pad shall be EMV Level 1 and EMV Level 2 compliant and certified.

REQ-OBS-12.5	Canadian Banking Standards Compliant	Approved	F

The Off-Board SRVM PIN Pad shall be certified to all banking industry standards for data entry required to support Payment Transactions.

REQ-OBS-12.6	Design Standards	Approved	F

The Off-Board SRVM PIN Pad shall be compliant to all relevant standards regarding the physical characteristics and durability of surfaces, such as wear, fade, spill, dust, and intrusion resistance.

REQ-OBS-12.7	Messaging Standards	Approved	F

The Off-Board SRVM PIN Pad and its Software shall be compliant to all applicable standards of banks, Acquirers, and the financial services and payments industry regarding audible and visual messaging and screen flows that affirm acceptance and rejection of TTC Customers' interaction with the LCD display in completion of the transaction.

REQ-OBS-13	Coin Box	Approved	F

The Off-Board SRVM shall be equipped with a Coin Box or Coin Boxes as required in order to achieve the performance levels for SRVM Availability as specified in Schedule A.

REQ-OBS-13.1	Storage Capacity	Approved	F

Each Off-Board SRVM Coin Box storage capacity shall be such that the maximum weight of the full Coin Box does not exceed 10 kg.

REQ-OBS-13.2	Impact Specification	Approved	F

The Off-Board SRVM Coin Box shall be hardened to withstand impacts when dropped from a height of no less than one meter and still be fully operational and secure.

REQ-OBS-13.3	Installation Orientation	Approved	F

The Off-Board SRVM Coin Box shall have keys an guides allowing it to be installed in only one orientation.

REQ-OBS-13.4	Cash Box Monitoring	Approved	F

The Off-Board SRVM Coin Box shall be fully monitored generating alerts, and status for events that include:

 - unauthorized access;
 - tamper detected;
 - level of cash box(s);
 - no Coin Box.

REQ-OBS-13.5	Action on Unauthorized Removal	Approved	F

The Off-Board SRVM shall require keys or other security devices to access the Coin Box.

REQ-OBS-13.5.1	Action on Unauthorized Removal-2	Approved	F

Unauthorized removal of the Off-Board SRVM Coin Box shall result in an alarm being generated.

REQ-OBS-14	Reader Assembly	Approved	F

Off-Board SRVM will have the equivalent of a PRESTO Reader Assembly component; however it will not be used for fare processing other than LUM queries, and validations.

REQ-OBS-14.1	Read / Write Capabilities	Approved	F

The Off-Board SRVM Reader Assembly shall be capable of reading and writing all TTC LUM products and TTC Fare Products.

REQ-OBS-14.2	Reader Assembly-2	Approved	F

Optional - Off-Board SRVM bank card reader shall read and write LUM.

REQ-OBS-15	Fare Media Tray	Approved	F

The Off-Board SRVM shall be equipped with a media tray for the deposit of newly purchased PRESTO Media.

REQ-OBS-15.1	Recessed Design	Approved	F

The Off-Board SRVM Fare Media Tray shall utilize a recessed design.

REQ-OBS-15.2	Fare Media Tray Door	Approved	F

The Off-Board SRVM Fare Media Tray shall have a clear, durable, and scratch-resistant poly carbonate door that covers the entire opening of the tray and will be affixed in a manner that opens inward and returns to a normally closed position via mechanical action or gravity.

REQ-OBS-15.3	Minimizes Pinching Hazard	Approved	F

The Off-Board SRVM Fare Media Tray shall be designed so as to minimize any pinching hazard to Customers while at the same time protects against any physical intrusions to the tray while the PRESTO Media is being dispensed.

REQ-OBS-15.4	Drainage of Liquids	Approved	F

The Off-Board SRVM Fare Media Tray shall be designed to permit drainage of liquids in the tray to an area outside the SRVM.

REQ-OBS-15.5	Dispensed Light Indicator	Approved	F

The Off-Board SRVM Fare Media Tray shall have an indicator that flashes light inside the tray and emits a sound at the moment that the payment purchase is completed and the SRVM will deposit the PRESTO Media in the tray.

REQ-OBS-15.5.1	Dispensed Light Indicator-2	Approved	F

The flashing light and sound in the Off-Board SRVM Fare Media Tray shall be no less than 5 seconds, or until the PRESTO Media is retrieved by the Customer.

REQ-OBS-15.6	Action on Tray Blockage	Approved	F

Ensure that if the tray becomes blocked the SRVM will automatically take itself out of service, and enter a degraded mode.

3.1.3.4.2   Functionality

3.1.3.4.2.1   SRVM Specific Functionality

REQ-OBS-16	Purchase of PRESTO Media	Approved	F

Customers shall be able to purchase only LUM at Off-Board SRVMs.

REQ-OBS-16.1	No PRESTO LUM Fees	Approved	F

Ensure the Customer will not be charged any PRESTO LUM fee, in accordance with TTC fare policy, when they purchase a LUM at the SRVM. The SRVM LUM is a pre-paid TTC Fare Product and, hence, subject to TTC fare policy.

REQ-OBS-17	Manual or Automatic Payment Selection	Approved	F

When the Off-Board SRVM prompts the Customer for the form of payment (cash, debit or credit); the Off-Board SRVM shall automatically select the Customer's form of payment based on the Customer's action and what they have inserted into the Off-Board SRVM.

REQ-OBS-18	Purchase of TTC Products	Approved	F

Customers shall only be able to purchase a:

 - single ride LUM or
 - return LUM

at the Off-Board SRVM.

REQ-OBS-18.1	Concession Types	Approved	F

Enable purchase of, adult, senior, child or student LUM at the SRVM.

REQ-OBS-18.2	Purchase of Multiple Products and Concessions	Approved	F

Off-Board SRVM shall permit the purchase of multiple LUM in a single transaction. These multiple products can be any combination of,

 - adult, child, senior and student;
 - single ride, return;

REQ-OBS-18.2.1	Purchase of Multiple Products and Concessions-2	Approved	F

The SRVM shall calculate the total cost of the Customer's purchase and use that figure for the one financial purchase transaction.

REQ-OBS-19	Coin Transactions	Approved	F

Enable cash transactions using coins for purchase of LUM at SRVMs.

REQ-OBS-19.1	Use of a Common Transaction Flow	Approved	F

Provide the same menu and transaction flow for Customers using coins to pay for LUM as that provided for Customers using credit or debit.

REQ-OBS-19.1.1	Use of a Common Transaction Flow-2	Approved	F

Configure the SRVM so that the steps to make a purchase are easily understood and common throughout all TTC/PRESTO Devices.

The SRVM will provide, within bank rules and regulations, a common experience, that will enable Customers to learn how to use the SRVM quickly and efficiently for all forms of payments and TTC Fare Product selection.

REQ-OBS-19.2	Selection of Coin Payment	Approved	F

The Off-Board SRVM shall have a coin selection option for Customers to select when prompted by the SRVM during the course of a purchase (or they may simply start inserting coins).

REQ-OBS-19.3	Approval for a Cash Transaction	Approved	F

Approval for a coin transaction is granted once the correct amount of money is deposited.

REQ-OBS-19.4	Customer Cancellation of Cash Transactions	Approved	F

Coin paying Customers shall have the option of cancelling their transaction at the Off-Board SRVM and having escrowed coins returned to them.

REQ-OBS-19.5	Opportunity for Cancellation of Cash Payments	Approved	F

Off-Board SRVM shall permit manual cancellation for coin payments at any moment up until the Customer presses the final purchase option (menu or button).

For example,

- The Customer selects Purchase Return LUM.
- The SRVM displays the cost of the Return LUM.
- Customer No More Items and begins inserting coins.
- Customer inserts sufficient (or insufficient) money into the machine and then changes their mind (i.e. no longer wishes to purchase the fare product).
- Customer presses Cancel menu option.
- SRVM returns the Customer's money.
- SRVM ends the transaction.

REQ-OBS-19.6	Automatic Cancellation of Cash Transactions	Approved	F

The Off-Board SRVM shall support the automatic cancellation of cash transactions due to time out reasons. These reasons will include:

- A pre-programmed (table driven) time-out has been reached prior to (or during) the insertion of any currency for payment.
- Failure of the SRVM LUM dispensing mechanism;
- Out of Change.

REQ-OBS-19.7	Timeouts Due to Delay in Cash Input	Approved	F

In such cases where the reason for delay is an automatic timeout due to slow cash input, every opportunity, message, and/or prompt shall be given by the Off-Board SRVM to the Customer to prompt the Customer to either continue with the transaction (e.g. add more money to the machine) or cancel the transaction by pressing the Cancel button / menu and have their cash returned to them

REQ-OBS-19.8	Completion of Cash Transaction	Approved	F

The Off-Board SRVM shall calculate the sum of the coins inserted to the cost of the Customers selection and shall prompt the Customer when enough money has been deposited.

When the Customer selects purchase, the coins are deposited into the cash box and the LUM(s) are deposited to the LUM dispenser. No change is provided at an SRVM.

REQ-OBS-19.9	Insufficient Funds when Purchasing LUMs	Approved	F

If a Customer has insufficient coins when purchasing a LUM, the Off-Board SRVM shall provide a Cancel option for the Customer, whereby all of their escrow coins are returned to them.

REQ-OBS-19.10	Overpaying for Purchase	Approved	F

If a TTC Customer pays with coins, and accidentally overpays by inserting extra coins, any coins after the total cost has been reached shall be returned to the Customer.

Note that this does not mean that the SRVM provides change; it merely returns the extra coins deposited after the full cost of the purchase was reached.

REQ-OBS-20	Bank Card Transactions	Approved	F

The Off-Board SRVM shall fully support all credit and Debit Cards issued by financial institutions.

REQ-OBS-20.1	Selection of Credit or Debit Payment	Approved	F

The SRVM shall have a Credit and a Debit selection options for Customers to select when prompted by the SRVM during the course of a purchase.

REQ-OBS-20.2	Approval for a Credit/Debit Transaction	Approved	F

Ensure approval for a credit/debit transaction is only granted once an approval from the financial Acquirer is received.

REQ-OBS-20.3	Manual Cancellation for Bank Card Payments	Approved	F

The Off-Board SRVM shall permit the manual cancellation for Bank Card Payments at any moment up until the Customer presses the final purchase option (menu or button).

 - The Customer selects Purchase Return LUM.
 - The SRVM displays the cost of the monthly pass and asks the Customer to insert (or Tap) bank card.
 - Customer inserts bank card and SRVM asks Customer if they wish to complete the purchase.
 - Customer changes their mind and no longer wishes to purchase fare product.
 - Customer presses Cancel menu option.
 - SRVM returns Customer card; no financial payment transaction has taken place.
 - SRVM ends the transaction.

Once the final purchase option is selected by the Customer, there will be no further opportunity for the Customer to cancel the transaction.

REQ-OBS-20.4	Automatic Cancellation for Financial Reasons	Approved	F

Cancellation of transactions using credit and debit at the Off-Board SRVM shall occur in a manner that complies with Canadian banking rules and accepted practices of the financial services and payments industries (The cancellation process will be similar to the one they experience in a retail environment, at ATMs, and other means of retail purchases).

REQ-OBS-20.5	Scope for Automatic Cancellation	Approved	F

Automatic cancellations for credit/debit transactions at the Off-Board SRVM shall occur due to:

 - A pre-programmed time-out (table driven parameter) has been reached prior to the insertion of any currency or presentment of a Credit or Debit Card for payment;

 - A communication failure that interrupts full Authorization of a credit or debit transaction;

 - The appearance of conditions described in BASE24 protocols during the course of a credit or debit transaction;

 - Failure of the fare media dispensing mechanism;

 - Empty PRESTO LUM;

 - Insufficient funds; and

 - Other failures in the Off-Board SRVM or PRESTO System Central Back Office that impede the completion of the transaction.

REQ-OBS-20.6	Timeouts Due to Delay in User Response	Approved	F

In such cases where the reason for delay is an automatic timeout due to no user response, every opportunity, message, and/or prompt shall; be given by the SRVM to the Customer to prompt the Customer to either continue with the transaction (e.g. respond) or cancel the transaction by pressing the Cancel button / menu and have their transaction cancelled.

REQ-OBS-20.7	Insufficient Funds when Using Bank Cards	Approved	F

Customers paying with credit or Debit Cards at Off-Board SRVM with insufficient funds shall be handled in accordance with Canadian Banking rules.

To be clear, the financial transaction will be cancelled regardless of the LUM product they are trying to purchase. If a Customer wishes to try their purchase again, they must initiate a new transaction at the SRVM

REQ-OBS-20.8	No Overpayment when Using Credit/Debit	Approved	F

No overpayment shall be allowed at Off-Board SRVM when a Customer uses there credit or Debit Card to make purchases.

When a Customer uses credit or debit the SRVM will calculate the price for all the Customers products, tabulate them, and display the total sum of the purchase. The total is what will be charged to their financial account.

REQ-OBS-21	No Split Sales	Approved	F

Split sales (i.e. use of a combination of payment options, such as coins combined with a Credit or Debit Card; or a combination of two different payment cards, whether or not issued to or in the possession of a single TTC Customer) shall not be supported by the Off-Board SRVM or the PRESTO System.

REQ-OBS-22	Action on Purchasing LUM	Approved	F

 - Customer selects "Purchase LUM" from SRVM Menu.

 - SRVM presents all LUM products on the display along with their prices.   Note that this includes Concession types.

 - Customer selects one or more LUM to purchase. There is no restriction on the amount of LUM products a Customer may purchase. LUM products may be purchased with mixed Concessions.

 - After each selection of LUM product, the SRVM, ensures that there are sufficient LUM in the SRVM for the purchase. If there are not, the LUM alerts the Customer that no more can be purchased and prompts the Customer to purchase what they have already selected or to cancel the transaction.

 - Customer selects "No More Products".

 - SRVM calculates total price and presents an itemized list on the LCD display consisting of each LUM selected.

 - LUM prompts Customer to select payment option, or Customer simply inserts credit/Debit Card or coins into the SRVM.

 - On successful completion of transaction, SRVM loads and initializes each purchase LUM and verifies that they are good for use.

 - SRVM deposits LUM(s) in Fare Media Tray, (no change is given except for overpayment coins).

 - SRVM returns credit/Debit Card (if used) and prompts Customer to take it.

 - SRVM prints itemized transaction receipt.

 - Customer takes LUM and receipt and proceeds to use LUM on TTC.

REQ-OBS-23	Action on PRESTO Media/TTC Product Validation Failure	Approved	F

Once a successful financial transaction transpires, the SRVM will encode/activate the LUM, validate it, present the validation results to the Customer and dispense the LUM.

If, for some reason the fare card fails validation within the SRVM, the SRVM will discard the LUM and re-cycle through the encode/activate and validate process again.   Multiple failures at this stage may render the SRVM inoperable.   In all cases the Customer receipt shall show the status of the fare media dispensed and whether or not it was validated or not.   All validations, encodings and activations will be monitored and recorded.

REQ-OBS-24	Action on Tap and Go	Approved	F

Idle Off-Board SRVM (i.e. SRVM not performing any other transaction) shall query LUM (i.e. display the card status) when it is presented to the assembly reader.

REQ-OBS-25	No Reloads	Approved	F

Off-Board SRVM shall not allow LUM to be reloaded.

REQ-OBS-26	Activation on First Use	Approved	F

Ensure the LUM dispensed from the Off-board SRVM is activated on first use by the Customer.   The Customer does not need to use it immediately.

REQ-OBS-27	Life Span on non-activated LUM	Approved	F

Additional TTC fare policies will be considered limiting the life span of the non-activated LUM dispensed from the SRVM.

3.1.3.4.2.2   SRVM States of Operation

REQ-OBS-28	States of Operation	Approved	F

The Off-Board SRVM shall operate in the following states:

 - Open; and
 - Closed.

REQ-OBS-29	Open State	Approved	F

In the Open State the Off-Board SRVM shall allow the same function as a Sales and Reload device.

REQ-OBS-29.1	Open State-2	Approved	F

In Open State Off-Board SRVM shall support two modes:

 - On-Line Mode; and
 - Off-Line Mode.

Open State will be referred to, and is the same as, In-Service.

REQ-OBS-29.2	Open State, On-Line Mode	Approved	F

Open State On-Line Mode is the normal mode for the Open State of the SRVM.   In this mode, the SRVM has full real-time communications with the PRESTO System and shall::

 - be a fully functional Off-Board SRVM;
 - allow Customers to purchase LUM, with credit/debit or coins;
 - have real time device management and monitoring;
 - update operating parameters;
 - update TTC Fare Products / Prices; and

- Query a LUM.

REQ-OBS-29.3	Open State, Off-Line Mode	Approved	F

Open State, off-line Mode is the exception mode for the Open State of the SRVM.   In this mode, the SRVM is in a degraded state with limited functionality as there is no communications with the PRESTO Central System and financial institutions due to communications failure (or partial failure). In this mode, the SRVM shall:

 - prominently display to TTC Customers that it is in a degraded state and only certain functions are allowed;

 - accept coins only (i.e. no credit/debit) for payment;

 - allow Customers to query their LUM status;

 - locally store all coin and query transactions, alerts, in a secure manner for uploading to the PRESTO System Central Back Office when communications is restored;

REQ-OBS-29.3.1	Open State, Off-Line Mode-2	Approved	F

Off line mode shall count directly against the Off-Board SRVM Sales Availability metric.

REQ-OBS-30	Closed State	Approved	F

In the Closed State the Off-Board SRVM shall:

- Not permit any Customer usage.
- Display, if possible, on its LCD Display, an Out of Service message.

Closed State will be referred to, and is the same as, Out-Of-Service.

3.1.3.4.3   Interfaces to TTC Equipment

REQ-OBS-31	Interface to Ticket Validator	Approved	F

The Off-board SRVM shall have no communications interface to the Ticket Validator.   To be clear, the Ticket Validator will operate in Off-Line mode only.
Note: TTC will provide Ticket Validators.

REQ-OBS-32	Token Acceptance - Off-board SRVM Functionality	Approved	F

Customer that uses a token for fare payment during the Transition Phase shall receive a paper receipt or LUM from the Off-board SRVM as Proof Of Payment during the transition phase.

REQ-OBS-33	Ticket Validator - Off board SRVM Functionality	Approved	F

Deleted.

REQ-OBS-34	RS485 Network	Approved	F

Deleted.

REQ-OBS-34.1	Number of RS485 Networks	Approved	F

Deleted.

REQ-OBS-34.2	Topology	Approved	F

Deleted.

REQ-OBS-34.3	Standards	Approved	F

Deleted.

REQ-OBS-34.3.1	Standards-2	Approved	F

Deleted.

REQ-OBS-34.4	Usage	Approved	F

Deleted.

3.1.3.4.4 Off-board SRVM Design Criterion

REQ-OBS-35	Location	Approved	F

Off-board SRVMs are located at specific Legacy LRV stops. SRVMs are relatively large devices which will occupy a relatively substantial space at the Legacy stop. Their location must take into account a variety of constraints such as Customer access, Customer flow, AODA standards for access, maintenance access, sidewalk access, advertising viewing, Merchant store fronts, service access,

REQ-OBS-36	Number of Devices	Approved	F

Legacy LRV stops shall have one (1) Off-board SRVM at specified stops.

REQ-OBS-37	Dimensions	Approved	F

Off-board SRVMs shall be no larger than the following dimensions:

 - Width ~ 500mm
 - Depth ~ 500mm
 - Height ~ 1000mm (not including standoff / mounting)

REQ-OBS-38	Space Allowances	Approved	F

The Off-board SRVM will have sufficient space allowance for maintenance, servicing and repair of the devices.   In situ, access to the interior of the Off-board SRVM for servicing, repair, consumables replenishment, coinage collection will be done through the device front panel.   This area should be kept clear of any additional on street equipment or obstructions.

The maximum door dimensions of the Off-board SRVM are,

 - Width ~ 500 mm
 - Height ~ 1000 mm

The maximum swing of the access/front panel door is approximately 36 in. from the front of the Off-board SRVM (i.e. allowance must be made for at least a 90 degree angle.

Additionally, Off-board SRVMs will may have air vents on the side, bottom, top or back panels. These vents cannot be blocked or obstructed. Space allowance between the cabinet and any adjacent walls or devices is required.

REQ-OBS-39	Weight	Approved	F

The Off-board SRVMs shall have a maximum weight of:

 - min. 50kg, max. 150kg, empty (i.e. no coins)
 - add 25kg for full (i.e. coin hoppers full)

REQ-OBS-40	Orientation	Approved	F

The Off-board SRVMs are oriented such that their front panel is easily accessible by Customers and service personnel.   Customers accessing this device will not restrict Customer flow and access to either the Off-board SRVMs or other devices at the Stop.

REQ-OBS-41	Mounting	Approved	F

The Off-board SRVMs will be directly bolted to a concrete pad at the LRV stop.   Four or more bolts may be located inside the Off-board SRVMs preventing unauthorized access (i.e. the Off-board SRVM is locked and secured from unauthorized access via a secure locking mechanism built into the Off-board SRVMs).   Note that the concrete pad will not be raised above ground level.   The Off-board SRVM will used a metal standoff if it needs to be raised above the level of the concrete pad.

All power connections come into the Off-board SRVMs vertically through the bottom of the Off-board SRVMs.

Mounting should be designed in order to minimize the MTTR.

REQ-OBS-42	Power	Approved	F

The Off-board SRVMs shall draw the following maximum continuous power:

 - 120 VAC (+/- 15%)
 - ~15A (maximum)

Note: This estimate assumes that the Off-board SRVMs will provide any required AC-DC conversion inside of the device   It also assumes that up to two (2) additional heaters may be required for the Off-board SRVMs to operate effectively in the Toronto environment.

REQ-OBS-42.1	Power-2	Approved	F

Off-board SRVMs at Legacy stops shall provide their own UPS functionality. This UPS functionality will be minimal, in that it will allow for the current transaction (financial or otherwise) to complete and then gracefully turn off.

REQ-OBS-43	Operating Temperature	Approved	F

The Off-board SRVMs shall typically operate without additional heating or cooling within the following temperature range:

 - 10C to +50C (without additional heating or cooling mechanisms)
 - Additional heating will extend the lower temperature range to -35C.

REQ-OBS-44	Heating	Approved	F

The Off-board SRVMs shall require an internal heater (or two) when installed at a Legacy LRV stop.

REQ-OBS-45	Cooling	Approved	F

The Off-board SRVMs shall support internal cooling fans.

REQ-OBS-46	Venting	Approved	F

Off-board SRVMs requiring vents shall have vents in the top, sides, bottom and back panels for air flow.

REQ-OBS-46.1	Venting-2	Approved	F

Off-board SRVMs requiring vents shall keep the vents clear of any other devices or mounting obstructions.

REQ-OBS-47	Communications	Approved	F

Equip Off-board SRVMs with an internal cellular modem for cellular data network connectivity.

REQ-OBS-47.1	Communications-2	Approved	F

Ensure that all communication using the SRVM link is encrypted according to all applicable standards.

REQ-OBS-47.2	Communications-3	Approved	F

Deleted.

REQ-OBS-47.3	Communications-4	Approved	F

Equip SRVMs with additional ports for connections to keyboards and USB.

REQ-OBS-47.4	Communications-5	Approved	F

Provide a means of securing these additional SRVM ports so they can only be physically accessed and used (password protected log in) locally by TTC and PRESTO personnel.

REQ-OBS-48	Electrical Connections	Approved	F

Ensure Off-board SRVMs use approved power and communications connectors. (i.e. meet all vehicle standards, locking, dust and vibration resistant etc).

These connectors will allow the Off-board SRVMs to be easily installed and/or replaced in the field. Power and communications to Off-board SRVMs at stops may be via underground conduit brought up to the Off-board SRVMs via the bottom of the Off-board SRVMs.

REQ-OBS-49	Infield Service Access	Approved	F

Access to the Off-board SRVMs will be required for:

 - servicing and maintenance
 - consumable replenishing (paper rolls, and LUM)
 - coin collection
 - configuring
 - troubleshooting / testing

REQ-OBS-49.1	Infield Service Access-2	Approved	F

Equip Off-board SRVMs with a front panel for easy access to components.

REQ-OBS-49.2	Infield Service Access-3	Approved	F

Equip the Off-board SRVMs with multiple internal compartments allowing secure access to various components as needed.

REQ-OBS-49.3	Infield Service Access-4	Approved	F

Ensure that the Off-board SRVMs location and position, and in particular the front door access does not impede the access and servicing of any of these components.

REQ-OBS-50	Accessibility	Approved	F

The Off-board SRVMs shall be compliant with AODA standards and all other applicable accessibility standards for height and accessibility by disabled persons.

Consideration must be made for how a disabled person would access the device while at the LRV stop.

REQ-OBS-51	No Changes Through Fare Media Phases	Approved	F

The Off-board SRVMs will be used through all phases of the LRV POP system installation.

During the transition phase when both PRESTO Media and current fare media are accepted, the Off-board TVM must provide Customers that use tokens with POP receipts. These receipts may be paper or LUM as specified in this Schedule. In the PRESTO Media only phase, no tokens will be accepted and therefore this functionality is no longer required.

The Off-Board SRVM shall not require any changes (e.g. Software, Hardware, and certifications,) before, during and after the PRESTO only media phase.

3.1.3.5   Onboard SRVM

3.1.3.5.1   General Specifications

REQ-ONS-1	Onboard SRVM Scope	Approved	F

Onboard SRVMs are PRESTO Devices located Onboard LRVs, that allow Customers to purchase a Single Ride / Return LUM that is used as Proof Of Payment Onboard an LRV. Customers may use credit, debit or coins to pay for their LUM. For coin payment, no change is given.

Additionally, during the Transition Phase, Customers may use TTC tokens at the SRVM. In this case, the SRVM will return a paper receipt as a proof of payment.

REQ-ONS-2	Location	Approved	F

All Onboard SRVMs are located in the payment area of the Legacy LRV. The device location will be confirmed during Legacy LRV Vehicle PDR, however it is generally agreed that the Onboard SRVMs will be located in two sections of the LRV.

Onboard SRVMs will have limited space within an LRV to be deployed. Their location in the LRV must take into account a variety of constraints such as Customer access, Customer flow, AODA access, maintenance access, service access, Final SRVM locations will be determined in discussion with TTC and the LRV manufacturer.

REQ-ONS-3	Inclusion of General Sales and Reload Device Specifications	Approved	F

Onboard SRVM field equipment shall comply to all specifications listed in the General Sales and Reload Device Specifications.

REQ-ONS-4	Single On-board SRVM Design	Approved	F

All Onboard SRVMs deployed on LRV vehicles shall conform to a single design specific to Onboard SRVMs.

REQ-ONS-5	Optimized for Onboard Use	Approved	F

The Onboard SRVM shall be designed to facilitate Customer usage and throughput for Onboard use as per OBS-5.

REQ-ONS-5.1	Optimized for Onboard Use-2	Approved	F

Optional - The Onboard SRVM shall accommodate Customer purchases in the relatively short amount of time between LRV stops.

REQ-ONS-6	Wireless Communications	Approved	F

Onboard SRVMs shall use the Onboard Ethernet network for communications. This Onboard Ethernet network is connected to a central, Onboard WLAN (802.11) for communication with the PRESTO System at carhouses or cellular modem network.

REQ-ONS-6.1	Wireless Communications-2	Approved	F

PRESTO shall work with the TTC and the LRV manufacturer to determine the network to use.

REQ-ONS-7	Size Constraints	Approved	F

The footprint and overall size of the Onboard SRVM shall be substantially smaller than the Off-board SRVM. PRESTO will ensure that foot print for Onboard SRMVs is as small as practically possible in order to ensure these devices will be acceptable by TTC for use Onboard LRVs.   Maximum sizes are provided in this Schedule.

REQ-ONS-8	Performance	Approved	F

Performance specifications for Onboard SRVMs shall be identical to Off-board SRVMs as outlined in OBS-8.

3.1.3.5.2   Functionality

REQ-ONS-9	Same Functionality as Off-Board SRVMs	Approved	F

All functional specifications for Onboard SRVMs shall be identical to those for Off-board SRVMs with one exception:
When purchased, a LUM (Single or Return) is activated when they are dispensed from the device.

To be clear, the Single / Return ride LUM is activated by the Onboard SRVM and does not require the Customer to tap it at a Reader Assembly.

3.1.3.5.3   Interfaces to Onboard SRVMs

REQ-ONS-10	Interface to Ticket Validator	Approved	F

The Onboard SRVM shall have no communications interface to the Ticket Validator.   To be clear, the Ticket Validator will operate in Off-Line mode only.

Note: TTC will provide Ticket Validators.

3.1.3.5.4   Onboard SRVM Design Criterion

REQ-ONS-11	Number of Devices	Approved	F

Legacy LRVs shall have two (2) Onboard SRVMs.

REQ-ONS-12	Dimensions	Approved	F

Onboard SRVMs shall not exceed the following maximum dimensions:

 - Width = max. 420 mm,
 - Depth = max. 420mm,
 - Height = max 960 mm (does not include standoff height)

REQ-ONS-13	Space Allowances	Approved	F

The Onboard SRVMs will have sufficient space allowance for maintenance, servicing and repair of the devices.   In situ, access to the interior of the Onboard SRVMs for servicing, repair, consumables

replenishment, coinage collection will be done through the device front panel.   This area should be kept clear of any additional Onboard equipment or obstructions.

The maximum door dimensions of the Onboard SRVMs are,

 - Width = 420 mm;
 - Height = 960 mm

The maximum swing of the access/front panel door is approximately 460 mm from the front of the Onboard SRVMs (i.e. allowance must be made for at least a 90 degree angle.

Additionally, Onboard SRVMs will may have air vents on the side, bottom, top or back panels. These vents cannot be blocked or obstructed. Space allowance between the cabinet and any adjacent walls or devices is required.

REQ-ONS-14	Weight	Approved	F

The Onboard SRVMs shall weigh no more than:

 - min. 50kg, max. 110kg, with an average of 80kg. empty (i.e. no coins)
 - add 25kg for full (i.e. coin hoppers full)

REQ-ONS-15	Orientation	Approved	F

The Onboard SRVMs are oriented such that their front panel is exposed to the interior of the LRV and is parallel to the mounting wall (or stanchions on the wall).   Customers accessing this device will not restrict Customer flow and access to either the SRVMs or other devices on the Legacy LRV.

REQ-ONS-16	Mounting	Approved	F

The Onboard SRVMs can be mounted between to two (2) stanchions, on a pedestal or directly to the LRV wall.

Mounting should be designed in order to minimize the MTTR.

REQ-ONS-17	Power	Approved	F

The Onboard SRVMs shall have the following (continuous) maximum power draw:

 - 24V DC, (+/- 20%)
 - ~10A (maximum)

REQ-ONS-18	Operating Temperature	Approved	F

The Onboard SRVMs shall typically operate without additional heating or cooling within the following temperature range:

 - -10C to +50C (without additional heating or cooling mechanisms)

REQ-ONS-19	Heating	Approved	F

If required, Onboard SRVMs shall have an internal heater and operate using the power identified in ONS-17.

REQ-ONS-20	Cooling	Approved	F

If required, Onboard SRVMs shall have internal cooling fans and operate using the power identified in ONS-17.

REQ-ONS-21	Venting	Approved	F

The Onboard SRVMs that require vents shall have vents in the top, sides, bottom and back panels for

air flow.

REQ-ONS-21.1	Venting-2	Approved	F

Onboard SRVMs vents shall be kept clear of any other devices or mounting obstructions.

REQ-ONS-22	Communications	Approved	F

The Onboard SRVMs shall have at a minimum 10/100BaseT Ethernet network as well as additional wireless networks to support the PRESTO System design for onboard LRVs.

Onboard SRVMs may have additional ports for connections to keyboards, USB, etc.   These 'secure' ports will be used for local access by TTC / PRESTO personnel.

REQ-ONS-23	Electrical Connections	Approved	F

Onboard SRVMs shall use approved vehicle power and communications connectors (i.e. approved connectors meet all vehicle standards, locking, dust and vibration resistant).

REQ-ONS-23.1	Electrical Connections-2	Approved	F

Onboard SRVM connectors shall allow the readers to be easily installed and/or replaced in the field. For example, SRVMs will use M12 (or equivalent type) connectors for this Onboard Ethernet connection.

The mounting stanchions may be used as the conduit for these connections.

REQ-ONS-24	Infield Service Access	Approved	F

Access to the on-board SRVMs will be required for:

 - servicing and maintenance
 - consumable replenishing (e.g. paper rolls, and LUM)
 - coin collection
 - configuring
 - troubleshooting / testing and
 - all other access needs required to fully operate and maintain the SRVM.

REQ-ONS-24.1	Infield Service Access-2	Approved	F

Equip on-board SRVMs with a front panel for easy access.

REQ-ONS-24.2	Infield Service Access-3	Approved	F

Equip the Onboard SRVMs with multiple internal compartments allowing secure access to various components as needed.

REQ-ONS-24.3	Infield Service Access-4	Approved	F

Ensure the Onboard SRVMs location and position, and in particular the front door access does not impede the access and servicing of any of these components.

REQ-ONS-25	Accessibility	Approved	F

The Onboard SRVMs shall be compliant with AODA, and other applicable accessibility standards, for height and accessibility by disabled persons.

For example, the centre of the MMI on the Onboard SRVMs should be approximately 1170 mm from the floor of the vehicle.

REQ-ONS-26	No Changes Through Fare Media Phases	Approved	F

The Onboard SRVMs shall be used through all phases of the LRV POP system installation.

REQ-ONS-26.1	No Changes Through Fare Media Phases-2	Approved	F

During the transition phase (when both PRESTO Media and current fare media are accepted) the Onboard SRVM shall provide Customers that use tokens with POP receipts (paper or LUM).

REQ-ONS-26.2	No Changes Through Fare Media Phases-3	Approved	F

PRESTO will design the Onboard SRVM such that it shall not require any Software, Hardware, and certifications changes before, during and after the PRESTO only media phase.

3.1.4   Handheld POS Equipment

3.1.4.1   General

REQ-HHP-1	General Description	Approved	F

An HHPOS will be a portable, battery operated Reader Assembly that shall be used by authorized TTC personnel as a portable PRESTO fare payment device or to check that Customer's PRESTO Media has been used appropriately for the Customer's current journey.

REQ-HHP-2	Inclusion of General Reader Assembly Specifications	Approved	F

The HHPOS shall comply with all specifications listed in the General Reader Assembly Specifications Section of this Schedule.

REQ-HHP-3	Base Station	Approved	F

Provide HHPOS devices with a base station.

REQ-HHP-3.1	Base Station Functionality	Approved	F

The HHPOS base station shall:

- Recharge the HHPOS
- Receive and transfer Data to and from the PRESTO System.

HHPOS data transfer may occur wirelessly while the device is in operation.

3.1.4.1.1   HHPOS Components

REQ-HHP-4	Reader Assembly	Approved	F

The HHPOS shall have the equivalent of a PRESTO Reader Assembly component.

REQ-HHP-4.1	Read / Write Capabilities	Approved	F

The HHPOS Reader Assembly shall be capable of reading and writing all PRESTO Media including LUM (i.e. LUM encoding of single/return tickets, transfers and passes).

REQ-HHP-4.1.1	Read / Write Capabilities-2	Approved	F

The HHPOS Reader Assembly shall be capable of reading and writing all TTC Fare Products and to/from the PRESTO e-Purse.

REQ-HHP-4.2	List Processing	Approved	F

The HHPOS Reader Assembly shall be capable of processing PRESTO Action and Hotlists provided by the PRESTO System Central Back Office.

REQ-HHP-4.3	Integrated Component	Approved	F

This Reader Assembly shall be integrated (as a component) into the HHPOS to be used in the validation of all PRESTO fare payments and PRESTO Media.

REQ-HHP-4.4	Target Area	Approved	F

The Reader Assembly shall have a target tap area clearly displayed on the HHPOS for Customer use.

REQ-HHP-5	Key Pad and Menu Keys	Approved	F

The HHPOS will use a variety of technologies for user input including but not limited to,

- keypad (e.g. 3x4, along with screen addressable keys); and/or
- touch screen (e.g. Software programmable user interface).

REQ-HHP-6	LCD Display	Approved	F

The HHPOS colour LCD shall display all information related to:

- Tap Checks;
- TTC Transit Products and e-Purse;
- menus
- instructions

REQ-HHP-6.1	Size of LCD Display	Approved	F

The HHPOS screen physical features shall be suited to TTC operating environment and appear and perform in a manner that enables easy use by all TTC personal. Screen features will be mutually agreed upon.

REQ-HHP-6.2	Key Features of LCD Display	Approved	F

HHPOS LCDs shall be equipped with:

- anti-glare features and finishes;
- programmable graphics and
- a minimum resolution of 240x320 pixels.

REQ-HHP-6.3	Contrast and Brightness Control	Approved	F

HHPOS Brightness and Contrast shall suitable for the following reading conditions – (1) full sunlight, (2) normal lighting, and (3) limited light source. Furthermore, controls shall be in place to adjust these parameters locally.

REQ-HHP-6.4	Screen Saver	Approved	F

The HHPOS device shall use a screen saver when it has been idle for a set period.

REQ-HHP-6.5	Vandal and Abuse Resistant	Approved	F

HHPOS displays shall be vandal-resistant and comply with UL certification testing for direct impact through utilization of protective overlays, or similar methodologies.

REQ-HHP-6.5.1	Vandal and Abuse Resistant-2	Approved	F

HHPOS LCD display, with protective overlays shall still have 90% transmission of visible light.

REQ-HHP-7	Communications Modules	Approved	F

HHPOS shall be equipped with multiple communications modules (that can be easily swapped out) enabling the HHPOS to use various wireless and wired communications as required.

REQ-HHP-7.1	Cellular Modem	Approved	F

The HHPOS shall have a broadband cellular data modem / module (e.g. 3G) for communication with the PRESTO System over the cellular phone network.

REQ-HHP-7.2	WiFi Modem	Approved	F

The HHPOS shall have a local wireless data communications modem / module based on WiFi (802.11) standards.

REQ-HHP-7.3	Ethernet Module	Approved	F

The HHPOS shall have an Ethernet module.

REQ-HHP-7.4	Serial Port	Approved	F

The HHPOS shall have a serial port (RS232, or USB) as an alternative data communications, diagnostics port.

REQ-HHP-8	Receipt Printer	Approved	F

Optional - The HHPOS shall be equipped with an Receipt Printer. The receipt printer may be used by authorized TTC personnel to print enforcement tickets.

REQ-HHP-8.1	Printing Capabilities	Approved	F

The receipt printer shall be capable of printing alphanumeric characters.

REQ-HHP-8.1.1	Printing Capabilities-2	Approved	F

The HHPOS Receipt Printer shall be a direct thermal type;

REQ-HHP-8.1.2	Printing Capabilities-3	Approved	F

The HHPOS Receipt Printer shall be capable of printing upper and lower case letters and graphics.

REQ-HHP-8.2	Minimum height: As determined by TTC.	Approved	F

The Receipt Printer will be capable of printing characters that will have the following characteristics:

 - Minimum height
 - Font type
 - Height to width ratio
 - Font Density

These characteristics will be determined during Design Review.

REQ-HHP-9	GPS module	Approved	F

The HHPOS shall be equipped with a GPS module.

3.1.4.1.2   Functionality

REQ-HHP-10	Tap and Go Functionality	Approved	F

The HHPOS shall have the capability to be set to "Tap and Go Functionality

Tap and Go functionality means:

 - A Customer taps their PRESTO Media to the HHPOS Reader Assembly;
 - The Reader Assembly determines if the tap has resulted in an accepted fare payment (or transfer);
 - The Reader Assembly illuminates a coloured light indicating an accepted fare payment;
 - Simultaneously the Reader Assembly produces a tone indicating an accepted fare payment;
 - The Customer proceeds through the Point of Entry.

REQ-HHP-10.1	Tap and Go Functionality-2	Approved	F

The HHPOS shall illuminate a different coloured light and produce a corresponding tone for accepted, rejected and Concession Customer taps on the reader.

REQ-HHP-11	Tap and Check	Approved	F

The HHPOS shall have a Tap and Check Functionality.

Tap and Check Functionality means:

 - At the request of authorized TTC personnel, a Customer taps their PRESTO Media to the HHPOS;

 - The HHPOS reads the Customer's PRESTO Media for a valid fare payment according to TTC fare rules and policies (this includes, transfers, Concessions etc).

 - The HHPOS will also check the PRESTO System Hot List to see if the card has been hot listed.

 - The HHPOS will illuminate a coloured light indicating acceptance or denial of fare payment.

 - Simultaneously the HHPOS produces a tone indicating the result of the check.

 - The HHPOS composes a short message which includes the results of the Check as well as the product and Concession type.

REQ-HHP-11.1	Tap and Check -2	Approved	F

The HHPOS shall illuminate a different coloured light and produce a corresponding tone for accepted, rejected and Concession Customer taps on the reader.

REQ-HHP-11.2	Tap and Check -3	Approved	F

The HHPOS shall record the results of the check for uploading to the PRESTO System and Data Mart later.

REQ-HHP-12	Validate TTC Product Use	Approved	F

Enable the HHPOS to interpret all TTC Fare Products on all PRESTO Media as detailed in the TTC fare rule and policy section of this schedule and determine if the fare payment and use is valid for the current journey.

REQ-HHP-13	Validate Cross Boundary Use	Approved	F

Enable the HHPOS to interpret and validate all cross boundary fare rules and policies as outlined in the cross boundary service of this schedule to determine if the fare payment and use is valid for the current journey.

REQ-HHP-14	Validate Transit Expansion Use	Approved	F

Enable the HHPOS to interpret and validate all Transit Expansion fare rules and policies as outlined in the Transit Expansion service of this schedule to determine if the fare payment and use is valid for the current journey.

REQ-HHP-15	PRESTO Media History	Approved	F

Ensure the HHPOS will be able to display, if requested by authorized TTC personnel, the transaction history contained on the PRESTO Media.

REQ-HHP-16	Acceptance of Payment	Approved	F

The HHPOS shall be able to accept payment from the Customers PRESTO Card.

REQ-HHP-17	Use of GPS Location and Time	Approved	F

The HHPOS shall use GPS location and device time (synchronized to the PRESTO System) when checking taps.   This information will be stored with the results of the tap check and sent to the PRESTO System.   Time and location will be used by the PRESTO System as an aid to fraud analysis. Furthermore, all tap checks will be sent to and recorded in the Data Mart.

REQ-HHP-18	Ticket Printing	Approved	F

The HHPOS shall be equipped with a thermal printer to print fare enforcement tickets.

REQ-HHP-19	Performance	Approved	F

PRESTO will ensure that all HHPOS's meet all applicable performance specifications as defined and detailed in Schedule A - SLA Specifications. These SLA specifications are briefly outline below for clarity only; how they are measured, calculated and enforced is detailed in Schedule A. Note that this list may not be exhaustive of Schedule A, and that Schedule A takes precedence.   It is the responsibility of PRESTO to ensure all SLA performance measures for HHPOS as described Schedule A are met.

REQ-HHP-19.1	Reader Assembly Sales Availability	Approved	F

The HHPOS used by authorized TTC personnel shall be included in the Reader Assembly Sales Availability measurement (whether or not the device is fully functional to check PRESTO Media)as another type of Reader Assembly.

3.1.4.1.2.1   States of Operation

REQ-HHP-20	States of Operation	Approved	F

The HHPOS shall operation in the following states:

 - On;
 - Off; and
 - Power Save.

REQ-HHP-21	On State	Approved	F

In the On State the HHPOS shall be fully functional and be able to be set to accept fare payments or to check/read the Customer's PRESTO Media for a valid fare payment according to TTC fare rules and policies (this includes, transfers Concessions).

In On State, two modes are supported:

 - On-Line Mode; and
 - Off-Line Mode

REQ-HHP-21.1	On State, On-Line Mode	Approved	F

The On State, On-Line Mode allows the fully functional HHPOS to be connected to the PRESTO System Central Back Office allowing the HHPOS to communicate with the PRESTO Central Back Office for any additional information relating to the PRESTO Media it is currently checking (e.g. Hotlists).

On-Line Mode shall allow the HHPOS to at a minimum:

 - Allows for continuous data transfers between the HHPOS and the PRESTO System Central Back Office.
 - Allow real- time device management and monitoring;
 - Download of PRESTO Media update files;
 - Download of lists (Hotlists);
 - Update of operating parameters;
 - Upload of tap check transaction files;

REQ-HHP-21.2	On State, Off-Line Mode	Approved	F

In the On State, off-line Mode the HHPOS shall be fully functional; however, it is not connected to the PRESTO System Central Back Office. All functionality is local to the HHPOS.

REQ-HHP-21.2.1	Optimization of Hot List	Approved	F

Ensure the Reader Assembly hot list is optimized and used in conjunction with the fraud detection and analysis capabilities of the PRESTO System for the on state off-line mode for purposes of reducing fraud.

Optimization here means that the Hot List is used in conjunction with the fraud detection and analysis capabilities of the PRESTO System to analyze usage patterns, trends etc. in order to decrease the likelihood of a fraudulent card being used.

REQ-HHP-21.2.2	Utilize Store and Forward	Approved	F

In off-line mode, PRESTO shall ensure that the HHPOS utilizes Store and Forward functionality as defined in the General Reader Assembly Specifications Section of this Schedule.

REQ-HHP-22	Power Save	Approved	F

In Power Save state, the HHPOS shall consume a minimal amount of battery power.

REQ-HHP-22.1	Power Save to On State	Approved	F

A single button press shall transition the HHPOS from Power Save state to On state in one (1) second.

REQ-HHP-23	Off State	Approved	F

In Off State the HHPOS shall consumes no power.

REQ-HHP-23.1	Off State-2	Approved	F

Switched on the HHPOS shall take no more than twenty (20) seconds to be fully functional and ready to accept Customer taps.

3.1.4.2   Design Criterion

REQ-HHP-24	Weight	Approved	F

The HHPOS shall be no more than 500g (without a paper roll) in weight.

REQ-HHP-25	Robust	Approved	F

The HHPOS shall be sufficiently robust to withstand the day-to-day environment encountered by authorized TTC personnel in the transit system (both indoor and outdoor operation).

REQ-HHP-25.1	Robust-2	Approved	F

 The HHPOS shall be capable of surviving, intact, a drop of 1 meter to a concrete floor.

REQ-HHP-26	Tap Transaction Count	Approved	F

The HHPOS shall be capable of at least 5000 tap transactions per shift.

Final tap transaction count capability will be determined in Design Review.

REQ-HHP-27	Battery Life	Approved	F

The HHPOS battery shall last a minimum of 10 hours, under normal inspection use, without recharge.

3.1.5   LUM on Bus Dispensers

REQ-LBD-1	Description	Approved	F

The LUM on Bus Dispenser is a mechanical dispenser that holds a group of stacked LUM (i.e. not in roll) securely in place while allowing the vehicle Operator to easily remove one LUM at a time by actuating a dispensing lever or mechanism.

REQ-LBD-2	Vehicles with LUM Dispensers	Approved	F

PRESTO will equip all buses and Legacy streetcars in TTC's fleet, including spares, with LUM on Bus Dispensers. Other vehicles, such as Wheel Trans may also be equipped with LUM on Bus Dispensers.

REQ-LBD-3	Mounting Standards	Approved	F

LUM on Bus Dispenser will be affixed to the TTC Vehicle in accordance with TTC operating requirements and safety procedures.

REQ-LBD-4	LUM Capacity	Approved	F

The LUM on Bus Dispenser shall be able to securely hold a minimum of two-hundred (200) LUM.

REQ-LBD-5	Bulk Loading of LUM Dispenser	Approved	F

The LUM Dispenser shall be capable of bulk LUM loads, without the need to first dispense any remaining LUM or to remove the LUM dispenser from its mounting on the bus.

REQ-LBD-6	Ease of Loading LUMs	Approved	F

Reloading the LUM on Bus Dispenser with additional LUM shall use a Finger-Tip Maintenance approach, without the need for keys or special tools.

REQ-LBD-7	Dispensing of LUMs	Approved	F

The LUM Dispenser shall be capable of dispensing LUM one-at-a-time by mechanical means actuated by vehicle Operator, without the need of electrical power.

REQ-LBD-8	Dispense One LUM at a Time	Approved	F

The dispensing mechanism of the LUM Dispenser shall be constructed in a manner that prevents issuance of more than a single LUM with each actuation by the Operator and that minimizes the opportunity for the mechanism to jam.

REQ-LBD-9	Location of LUM Dispenser	Approved	F

The LUM on Bus Dispenser will be mounted so that the vehicle operator can easily actuate the LUM Dispenser mechanism, retrieve the LUM, activate it, and hand it to the Customer.   The vehicle Operator should in no way strain to reach, activate or hand the LUM to a Customer. Furthermore, the LUM dispenser will be mounted so that Customers may not dispense their own transfer LUMs.

REQ-LBD-10	No Impact on Operator Activities	Approved	F

The LUM on Bus Dispenser cannot impact the other activities and responsibilities of the vehicle Operator. The design, location and ergonomics associated with the LUM on Bus Dispenser will be approved by TTC during Design Review.

3.1.6   Distribution Equipment

REQ-DEQ-1	Issuing Equipment for Non-Revenue Products	Approved	F

Provide three sets of issuing equipment for issuing TTC private fare cards for use as both non-revenue fare cards and revenue fare cards (as per FRP-65).   This requirement is separate from any equipment required for the TTC's Customer Service Centre(s).

REQ-DEQ-2	Distribution Equipment	Approved	F

Distribution equipment may include, but not be limited to,

 - Portable media encoding machine;
 - Handheld media activation device (may be a HHPOS suitably programmed);
 - Colour photograph printing machine cable of printing directly on to plastic Smart Cards;
 - Smart card lamination device;
 - Portable Reader Assembly and PRESTO System interface.

REQ-DEQ-3	Registration Equipment	Approved	F

PRESTO shall provide any equipment in addition to the equipment stated in DEQ-2 that may be required to register PRESTO Cards.

This may include interfaces, Hardware, Software, computers etc.

REQ-DEQ-4	Provision of PRESTO Media	Approved	F

PRESTO will provide PRESTO Media, suitably configured for TTC Private Fare Cards issuance using the provided distribution equipment. Details of this process will be confirmed with TTC during Design Review.

REQ-DEQ-5	Design Review Details	Approved	NF

The roles and responsibilities for the distribution of TTC Private Fare Cards will be determined during Design Review.

REQ-DEQ-6	Scope	Approved	F

Ensure PRESTO Media distribution equipment will be used by TTC to distribute all TTC private fare cards.

3.1.7   Point of Sale Equipment

REQ-POS-1	Scope	Approved	F

PRESTO shall provide two types of Point of Sale equipment:

- A portable POS that can be used at various non-TTC locations (e.g. schools, institutions) and work in conjunction with the Distribution equipment.

- An integrated POS that is used at the TTC Customer Service Centre.

REQ-POS-2	Integrated POS	Approved	F

The PRESTO Integrated POS equipment shall be an integrated POS solution that will consist of:

- A PC based terminal, with touch sensitive LCD display (for easy selection/loading of TTC Fare Products);
- Payment Software, certified for taking Customer payments
- A receipt printer
- A communications interface and
- a PIN Pad.

REQ-POS-3	Portable POS	Approved	F

The PRESTO Portable POS equipment shall:

- Be a certified POS devices with touch sensitive LCD display (for easy selection of TTC Fare Products);
- Have Payment Software, certified for taking Customer payments;
- A receipt printer;
- A communications interface; and
- A keypad.

REQ-POS-4	Functionality	Approved	F

Provide point of sale equipment that is capable of:

REQ-POS-4.1	Functionality-2	Approved	F

- activating PRESTO Media

REQ-POS-4.2	Functionality-3	Approved	F

- loading PRESTO Media with TTC Fare Products and PRESTO e-Purse

REQ-POS-4.3	Functionality-4	Approved	F

- enabling PRESTO Media and TTC Fare Products on that media for immediate use on TTC

REQ-POS-4.4	Functionality-5	Approved	F

- printing receipts

REQ-POS-4.5	Functionality-6	Approved	F

- querying PRESTO Media

REQ-POS-4.6	Functionality-7	Approved	F

- registering PRESTO Cards, as necessary

REQ-POS-4.7	Functionality-8	Approved	F

- processing refunds, as necessary

REQ-POS-5	Compliance	Approved	F

Ensure that the point of sale equipment complies with all applicable financial payment standards.

REQ-POS-6	Customer Payment Options	Approved	F

Ensure that the point of sale equipment is capable of accepting all major Credit Cards and Debit Cards.

REQ-POS-7	Customer Facing PIN Pad	Approved	F

The PRESTO POS shall have a Customer facing PIN Pad that supports contact and contactless bank cards and meets all financial and AODA standards.

PIN Pad should be easily accessible to the Customer for their payment purchases.

REQ-POS-8	Reader Assembly Integration	Approved	F

The Point of Sale Equipment shall have several standard serial ports for interfacing to a PRESTO Reader Assembly. For example RS232, USB,

REQ-POS-8.1	Reader Assembly Integration-2	Approved	F

The Point of Sale Reader Assembly shall be used for reading / writing, updating, and reloading PRESTO Cards.

REQ-POS-9	Location	Approved	F

The PRESTO point of sale equipment will be located at the TTC Customer service centres and also at non-TTC locations.

REQ-POS-10	Quantity	Approved	F

Provide one (1) PRESTO point of sale device for each Customer wicket at each Customer service centre.

REQ-POS-11	PRESTO Card Stock	Approved	F

PRESTO will provide PRESTO Cards to the TTC for sale to Customers using the PRESTO point of sale equipment.

REQ-POS-12	TTC Product Update and PRESTO System Updates	Approved	F

The PRESTO POS equipment shall be capable of securely receiving TTC Fare Product and pricing updates from the PRESTO System Central Back Office and processing all PRESTO lists(e.g. Hot Lists etc.) as necessary.

3.2   Installation of PRESTO Field System

3.2.1   General Guidelines

REQ-IOF-2	Role of TTC in Installations	Approved	NF

All on-site and all vehicle equipment installations will be executed by PRESTO resources. TTC will provide supervised, controlled access to its facilities and equipment in a manner that assists and fully supports PRESTO's efficient, effective, and timely compliance with the requirements of this Schedule. In addition, TTC will make available personnel with subject matter expertise whose responsibility will be to facilitate the installation activities of PRESTO with additional knowledge and insight about TTC operations, equipment, infrastructure, and other relevant subject matter as it relates to the planned implementation of the PRESTO System. TTC will not be required to provide labour or materials directly or indirectly needed to execute physical, technical, testing, and other attributes of the installation process. There may be specific installation activities that must be done by TTC personnel. These will be identified during Detailed Design.

REQ-IOF-3	Following TTC Standards	Approved	NF

PRESTO will ensure that PRESTO, its affiliates, its subcontractors, and any other personnel under the supervision and control of PRESTO will abide by all TTC requirements, rules, procedures, and safety standards while on TTC property

REQ-IOF-4	State of Installation Site	Approved	NF

PRESTO will return the site to a clean, orderly state, having removed all debris and remnants of site installation work prior to leaving the installation site and moving on to the next installation location.

3.2.2   On-Site Installation

REQ-IOF-5	PRESTO Installation Deliverables	Approved	F

Provide labour and supervision for all on-site installations.

REQ-IOF-5.1	PRESTO Installation Deliverables-2	Approved	F

Provide materials and tools for all on-site installations

REQ-IOF-5.2	PRESTO Installation Deliverables-3	Approved	F

Provide comprehensive installation manuals that include drawings of equipment, components and parts; including step-by-step installation procedures with detailed specifications of tools required; and in-field testing procedures

REQ-IOF-6	Installation Plan	Approved	NF

In conjunction with TTC personnel from appropriate departments and areas of responsibility, PRESTO will develop and submit for TTC review and approval an installation plan for all PRESTO equipment to be deployed for the PRESTO System at TTC.   The Installation Plan will provide:

- An installation schedule that identifies the amount of time and PRESTO personnel resources required to complete timely installation;
- Installation milestones such as station completions;
- Coordination of parallel installation efforts;
- etc.

The specific installation/deployment plan details will be developed as part of the joint development of the PRESTO/TTC "Project Plan"

REQ-IOF-7	Installation Manuals	Approved	F

PRESTO will work with TTC to develop and publish an Installation Manual that will be used to guide the required installation process. The Installation Manual will be subject to review and final approval by TTC and will be subject to TTC's Quality Assurance/Quality Control procedures and guidelines.

REQ-IOF-7.1	Installation Manuals-2	Approved	F

 - a detailed description of all PRESTO components, accompanied by drawings, images, and technical specifications

REQ-IOF-7.2	Installation Manuals-3	Approved	F

 - a parts and materials list encompassing all installation scenarios for each TTC station location and mode of transportation

REQ-IOF-7.3	Installation Manuals-4	Approved	F

 - detailed drawings that shows the physical location/placement of the PRESTO equipment

REQ-IOF-7.4	Installation Manuals-5	Approved	F

 - detailed installation procedures and guidelines

REQ-IOF-7.5	Installation Manuals-6	Approved	F

 - a detailed field Quality Assurance and testing protocol

REQ-IOF-7.6	Installation Manuals-7	Approved	F

 - a detailed trouble-shooting guide

REQ-IOF-7.7	Installation Manuals-8	Approved	F

 - details of safety procedures and protocols to be followed

REQ-IOF-8	Kitting prior to Installation	Approved	F

Prior to installation, and in conjunction with the staging process, all equipment and components will be "kitted" in a manner that facilitates field installation. Prior to installation, PRESTO will conduct "dry runs" of the kitting and installation procedures to validate the accuracy and timeliness of the installation process.

REQ-IOF-9	Coordination of Installations	Approved	NF

All installations will be scheduled in advance in coordination with TTC. TTC requires that installations occur without interruption of or interference with normal service delivery operations. PRESTO must perform installations at times and locations required by TTC so as to permit normal operations to continue without interruption from PRESTO installation activities.

REQ-IOF-10	Protection for Customers and Employees	Approved	NF

TTC requires that PRESTO conduct installation and operations in a manner that shields TTC Customers and employees from physical injury, prevents damage and protects all TTC equipment, property, and maintains access to public rights-of-way.

3.2.3   Surface Vehicle Equipment

REQ-IOF-11	Standards for Surface Vehicles	Approved	NF

TTC will provide its engineering standards where available for equipment to be installed on TTC surface vehicles. Standards for each vehicle type will be detailed during Design Review.

REQ-IOF-12	Installation of Vehicle Antennas	Approved	F

In the event that installation of a roof-top, or other antenna, may be required, PRESTO will be expected to work with TTC to identify an acceptable solution. In addition, PRESTO must comply with all applicable safety standards and regulations if external antennas are required.

Additional safety, operating and design constraints must be adhered with regards to LRVs. PRESTO must work within the design constraints set out by the LRV manufacturer and TTC with regards to all Onboard LRV installations including, if permissible, additional external antennas.

REQ-IOF-13	Protection of Surface Field Equipment	Approved	F

All installations will be executed in a manner that protects all PRESTO field equipment (e.g. Reader Assemblies, Onboard/Off-board SRVMs, etc.), their associated cables and conduit, and other components integral to normal operations from unauthorized access, vandalism, or accidental damage or abuse.

3.2.4   In-Station Equipment

REQ-IOF-14	Standards for Installation Equipment on TTC Property	Approved	NF

TTC will provide where available its engineering standards for equipment to be installed on TTC property during Design Review. Standards for each location will be detailed during Design Review.

3.2.4.1   Wireless Communications

REQ-IOF-15	Use of Wireless Communications	Approved	F

PRESTO may use wireless telecommunications to support operation of all PRESTO equipment on TTC property and/or vehicles. If a wireless telecommunications architecture is chosen by PRESTO, then the power and communications required to support this wireless communication will be determined during detailed Design Review.

REQ-IOF-16	Installation of Station Wireless Antennas	Approved	F

In the event that installation of an external or other antenna may be required, PRESTO will be expected to work with TTC to identify an acceptable solution.

3.2.4.1.1   Wireless Design Constraints

REQ-IOF-29	Frequency Band Restrictions	Approved	F

Ensure the following frequency bands shall not be used by PRESTO Devices:

 - VHF = 138-174 MHz (used by SRAS);
 - UHF = 406-470 MHz (used by SRAS);
 - 800 = 806-960 MHz (used by SRAS);
 - ATC/CBTC = 5.0-6 MHz (Communication Based Train Control); and
 - iDEN "Mike" marketed by TELUS (800 MHz)

REQ-IOF-30	Allowable Frequency Bands	Approved	F

The following frequency bands may be used:

 - PCS = 1850-1990 MHz (Portable Communication System);
 - AWS = 1710-2155 MHz (Advanced Wireless System);

- Wi-Fi = 2400-2495 MHz (Wireless Fidelity); and
- LTE = 1700 and 1900 MHz (Long Term Evolution).

REQ-IOF-31	Antenna Orientation Restrictions	Approved	F

Ensure PRESTO Device antennas are not directly pointed at SRAS antennas or radiating cables (unless mounted more than 3 feet (1 meter) from the SRAS antenna or radiating cables).

REQ-IOF-25	Antenna Location Restrictions	Approved	F

Ensure UMTS, GSM, CDMA, TETRA or any other radio system antenna will be in compliance with best practices and industry recommendations (and agreement with TTC).

REQ-IOF-26	Antenna Minimum Distances	Approved	F

The minimum distance between the CBTC track side and Onboard antennas and radiating feeder for

- TETRA, (860 MHz) is 10 cm;
- GSM and CDMA (1850 MHz band) is 15 cm; and
- UMTS (2015 MHz Band) is 25 cm.

REQ-IOF-32	Wireless Equipment Space	Approved	F

TTC will make available wall space (approximately 1.0m x 1.0m x 0.5m) for housing Base Station Wireless Equipment on TTC property.

3.2.4.2   Reader Assemblies for Fare Gates

REQ-IOF-17	Installation and Testing of Reader Assemblies at Fare Gates	Approved	F

Installation and field testing of Reader Assemblies for Fare Gates will occur at Subway stations. PRESTO will provide necessary vehicles (for getting contractors, equipment, etc... to installation site) and equipment to permit its contractors to execute installation of Reader Assemblies for Fare Gates at station locations.

REQ-IOF-18	Protection of In-Station Equipment	Approved	F

All installations will be executed in a manner that protects Reader Assemblies cables and conduit, and other components integral to normal operations from unauthorized access, vandalism, or accidental damage or abuse.

3.2.4.3   FMVDs and AVMs

REQ-IOF-19	In-Station Location	Approved	F

During Design Review, TTC will work with PRESTO to identify optimal locations for the installation of new FMVD and AVMs. In-station locations for deployment of these machines will be optimized for TTC Customer convenience and use, as well locations that require minimal physical modifications, and minimize the impact on TTC station operations (e.g. Customer flows, etc.).

REQ-IOF-20	Redeployment of Legacy TTC Vending Machines	Approved	F

In many cases, optimal deployment of new machines will require strategic redeployment of legacy TTC vending machines prior to installation of new machines.

REQ-IOF-21	Responsibility of Legacy Fare Vending Machines	Approved	NF

TTC is responsible for the redeployment, removal and/or storage of all TTC legacy fare vending

machines. The removal of existing legacy equipment will be coordinated with the installation of new PRESTO machines so that all equipment moves will occur outside of peak TTC hours of operation.

REQ-IOF-24	Installations in Accordance with Schedule 12	Approved	F

All installations will be executed in accordance with Schedule 12.1.1 and in a manner that protects FMVDs and AVMs, cables and conduit, and other components integral to normal operations from unauthorized access, vandalism, or accidental damage or abuse.

3.3 Estimated Operating Equipment

REQ-EOE-1	Estimated Operating Equipment	Approved	F

Determine specific device quantities required to meet the SLA and present these numbers to the TTC for approval.
Minimum PRESTO Device estimates are provided in the following table.

For the excel version of the TTC Specifications the table is located in EOE-1 in the document **Appendix B for Excel Version of TTC Specifications.**

PRESTO Equipment Estimates & Assumptions		
Area	**Estimated # Devices**	**Assumption/Rationale**
Subway		
Reader Assembly	990	1/entry turnstile
Fare Media Vending Device (FMVD)	233	2/staffed entrance + 1/unattended entrance
AVM	437	3/staffed entrance + 1/unattended entrance + 2/platform area
Hand Held Point-of-Sale	249	1/booth + 1/Supervisor + 1/TSC
New Turnstiles	127	Replace existing "free-wheeling" turnstiles @ booths
Surface		
Reader Assembly	5452	2/bus +1/passenger entry stream on streetcars & Legacy LRVs +10WT
LUM Dispenser on Bus	1937	1/bus+1/WT owned
Legacy On-Board Single Ride Vending Machine	408	2/LRV
Legacy Off-Board Single Ride Vending Machine	75	1 @ busiest LRV stops
Hand Held Point-of-Sale	565	1/Supervisor + 1/WT-owned & accessible taxi
Commuter Parking		
Reader Assembly at Gated Lots	84	entry/exit at gated lots
Transit Expansion		
Reader Assembly	-	To Be Determined by Transit Expansion
FMVD	-	To Be Determined by Transit Expansion
Hand Held Point-of-Sale	-	To Be Determined by Transit Expansion
Other?	-	To Be Determined by Transit Expansion
Distribution & Sales		
Issuing Equipment for Private TTC Fare Media	3 sets	TTC issues/distributes Private TTC Fare Media as needed
Point of Sale Equipment	6 sets	1 / wicket @ TTC Customer Service Centre
Portable Point of Sale Equipment	TBD	To Be Determined during Design Review

Other PRESTO Equipment - To Be Determined
SRVM vaulting equipment at TTC streetcar & LRV Car houses
Payment device for non-dedicated fleet of taxis for Wheel-Trans contracted services

<p align="center">Table PRESTO Equipment Estimates and Assumptions for TTC</p>

REQ-EOE-1.1	Estimated Operating Equipment-2	Approved	F

Install necessary field equipment at TTC in order to comply with TTC's performance standards as outlined in Schedule A.

REQ-EOE-1.2	Estimated Operating Equipment-3	Approved	F

Provide any supporting equipment that may be required for the on-going operation of the PRESTO System at TTC.

4 TTC Fare Rules and Policy

4.1 General

REQ-FRP-1	PRESTO Media to Replace Tickets, Tokens and Passes	Approved	F

Ensure the PRESTO System will use standards based (ISO 14443 A, B or C), Contactless Smart Cards and PRESTO Media to replace all current TTC tickets, tokens, passes and paper transfers.

REQ-FRP-2	Replication of current TTC Fare Products	Approved	F

At a minimum PRESTO Media will mimic current fare products and policies. For example, a TTC monthly pass will function identically to a TTC monthly pass on PRESTO Media (other than the user action of tapping the PRESTO Media to the PRESTO Reader Assembly).

REQ-FRP-3	New and Enhanced of Fare Products	Approved	F

Ensure there is flexibility to allow the TTC to introduce new fares, policies and products quickly, efficiently and at a minimal cost.

REQ-FRP-4	A Solution for the Cash User	Approved	F

Ensure there is a solution for the TTC cash user based on Limited Use Media or an alternative that is acceptable to the TTC and complies to the other specifications in these schedules.

REQ-FRP-5	Passback Protection	Approved	F

Provide PRESTO Media Passback protection.

REQ-FRP-6	Unintentional Taps	Approved	F

Design and implement devices so that unintentional multiple taps by the Customer do not result in additional fares being removed from the Customers PRESTO Media.

To be clear, the Passback feature will not be the mechanism for preventing unintentional taps.

REQ-FRP-7	Configurable Passback time expiry	Approved	F

Ensure the PRESTO System, components and devices shall allow for the Passback time expiry to be configurable.

REQ-FRP-8	Flexible time limit on the collection of Fare Products	Approved	F

Enable Customers to collect TTC Fare Products on PRESTO Media for up to 30 days after the date of purchase.

REQ-FRP-9	Maximum Wait Period for Fare Card Update	Approved	F

Enable Customers to collect TTC Fare Products on PRESTO Media at any point in the TTC network within 90 minutes of purchase from any self-service channels (e.g. Website, IVR) and the call centre.

REQ-FRP-9.1	Maximum Wait Period for Fare Card Update-2	Approved	F

Enable Customers to collect TTC Fare Products on PRESTO Reader Assemblies supporting open payments in real time.

REQ-FRP-10	Support for TTC Pass Programs	Approved	F

Support TTC's current pass programs which include both MDP and VIP programs.

REQ-FRP-11	Support for the TTC Family / Group pass	Approved	F

Support the TTC Family or Group Pass.

REQ-FRP-12	Support for Day Pass	Approved	F

Support the TTC Day Pass.

REQ-FRP-13	Support for Weekly Pass	Approved	F

Support the Weekly Pass.

REQ-FRP-14	Support for the GTA Weekly Pass	Approved	F

Enable cross-boundary travel on the GTA Weekly Pass.

REQ-FRP-15	Support for Preloading of Pass Products	Approved	F

Enable pre-load pass products onto PRESTO Media for future time periods.

REQ-FRP-16	Support for Multiple Passes on PRESTO Media	Approved	F

PRESTO Media will support multiple pass loading.   The pass period of the multiple passes loaded on the PRESTO Media will not have to be the same (e.g. mix monthly with weekly etc.). For example the PRESTO System will support multiple pass loading:

REQ-FRP-16.1	Support for Multiple Passes on PRESTO Media-2	Approved	F

 - current monthly with future monthly

REQ-FRP-16.1.1	Support for Multiple Passes on PRESTO Media-3	Approved	F

 - current monthly with future weekly

REQ-FRP-16.1.2	Support for Multiple Passes on PRESTO Media-4	Approved	F

 - current monthly with weekly

REQ-FRP-16.1.3	Support for Multiple Passes on PRESTO Media-5	Approved	F

 - current monthly with family

REQ-FRP-17	Support for Rolling and Fixed Period Passes	Approved	F

Enable both rolling (i.e. activation on first use) and fixed (i.e. activated by start date) period passes.

REQ-FRP-18	Support for Open Payments	Approved	F

Ensure acceptance of open payments bank cards will fully support TTC Fare Products and policies as outlined in Schedule G.

REQ-FRP-19	Compliance with Financial Payment Standards	Approved	F

Any Enhancements to the PRESTO System including but not limited to the acceptance of Open Payments cards must likewise ensure that all systems, processes, components, devices etc. of the PRESTO System are in compliance with Financial Payments Standards.

4.2   Fare Products

REQ-FRP-20	Pre-Funded Adult Fares		Approved	F

Support TTC Pre-Funded adult fares. The current Adult Fares are given in the following table.

For the excel version of the TTC Specifications the table is located in FRP-20 in the document Appendix B for Excel Version of TTC Specifications.

Pre-Funded Processing Category Adult Fares (72% of total Linked Trips)			
Fare Product	Price	% of Total TTC Linked Trips	Notes
5 tokens	$12.50	27.5%	Minimum purchase is 5 tokens.
10 tokens	$25.00		Minimum purchase is 10 tokens.
Monthly Pass	$121.00	42.6%	
MDP Monthly Pass	$111.00		
VIP	Various		
Weekly Pass	$36.00	1.9%	

Table Pre-Funded - Adult Fares

REQ-FRP-21	Pre-Funded Senior /Student Fares		Approved	F

Support TTC Pre-Funded senior/student fares. The current Pre-Funded Senior/Student Fares are given in the following table.

For the excel version of the TTC Specifications the table is located in FRP-21 in the document Appendix B for Excel Version of TTC Specifications.

Pre-Funded Processing Category Senior/Student Fares (12% of total Linked Trips)			
Fare Product	Price	% of Total TTC Linked Trips	Notes
5 tickets	$8.25	8.1%	Minimum purchase is 5 tickets.
10 tickets	$16.50		Minimum purchase is 10 tickets.
Monthly Pass	$99.00	3.6%	
MDP Monthly Pass	$89.00		
Weekly Pass	$28.00	0.2%	

Table Pre-Funded - Senior/Student Fares

REQ-FRP-22	Other Pre-Funded Fares		Approved	F

Support TTC Pre-Funded other fares. The current Pre-Funded Other Fares are given in the following table.

For the excel version of the TTC Specifications the table is located in FRP-22 in the document Appendix B for Excel Version of TTC Specifications.

Pre-Funded Processing Category Other Fares (5% of total Linked Trips)			
Fare Product	**Price**	**% of Total TTC Linked Trips**	**Notes**
Day/Family Pass	$10.00	2.2%	Weekdays-one person. Holidays/weekends-up to 6 persons, a maximum of 2 adults. Special promotions during holidays.
Child Ten Ticket	$5.50	1.7%	Sold in strips of ten rides.
GTA Pass	$52.00	1.2%	TTC; Mississauga; Brampton; York Region
Downtown Express	Second fare equal to ticket or token rate, or Express Sticker	0.1%	Available to adults, seniors, students, and children; sold in minimum quantities of 5 and 10 rides.

Table Pre-Funded - Other Fares

REQ-FRP-23	Pay As You Go Single Ride Trip		Approved	F

Support TTC Pay As You Go (PAYG) single ride trip fares. The current Pay-As-You-Go single ride fares given in the following table.

For the excel version of the TTC Specifications the table is located in FRP-23 in the document Appendix B for Excel Version of TTC Specifications.

Pay-As-You-Go of Single Ride Trip Processing Category (11% of total Linked Trips)			
Fare Product	**Price**	**% of Total TTC Linked Trips**	**Notes**
Adult Cash Fare	$3.00	9.0%	

Pay-As-You-Go of Single Ride Trip Processing Category (11% of total Linked Trips)		
Senior/Student Cash Fare	$2.00	1.2%
Child Cash	$0.75	0.5%

Table Pay-As-You-Go - Single Ride Trip

REQ-FRP-24	TTC Private Non-Revenue Cards	Approved	F

Support TTC Private Non-Revenue Cards as outlined in section TTC Private Non-Revenue Cards.

REQ-FRP-25	TTC Private Revenue Cards	Approved	F

Support TTC private revenue cards as outlined in section TTC Private Revenue Cards..

REQ-FRP-26	LUMs for Cash User	Approved	F

Support Customers that only use cash. The PRESTO System will provide Limited Use Media (LUM) that Customers may purchase at subway stations and on the LRV POP system.

REQ-FRP-27	LUM Usage	Approved	F

LUM will be used in the PRESTO System for:

REQ-FRP-27.1	LUM Usage-2	Approved	F

 - the purchase of a fare in TTC's subway system

REQ-FRP-27.2	LUM Usage-3	Approved	F

 - the purchase of a fare on legacy LRV vehicles

REQ-FRP-27.3	LUM Usage-4	Approved	F

 - the purchase of a fare at legacy LRV stops and Transit Expansion stations

REQ-FRP-27.4	LUM Usage-5	Approved	F

 - as a transfer to be distributed on buses

4.2.1   Concession Fares

REQ-FRP-28	Support for all TTC Concession Fare Products	Approved	F

Configure the PRESTO System to provide full business, operational, and Customer support for all of TTC's Concession fare products presented in this Schedule.   This includes at a minimum:

REQ-FRP-28.1	Support for all TTC Concession Fare Products-2	Approved	F

 - child

REQ-FRP-28.2	Support for all TTC Concession Fare Products-3	Approved	F

 - student

REQ-FRP-28.3	Support for all TTC Concession Fare Products-4	Approved	F

- post-secondary

REQ-FRP-28.4	Support for all TTC Concession Fare Products-5	Approved	F

- senior

REQ-FRP-29	Additional Products for TTC Concession Fare Products	Approved	F

Ensure any adult product can be loaded onto a Concession card if the Customer chooses to do so.

REQ-FRP-30	Designating a Concession Card	Approved	F

Enable an adult PRESTO Card to be designated for use as a Concession card for an eligible Concession user, and subject to proof of eligibility and all other TTC policies that govern the use of Concession fares.

REQ-FRP-31	Registration for Concession Cards	Approved	F

Enable Customers who qualify for a TTC Concession to register with PRESTO as Concession users. The PRESTO System will provide all the necessary services, functionality and equipment required for Concession registration.

REQ-FRP-32	Proof of Eligibility	Approved	F

Concession TTC Customers must provide proof of eligibility. It is deemed to be fare evasion to use a Concession fare to enter and ride TTC's transportation if the person using PRESTO Media purchased at the price of a Concession fare is ineligible for that fare.

REQ-FRP-33	Loading and Reloading of Concession Cards	Approved	F

Ensure Concession products cannot be loaded/reloaded to a non-Concession enabled card.

REQ-FRP-33.1	Loading and Reloading of Concession Cards-2	Approved	F

Ensure Concession fare products can only be loaded to appropriately enabled Concession cards.

REQ-FRP-34	Distribution to Concession Groups	Approved	F

The distribution of PRESTO Media to qualified Concession groups will be determined by TTC policy

REQ-FRP-35	HHPOS is Concession Capable	Approved	F

In order to control for fare evasion and misuse of Concessions, PRESTO will furnish and provide support for hand held point of sale device (HHPOS) that will be used by authorized TTC personnel to validate purchase and payment of Concession fare by eligible persons only.

REQ-FRP-36	Visual Inspection of Concessions	Approved	F

Support visual and audio inspections of Customer Concession fare usage as detailed in the section on field equipment in this schedule.

REQ-FRP-37	Concession Functionality of PRESTO System	Approved	F

The PRESTO System with regards to Concessions must be able to:

REQ-FRP-37.1	Concession Functionality of PRESTO System-2	Approved	F

Capture the category and amount of the Concession fare sold from any point of sale device.

REQ-FRP-37.2	Concession Functionality of PRESTO System-3	Approved	F

Identify and record all Concession tap transactions in a manner that supports the specifications in this Schedule.

REQ-FRP-37.3	Concession Functionality of PRESTO System-4	Approved	F

Providing all raw data and information about Concession fare processing to the Data Mart

REQ-FRP-37.4	Concession Functionality of PRESTO System-5	Approved	F

Provide HHPOS with complete enforcement check data as required by authorized TTC personnel.

4.3　Fare Policy

REQ-FRP-38	Application of TTC Fare Policies	Approved	F

In determining the actual fare payment due from TTC Customers, PRESTO will ensure that the PRESTO System (including Reader Assemblies etc.) will apply all TTC fare policy and business rules, including:

REQ-FRP-38.1	Application of TTC Fare Policies-2	Approved	F

 - those governing free transfers (including transaction-free transfers)

REQ-FRP-38.2	Application of TTC Fare Policies-3	Approved	F

 - Passbacks

REQ-FRP-38.3	Application of TTC Fare Policies-4	Approved	F

 - fraud and security checks

REQ-FRP-38.4	Application of TTC Fare Policies-5	Approved	F

 - Velocity Checks

REQ-FRP-38.5	Application of TTC Fare Policies-6	Approved	F

 - group travel

REQ-FRP-39	Capturing of Customer Taps	Approved	F

Ensure the PRESTO System captures, tracks and records individual taps (accepted and denied) for all fare products.

REQ-FRP-40	Storage of Fare Taps to Data Mart	Approved	F

Store all tap information to the Data Mart as outlined in Schedule A.

REQ-FRP-41	Real Time Fare Tap Validation	Approved	F

Determine in real-time, the validity of the PRESTO Media (or device) tapped on the Reader Assembly as specified by Schedule A - SLAs.

REQ-FRP-42	Determination of Fare Tap	Approved	F

Validating a PRESTO Media tap will at a minimum check for:

REQ-FRP-42.1	Determination of Fare Tap-2	Approved	F

- active TTC Fare Products

REQ-FRP-42.2	Determination of Fare Tap-3	Approved	F

- PRESTO Media on the PRESTO Hotlist

REQ-FRP-42.3	Determination of Fare Tap-4	Approved	F

- status of LUM

REQ-FRP-42.4	Determination of Fare Tap-5	Approved	F

- TTC policy compliance

REQ-FRP-43	Order of Fare Product Priorities	Approved	F

The PRESTO System, components and devices will process fare products located on the PRESTO Media in the following order:

- Perform Hot List Processing
- Perform all other PRESTO Card list processing (e.g. Add Value, etc.)
- Check for a valid Transfer
- Check for a valid TTC pass product:

   - If PRESTO Card contains a valid pass product and it is activated, use it.
   - If PRESTO Card contains valid pass product and not activated, such as a rolling pass, activate it and use it
   - If PRESTO Card contains more than one pass product, perform steps a and b on all of them until an active product is found or list is exhausted.

- Check if Customer qualifies for loyalty trip.
- Check for valid TTC Pre-Funded product
- Check for valid e-purse and sufficient funds for journey

Further refinement, additions and details with regards to fare product processing (e.g. overdraft protection, loyalty etc.) will be dealt with in final Design.

REQ-FRP-44	Entry to TTC System on Valid Tap	Approved	F

Ensure a media tap that returns an "approval" will permit entry to the TTC system.

REQ-FRP-45	False positive taps	Approved	F

TTC will receive all revenues due for any passenger entry to the TTC system that is approved by the PRESTO System as per Agreements between PRESTO and TTC. Further, all "approved" entries into the TTC system by the PRESTO System, which may later turn out to be in error will not be fault of TTC and as such TTC will not be responsible for re-compensating PRESTO for any such monetary loss.

REQ-FRP-46	Tap Transaction Recording and Storage	Approved	F

Ensure all PRESTO Media taps on all Reader Assemblies in the PRESTO System are recorded and stored in the PRESTO System and Data Mart as individual transactions, i.e. not aggregated.

REQ-FRP-47	Tap Transaction Tracking and Reporting	Approved	F

Ensure that all tap transactions recorded and saved to the PRESTO System and Data Mart contain sufficient information so that the all linked and unLinked Trips as well as revenue and non-revenue taps can be reconstructed and reported on by PRESTO, and by the Business Intelligence / reporting service of the PRESTO System as outlined in Schedule A.

REQ-FRP-48	Customer Linked and Unlinked Trips	Approved	F

Make Customers' linked and unLinked Trip information available to them through the PRESTO web site and other sales channels.

REQ-FRP-49	Tracking, Recording and Storage of Linked Trips	Approved	F

Calculate, record, track, and link revenue passenger rides and transfers into journeys or Linked Trips. Ensure this information will be made available to the Customer when requested either through the Customer web site or other sales channels.   linked and un-Linked Trip information will be stored periodically to the Data Mart as outlined in Schedule A - SLAs.

REQ-FRP-49.1	Tracking, Recording and Storage of Linked Trips-2	Approved	F

Store linked and un-Linked Trip information to the Data Mart as outlined in Schedule A.

REQ-FRP-50	Consideration for Increased Ridership Policies	Approved	F

TTC will consider fare policy options that could enhance TTC Customer service and result in increased ridership and increased general use of public transportation. The final outcome of these considerations will be presented and will be the basis for implementation of the PRESTO System at TTC. In offering proposals for processing these fare products, as well as all others included in the tables above, PRESTO will need to take into account the specific requirements, rules, and regulations that govern the management, distribution, eligibility for and use of these fare products.

REQ-FRP-51	Updating TTC Fare Policies	Approved	F

The PRESTO System will be capable of updating TTC policies and TTC Fare Products to the PRESTO System including all field devices within a 24 hour period. Modifications will include at a minimum:

REQ-FRP-51.1	Updating TTC Fare Policies-2	Approved	F

 - new fare products

REQ-FRP-51.2	Updating TTC Fare Policies-3	Approved	F

 - fare group modifications

REQ-FRP-51.3	Updating TTC Fare Policies-4	Approved	F

 - transfer policies

REQ-FRP-52	Cross-Boundary Fare Policies	Approved	F

Ensure support of all applicable cross-boundary fares rules, policies and transfers.

4.3.1   Transfers

REQ-FRP-53	Support for all TTC Transfer Policies	Approved	F

Ensure support of all TTC transfer policies.

REQ-FRP-54	Applicability of Transfer Policies	Approved	F

TTC transfer policies are applicable to all TTC-operated services and vehicles (e.g. subway, surface, and Wheel-Trans).

REQ-FRP-55	PRESTO Reader Assembly Support for Transfers	Approved	F

Ensure that all PRESTO Reader Assemblies on all TTC-operated services and vehicles and that HHPOS used for fare enforcement activities and POP will support TTC's transfer policies.

REQ-FRP-56	PRESTO Media Support for Transfers	Approved	F

Ensure to support PRESTO Media for transfers.   All PRESTO Media regardless of fare type will support transfers.

REQ-FRP-57	Support for Automated Validation of Transfers	Approved	F

Support the automated validation of transfers at Reader Assemblies.

REQ-FRP-58	Transfer Rules Table for Time, Direction, Route	Approved	F

Ensure that the PRESTO System will support configuration of TTC's transfer policies through table and rules driven parameters, including at a minimum:

REQ-FRP-58.1	Transfer Rules Table for Time, Direction, Route-2	Approved	F

 - service routes

REQ-FRP-58.2	Transfer Rules Table for Time, Direction, Route-3	Approved	F

 - vehicles

REQ-FRP-58.3	Transfer Rules Table for Time, Direction, Route-4	Approved	F

 - direction of travel as defined in TTC's policies

REQ-FRP-58.4	Transfer Rules Table for Time, Direction, Route-5	Approved	F

 - duration of transfer validity, in minutes from the time that a full fare was first paid

REQ-FRP-59	Modification of Transfer Rules Table	Approved	F

Ensure that the PRESTO System is capable of amending transfer policies through the modification of the transfer rules table Amendment of TTC transfer policy must be managed and controlled in a secure manner, and must only occur with proper Authorization from TTC.

REQ-FRP-60	Timing for Transfer Rules Table Modification	Approved	F

Modify and distribute the transfer rules table within a 24 hour period.

REQ-FRP-61	LUM as Transfer Media	Approved	F

Support a LUM as the transfer media for all cash paying (or single ride cash) Customers. The single ride Cash Customer will be afforded the same transfer rules as other Customers across all transit modes.

4.4   Fare Matrix

REQ-FRP-62	Creation of a Fare Matrix	Approved	F

TTC will work with PRESTO to create a comprehensive Fare Matrix that summarizes all current TTC

Fare Products, policies, pricing and usage guidelines for processing fare transactions with the PRESTO System.

REQ-FRP-63	Comprehensive Fare Processing Flowcharts	Approved	F

PRESTO will submit a comprehensive flow chart that illustrates fare transaction processing flows for all TTC Fare Products across all possible use cases for TTC Customer travel using TTC transportation services.

REQ-FRP-64	Fare Matrix Design Flexibility	Approved	F

Ensure the Fare Matrix is flexible and adaptable as mutually agreed to by TTC and PRESTO prior to Final Design and easily changed at TTC's discretion during operation at TTC.

4.5 TTC Fare Cards

REQ-FRP-65	Support for all TTC Fare Cards	Approved	F

Support PRESTO fare cards that can be purchased publicly (TTC public fare cards) and the TTC private fare cards.

The figures below illustrate in detail the fare card types.

For the excel version of the TTC Specifications the figures are located in FRP-65 in the document Appendix B for Excel Version of TTC Specifications.

Figure Fare Card Types

TTC Public Fare Cards

Available through general sales/ distribution channels

Available through specialized sales/ distribution channels

- Senior
- Student
- Post-Secondary
- Child
- Convention
- Special Event
- Other ....

Limited Use Media

Adult Fare Cards

- Adult
- Senior
- Student
- Child
- Special Event

Cash Customer

Revenue Fare Cards
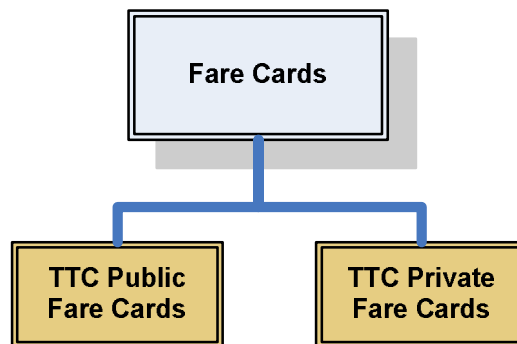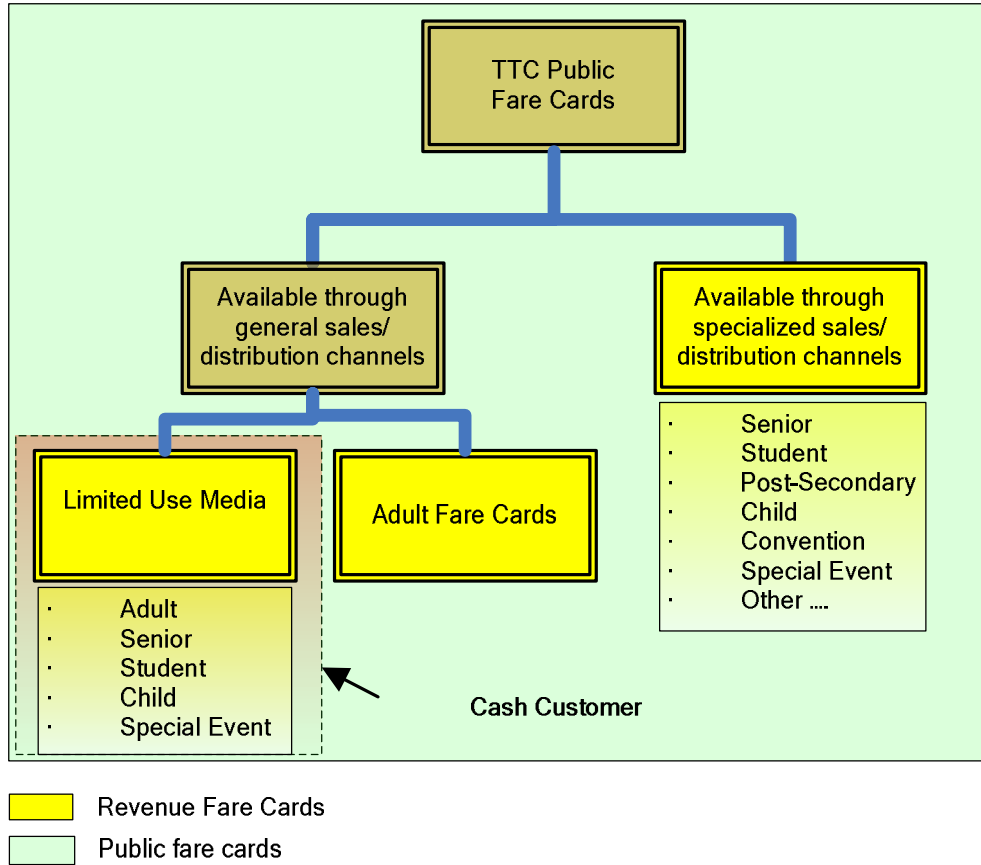
Public fare cards

Figure TTC Public Fare Cards
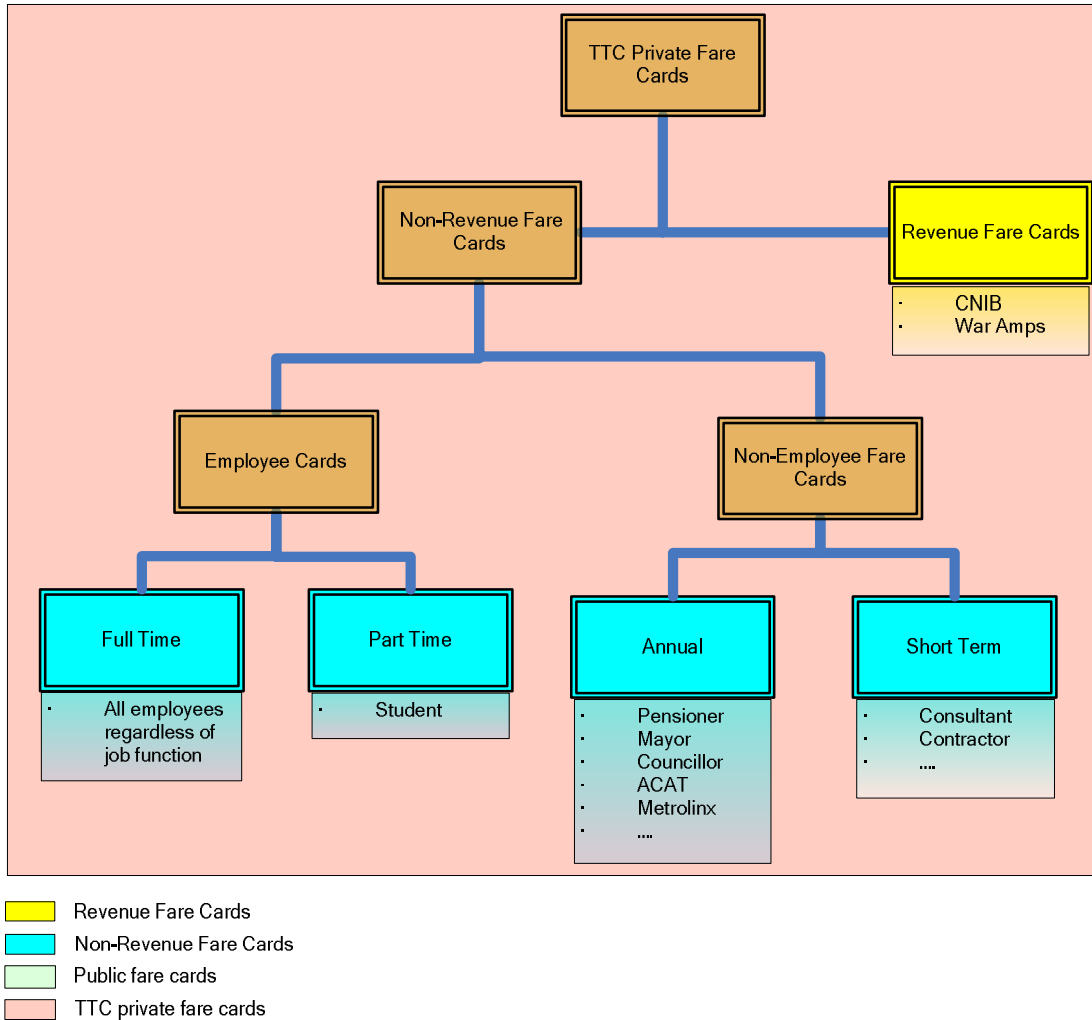
Figure Privately Available Fare Cards

REQ-FRP-65.1	Support for all TTC Fare Cards-2	Approved	F

Support two classifications: Concession and non-Concession types.

REQ-FRP-65.2	Support for all TTC Fare Cards-3	Approved	F

Ensure the single ride Cash Customer is accommodated by the PRESTO System through the use of a LUM.

4.5.1   TTC Public Fare Cards

REQ-FRP-66	Cancellation of fare card	Approved	F

Enable Customers to cancel their PRESTO Card at any time.

REQ-FRP-66.1	Cancellation of fare card-2	Approved	F

Remove Customers' private data from the PRESTO System Central Back Office when they cancel their card.

REQ-FRP-67	Opt out support	Approved	F

Enable Customers to de-register their PRESTO Card.

REQ-FRP-67.1	Opt out support-2	Approved	F

Remove Customers' private data from the PRESTO System Central Back Office when they de-register their PRESTO Card.

4.5.1.1   Adult

REQ-FRP-68	Scope	Approved	F

Adult fare cards are PRESTO Media that indicate they are classified as adult fare cards (in accordance with TTC fare policies) automatically to all PRESTO Devices in the system.

REQ-FRP-69	Eligibility	Approved	F

Enable anyone to purchase an adult PRESTO Card.

REQ-FRP-70	Determination of Eligibility	Approved	F

The TTC will determine who qualifies for adult fare cards.

REQ-FRP-71	Period of eligibility on fare card	Approved	F

For adult fare cards, there is no specific period of eligibility on (or within the data content) of the fare card.

REQ-FRP-72	Fare card products allowed	Approved	F

Enable pricing for these following products to be set as per TTC policy. The adult fare card will include at a minimum:

REQ-FRP-72.1	Fare card products allowed-2	Approved	F

- e-Purse

REQ-FRP-72.2	Fare card products allowed-3	Approved	F

- TTC transit pass products

REQ-FRP-72.3	Fare card products allowed-4	Approved	F

- TTC Pre-Funded products

REQ-FRP-72.4	Fare card products allowed-5	Approved	F

- non-TTC e-Pass products

REQ-FRP-72.5	Fare card products allowed-6	Approved	F

- products such as parking and loyalty

REQ-FRP-73	Photo ID	Approved	F

No Photo ID is required on the adult fare card.

REQ-FRP-74	Availability to Customer	Approved	F

Enable Customers to purchase adult PRESTO Cards from:

REQ-FRP-74.1	Availability to Customer-2	Approved	F

- FMVD

REQ-FRP-74.2	Availability to Customer-3	Approved	F

- PRESTO website and call centre

REQ-FRP-74.3	Availability to Customer-4	Approved	F

- TTC Customer service centre

REQ-FRP-74.4	Availability to Customer-5	Approved	F

- third party agents

REQ-FRP-75	Immediate usage	Approved	F

Enable adult PRESTO Cards loaded with appropriate transit product to be used immediately on the PRESTO System.

REQ-FRP-75.1	Immediate usage-2	Approved	F

Allow an anonymous, adult fare card to be used on the PRESTO System.

REQ-FRP-76	Registration	Approved	F

Enable Customers to choose between registering and not registering their PRESTO Card.

REQ-FRP-77	Support for MDP product	Approved	F

Ensure the adult fare card supports the TTC MDP fare product.

REQ-FRP-78	Support for VIP product	Approved	F

Ensure the adult fare card supports the TTC VIP fare product.

4.5.1.2 Senior

REQ-FRP-79	Scope	Approved	F

PRESTO Media with a senior Concession are classified as senior fare (in accordance with TTC fare policies) to all PRESTO Devices in the system.

REQ-FRP-80	Eligibility	Approved	F

Senior Concessions are restricted to individuals who meet the eligibility requirements for a senior.

REQ-FRP-81	Determination of eligibility	Approved	F

The TTC will determine the eligibility requirements for Customers wishing to obtain a senior fare card for use on the TTC.

REQ-FRP-82	Period of eligibility on fare card	Approved	F

The TTC will determine the eligibility requirements for senior Concessions for use on TTC transit.

REQ-FRP-83	Fare card products allowed	Approved	F

As per adult fare card FRP-72. The pricing for these products will be as per TTC policy.

REQ-FRP-84	Photo ID	Approved	F

Proof of eligibility is required for usage of the senior fare card. This proof of eligibility is separate from PRESTO Media. TTC will determine what constitutes valid proof of eligibility for use on the TTC system.

REQ-FRP-85	Customized graphics	Approved	F

Enable the TTC to specify a customized graphics/card layout specific on the senior card.

REQ-FRP-86	Availability to Customer	Approved	F

How senior Customers will acquire a senior fare card will be determined by TTC and PRESTO. This may include a specialized senior fare card distribution process that would directly make senior fare cards available at senior citizens homes and community centres.

REQ-FRP-87	Immediate usage for in-person purchase	Approved	F

Enable PRESTO Cards configured for senior Concession and loaded with appropriate transit product to be used immediately on the PRESTO System.

REQ-FRP-88	Support for MDP product	Approved	F

Ensure the senior Concession fare card supports the TTC MDP fare product.

4.5.1.3   Student

REQ-FRP-89	Scope	Approved	F

PRESTO Media with a student Concession are classified as student fare (in accordance with TTC fare policies) automatically to all PRESTO Devices in the system.

REQ-FRP-90	Eligibility	Approved	F

Student Concessions are restricted to individuals who meet the eligibility requirements for a student.

REQ-FRP-91	Determination of eligibility	Approved	F

The TTC will determine the eligibility requirements for students wishing to obtain student Concessions for use on the TTC.

REQ-FRP-92	Period of eligibility on fare card	Approved	F

The TTC will determine the eligibility requirements for student Concessions for use on the TTC.

REQ-FRP-93	Fare card products allowed	Approved	F

As per adult fare card FRP-72. The pricing for these products will be as per TTC policy.

REQ-FRP-94	Photo ID	Approved	F

A valid TTC student photo ID is required for usage of PRESTO Media with a student Concession.   The photo ID will be on a separate student photo card. The distribution of the student photo ID will be TTC's responsibility.

REQ-FRP-95	Customized graphics	Approved	F

Enable the TTC to specify a customized graphics/card layout specific on the student card.

REQ-FRP-96	Availability to Customer	Approved	F

How students will acquire a student Concession on PRESTO Media will be determined. This may include a specialized student fare card distribution process that would make PRESTO Media with a student Concession available at schools.

REQ-FRP-97	Distribution at TTC Customer Service Centre	Approved	F

Student fare cards may be distributed at Customer service centres to students with the appropriate, signed documentation from their current school.   The TTC will determine what constitutes appropriate signed documentation.

REQ-FRP-98	Support for student registration fields	Approved	F

Support the following fields for registering a PRESTO Card configured for a student Concession:

REQ-FRP-98.1	Support for student registration fields-2	Approved	F

- TTC identification number

REQ-FRP-98.2	Support for student registration fields-3	Approved	F

- fare card serial number

REQ-FRP-98.3	Support for student registration fields-4	Approved	F

- school identification

REQ-FRP-98.4	Support for student registration fields-5	Approved	F

- date of issue

REQ-FRP-99	Immediate usage for in-person purchase	Approved	F

Enable a PRESTO Card configured with a student Concession to be used immediately by the student for travel on TTC transit once the Concession is set.

REQ-FRP-100	Secondary verses elementary schools	Approved	F

Both secondary and elementary schools may be handled in the same manner.   There may be some procedural differences between registrations which will be determined by TTC.

REQ-FRP-101	Support for MDP product	Approved	F

Support the student Concession fare card TTC MDP fare product. (as per FRP-77.)

4.5.1.4   Post-Secondary Students

REQ-FRP-102	Scope	Approved	F

Ensure PRESTO Media with a post-secondary student Concession are classified as a post-secondary student fare to all PRESTO Devices in the system.

REQ-FRP-102.1	Scope-2	Approved	F

Enable TTC to configure PRESTO Cards with a post-secondary student Concession in accordance with TTC fare policies.

REQ-FRP-102.2	Scope-3	Approved	F

Ensure that once a post-secondary Concession is configured on a PRESTO Card, the Concession is automatically recognized by PRESTO.

REQ-FRP-103	Eligibility	Approved	F

Post-secondary student Concessions are restricted to individuals who meet the eligibility requirements for a student at an eligible post-secondary school. TTC will determine the eligibility requirements.

REQ-FRP-104	Period of eligibility on fare card	Approved	F

For post-secondary student Concessions the period of eligibility of the Concession will be determined by the TTC.

REQ-FRP-105	Fare card products allowed	Approved	F

As per adult fare card FRP-72, the pricing of transit products for post-secondary students will be as per TTC policy.

REQ-FRP-106	Photo ID	Approved	F

A valid TTC post-secondary photo ID is required for usage of the post-secondary fare card.   The photo ID will be on a separate post-secondary student photo card. The distribution of the post-secondary student photo ID will be TTC's responsibility.

REQ-FRP-107	Customized graphics	Approved	F

Enable the TTC to specify a customized graphics/card layout specific (or in general) on PRESTO Cards configured with a post-secondary student Concession.

REQ-FRP-108	Availability to Customer	Approved	F

How post-secondary student Customers will acquire a post-secondary student Concession will be determined during a business process Design Review. This may include a specialized distribution of PRESTO Cards configured with a post-secondary Concession to make these available at schools.

REQ-FRP-109	Distribution at TTC Customer Service Centre	Approved	F

Post-secondary student Concessions may be configured and distributed at TTC Customer service centres to students with the appropriate, signed documentation from their current school.   The TTC will determine what constitutes appropriate signed documentation.

REQ-FRP-110	Support for post-student registration fields	Approved	F

Support the capability for post-secondary students to include the following fields when registering their PRESTO Cards:

REQ-FRP-110.1	Support for post-student registration fields-2	Approved	F

 - TTC identification number

REQ-FRP-110.2	Support for post-student registration fields-3	Approved	F

- fare card number

REQ-FRP-110.3	Support for post-student registration fields-4	Approved	F

- school identification

REQ-FRP-110.4	Support for post-student registration fields-5	Approved	F

- date of issue

REQ-FRP-111	Immediate usage for in-person purchase	Approved	F

Enable a PRESTO Card with a post-secondary Concession to be used immediately by the student for travel on TTC transit once the Concession is set.

REQ-FRP-112	Support for MDP product	Approved	F

Ensure post-secondary Concessions cannot be purchased through the MDP program.

4.5.1.5   Child

REQ-FRP-113	Scope	Approved	F

Enable TTC to configure PRESTO Cards with child Concession in accordance with TTC fare policies.

REQ-FRP-113.1	Scope-2	Approved	F

Ensure that once a child Concession is configured on a PRESTO Card, the Concession is automatically recognized by PRESTO.

REQ-FRP-114	Eligibility	Approved	F

Child Concessions are restricted to individuals who meet the eligibility requirements for a child.

REQ-FRP-115	Determination of eligibility	Approved	F

The TTC will determine the eligibility requirements for child Concessions for use on the TTC.

REQ-FRP-116	Period of eligibility on fare card	Approved	F

For child Concessions the period of eligibility (e.g. non-annual, number of years etc.) of the Concession will be determined by the TTC.

REQ-FRP-117	Fare card products allowed	Approved	F

As per adult fare card FRP-72, the pricing of transit products for children will be as per TTC policy.

REQ-FRP-118	Photo ID	Approved	F

Photo ID is not required for child fare cards.

REQ-FRP-119	Customized graphics	Approved	F

Enable the TTC to specify a customized graphics/card layout specific (or in general) on the PRESTO Card configured with a child Concession.

REQ-FRP-120	Availability to Customer	Approved	F

How children will acquire a child Concession will be determined during a business process Design Review. This may include a specialized distribution of PRESTO Cards configured with a child Concession to make these available at schools.

REQ-FRP-121	Distribution at TTC Customer Service Centre	Approved	F

Child fare cards may be distributed at Customer service centres to elementary students and preschooler's.   Elementary school students must have the appropriate signed document from their school, verifying they are elementary students.

REQ-FRP-122	Multiple registrations under one parent/guardian name	Approved	F

Enable parents to register multiple PRESTO Cards configured with child Concession in their name, on behalf of their children.

REQ-FRP-123	Support for child registration fields	Approved	F

Support the following fields for registering a PRESTO Card configured for a child Concession:

REQ-FRP-123.1	Support for child registration fields-2	Approved	F

 - TTC identification number

REQ-FRP-123.2	Support for child registration fields-3	Approved	F

 - fare card serial number

REQ-FRP-123.3	Support for child registration fields-4	Approved	F

 - school identification (if applicable)

REQ-FRP-123.4	Support for child registration fields-5	Approved	F

 - date of issue

REQ-FRP-124	Immediate usage for in-person purchase	Approved	F

Enable a PRESTO Card configured with a child Concession to be used immediately by the child for travel on TTC transit once the Concession is set.

4.5.1.6   Convention

REQ-FRP-125	Scope	Approved	F

Convention fare media are PRESTO Media that indicate they are classified as convention fare cards automatically to all PRESTO Devices in the system.

REQ-FRP-126	Eligibility	Approved	F

Convention fare media will be restricted to individuals who meet eligibility requirements as determined by the TTC.

REQ-FRP-127	Period of eligibility on fare card	Approved	F

Enable TTC to set the period of eligibility for convention media.

REQ-FRP-128	Fare card products allowed	Approved	F

The convention card will only have the TTC transit access pre-encoded on the fare card. This transit access will only be for the duration period specified by the TTC and will vary depending on the convention.

REQ-FRP-129	Start time and duration of convention card	Approved	F

Enable TTC to specify the duration (active and expiry time/date) of convention media in day increments or by week or month. At the end of the duration time, these cards will automatically expire.

REQ-FRP-130	Photo ID	Approved	F

No Photo ID is required on the convention fare media.

REQ-FRP-131	Customized graphics	Approved	F

Enable the TTC to specify customized graphics for convention media.

REQ-FRP-132	TTC card ordering	Approved	F

Enable TTC to place orders for convention cards via the PRESTO System; convention fare cards will be shipped to TTC directly from the manufacturer.

REQ-FRP-133	Card inventory	Approved	F

Enable TTC to track and monitor the inventory of convention media.

REQ-FRP-134	Distribution to Customer	Approved	F

TTC will supply the convention organizer with the convention cards.   The convention organizer will issue the card to the convention Customer.

REQ-FRP-135	Immediate usage	Approved	F

Ensure that the convention card is available for immediate usage by the Customer during the allowed time period specified by the convention.

REQ-FRP-136	Registration	Approved	F

The convention media user is not required to register with PRESTO. The list of fare card numbers used by the convention will be known by the TTC and sent to the PRESTO as 'active' for the time period of the convention.

REQ-FRP-137	Tracking of convention fare cards	Approved	F

Track convention media by serial number in the PRESTO System.

REQ-FRP-138	Reporting	Approved	F

Provide ability to separate ridership and revenues for convention cards.

REQ-FRP-139	Customer service	Approved	F

Enable Customers with PRESTO Media configured for convention to report fare media related issues to either PRESTO or the TTC.

REQ-FRP-140	Support for LUM	Approved	F

For some conventions, the TTC may use Limited Use Media.   When and how LUM are used for conventions will be determined by the TTC.

4.5.1.7   Special Event

REQ-FRP-141	Scope	Approved	F

The TTC has historically provided special event media when there is an event of importance for the City of Toronto and the Greater Toronto Area (e.g. Papal visit; Molson Indy; Toronto International Film Festival). The pricing, transportation privileges, Media, and the target Customer market typically varies based on the specific special event. The TTC must continue to have the flexibility within the PRESTO System to support TTC travel for special events that reflect the specific requirements for that event.

REQ-FRP-142	TTC Product and Special Event Card	Approved	F

Enable special event media and products in two basic approaches:

REQ-FRP-142.1	TTC Product and Special Event Card-2	Approved	F

 - enable a special event product that can be loaded by a Customer to an existing PRESTO Card

REQ-FRP-142.2	TTC Product and Special Event Card-3	Approved	F

 - enable a special event PRESTO Card that is separate and distinct from the standard PRESTO Card in design and other features as appropriate for that event

REQ-FRP-143	Eligibility	Approved	F

The TTC expects there to be no restrictions on eligibility, but since this may vary from event to event, the TTC reserves the right to put in restrictions as required.

REQ-FRP-144	Period of eligibility on fare card	Approved	F

Ensure that for special events, the period of eligibility shall be determined by the TTC.

REQ-FRP-145	Fare card products allowed	Approved	F

This transit access will only be for the duration period specified by the TTC and will vary depending on the special event.

REQ-FRP-146	Start time and duration of the special event card	Approved	F

Ensure that special event products may be incremented by: number of days, weeks or months

REQ-FRP-146.1	Start time and duration of the special event card-2	Approved	F

Ensure that the special event products automatically expire at the end of the duration time

REQ-FRP-147	Photo ID	Approved	F

No Photo ID is required on the special event card.

REQ-FRP-148	Customized graphics	Approved	F

Enable TTC to specify a customized graphics on special events fare media.

REQ-FRP-149	Distribution to sales channels	Approved	F

Make special event fare media and products available through PRESTO remote sales channels (PRESTO website and call centre) and all TTC sales channels.

| REQ-FRP-150 | Allowance for specialized card distribution process | Approved | F |

Make special event media and products available through PRESTO remote sales channels (PRESTO website and call centre) and all TTC sales channels.

| REQ-FRP-151 | Registration | Approved | F |

Do not require PRESTO Media configured for special events to be registered.

| REQ-FRP-152 | Tracking of convention fare cards | Approved | F |

Track special event media by serial number in the PRESTO System.

| REQ-FRP-153 | Reporting | Approved | F |

Provide ability to separate ridership and revenues for special event cards and special event products.

| REQ-FRP-154 | Customer service | Approved | F |

Enable Customers with PRESTO Media configured for special events to report fare media related issues to either PRESTO or the TTC.

| REQ-FRP-155 | Support for LUM | Approved | F |

As per convention fare card requirement FRP-140.

4.5.2 TTC Private Fare Cards

4.5.2.1 Private Non-Revenue Cards

| REQ-FRP-156 | Scope | Approved | F |

Private non-revenue fare cards are all PRESTO Media used by the TTC or TTC selected groups that do not have any TTC passenger revenue associated with them.   Generally, these cards will be used by:

 - TTC employees as employee cards (both full time and part time, students, pensioners), which may have both travel and access (location and device) privileges required for employees to do their jobs; and

 - non-employees (Mayor, City of Toronto Councillors.)

| REQ-FRP-156.1 | Scope-2 | Approved | F |

All private non-revenue cards have the same basic internal card layout or card structure.   For all intents and purposes, they are internally the same card.   Card functionality is determined by what functionality is enabled on the card.

| REQ-FRP-156.2 | Scope-3 | Approved | F |

This functionality or 'card user profile' will be determined by authorized TTC personnel. TTC employee cards may have specific 'operations' functionality enabled on the card in order to perform their fare card system tasks.

| REQ-FRP-156.3 | Scope-4 | Approved | F |

Employees only have one card to travel and perform duties as required.

| REQ-FRP-156.4 | Scope-5 | Approved | F |

Ensure certain non-employees will have the same base functionality as TTC employee cards.   These non-employees include contractors, Mayor, City of Toronto Councilors. Again, the internal card structure and layout is identical to the cards used by TTC employees.

REQ-FRP-156.5	Scope-6	Approved	F

Externally, private non-revenue cards may be branded according to which logical groups the card user belongs to.   For example, employee/operators will have a common card look and layout, while part time employees, pensioners, contractors, and groups external to the TTC (e.g. Mayor, City of Toronto Councilors) may each have their own unique design for identification purposes.

REQ-FRP-156.6	Scope-7	Approved	F

All private fare cards are owned by the TTC.

REQ-FRP-156.7	Scope-8	Approved	F

Externally, private non-revenue cards may be branded according to which logical groups the card user belongs to.   For example, employee/operators will have a common card look and layout, while part time employees, pensioners, contractors, and groups external to the TTC (e.g. Mayor, City of Toronto Councilors) may each have their own unique design for identification purposes.

REQ-FRP-156.8	Scope-9	Approved	F

 All private fare cards are owned by the TTC.   Any associated private data with regards to individuals is kept solely and securely by the TTC; however all private non-revenue cards will still be tracked by fare card number only by the PRESTO System.

REQ-FRP-156.9	Scope-10	Approved	F

This tracking/auditing may be conducted internally by the TTC only by use of PRESTO reports.   The PRESTO System will never have the corresponding private data associated with a particular fare card number.   That is PRESTO will need to track travel/usage but never know the identity of the individual. This linkage between fare card number and actual identity of the person using the card will always be confidential to the TTC and will abide by all relevant private information policies and standards.

REQ-FRP-157	Classification by groups	Approved	F

Ensure TTC non- revenue fare cards are PRESTO Media that support a variety of fare card user groups as specified by the TTC.   Fare card readers, and subsequently the CBO, will recognize at least the following groups:

 - TTC non-revenue employees
 - TTC non-revenue full time employees
 - TTC non-revenue part-time employees
 - TTC non-employees
 - contractors working for TTC
 - Annual
 - Pensioner
 - Others (Mayor, Councilors, ACAT, Metrolinx)

REQ-FRP-158	Ownership	Approved	F

All TTC private non-revenue cards are managed and owned by the TTC. The TTC and its employees are solely responsible for the life cycle of this card. These cards remain the property of the TTC at all times.

REQ-FRP-159	Distribution and issuance	Approved	F

Private non-revenue cards will be distributed and issued by the TTC according to the policies and procedures of the TTC.

REQ-FRP-160	Confiscation	Approved	F

Enable authorized TTC personnel to Hotlist private non-revenue.

Private non-revenue cards may be confiscated and/or hot listed by the TTC at any time.

REQ-FRP-161	No Registration with CBO	Approved	F

Disallow registration of and loading transit products on private non-revenue cards.

REQ-FRP-162	No TTC Products or e-Purse	Approved	F

Do not allow TTC Fare Products or e-Purse on private non-revenue cards.

REQ-FRP-163	Privacy	Approved	F

Ensure all data stored on private non-revenue cards or within the PRESTO System is secure and following appropriate and applicable privacy guidelines and legislation.

REQ-FRP-163.1	Privacy-2	Approved	F

Ensure security measures are taken to keep data confidential and secure from inappropriate use or access.

REQ-FRP-163.2	Privacy-3	Approved	F

Ensure agencies outside TTC/PRESTO have no access to the private data (unless explicitly allowed by the applicable privacy standards).

REQ-FRP-163.3	Privacy-4	Approved	F

Ensure the usage and reporting of all non-fare card related information will be governed by appropriate privacy policy.

REQ-FRP-164	Common base Smart Card	Approved	F

Make TTC private non-revenue card types based on the same internal Smart Card/ fare card layout.

REQ-FRP-165	Eligible employees	Approved	F

All TTC employees will be issued a private non-revenue card. This card will replace the current employee card.   By all employees it is understood that this card will be:

 - an employee card
 - a part - time employee card (i.e. summer student card)

Policies governing card usage, card life cycle, etc. will be determined by the TTC.   Employees will use their employee card for all their interactions with the PRESTO System functionality. An employee card (full or part time) are for all intents and purposes, the same private non-revenue card.   There is no distinction between the two cards other than different card functionality (e.g. user profiles) enabled on the card.

REQ-FRP-166	Eligible non-employees	Approved	F

Certain non-employees may be eligible for a private non-revenue card.   These will include, but not be limited to:

 - contractors working for the TTC
 - TTC pensioners
 - Mayor

- City of Toronto Councilors
- ACAT
- Metrolinx

Other non-employees may be eligible for TTC non-revenue Smart Cards.   This will be decided solely by the TTC and its policies.

REQ-FRP-167	External card information - front of card	Approved	F

The TTC private non-revenue card may have (but not be limited to) the following information displayed on the front of the card:

REQ-FRP-167.1	External card information - front of card-2	Approved	F

- photo ID

REQ-FRP-167.2	External card information - front of card-3	Approved	F

- name

REQ-FRP-167.3	External card information - front of card-4	Approved	F

- badge number

REQ-FRP-167.4	External card information - front of card-5	Approved	F

- year

REQ-FRP-167.5	External card information - front of card-6	Approved	F

- expiry date

REQ-FRP-168	External card information - back of card	Approved	F

The TTC private non- revenue card may have (but not be limited to) the following information displayed on the back of the card:

REQ-FRP-168.1	External card information - back of card-2	Approved	F

- terms and conditions

REQ-FRP-168.2	External card information - back of card-3	Approved	F

- employee signature

REQ-FRP-169	External attributes	Approved	F

Enable external attributes for private non-revenue cards to be determined by the TTC and TTC policies as well as physical card real estate constraints:

REQ-FRP-169.1	External attributes-2	Approved	F

- field layout (where information is placed on the card)

REQ-FRP-169.2	External attributes-3	Approved	F

- format (fonts, font size, font colour, font type, picture size)

REQ-FRP-169.3	External attributes-4	Approved	F

- card appearance (background graphics, logos, images)

REQ-FRP-170	External TTC logo	Approved	F

Enable TTC private non-revenue cards to have a TTC logo; size and placement determined by TTC.

REQ-FRP-171	Card design and layout	Approved	F

Enable the look and layout of, and information printed on, private non-revenue cards to be different for different groups.

REQ-FRP-172	Internal card information	Approved	F

The information contained within the TTC private non-revenue card internal layout will at a minimum support the external information displayed on the card.

This card will include additional information required to set user roles and profiles allowing additional user functionality within the TTC fare card system.   This information will include:

 - Employee name;
 - Employee badge number;
 - Expiry date;
 - Card status and reason for status (active, in-active etc.);
 - Fare card ID;
 - TTC identifier (Service Provider);
 - Employee classification (i.e. role and authority);
 - group classification (i.e. full time, part time, non-employee);
 - Employee location;
 - Fare system device access privileges;
 - Fare system device functionality privileges;
 - Employee Card PIN;
 - TTC travel privileges with/without anti-Passback constraint;
 - TTC parking privileges; and
 - shift data.

REQ-FRP-173	HHPOS and Private Non-Revenue Card	Approved	F

Ensure the HHPOS is capable of reading and writing all information on the private non-revenue card.

REQ-FRP-174	TTC travel privileges options	Approved	F

The TTC private non-revenue card shall support various TTC travel privileges.   These travel privileges will include:

REQ-FRP-174.1	TTC travel privileges options-2	Approved	F

 - travel on the TTC system with anti-Passback enabled

REQ-FRP-174.2	TTC travel privileges options-3	Approved	F

 - travel on the TTC system with anti-Passback disabled

REQ-FRP-174.3	TTC travel privileges options-4	Approved	F

Ensure the private fare card anti-Passback functionality is assigned on a per individual basis as warranted by the card carrier's user role.

REQ-FRP-175	TTC parking privileges	Approved	F

Ensure the TTC private non-revenue card will support TTC parking privileges.   These parking privileges will include parking at:

- TTC commuter parking lots;
- TTC on-site parking lots (i.e. divisions, yards); or
- both of the above.

This functionality will be assigned on a per individual basis as warranted by the card carriers user role.

REQ-FRP-176	Card functionality configuration	Approved	F

TTC personnel will be responsible for configuring all TTC private non-revenue cards. This includes 'spare-cards' as defined in this requirements section.

Enable authorized TTC personnel to configure private non-revenue cards:

REQ-FRP-176.1	Card functionality configuration-2	Approved	F

- at the time the card is ordered

REQ-FRP-176.2	Card functionality configuration-3	Approved	F

- at card initialization time

REQ-FRP-176.3	Card functionality configuration-4	Approved	F

- at any time (in-house or in-field)

REQ-FRP-177	Card configuration frequency	Approved	F

Enable authorized TTC personnel to:

REQ-FRP-177.1	Card configuration frequency-2	Approved	F

- configure blank/spare private non-revenue cards on a regular (daily basis)

REQ-FRP-177.2	Card configuration frequency-3	Approved	F

- re-configure private non-revenue cards on a regular basis

REQ-FRP-178	Card configuration device	Approved	F

At a minimum, provide the HHPOS with the capability to securely configure new or used private non-revenue cards as follows:

REQ-FRP-178.1	Card configuration device-2	Approved	F

- set/reset the non-revenue card device and system access privileges

REQ-FRP-178.2	Card configuration device-3	Approved	F

- set/reset user PIN

REQ-FRP-178.3	Card configuration device-4	Approved	F

- set/reset system functionality

REQ-FRP-178.4	Card configuration device-5	Approved	F

- disable/enable private non-revenue cards

REQ-FRP-178.5	Card configuration device-6	Approved	F

- compose user definable user roles for private non-revenue cards

| REQ-FRP-178.6 | Card configuration device-7 | Approved | F |

- assign a pre-configured role to a private non-revenue card

| REQ-FRP-178.7 | Card configuration device-8 | Approved | F |

Ensure that all card configuration devices are aware of all user roles defined for private non-revenue cards.

| REQ-FRP-179 | Support for multiple user roles | Approved | F |

Enable multiple user roles/configurations on the same private non-revenue card.   In this case, the two user roles may either be present on the card or combined to form a single union of the two user roles.

| REQ-FRP-180 | Support for spare cards | Approved | F |

Enable authorized TTC personnel to configure and issue non-assigned, spare or blank private non-revenue cards to employees (or other qualifying people)based on a time-limited period with all the functionality required for the temporary job and an associated for the user at the time of issuance.

| REQ-FRP-180.1 | Support for spare cards -2 | Approved | F |

Enable private non-revenue cards to be reused.

| REQ-FRP-180.2 | Support for spare cards -3 | Approved | F |

Track private non-revenue cards by card serial number in the PRESTO System.

| REQ-FRP-180.3 | Support for spare cards | Approved | F |

Spare cards do not have pictures or employee names on them.   They will however be clearly marked as temporary or spare cards and have PINs associated for the user at the time of issuance.

| REQ-FRP-181 | Support for dual interface | Approved | F |

If required, provide a temporary dual support interface for TTC private non-revenue cards during the roll out phase of the PRESTO System at TTC. Dual interface cards refer to Smart Cards that have both the Contactless Smart Card, and the traditional magnetic stripe

| REQ-FRP-182 | Non-revenue fare card reporting | Approved | F |

Provide reports on the usage of a particular fare card number, range of numbers, or by groups(FRP-157). This may be done at TTC's discretion for:

- auditing;
- fraud detection;
- attempted access;
- misuse of travel;
- usage patterns;
- dispute resolution (i.e. was the employee at a particular site); and
- number or Boardings.

Authorized TTC personnel (and only authorized TTC personnel) may relate the fare card number to the private data on the non-revenue card (e.g. badge number, name).

| REQ-FRP-183 | Expiry date and functionality | Approved | F |

Block all private non-revenue cards from further use when the card reaches the expiry date printed on the card.

| REQ-FRP-183.1 | Expiry date and functionality-2 | Approved | F |

Enable TTC to maintain a calendar or rolling renewal system for private non-revenue cards.

| REQ-FRP-183.2 | Expiry date and functionality | Approved | F |

The card must then be re-issued, re-configured or granted an extended period of use by authorized TTC personnel.   That the expiry date is clearly indicated on the external surface of the card should limit the use of this feature.   Note that this applies to spare cards, which also have an expiry date printed on them.

| REQ-FRP-184 | Support for other independent applications | Approved | F |

Enable the TTC private non-revenue card to support other fare card system applications such as

| REQ-FRP-184.1 | Support for other independent applications-2 | Approved | F |

 - TTC facility access (either specific or system wide)

| REQ-FRP-184.2 | Support for other independent applications-3 | Approved | F |

 - Access to TTC travel;
 - Access to TTC Parking; and
 - Any access / functionality required for TTC job functions.

| REQ-FRP-184.3 | Support for other independent applications-4 | Approved | F |

Make the TTC private, non-revenue card the property of the TTC that can be confiscated at any time.

| REQ-FRP-185 | Ability of operations personnel to work across the TTC region | Approved | F |

There is a need for operation personnel to be able to work across the transit region. Operation personnel should be able to perform the same duties (whether it is at a station, bus, streetcar or subway station) depending on their assigned role and authority. Devices and list of functions permitted to be used on that device need to be associated with the employee's role.

| REQ-FRP-185.1 | Ability of operations personnel to work across the TTC region-2 | Approved | F |

There is a need for operation personnel to be able to work across the transit region. Operation personnel should be able to perform the same duties (whether it is at a station, bus, streetcar or subway station) depending on their assigned role and authority. Devices and list of functions permitted to be used on that device need to be associated with the employee's role.

4.5.2.2   Private Revenue Cards

4.5.2.2.1   Canadian National Institute for the Blind (CNIB)

| REQ-FRP-186 | Scope | Approved | F |

Ensure that CNIB fare cards indicate they are classified as CNIB fare cards automatically to all PRESTO Devices in the system.

| REQ-FRP-187 | Eligibility | Approved | F |

The CNIB fare card is restricted to individuals who meet the eligibility requirements as specified by the CNIB.

REQ-FRP-188	Period of eligibility on fare card	Approved	F

The current period of eligibility on CNIB fare cards is annual.   However, the period of eligibility for CNIB fare cards will be determined by TTC policy in consultation with the CNIB. Renewal of the CNIB fare card is supported.   Renewals, may or may not require a new fare card.

REQ-FRP-189	Fare card products allowed	Approved	F

Ensure the CNIB fare card will have TTC transit access pre-encoded on the card.

REQ-FRP-190	Photo ID	Approved	F

A separate photo ID will be required for CNIB PRESTO Card holders.   The national ID provided by the CNIB to its members is the current ID acceptable to the TTC.

REQ-FRP-191	Card design and layout	Approved	F

Consider making PRESTO Cards configured for CNIB visually distinct from adult and other TTC Concession cards.

REQ-FRP-192	TTC card ordering	Approved	F

Enable TTC to order and receive shipments of PRESTO Cards configured for CNIB directly from the manufacturer.

REQ-FRP-193	Card inventory	Approved	F

TTC will be able to track and monitor CNIB fare card inventory.

REQ-FRP-194	Availability to Customer	Approved	F

The CNIB fare card is available to the Customer as per the distribution policies and practices of the CNIB.

REQ-FRP-195	CNIB card distribution process	Approved	F

The CNIB will request the number of CNIB fare cards required for its members.   The TTC may order the cards from the manufacturer and supply them to the CNIB. The CNIB will distribute the cards to their eligible clients/members and record who receives which card.

The CNIB will provide the TTC with a list of the CNIB fare cards that have been distributed. In turn, the TTC will supply a list of active fare card numbers only, to PRESTO.

REQ-FRP-196	Immediate usage	Approved	F

Ship PRESTO Cards configured for CNIB activated and ready for use.

REQ-FRP-197	Registration	Approved	F

CNIB fare card Customers do not have to register their card with PRESTO; however they are all registered with the CNIB.

REQ-FRP-198	Tracking of distribution	Approved	F

Enable PRESTO Cards configured for CNIB to be tracked by serial number.

REQ-FRP-199	Reporting	Approved	F

Provide ability to separate ridership and revenues for CNIB cards.

REQ-FRP-200	Card management lists	Approved	F

Enable TTC to Hotlist PRESTO Cards configured for CNIB.

REQ-FRP-201	Customer service	Approved	F

Enable CNIB PRESTO Cardholders report any fare card related issues to PRESTO or the TTC.

REQ-FRP-202	Customer Trip Histories	Approved	F

Enable CNIB PRESTO Cardholders to access their trip usage by the conventional PRESTO channels.

4.5.2.2.2   War Amps

REQ-FRP-203	Scope	Approved	F

Provide PRESTO Cards that are configured for War Amps for use in the PRESTO System.

REQ-FRP-204	Eligibility	Approved	F

The War Amps fare card is restricted to individuals who meet the eligibility requirements as specified by the War Amps.

REQ-FRP-205	Period of eligibility on fare card	Approved	F

The current period of eligibility for War Amp fare cards is annual.   However, the period of eligibility for War Amp fare cards will be determined by TTC policy in consultation with the War Amps. Renewal of the War Amp fare card is supported.   Renewals may or may not require a new fare card. This will be determined during Design Review.

REQ-FRP-206	Fare card products allowed	Approved	F

Pre-encode TTC transit access on PRESTO Cards configured for War Amps.

REQ-FRP-207	Photo ID	Approved	F

Enable photo ID to be printed on PRESTO Cards configured for War Amps.

REQ-FRP-208	Card design and layout	Approved	F

Consider making PRESTO Cards configured for War Amps visually distinct FRP-191

REQ-FRP-209	TTC card ordering	Approved	F

Enable TTC to order and receive shipments of PRESTO Cards configured for War Amps directly from the manufacturer.

REQ-FRP-210	Card inventory	Approved	F

Enable TTC to track and monitor inventory of PRESTO Cards configured for War Amps.

REQ-FRP-211	Availability to Customer	Approved	F

The War Amps fare card is available to the Customer as per the distribution policies and practices of the War Amps and TTC.

REQ-FRP-212	War Amp card distribution process	Approved	F

Enable TTC to order PRESTO Cards configured for War Amps.

| REQ-FRP-212.1 | War Amp card distribution process | Approved | F |

The War Amps will request the number of War Amp fare cards required for its members.   The TTC may order the cards from the manufacturer and supply them to the War Amps. The War Amps will distribute the cards to their eligible clients/members and record who receives which card.

The War Amps will provide the TTC with a list of the War Amp fare cards that have been distributed.

| REQ-FRP-213 | Immediate usage | Approved | F |

Ship PRESTO Cards configured for War Amps activated and ready for use.

| REQ-FRP-214 | Registration | Approved | F |

War Amp cardholders do not have to register their PRESTO Card with PRESTO; however they are all registered with the War Amps.

| REQ-FRP-215 | Tracking of distribution | Approved | F |

The War Amps will match PRESTO Card serial numbers with War Amp client details.

| REQ-FRP-215.1 | Tracking of distribution | Approved | F |

Enable PRESTO Cards configured for War Amps to be tracked by serial number by PRESTO.

| REQ-FRP-216 | Reporting | Approved | F |

Provide ability to separate ridership and revenues for War Amps cards.

| REQ-FRP-217 | Card management lists | Approved | F |

Enable the TTC to report PRESTO Cards configured for War Amps that should be removed from the PRESTO System.

| REQ-FRP-218 | Customer service | Approved | F |

Enable War Amp PRESTO Cardholders to report fare card related issues to PRESTO or the TTC.

4.5.3   Limited Use Media

| REQ-FRP-219 | Support for Limited Use Media | Approved | F |

Enable support of LUM throughout the transit system.   LUM will be the media used to support Cash Customers throughout the TTC.

| REQ-FRP-219.1 | Support for Limited Use Media-2 | Approved | F |

Provide the necessary Hardware and Software (e.g. SRVMs, FMVDs) components and services to issue, as well as permit the acceptance of LUM throughout TTC.

| REQ-FRP-219.2 | Support for Limited Use Media-3 | Approved | F |

Ensure LUM are uniquely tracked and reported like any other pass product fare cards.   This is also true for single trip LUM.

| REQ-FRP-220 | Limited use cards product range | Approved | F |

Limited use media may be purchased for:

REQ-FRP-220.1	Limited use cards product range-2	Approved	F

- single trips

REQ-FRP-220.2	Limited use cards product range-3	Approved	F

- two fare (return) ticket

REQ-FRP-220.3	Limited use cards product range-4	Approved	F

- day passes

REQ-FRP-220.4	Limited use cards product range-5	Approved	F

- multi-day passes

REQ-FRP-220.5	Limited use cards product range-6	Approved	F

- special events

REQ-FRP-220.6	Limited use cards product range-7	Approved	F

Ensure day passes and multi-day passes will support both fixed and rolling period passes where the rolling period is initiated on Customer first use.

Note that the two fare/return ticket does not imply that the LUM Customer must return to the point of origin; rather the LUM simply has the equivalent of two paid fare trips loaded and the Customer may use them as they see fit.

REQ-FRP-221	Limited use card family	Approved	F

Ensure support for Limited Use Media for pass products, single trips, return trips or purely transfers.

REQ-FRP-222	Limited use cards as transfers	Approved	F

LUM will be used as purely transfer cards on surface vehicles. Cash paying Customers can request an LUM transfer from the vehicle operator.   The vehicle operator will then activate the LUM for transfer via the Reader Assembly before handing the transfer card to the Customer. These LUM transfer cards operate exactly the same as a transfer on a PRESTO Card.

REQ-FRP-222.1	Limited use cards as transfers-2	Approved	F

Ensure transfer LUM can only be activated by the vehicle operator.

REQ-FRP-222.2	Limited use cards as transfers-3	Approved	F

Ensure LUM cards used for transfers are pre-encoded to act only as transfer cards before they are distributed to surface vehicle operators.   On activation, these transfer LUM start their transfer period (i.e. how long the transfer is good for) immediately.

REQ-FRP-222.3	Limited use cards as transfers-4	Approved	F

Ensure LUM transfer cards are recorded and tracked by the PRESTO System.

REQ-FRP-222.4	Limited use cards as transfers-5	Approved	F

Ensure that for transfer cards there is no indication of Concession type.

REQ-FRP-223	Expiration of LUM Product	Approved	F

Ensure LUM will self-expire on time, usage or until the 'good until date' is exceeded.

REQ-FRP-224	Non-reloadable	Approved	F

All LUM are non-reloadable. LUM can only be used for the fare they were originally purchased for. This also applies to transfer only LUM.

REQ-FRP-225	No support for e-Purse	Approved	F

No e-Purse product is supported on LUM.

REQ-FRP-226	Support for single trip	Approved	F

Ensure LUM support a single trip/round trip fare.   This may be implemented as a simple counter on the LUM.

REQ-FRP-227	Concession support	Approved	F

LUM will support the following Concessions:

REQ-FRP-227.1	Concession support-2	Approved	F

 - senior

REQ-FRP-227.2	Concession support-3	Approved	F

 - post-secondary

REQ-FRP-227.3	Concession support-4	Approved	F

 - child

REQ-FRP-227.4	Concession support-5	Approved	F

 - student

REQ-FRP-228	Card query support	Approved	F

LUM can be queried at FMVD, AVM and HHPOS machines in the same manner as regular PRESTO Media. LUM may display:

REQ-FRP-228.1	Card query support-2	Approved	F

 - return trip status

REQ-FRP-228.2	Card query support-3	Approved	F

 - start of period pass

REQ-FRP-228.3	Card query support-4	Approved	F

 - length or end of period pass

REQ-FRP-228.4	Card query support-5	Approved	F

 - end of life of the LUM

REQ-FRP-228.5	Card query support-6	Approved	F

- type of Concession card

REQ-FRP-228.6	Card query support-7	Approved	F

- transfer validity

REQ-FRP-228.7	Card query support-8	Approved	F

- status of the LUM

REQ-FRP-228.8	Card query support-9	Approved	F

- querying an un-active LUM does not activate it

REQ-FRP-229	Maximum LUM pass period	Approved	F

Ensure the maximum LUM pass period supported to be two (2) consecutive days (but is configurable) for all LUM products. For clarity, if the security controls prove to be more than adequate, the maximum LUM pass period may be extended by the TTC in the future to include such things as convention passes etc.

REQ-FRP-230	Longevity of LUMs	Approved	F

Ensure rolling LUM (i.e. LUMs whose valid time period starts when they are first used) automatically expires after two months and will no longer be valid for use within the fare system.

REQ-FRP-230.1	Longevity of LUMs-2	Approved	F

Ensure that the TTC has the ability to determine this time span (the "must use before date"), set this time span in the fare system and notify its Customers of these constraints.

REQ-FRP-230.2	Longevity of LUMs-3	Approved	F

Any refund due to a LUM purchased but not used before the expiry date will be at the discretion of the TTC.

REQ-FRP-230.3	Longevity of LUMs-4	Approved	F

Ensure pure transfer LUM start immediately and cannot be saved for future use.

REQ-FRP-231	Tracking and recording	Approved	F

Provide statistics, reports and analysis on all trips and transfers by LUM.

Furthermore, all LUM usage, (whether it is for single rides or transfers) will be recorded, reported and stored in the Data Mart.   All services, reports and functionality afforded open payments Media such as Business Intelligence, revenue assurance, Fraud Detection, etc. as described in this Schedule will apply equally to LUMs.

REQ-FRP-232	Limited use card auditing	Approved	F

Support real time auditing of LUM.

Auditing of LUM will include such things as:

 - Recording encoding/activation time of a LUM;
 - Recording 'First time of use' of a LUM;
 - Recording usage of the LUM in the same fashion as a regular fare card and
 - Recording expiration of a LUM.

REQ-FRP-233	Fixed and rolling time periods	Approved	F

LUM support both fixed time periods and rolling time periods.

REQ-FRP-233.1	Fixed and rolling time periods-2	Approved	F

 - for fixed time periods: Ensure the start date and the length is clearly printed on the card

REQ-FRP-233.2	Fixed and rolling time periods-3	Approved	F

 - for rolling time periods: Ensure the length is clearly printed on the card, along with an indicator stating that it is a rolling start pass

REQ-FRP-234	LUMs used for special events	Approved	F

LUM may be used for special events.   These cards can be:

REQ-FRP-234.1	LUMs used for special events-2	Approved	F

 - specially branded

REQ-FRP-234.2	LUMs used for special events-3	Approved	F

 - have a unique identifier printed on them

REQ-FRP-234.3	LUMs used for special events-4	Approved	F

 - fixed time period starting at the day printed on the ticket

REQ-FRP-234.4	LUMs used for special events-5	Approved	F

 - purchased in advance of the special event but shall only be activated at the time printed on the card

REQ-FRP-234.5	LUMs used for special events-6	Approved	F

Ensure that special event passes may also be added to normal fare cards. These special event products may be downloaded from the Customer web site, or purchases at the Customer service center or third party ticket agency.

REQ-FRP-235	No loyalty products	Approved	F

Ensure that LUM will not support any loyalty products.

REQ-FRP-236	No parking support	Approved	F

Ensure that LUM will not support any parking product(s).

REQ-FRP-237	Purchase of limited use cards	Approved	F

Limited Use Media are purchased at:

REQ-FRP-237.1	Purchase of limited use cards-2	Approved	F

 - Full Service Vending Machine (FMVD) in subway stations/bus platforms

REQ-FRP-237.2	Purchase of limited use cards-3	Approved	F

 - SRVMs Onboard LRVs and at Off-board SRVM's at selected LRV stops

REQ-FRP-237.3	Purchase of limited use cards-4	Approved	F

- The TTC Customer Service Centre.

| REQ-FRP-237.4 | Purchase of limited use cards-5 | Approved | F |

Ensure that LUM purchased Onboard an LRV are activated at time of purchase. TTC will restrict the type of LUM product purchased Onboard an LRV to a single ride or return product only.

Once a LUM is purchased, it may be used throughout the TTC system (subway and surface).

| REQ-FRP-238 | LUM Labeling | Approved | F |

Ensure LUM's are labeled with the type of pass product and Concession type when purchased at an FMVD and /or SRVM. The labeling on the LUM would indicate Concession type if applicable, and type of pass.

| REQ-FRP-238.1 | LUM Labeling-2 | Approved | F |

Enable the TTC to determine whether or not to print the 'to be used before date' on a LUM that has a rolling pass product installed on it.

| REQ-FRP-238.2 | LUM Labeling-3 | Approved | F |

Ensure that the ability to print the use before date on the card at the time the Customer purchases the LUM is configurable.

| REQ-FRP-238.3 | LUM Labeling-4 | Approved | F |

Enable the name of the special event to be printed on the card, along with the type of LUM and the start date of the event.

| REQ-FRP-238.4 | LUM Labeling-5 | Approved | F |

Ensure that FMVD machines are flexible enough to provide a TTC accessible 'special event' field that can be populated with the name of the special event by TTC personnel and downloaded to the FMVD before the event occurs.

| REQ-FRP-238.5 | LUM Labeling-6 | Approved | F |

Ensure the labeling indicates whether the pass product has a rolling start time or not.

| REQ-FRP-239 | LUM encoding | Approved | F |

Ensure that pass product type LUM will be encoded at the time of purchase.

| REQ-FRP-239.1 | LUM encoding-2 | Approved | F |

Ensure the encoding, verification and activation of the LUM occurs after Customer payment verification and acceptance has been completed.

| REQ-FRP-239.2 | LUM encoding-3 | Approved | F |

Ensure encoding occurs in the FMVD and SRVMs.

| REQ-FRP-239.3 | LUM encoding-4 | Approved | F |

Ensure LUM used for conventions are bulk encoded before the event.

| REQ-FRP-239.4 | LUM encoding-5 | Approved | F |

Ensure LUM distributed as transfers on buses will be pre-encoded such that they can only be activated as transfers.

REQ-FRP-240	LUM graphics	Approved	F

Printed information/graphics on the LUM will be determined as needs arise.

REQ-FRP-241	Activation for use	Approved	F

Ensure LUM are activated on first use by the Customer when they are purchased from all sales channels except the LRV Onboard SRVM

REQ-FRP-241.1	Activation for use-2	Approved	F

Ensure a LUM purchased Onboard the LRV is immediately activated.

REQ-FRP-241.2	Activation for use-3	Approved	F

When LUM are distributed to Customers on a bus as transfers, the bus driver activates the LUM before it is handed to Customer.

REQ-FRP-242	LUM refunds	Approved	F

Refunds for LUM's will only be available in equivalent fare media for Customers with valid receipts.

For example, a failed fare Media card purchased as a two day pass (clearly marked on the receipt) will be refunded based on TTC refund policies when the Customer presents the card and the original purchase receipt at a Customer service centre.

REQ-FRP-242.1	LUM refunds-2	Approved	F

Refunds for transfers will be in the form another transfer card provided the Customer can show proof of failed transfer card.

REQ-FRP-242.2	LUM refunds-3	Approved	F

The policies governing refunds will be determined by the TTC and can be changed, modified, enhanced at any time.

REQ-FRP-243	Start of time for period limited use cards	Approved	F

Ensure pass product LUM purchased as rolling passes will start their pass period when a fare payment is first made.

REQ-FRP-243.1	Start of time for period limited use cards-2	Approved	F

Ensure that querying a card does not constitute 'first use' of an pass product LUM

REQ-FRP-243.2	Start of time for period limited use cards-3	Approved	F

Ensure that a pass product LUM purchased for a particular date in the future will start the pass period at that date, at the hour indicated on the LUM.

REQ-FRP-243.3	Start of time for period limited use cards-4	Approved	F

Ensure that pass product LUM purchased for the current day will start the pass period immediately.

REQ-FRP-243.4	Start of time for period limited use cards-5	Approved	F

Ensure that pass product LUM purchased as single or return trips simply count the trips taken when they are used.

REQ-FRP-243.5	Start of time for period limited use cards-6	Approved	F

Ensure LUM transfer only cards start their time period immediately upon activation by the surface vehicle operator.

REQ-FRP-244	LUM Standards	Approved	F

Ensure LUM follows the ISO7810 standard for cards size and adheres to standard for media thickness, wear and durability.

REQ-FRP-245	Limited use card security	Approved	F

Ensure the appropriate security standards are in place to reduce or eliminate potential fraud. All communications between the LUM and Reader Assemblies shall be encrypted to the appropriate level.

REQ-FRP-246	LUM Key Management System	Approved	F

Provide LUM and LUM security that is equivalent to PRESTO Cards.

REQ-FRP-247	Automatic expiry	Approved	F

Ensure that all LUM cards have automatic expiry.

REQ-FRP-247.1	Automatic expiry-2	Approved	F

Ensure that single and return trip cards are rendered inactive after their trip count is reached.

REQ-FRP-247.2	Automatic expiry-3	Approved	F

Ensure that once a LUM has expired it can never be used in the system again.

REQ-FRP-247.3	Automatic expiry-4	Approved	F

Ensure that expiration of all LUM is recorded by the CBO as part of the auditing and trip/revenue processes.

REQ-FRP-247.4	Automatic expiry-5	Approved	F

Ensure that rolling period passes are rendered inactive when their time/date period is exceeded.

REQ-FRP-247.5	Automatic expiry-6	Approved	F

Ensure that once a transfer has exceeded its time out period, or violated some business transfer rules, it will be rendered inactive.

REQ-FRP-248	Hot listing	Approved	F

Provide capability to Hotlist individual and ranges of LUM.

REQ-FRP-249	Alternative LUM Application	Approved	F

LUM may also incorporate a standard, world-wide accepted payment application on them if PRESTO so chooses. For example, PayPass or Visa PayWave can be programmed on the LUM if this proves to be a cost-effective solution.

REQ-FRP-250	Protection from environment	Approved	F

Provide a clear, thin laminate protective coating protecting, or other comparable physical protection to protect LUM from the environment. (must comply with ISO 7810 as stated in FRP-244)

REQ-FRP-251	LUM Distribution	Approved	F

Provide managed services for the distribution, servicing and stocking of LUM in SRVMs and FMVDs.

REQ-FRP-251.1	LUM Distribution-2	Approved	F

Ensure LUM are distributed to bus garages as outlined in the cash user section of Schedule B and the performance metric for LUM provisioning in Schedule A.

4.6   Loyalty

REQ-FRP-252	Overview	Approved	F

Loyalty programs for the PRESTO System may be implemented at some point in the future by TTC.   If implemented these programs will be designed to increased Customer loyalty directly via fare incentives or indirectly via third party loyalty programs (e.g. Air Miles, Transit Points etc.).

REQ-FRP-252.1	Overview-2	Approved	F

Ensure that multiple, concurrent loyalty schemes are supported.

REQ-FRP-252.2	Overview-3	Approved	F

Ensure that new loyalty schemes may be added to the PRESTO System as TTC policy evolves.

REQ-FRP-252.3	Overview-4	Approved	F

Ensure that loyalty schemes may be cancelled at any time.

REQ-FRP-253	Scope of loyalty programs	Approved	F

Loyalty schemes fall into two broad categories:

REQ-FRP-253.1	Scope of loyalty programs-2	Approved	F

 - TTC fare card loyalty programs

REQ-FRP-253.2	Scope of loyalty programs-3	Approved	F

 - Third party loyalty programs.

REQ-FRP-253.3	Scope of loyalty programs-4	Approved	F

TTC fare card loyalty programs are based on trips and trip frequency within a specified period of time (e.g. day, week, month). These loyalty schemes will primarily generate loyalty rewards in the form of reduced fares or free transit. No equivalent monetary re-imbursement will be allowed.

REQ-FRP-254	Association with fare card type	Approved	F

Ensure that loyalty programs may be associated with a particular fare product or any combination of TTC Fare Product types.

REQ-FRP-255	Limited use cards and cash	Approved	F

Ensure that Limited Use Media and cash usage will not belong to any loyalty program.

REQ-FRP-256	Association with Fare Group	Approved	F

Enable loyalty schemes to be associated with fare groups as specified in the services schedule.

REQ-FRP-257	Multiple simultaneous loyalty schemes	Approved	F

Enable support of multiple simultaneous loyalty schemes.   This includes TTC only loyalty schemes as well as third party loyalty schemes.

REQ-FRP-258	Real time and delayed loyalty rewards	Approved	F

Ensure loyalty rewards may be granted in real time or granted at some future date as specified by the loyalty scheme.

For example, an e-Purse fare card Customer could be granted a reduced fare (or free ride) after they have taken their 20th trip in one week. This reward would be granted automatically at the time of the 21th trip.

REQ-FRP-258.1	Real time and delayed loyalty rewards-2	Approved	F

Enable delayed loyalty rewards to be granted sometime in the future, as determined by TTC policy, to a fare card holder meeting the loyalty scheme requirements.

For example, a monthly e-Pass holder who has taken 60 trips this month could be granted a 5% discount in next month's e-Pass cost.   In this case, this reward would be triggered on the 60th trip but not used until the next month's e-Pass is purchased.

REQ-FRP-259	Primary parameters for transit loyalty	Approved	F

Transit loyalty will be based primarily on the number of paid trips over a given time period.   Any fare card holder meeting or exceeding a pre-determined criteria of number of trips per time period would receive discounted or free trips for a specific amount of time. TTC transit loyalty may encompass a variety of Pre-Funded fare products such as the Transit Purse product. All parameters dealing with this loyalty scheme, number of trips, time period these trips are attained in, start time of the loyalty period and stop time of the loyalty period are determined by TTC.

REQ-FRP-260	Graduated loyalty scales and multiple break points	Approved	F

Enable loyalty schemes to support a graduated (or multiple break points) scale as defined by the TTC.

REQ-FRP-260.1	Graduated loyalty scales and multiple break points-2	Approved	F

With an increase in fare card usage over a given time frame, the fare card Customer could achieve greater savings using this graduated step loyalty scheme.

REQ-FRP-261	Trip count multipliers	Approved	F

Enable trip count multipliers to have the effect of counting a single trip as a fractional multiple of that trip.

REQ-FRP-262	Provision of loyalty information to a Customer	Approved	F

Provide the loyalty fare Customer card with their current loyalty status.

For example, the fare Customer could inquire what their current trip frequency is and how many more trips they need to make within the week to be eligible for benefits under the program.

REQ-FRP-262.1	Provision of loyalty information to a Customer-2	Approved	F

Enable additional loyalty rewards opportunities offered either by TTC alone or in co-operation with other entities to be presented to the Customer.

REQ-FRP-262.2	Provision of loyalty information to a Customer-3	Approved	F

Provided the loyalty fare card via Customer service centres, IVR, Web Site, AVM and FMVD.   Loyalty status will not be provided by the SRVMs.

| REQ-FRP-263 | Web site Customer presentation | Approved | F |

Enable fare card Customer loyalty information to be available on PRESTO Customer web site. When a fare card Customer signs onto the PRESTO web site, all the loyalty schemes, rewards (savings) and other pertinent information with regards to their loyalty schemes will be available for display.

| REQ-FRP-263.1 | Web site Customer presentation-2 | Approved | F |

Or, enable a link to a separate personal loyalty points web page (especially for third party loyalty programs).
In either case, the Customer's loyalty information will be properly formatted and may be printed by the fare card Customer.

| REQ-FRP-264 | Loyalty scheme enrollment channels | Approved | F |

Enable the fare card Customer to enroll in various fare card loyalty programs via the web, Customer service centre, mail, phone and IVR.

| REQ-FRP-265 | Automatic enrollment for basic loyalty program | Approved | F |

Enable the capability of automatically enrolling all fare card holders (except LUM) in a basic loyalty card scheme.

| REQ-FRP-266 | Cancelling of loyalty schemes | Approved | F |

Ensure that any active TTC loyalty scheme may be cancelled at the TTC's discretion.

| REQ-FRP-267 | Due notice for cancellation | Approved | F |

Fare card Customers will be given ample notification in the event that a loyalty program is to be cancelled.

| REQ-FRP-268 | Loyalty scheme terms and conditions | Approved | F |

All loyalty programs must plainly state (on the web site, at the Customer service centre, and in writing) the terms and conditions of the loyalty scheme, and the loyalty schemes reward structure and operation.

| REQ-FRP-269 | Loyalty scheme uniqness | Approved | F |

Loyalty schemes defined by the TTC are unique to the TTC.   Loyalty schemes from other service providers do not apply to the TTC. Provisions may be made for future integration of various service providers loyalty schemes. This may be done at the front end (card level) or back end (central service).

| REQ-FRP-270 | Loyalty recording, tracking and usage | Approved | F |

Ensure that all transactions in the PRESTO System will be recorded. This includes all transit trips purchased at loyalty level discounts for all fare card types.

| REQ-FRP-271 | Revenue trips only | Approved | F |

Ensure that all loyalty schemes and programs will only count passenger revenue trips towards the loyalty program.

For example, once an e-Purse Customer has reach the number of trips that allow them to travel for free for the rest of the day, all additional trips that day (regardless if they would normally be counted as paid trips otherwise), will not count toward any further loyalty scheme (for that day, the week or the month).

REQ-FRP-271.1	Revenue trips only-2	Approved	F

Ensure that only Revenue Passenger Trips count toward any loyalty scheme.

5   TTC Customer Service Centre

5.1   Overview

REQ-CSC-1	Current Customer Service Centre Services	Approved	F

TTC operates a walk-in Customer Service Centre on the first floor of its headquarters location at 1900 Yonge Street, Toronto, Ontario. Currently, the Customer Service Centre serves as a sales location for legacy TTC fare media, a point of intake for TTC Customer complaints, and commendations; administers the Metropass Discount Plan; and as a point of contact for general information about TTC's transportation services.

REQ-CSC-2	Continuation of CSC Services During Implementation	Approved	F

TTC intends to continue operating its Customer Service Centre (CSC) with TTC staff through the period of implementation of the PRESTO System. During this time, TTC will continue to perform existing functions and address inquiries regarding TTC's transportation services.

REQ-CSC-3	Ongoing CSC Services	Approved	F

Once the PRESTO System is fully operational, TTC Customer Service Centre will assume the new functionality of supporting TTC Customer service related to the PRESTO System. The CSC will not replace PRESTO Customer services, channels and/or functionality; rather it will compliment it.

REQ-CSC-3.1	Ongoing CSC Services	Approved	F

Take all actions necessary for the TTC CSC to provide the following minimum services to Customers:

REQ-CSC-3.1.1	Ongoing CSC Services -2	Approved	F

 - sell PRESTO Cards

REQ-CSC-3.1.11	Ongoing CSC Services -3	Approved	F

 - load transit products on PRESTO Cards and accounts.

REQ-CSC-3.1.2	Ongoing CSC Services -4	Approved	F

 - access PRESTO Customer account information

REQ-CSC-3.1.3	Ongoing CSC Services -5	Approved	F

 - handle PRESTO-related inquiries and resolve Customer problems

REQ-CSC-3.1.4	Ongoing CSC Services -6	Approved	F

 - transfer Customers to the PRESTO call centre

REQ-CSC-3.1.5	Ongoing CSC Services -7	Approved	F

 - provide PRESTO marketing and how-to literature

REQ-CSC-3.1.6	Ongoing CSC Services -8	Approved	F

 - demonstrate how to use PRESTO Cards and devices on fully functional PRESTO equipment

REQ-CSC-3.1.7	Ongoing CSC Services -9	Approved	F

- provide support for PRESTO features and functionality, current and future initiatives

REQ-CSC-3.1.8	Ongoing CSC Services -10	Approved	F

- issue PRESTO refunds

REQ-CSC-3.1.9	Ongoing CSC Services -11	Approved	F

- set a Concession on PRESTO Cards

REQ-CSC-3.1.10	Ongoing CSC Services -12	Approved	F

- facilitate PRESTO Card registration

REQ-CSC-4	PRESTO's Role	Approved	NF

PRESTO will provide PRESTO devices, services and support for the TTC CSC devices and activities.

REQ-CSC-5	Performance of PRESTO Devices, Services and Support	Approved	F

The performance of the TTC CSC devices, services and support will meet all of TTC's Service Levels as stated in this Schedule, Schedule A - SLAs and Schedule B - Services.   In particular PRESTO will report on activities and performance regarding the TTC CSC PRESTO equipment and PRESTO Services using the same methodology and metrics as for PRESTOs Customer Call Centre.

REQ-CSC-6	Functionality of PRESTO Devices, Services and Support	Approved	F

The functionality of the TTC CSC devices, services and support shall meet all of TTC's Specifications as outlined in this Agreement.

REQ-CSC-7	CSC Standard Reports	Approved	F

Standard reports will capture information from all business functions of the TTC CSC by date, time of day, and day by hour for the following minimum activities:

REQ-CSC-7.1	CSC Standard Reports-2	Approved	F

- Customer agent activity reports

REQ-CSC-7.2	CSC Standard Reports-3	Approved	F

- caller activities that result in Warm Transfers to the PRESTO call centre

REQ-CSC-7.3	CSC Standard Reports-4	Approved	F

- utilization of web site resources

5.2   Equipment

REQ-CSC-8	Equipment Required for the CSC	Approved	F

PRESTO shall equip TTC's CSC with:

- FMVDS;
- AVMs;
- SRVMs; and

- SPOS including PIN Pad, as necessary.

REQ-CSC-8.1	Equipment Required for the CSC-2	Approved	F

The number of device and their location of installation at TTC's CSC shall be defined during Design Review.

REQ-CSC-9	Fully Functional Vending Machines	Approved	F

FMVDs, AVMs and SRVMs installed at the TTC CSC shall be identical in design and function to those installed in TTC's subway locations and on TTC surface vehicles.

REQ-CSC-10	Reader Assembly Mock-Ups	Approved	F

To facilitate TTC Customers' learning experience, PRESTO will install mock-ups at the TTC CSC of

 - surface vehicle Reader Assembly;
 - subway Turnstile Reader Assembly; and
 - LRV Reader Assembly.

REQ-CSC-11	Functionality of Reader Assemblies at TTC CSC	Approved	F

The reader Assemblies at TTT CSC shall be fully operational, except that it will not permit the processing of fare transactions (i.e. add-value or reloads) and will not decrement any fare value from the Customer's PRESTO Media.

REQ-CSC-11.1	Functionality of Reader Assemblies at TTC CSC-2	Approved	F

The Reader Assembly at TTC CSC shall be capable of cycling through the various modes of PRESTO Media acceptance and status conditions that TTC Customers would experience under normal operations.

REQ-CSC-12	Provision of PRESTO Test Media	Approved	F

In order to facilitate the educational purpose of this installation, PRESTO will provide TTC with sufficient PRESTO test Media. The test media will activate the Reader Assembly so that it can be used to illustrate normal operations, except for the execution of actual fare transactions.   Lost or stolen test media will be designed so that they will not work on in field Reader Assembly installations.

REQ-CSC-13	Provision of a Simulated Card Tap at Reader Assemblies	Approved	F

For Reader Assembly mock-ups, the results of "test" and demonstration activity will be captured and capable of being displayed to TTC Customers via simulated access to the PRESTO Customer Web Site.

REQ-CSC-14	Access to the PRESTO Customer Web Site	Approved	F

PRESTO will ensure that the Customer wicket locations at TTC's Customer Service Centre will also be equipped with computerized access to the PRESTO Web Site.   Access to the PRESTO Customer Web Site will be enabled with all functionalities that would permit Customer Agents to assist TTC Customers in person in the same manner as live agents assigned to PRESTO's Customer service channel can when conducting business over the phone.

All manner of Web Site access and functionality will be identical to what is available to TTC Customers accessing the Web Site through their personal computers and other web-enabled means. Any additional equipment such as PIN Pads required for TTC Customers to add value to their accounts will also be provided.

REQ-CSC-15	Revenue Servicing/Collection and Maintaining PRESTO Equipment in the TTC CSC	Approved	F

Perform all revenue servicing/collection and maintenance activities for all PRESTO equipment installed as part of an integrated PRESTO System at the TTC CSC.   This maintenance will include both preventative and Corrective Maintenance.

REQ-CSC-16	Support for TTC Concession Registration	Approved	F

Support and provide the necessary tools for the registration of TTC Concessions on PRESTO Cards at the TTC CSC.

This will include all Software, Hardware, devices, stock etc. required for the registration of a PRESTO Card as a Concession.

5.3   TTC Customer Agents

5.3.1   Duties and Responsibilities

REQ-CSC-17	Role	Approved	F

TTC will rely on TTC Customer agents employed by TTC to assist walk-in TTC Customers and address in-person inquiries only.

REQ-CSC-18	Directing PRESTO Inquiries	Approved	F

All Customer inquiries regarding the PRESTO System will be directed to the PRESTO call centre. TTC CSC staff will address inquiries regarding TTC policy and specific TTC-PRESTO field system services and devices (as per CSC-21).

REQ-CSC-19	Maintaining TTC Call Capability	Approved	F

TTC intends to maintain its own call intake capabilities. However: the call-intake capability will be modified to instruct TTC Customers to contact PRESTO's Service Desk / Call Centre for all inquiries related to PRESTO. TTC's call system will be multi-language capable and will have the capability to provide Warm Transfer for PRESTO call centre and vice versa.

5.3.2   TTC CSC Training

REQ-CSC-20	PRESTO's Role in Training	Approved	F

Provide PRESTO training for TTC's Customer agents in all aspects of FMVD, AVM, SRVM, PRESTO website PRESTO call centre/IVR and all PRESTO Media.

REQ-CSC-21	Desired results of PRESTO Training	Approved	NF

At a minimum after completion of training, TTC's Customer Agents will be able to address:

 - Use of FMVD for purchase and reload of PRESTO Media;
 - Use of FMVD and internet access to acquire information about individual TTC Customer accounts and the PRESTO program at TTC;
 - Use of SRVMs for purchase of LUM on the LRV system;
 - Use of surface vehicle Reader Assemblies for payment of fares;
 - How to find sales and reload locations for PRESTO Media that are off TTC property;
 - Inquiries about fare purchase options and pricing;
 - Inquiries about billing;
 - Inquiries about LUM types, on-bus activation, and usage for single ride and transfer purposes, according to TTC fare policies;
 - How to resolve payment issues versus usage issues;

- PRESTO Card replacement issues;
- Refund and Chargeback Requests;
- Reports of lost or stolen PRESTO Media;
- Registration processes for PRESTO Media used on TTC property;
- Enabling/disabling Autoload;
- Inquiries about Concession Fares and procedures needed to qualify and register for Concession cards;
- Customer complaints;
- Explanation of Customer statements provided by PRESTO;
- Inquiries about PRESTO Media issued through Fare Media Vending Devices on TTC property;
- Inquiries about use of any PRESTO Device used by Customers on TTC property;
- Referrals to appropriate resources for inquiries outside the responsibility of TTC's CSCs and of the general responsibilities and capabilities of TTC

5.3.3   TTC Customer Service Scripts

REQ-CSC-24	Customer Service Centre Call Scripts	Approved	F

PRESTO will develop and publish Customer Service Call Centre scripts for use by Customer Agents. These Call Scripts may be based on the same Call Scripts used by PRESTO for its own call centre. The basis for these Customer Service Call Scripts will be to anticipate and document all likely interactive discourses between Customers and Customer Agents. TTC requires that PRESTO, in conjunction with TTC staff, review and modify the scripts for training purposes and use in a face-to-face TTC Customer service environment.

REQ-CSC-25	Feedback and Revision of Scripts	Approved	F

PRESTO will proactively revise Customer Service scripts in response to actual Customer Agent's experience in handling TTC Customer inquiries. PRESTO must include feedback from all Customer Service operations in the revision process. To do so, TTC requires that PRESTO include formal feedback from TTC's CSC.

6 Cash Customer

REQ-CAC-1	Cash Customer Use Cases	Approved	F

The Cash Customer will be able to start their journey on any TTC vehicle, transferring to other modes of travel according to TTC fare rules and policies without having to pay additional fares.
Cash Customer use cases are illustrated in the following figure.

For the excel version of the TTC Specifications the figure is located in CAC-1 in the document Appendix B for Excel Version of TTC Specifications.
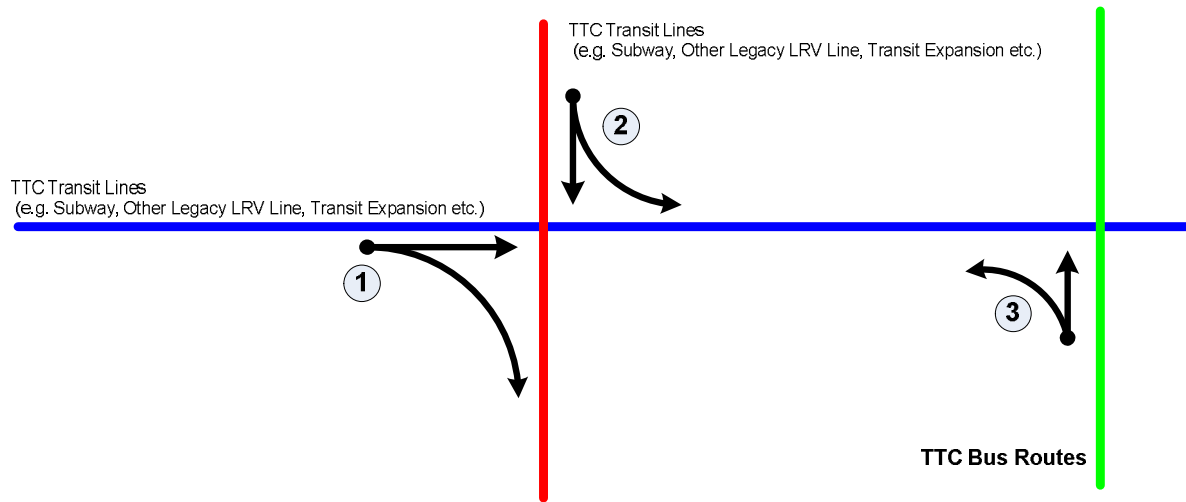
Figure Cash Customer - Use Cases

REQ-CAC-2	Cash Customer Transfer Scenarios	Approved	F

The Cash Customer will be able to start their journey on any TTC vehicle, transferring to other modes of travel according to TTC fare rules and policies without having to pay additional fares.
Cash Customer use cases are illustrated in the following figure.

For the excel version of the TTC Specifications the figure is located in CAC-2 in the document Appendix B for Excel Version of TTC Specifications.

Use Case	High Level Customer Usage
UC-1	Cash Customer starts their journey on a Legacy LRV line and transfers to another TTC mode of transportation or Transit Expansion service.

Use Case	High Level Customer Usage
UC-2	Cash Customer starts their journey at a subway or SRT station and transfers to another TTC mode of transportation or Transit Expansion service.
UC-3	Cash Customer starts their journey on a TTC bus or streetcar and transfers to another TTC mode of transportation or Transit Expansion service.
UC-4	Cash Customer starts their journey on a Transit Expansion service (stop or station) and transfers to another TTC mode of transportation or Transit Expansion service

Table Cash Customer Transfer Scenarios

REQ-CAC-3	Use of LUM for Cash Customer	Approved	F

Provide LUM for Cash Customers (see FRP-23).

REQ-CAC-4	Availability of LUMs within TTC	Approved	F

Ensure Cash Customers will be able to purchase LUM at FMVDs and SRVMs (on-board and Off-board).

REQ-CAC-4.1	Availability of LUMs within TTC-2	Approved	F

Support LUM issued as a transfer on buses and streetcars.

6.1   UC-1 - Start of Journey on Legacy LRV Line

REQ-CAC-7	Cash Customer Purchases LUM	Approved	F

Cash Customers will purchase a LUM at selected Legacy LRV stops where SRVMs are located or on board the Legacy LRV vehicle at Onboard SRVMs.

REQ-CAC-8	Customer Action when LUM is purchased from Onboard SRVM	Approved	F

Ensure a LUM purchased from an Onboard SRVM is activated on purchase.

To be clear, the Cash Customer will not be required to tap their LUM on the LRV Reader Assemblies at the doors of the LRV at the time of purchase.

REQ-CAC-8.1	Customer Action when LUM is purchased from Onboard SRVM-2	Approved	F

A Cash Customer using an on-board SRVM will not be required to tap their LUM on the LRV Reader Assemblies at the doors of the LRV at the time of purchase.

REQ-CAC-8.2	Customer Action when LUM is purchased from Onboard SRVM-3	Approved	F

 LUM purchased from Onboard SRVMs will only be for single Revenue Passenger Trip or return journeys.

REQ-CAC-9	Customer Action when LUM is purchased from Off-board SRVM	Approved	F

Activate a LUM purchased from an Off-board SRVM on first use.

REQ-CAC-9.1	Customer Action when LUM is purchased from Off-board SRVM-2	Approved	F

Ensure LUM purchased from Off-board SRVMs will only be for single ride or return journeys.

REQ-CAC-10	Cash Customer LUM Usage	Approved	F

Support LUM as Proof Of Payment across all modes of TTC transportation when tapping on the PRESTO Reader Assembly.

The PRESTO System and in particular, the PRESTO Reader Assembly will treat the LUM, from a TTC Customer and operations perspective, no differently than other PRESTO Media accepted by the PRESTO System

REQ-CAC-11	End of LUM Usage	Approved	F

Support the LUM used as a transfer according to TTC fare rules and policy.

REQ-CAC-11.1	End of LUM Usage-2	Approved	F

Ensure activated LUM will expire according to TTC rules and policies and as per FRP-223 .

6.2   UC-2 - Start of Journey at a Subway or SRT Station

REQ-CAC-12	Cash Customer Purchases LUM	Approved	F

Enable Customers to purchase LUM via FMVDs.

REQ-CAC-13	Customer Action when LUM is purchased from FMVD	Approved	F

Ensure a LUM purchased from a FMVD is not activated on purchase.

REQ-CAC-13.1	Customer Action when LUM is purchased from FMVD-2	Approved	F

Ensure tapping the LUM to the PRESTO Reader Assembly located at the Point of Entry of any mode of transportation will activate it for use.

REQ-CAC-13.2	Customer Action when LUM is purchased from FMVD-3	Approved	F

Ensure LUM purchased from FMVDs will support a variety of TTC Fare Products as outlined in FRP-220.

REQ-CAC-14	Cash Customer LUM Usage	Approved	F

Support LUM as Proof Of Payment across all modes of TTC transportation when tapping on the PRESTO Reader Assembly located at:

REQ-CAC-14.1	Cash Customer LUM Usage-2	Approved	F

 - turnstiles (subway, SRT)

REQ-CAC-14.2	Cash Customer LUM Usage-3	Approved	F

- on surface vehicles

REQ-CAC-14.3	Cash Customer LUM Usage-4	Approved	F

- at Transit Expansion stations and/or stops

REQ-CAC-14.4	Cash Customer LUM Usage-5	Approved	F

- at the doors of the Legacy LRV

REQ-CAC-14.5	Cash Customer LUM Usage-6	Approved	F

- On Wheel-Trans vehicles

The PRESTO System and in particular, the PRESTO Reader Assembly will treat the LUM, from a TTC Customer and operations perspective, no differently than other PRESTO Media accepted by the PRESTO System.

REQ-CAC-15	End of LUM Usage	Approved	F

Support the LUM used as a transfer according to TTC fare rules and policy.

REQ-CAC-15.1	End of LUM Usage-2	Approved	F

Ensure activated LUM will expire according to TTC rules and policies and as per FRP-223.

6.3   UC-3 - Start of Journey on a Bus or Streetcar

REQ-CAC-16	Cash Customer Pays Cash Fare	Approved	F

Cash Customer will pay for their journey starting on a bus or streetcar by depositing the correct amount of money in a TTC fare box.

REQ-CAC-17	Cash Customer Requests Transfer	Approved	F

At the TTC Customer's request, and upon verification by the TTC operator that the correct fare has been paid, a transfer LUM will be extracted from the transfer LUM dispensing device by the TTC operator.

REQ-CAC-18	TTC Operator Activates LUM as a Transfer	Approved	F

The transfer LUM must be tapped by the TTC operator on the Reader Assembly to be activated..

REQ-CAC-19	LUM Activation Speed	Approved	F

Ensure the Reader Assembly will activate a transfer LUM in 300 milliseconds or less.

REQ-CAC-20	Cash Customer LUM Usage	Approved	F

Ensure support of transfer LUM as Proof Of Payment across all TTC modes of transportation or Transit Expansion services.

The PRESTO System and in particular, the PRESTO Reader Assembly will treat the transfer LUM, from a TTC Customer and operations perspective, no differently than other PRESTO Media accepted by the PRESTO System.

REQ-CAC-21	Failure to Activate LUM	Approved	F

Ensure that a LUM not activated by the TTC operator before being given to the Customer will result in the LUM not being accepted for transfer purposes.

REQ-CAC-22	End of LUM Usage	Approved	F

Ensure support of the LUM used as a transfer according to TTC fare rules and policy.

REQ-CAC-22.1	End of LUM Usage-2	Approved	F

Ensure activated transfer LUM will expire according to TTC rules and policies and as per FRP-223.

6.4 UC-4 - Start of Journey at a Transit Expansion Service

REQ-CAC-23	Cash Customer Purchases LUM	Approved	F

Enable Customers to purchase LUM via SRVMs.

REQ-CAC-23.1	Cash Customer Purchases LUM-2	Approved	F

Cash Customers will purchase LUM via FMVDs located at each station entrance or SRVMs located at stops.

REQ-CAC-24	Customer Action when LUM is purchased from FMVD	Approved	F

Ensure a LUM purchased from a FMVD or Off-board SRVM is not activated on purchase.

REQ-CAC-24.1	Customer Action when LUM is purchased from FMVD-2	Approved	F

Ensure tapping the LUM to the PRESTO Reader Assembly located at the subway or pedestal reader located at a stop will activate it for use.

REQ-CAC-24.2	Customer Action when LUM is purchased from FMVD-3	Approved	F

Ensure LUM purchased from FMVDs will support a variety of TTC Fare Products as outlined in FRP-220.

REQ-CAC-25	Cash Customer LUM Usage	Approved	F

Support LUM as Proof Of Payment across all modes of TTC transportation when tapping on the PRESTO Reader Assembly located at:

REQ-CAC-25.1	Cash Customer LUM Usage-2	Approved	F

 - turnstiles (subway, SRT)

REQ-CAC-25.2	Cash Customer LUM Usage-3	Approved	F

 - on surface vehicles

REQ-CAC-25.3	Cash Customer LUM Usage-4	Approved	F

 - at Transit Expansion stations and/or stops

REQ-CAC-25.4	Cash Customer LUM Usage-5	Approved	F

 - at the doors of the legacy LRV

REQ-CAC-25.5	Cash Customer LUM Usage-6	Approved	F

 - on Wheel-Trans vehicles

REQ-CAC-26	End of LUM Usage	Approved	F

Ensure support of the LUM used as a transfer according to TTC fare rules and policy.

REQ-CAC-26.1	End of LUM Usage-2	Approved	F

Ensure activated LUM will expire according to TTC rules and policies and as per FRP-223.

7   TTC Test Lab

REQ-TTL-1	Scope	Approved	NF

The TTC Test Lab will be a fully functional test lab used by PRESTO and TTC for and during:

- developing;
- testing;
- Training;
- troubleshooting;
- verifying functionality;
- User Acceptance Testing;
- new technology testing/introduction (e.g. Open Payments); and
- ongoing operation.

REQ-TTL-2	PRESTO System Production Environment Equivalent	Approved	NF

The TTC Test Lab will be equivalent to the PRESTO System production environment as outlined in these TTC Specifications for the PRESTO System at TTC.

REQ-TTL-3	PRESTO Responsibilities	Approved	NF

PRESTO will:

- equip the TTC Test Lab with PRESTO equipment and services as defined in this Agreement;
- ensure the equipment and services are fully functional and operational and equivalent to the production environment;
- ensure that all field system support equipment and networking (e.g. data concentrators, wireless, GPS data etc.,) mirrors the in-field installation;
- ensure the equipment and services are fully able to accept and process all payment of fares using all types of fare payment media required by this specification;
- ensure that all customer service channels for sales and reload (e.g. web site, IVR, FMVD, AVM, SRVM) are fully functional and accessible at the PRESTO-TTC Test Lab;
- ensure that all operational services (e.g. device management, monitoring, Business Intelligence/ reporting etc.) are fully functional and accessible at the PRESTO-TTC Test Lab; and
- ensure the equipment and services are fully integrated (networked etc.) with a production PRESTO System backend system as outlined in this Specification.

REQ-TTL-4	Location	Approved	NF

TTC will provide a facility for the TTC Test Lab.

REQ-TTL-5	PRESTO Equipment for PRESTO-TTC Test Lab	Approved	NF

PRESTO will equip the TTC Test Lab with the following types and estimated quantities of devices and capabilities, subject to review and mutual agreement by PRESTO and TTC during Design Review:

- Bus, streetcar, and LRV Reader Assemblies, installed to simulate a typical field implementation- Minimum Quantity of 4;
- Subway Reader Assemblies installed on TTC Fare Gates- Minimum Quantity of 4;
- FMVDs - Quantity of 2;
- AVMs - Quantity of 4;
- Off-board, On-board SRVMs - Quantity of 2 of each;
- Handheld Point of Sale Devices (HHPOS)- Quantity of 4;
- LUM on Bus Dispenser - Quantity of 2;
- Computer Web Site account access;
- All PRESTO Media (including concession types, LUMs, Open Payment test cards) that will be used, or

is anticipated being used, on the PRESTO System at TTC;
- Access via the Internet to PRESTO Central Processor for the purpose of monitoring system performance during testing and normal operation;
- IVR Test Environment that allows TTC to conduct system Testing of all of the functionality present in the PRESTO Call Centre;
- System Monitoring and Management Test Environment that allows TTC to conduct testing. Data Mart Test Environment that replicates all of the functionality of the PRESTO System Data Mart;
- Test Environment containing all the Business Intelligence Reports that will be used by TTC; and
- Website Test Environment that replicates all of the functionality of the PRESTO Customer Website.

REQ-TTL-6	PRESTO Equipment Specifications and Performance	Approved	NF

The specifications and performance of all the PRESTO equipment and associated software installed by PRESTO in the TTC Test Lab will be identical to the actual field installed PRESTO equipment at TTC. All of the PRESTO equipment installed in the TTC Test Lab will use the live production requirements of the PRESTO System and be enabled to perform all functionalities specified in the TTC Specifications and Services, as well as simulate all fare options and use case scenarios under normal operating conditions and TTC fare policies.

REQ-TTL-7	Maintenance of PRESTO Equipment	Approved	NF

PRESTO will be responsible for maintenance of all PRESTO equipment in the TTC Test Lab for the term of this agreement.

REQ-TTL-8	Use of Virtual Machines for PRESTO Services in PRESTO-TTC Test Lab	Approved	NF

PRESTO may cause the IVR, Website, Data Mart, Business Intelligence etc., to run on virtualized hardware/software platforms provided these services when running on virtual platforms are identical in all other respects to those in the PRESTO System. PRESTO will be responsible for version control and configuration management for these virtual environments.

REQ-TTL-9	Stress Testing Equipment and Software	Approved	NF

PRESTO will be responsible for the provision of necessary test equipment and associated software for the purposes of stress testing the entire PRESTO System. The software for stress testing purposes should include emulator programs that can generate the necessary load or data traffic to the various components of the PRESTO System. This stress testing equipment and software will be available for use in the -TTC Test Lab.

REQ-TTL-11	Provision of a Full Suite of PRESTO Test cards	Approved	F

Provide TTC with a full set of cards (including LUM) for testing purposes.

REQ-TTL-12	Completion Date of PRESTO-TTC Test Lab	Approved	NF

The -TTC Test Lab will be implemented concurrently with the implementation of the PRESTO System at TTC with the following constraints:

Components/devices of the TTC Test Lab will be implemented before they are installed in the field; and
The TTC Test Lab will be completed before User Acceptance Testing or as mutually agreed.

REQ-TTL-13	Ongoing Use	Approved	NF

The -TTC Test Lab will be used by PRESTO and TTC on an ongoing basis for,

- testing new TTC Products;
- testing fare changes;
- testing fare policies (e.g. transfers, cross-boundary, etc.);
- testing new device functionalities;

- testing new services / service updates /fixes etc.;
- Training; and
- testing / verifying incident / fixes and firmware upgrades.

REQ-TTL-14	Role of TTC	Approved	NF

TTC has the ability to conduct additional testing but must do so at its own cost and without impacting the agreed upon testing schedule within the PRESTO/TTC Test Plan.

8   Cross Boundary Service

Cross Boundary Service will subject to further review during Design Review with all applicable Cross-Boundary Service Providers, TTC, and PRESTO.

8.1   General

REQ-CBD-1	Cross-Boundary Scope	Approved	F

TTC operates contracted services between the City of Toronto and various adjacent municipalities. The PRESTO System will address TTC Customers travelling between the City of Toronto on TTC and the applicable municipality or Region. To be more specific, TTC operates buses that operate within the City of Toronto and extend their services to certain Transit Regions without stopping at the City of Toronto boundary. The PRESTO System will need to address this functionality and apply both TTC fare rules and policies, and the applicable fare structures and transfer policies of the other transit properties.

The PRESTO System will support all current TTC Cross-Boundary policies and travel to and with adjacent municipalities.

REQ-CBD-2	Flexible Cross-Boundary Support	Approved	F

The PRESTO System must be able to support changing fare policies and agreements between TTC and surrounding transit properties without modifying field device Hardware and Software.   Modifications to support Cross-Boundary fare policies should only be done via fare rules and fare tables easily uploaded to the devices.

REQ-CBD-3	Usage of GPS for Location and Direction on Surface Vehicles	Approved	F

All PRESTO Reader Assemblies on surface vehicles will use GPS location capability that will allow position, direction and stop location to be determined.

REQ-CBD-4	Source of GPS data	Approved	F

GPS capability will be located (if possible) within the Reader Assembly installed on the bus. Alternatively, interfacing to the existing TTC bus stop announcement system will be explored during Design Review to determine if the same information required by the PRESTO Services is available. The PRESTO Reader Assemblies may use the GPS location and direction information along with last tap information on the card to calculate appropriate fares.

REQ-CBD-5	Support for Subway Cross-Boundary Service	Approved	F

Subway extensions into the York region are being designed and PRESTO will need to address cross-boundary travel on these extensions.   The PRESTO System must be flexible and adaptable to support Cross-Boundary travel and be compliant with agreements developed between the TTC, City of Toronto and other regions and/or municipalities involved with these subway extensions.. Note that there will be no Reader Assemblies Onboard the subway train, however additional support equipment may be required in station for this situation.   This will be determined during detailed Design Review.

REQ-CBD-6	Additional PRESTO Devices	Approved	F

Cross-Boundary may require additional PRESTO Devices such as Reader Assemblies installed at rear doors for tapping on exit or additional Reader Assemblies at Subway exits for cross-boundary Customers.   Additional PRESTO Devices, if required, will be determined during detailed Design Review and will be supplied by PRESTO.

REQ-CBD-7	Cross-Boundary Reconciliation	Approved	F

The PRESTO System will process all taps/fares according to the fare policies and practices with the region they were tapped and apply any applicable cross-boundary fare policies., as necessary.   The PRESTO System may use GPS and location data at the time of "tapping," and take all appropriate actions in reconciling these amounts to their respective Transit Authorities and with PRESTO. All reconciliation specifications and SLAs for intra-Region (i.e. within TTC) taps stated in this agreement equally apply to cross-boundary taps.

REQ-CBD-8	Customer Education	Approved	F

PRESTO and TTC will be responsible for developing and providing the necessary resources and education materials associated with cross-boundary travel that will at least include,

 - a description of how cross-boundary works;
 - a summary of what fares will be charged and when;
 - any default fares associated with first tap and/or direction travelled; and
 - any additional actions required by the Customer such as tap on exit.

REQ-CBD-9	Accommodation for Transition Period	Approved	F

As the PRESTO System is rolled out at TTC and other Transit Regions, the current fare media used by TTC (and other regions) may still be used. PRESTO will ensure that a smooth transition to the PRESTO System occurs.

REQ-CBD-10	Minimize Customer Actions	Approved	F

The PRESTO System Cross-Boundary service will be designed to minimize any new or additional actions required by the Customer using the service.

REQ-CBD-11	Minimal Impact on TTC Operations and Customer Flow	Approved	F

The PRESTO System Cross-Boundary service will have a minimal impact on TTC Operations and Customer flow.   This includes impact on free body transfers associated with Cross-Boundary service. Impact assessments will be conducted by TTC during detailed Design Review.

REQ-CBD-12	Reconciliation of Cross-Boundary Fares	Approved	F

Fares payments owed to TTC and the other transit properties must be accurate and effectively reconciled in a timely manner as per Schedule A - SLA Specifications.

REQ-CBD-13	Reporting	Approved	F

The PRESTO System will report, record and store (to the Data Mart) all cross-boundary travel. Detailed data allowing full ridership, reconciliation, settlement and auditing will be stored in the Data Mart and made available to each applicable cross-boundary transit service provider, as appropriate.

REQ-CBD-14	Customer Trip History Reports	Approved	F

Customer trip history reports will show their cross-boundary trips, transfers and individual line items, itemized by the amount paid per cross-boundary journey.

REQ-CBD-15	Support for all TTC Fare Types and Products	Approved	F

All TTC Fare Products and Fare Types will be supported by the PRESTO Cross-Boundary solution.

REQ-CBD-16	Support for TTC Transfer Rules	Approved	F

Cross-Boundary service will fully support TTC transfer rules and policy.   For example, TTC Customers that travel across a region into the TTC, and have already paid the TTC fare, can transfer within TTC according to TTC transfer rules. Likewise, transfer rules for other transit regions where TTC Customers alight should equally apply.

REQ-CBD-17	Support for Fare Policies, Rules and Products of Transit Services	Approved	F

The PRESTO System will support for all fare policies, products and transfer agreements of applicable cross-boundary transit services. For example, PRESTO cross-boundary solution must support the fare policies, products and transfer rules of both TTC and YRT.

REQ-CBD-18	Support for Future Cross-Boundary Services	Approved	F

The PRESTO System Cross-Boundary Service will be designed to be flexible and adaptable in order to support potential future Cross-Boundary services with minimal impact on Hardware and Software changes.

REQ-CBD-19	Enforcement	Approved	F

HHPOS devices will need to support the checking and verification of all Cross-Boundary travel.

REQ-CBD-20	Use of Design Review	Approved	F

A mutually agreeable solution for Cross Boundary Service will be further refined and developed during Design Review with all applicable Cross-Boundary Service Providers, TTC and PRESTO.

8.2   Cross-Boundary Service with York Region

REQ-CBD-21	York Region Cross-Boundary Travel	Approved	F

TTC operates buses that cross into York region. This Cross-Boundary service results in the need for the PRESTO System to support fare collection from TTC and YRT Customers for one or more zones of travel. PRESTO must configure the PRESTO System so that it will support payment of fares for TTC Customers travelling between TTC and York Region using TTC transit services under TTC fare rules and policies.

Both TTC and YRT fare polices and rules, and transfer policies must be supported and applied to cross-boundary service scenarios outlined in the tables below.

For the excel version of the TTC Specifications these tables are located in CBD-21 in the document Appendix B for Excel Version of TTC Specifications.
TTC fare polices and rules applicable to cross-boundary services are outlined in the tables below.

Customer Journey Begins:	Customer Journey Ends:	
	Within City of Toronto	Outside City of Toronto
Within City of Toronto	Scenario NB-1 One (1) TTC fare	Scenario NB-2 One (1) TTC fare + One (1) YRT fare (1 or 2 zones)
Outside City of Toronto	Scenario NB-3 Not Applicable	Scenario NB-4 One (1) YRT fare (1 or 2 zones)

Table Northbound Journeys

Customer Journey Begins:	Customer Journey Ends:	
	Within City of Toronto	Outside City of Toronto
Within City of Toronto	Scenario SB-1 One (1) TTC fare	Scenario SB-2 Not Applicable

Outside City of Toronto	Scenario SB-3 One (1) TTC fare + One (1) YRT fare (1 or 2 zones)	Scenario SB-4 One (1) YRT fare (1 or 2 zones)

<div align="center">Table Southbound Journeys</div>

Table illustrates fare payment scenarios for northbound journeys between TTC and York Region, while Table illustrates fare payment scenarios for southbound journeys between York Region and TTC. In these tables, the following abbreviations are used:

TTC	-	Toronto Transit Commission
YRT	-	York Region Transit
SB	-	Southbound, as in the direction of the journey
NB	-	Northbound, as in the direction of the journey
TTC Fare	-	TTC fare; may be cash, or PRESTO media
YRT Fare	-	YRT fare; may be cash, or PRESTO media

Note that in all cases, the customer is travelling on a TTC vehicle and may be transferring to another TTC vehicle or mode.   Customers may also be transferring from the TTC vehicles in York Region to another YRT vehicle or another adjacent transit service provider. Currently, these are buses and this is the primary focus of these Cross-Boundary requirements. In TTC bus fleet, any TTC bus may be assigned for use in Cross-Boundary service.   PRESTO must provide a solution that will be implemented across the entire TTC bus fleet.

REQ-CBD-22	Cross-Boundary Travel Design Considerations	Approved	F

The PRESTO design for Cross-boundary services must consider not only services into York Region (YRT) which represent the majority of Cross-Boundary rides for the TTC but also all other Cross-Boundary rides that currently are or could be offered by the PRESTO System.   PRESTO designs for Cross-Boundary services will be reviewed in Design Review.

REQ-CBD-23	Southbound Volumes and a Second Reader Assembly	Approved	F

Due to the volume of Customers travelling southbound, a Reader Assembly may be required at the rear door of all TTC buses, resulting in two (2) Reader Assemblies per bus. If required the installation of the second reader will incorporate the ability to control its activation from the TTC Operator's location on the vehicle.

Since all TTC buses may be used for southbound cross-boundary service, this would necessitate that all buses in TTC bus fleet be installed with rear door Reader Assemblies.

REQ-CBD-24	Detection of Cross-Boundary misuse	Approved	F

Any designated TTC Reader Assembly (on any mode) will need to be able to detect misuse of incoming York Region Transit trips, as well as to set the York Region Transit underpayment flag as necessary. (ie. Crossing a zone boundary without paying for the appropriate zones).

REQ-CBD-41	Clarity on Tansfer Validity	Approved	F

To Clarify, the following is the set of conditions in which the transfer must be created and allowed for cross boundary transfers to function correctly:

Northbound Transfer conditions on TTC serviced York routes:

Customer Journey begins within City of Toronto heading Northbound:
  - Transfer created good for TTC north direction and York zone 1.

Customer Journey begins outside City of Toronto heading Northbound:
   - Transfer created good for York zone 1 only.

Southbound Transfer Conditions on TTC serviced York routes:

Customer Journey begins within the City of Toronto heading Southbound:
   - Transfer created good for TTC south direction and York Zone 1.

Customer Journey begins outside the City of Toronto heading Southbound:
   - Transfer created good for York Zone 1.

Transfer products created by TTC serviced York routes must be accepted by existing York transfer conditions as configured within system seamlessly. TTC transfers applicable to York must be accepted as normal York transfers but logged as unique data for reporting purposes. TTC routes running York services must accept transfers normally accepted by York from other transit provider's when outside the city of Toronto as configured within the system. Zone 2 validity for York will only be allowed when a 2 zone has been deducted.

8.2.1   Northbound Use Cases

REQ-CBD-25	Northbound Use Cases	Approved	F

Northbound use cases are illustrated in the Table below

For the excel version of the TTC Specifications this table is located in CBD-25 in the document Appendix B for Excel Version of TTC Specifications.

Table outlines the northbound use cases for cross-boundary with YRT.

Scenario	High Level Customer Usage
NB-1	***Customer travels north from a Toronto location to a Toronto location (i.e. they do not cross the City of Toronto boundary into York Region)*** Customer pays for fare using cash or PRESTO media (including LUM).
NB-2	***Customer travels north from a Toronto location to a location in York Region.*** Customer pays for fare using cash, or PRESTO media (including LUM).
NB-4	***Customer travels north from a York Region location to a York Region Location.*** Customer pays for fare using cash, or PRESTO media.

Table Cross-boundary - Northbound Customer Use Cases

In all of the use cases above, the Reader Assembly will automatically determine the position and direction of the bus when determining fare and fare deductions.

8.2.1.1   Northbound Use Case: NB-1

This use case describes a normal PRESTO payment scenario where the TTC Customer may use cash or any PRESTO Media, including LUMs or cash to pay for their journey on a northbound cross-boundary bus where they alight while in the Toronto area.

REQ-CBD-26	Customer Action on Boarding	Approved	F

In all cases, the TTC Customer will tap their PRESTO Media (e.g. cards, LUMs etc) at the front door of the vehicle on the Reader Assembly and have the Reader Assembly determine their TTC fare.   All TTC fares and fare products are supported.

REQ-CBD-27	Cash Users	Approved	F

Cash users will place the appropriate payment in the fare box and the TTC Operator will activate and hand them a LUM if requested.

8.2.1.2   Northbound Use Case: NB-2

REQ-CBD-28	Fare Deduction	Approved	F

For those TTC Customers travelling north on a Cross-Boundary bus who alight in York Region a second, York region fare will be deducted from their PRESTO Media.

REQ-CBD-29	Customer Action on Boarding	Approved	F

On-Boarding the northbound cross-boundary bus in Toronto, the appropriate fare is deducted or charged (in the case of cash or LUM users) upon entry into the bus.   This is described in the use case NB-1.

REQ-CBD-30	Customer Action on Exiting	Approved	F

On alighting from a TTC vehicle in York Region, all TTC Customers will be required to exit via the front door of the bus where a second, York Region fare will be charged. Explicitly this York Region Fare for TTC Customers will follow the following process:

 - Customers that used a PRESTO Card on Boarding will tap their PRESTO Card on exit.   As in use case NB-1 the Reader Assembly will read the PRESTO Card and determine acceptance / denial of fare payment.

 - Single Ride Cash Customers may already have a valid LUM. LUM users will be required to tap their LUM on the vehicle's Reader Assembly and deposit the additional York Region fare, as necessary, in the fare box.

 - All Customers who have paid cash on exit may use the LUM to transfer onto another York Region vehicle PRESTO must support the transfer from a TTC vehicle to a York Region Transit vehicle.

8.2.1.3   Northbound Use Case: NB-4

REQ-CBD-31	Fare Deduction on Exit	Approved	F

For those TTC Customers travelling north on a Cross-Boundary bus who board in York Region, a York Region fare will be deducted from their PRESTO Media on exit from the front doors of the vehicle as described in use case NB-2.

REQ-CBD-32	Customer Action on Boarding	Approved	F

On-Boarding the northbound Cross-Boundary bus in York Region, the Customer does not tap their PRESTO Media to the Reader Assembly.   No action is required by the Customer in this scenario.

REQ-CBD-33	Customer Action on Exiting	Approved	F

On exit the PRESTO TTC Customer taps their PRESTO Media to the Reader Assembly at the front doors of the bus. The Reader Assembly reads the PRESTO Card and determines if there is any of the following:

- PRESTO Media is not on a hot list;
- A valid PRESTO transfer on the card;
- A valid York Region Pass or other Product on the card;
- Sufficient e-Purse Funds on the PRESTO Card; or
- Any other valid PRESTO product (as defined in Design Review).

If any of the above conditions are read, the Reader Assembly will generate an approval message.   In all other cases, a denial message will be generated.

8.2.2   Southbound Use Cases

REQ-CBD-34	Southbound Use Cases	Approved	F

Northbound use cases are illustrated in the Table below

For the excel version of the TTC Specifications this table is located in CBD-34 in the document Appendix B for Excel Version of TTC Specifications.
Table outlines the southbound use cases for Cross-Boundary Service.

Scenario	High Level Customer Usage
SB-1	***Customer travels south from a Toronto location to a Toronto location.*** Customer pays for fare using cash, or PRESTO media (including LUM).
SB-3	***Customer travels south from a York region location to a location in Toronto.*** Customer pays for fare using cash, or PRESTO media (including LUM).
SB-4	***Customer travels south from a York Region location to a York Region Location.*** Customer pays for fare using cash, or PRESTO Media.

Table Cross-boundary - Southbound Customer Use Cases

In all of the use cases above, the Reader Assembly will automatically determine the position and direction of the bus when determining fare and fare deductions.

8.2.2.1   Southbound Use Case: SB-1

This use case describes a normal PRESTO payment scenario where the TTC Customer may use PRESTO Media, including LUMs or cash to pay for their journey on a southbound cross-boundary bus where they board within the Toronto area.

REQ-CBD-35	Customer Action on Boarding	Approved	F

Customers with PRESTO Media (e.g. cards, LUMs etc.) will tap their PRESTO Card on the bus Reader Assembly on Boarding.   As previously described the Reader Assembly will read the PRESTO Card and determine acceptance / denial of fare payment.

This use case is the same as use case NB-1.

REQ-CBD-36	Cash Users	Approved	F

Cash users will place the appropriate payment in the fare box and the TTC Operator will activate and

hand them a LUM if requested.

8.2.2.2   Southbound Use Case: SB-3

This use case describes a normal PRESTO payment scenario for TTC Customers travelling south on a bus in cross-boundary Service who board in York Region and alight in Toronto.

REQ-CBD-37	Customer Action on Boarding	Approved	F

On Boarding the southbound cross-boundary bus, a TTC fare and a York Region Fare is deducted or charged (in the case of cash users) upon entry into the bus. Explicitly, fare payment for this use case will work in the following manner:

 - Presto Customers with valid PRESTO pass, transfer and e-Purse funds can board the southbound bus in York Region. On entry the PRESTO TTC Customer taps their PRESTO Card to the Reader Assembly at the front doors of the bus. The Reader Assembly reads the PRESTO Card and the Reader Assembly determines if there any of the following:

  - A valid PRESTO transfer on the card;
  - A valid York Region Pass or other Product on the card;
  - Sufficient e-Purse Funds on the PRESTO Card; or
  - Any other valid PRESTO product (as defined in Design Review).

 - Single Ride Cash Customers will pay the double fare upon entry to the bus by placing cash into the bus fare box. The TTC Customer may request a TTC LUM for use within TTC.

When tapped, valid PRESTO Media with sufficient funds for cross-boundary travel will generate an approval message. Otherwise a denial message will be generated. Furthermore the Reader Assembly will signal an alert. The TTC Customer may then pay the extra TTC fare with cash, or LUM.

REQ-CBD-38	Customer Action on Exiting	Approved	F

On exit no tap to the bus Card Reader is required.

8.2.2.3   Southbound Use Case: SB-4

This use case describes a normal PRESTO payment scenario for TTC Customers who have boarded a southbound cross-boundary bus in York Region and alight within York region.

REQ-CBD-39	Customer Action on Boarding	Approved	F

As stated in use case SB-3, all TTC Customers pay TTC fare and the York Region fare on entry.

REQ-CBD-40	Customer Action On Exit	Approved	F

On exiting the bus, TTC Customers will tap their PRESTO Card on the Reader Assembly. Due to the volume of anticipated southbound TTC Customers, a second Reader Assembly may be installed at the rear doors of the vehicle.

PRESTO Card Users (including LUMs) and Cash Customers intending to only travel within the York Region would not have paid the second fare hence no further action is required.

In all cases, Cash Customers may request a LUM to allow them to transfer onto other York Region services. PRESTO must support the transfer from a TTC vehicle to a York Region Transit vehicle.

9 Transit Expansion Operations

Transit Expansion to be dealt with in the Master Agreement.

9.1 General

9.2 Customer only uses Transit Expansion

9.3 Transfers from Transit Expansion to TTC

9.4 Transfers from TTC to Transit Expansion

10 Parking

REQ-PRK-1	Overview	Approved	F

Parking to be considered as a fare product and may be purchased for e-Purse or pass product cards. This fare product will be accepted at all TTC commuter parking lots (gated or pay and display).

REQ-PRK-1.1	Overview-2	Approved	F

Ensure that parking products may be purchased as a pass product for any valid PRESTO Card.

REQ-PRK-1.2	Overview-3	Approved	F

Ensure Customers may pay with cash or credit or use their PRESTO Card.

REQ-PRK-1.3	Overview-4	Approved	F

Ensure a valid parking product allows Customer to park.

REQ-PRK-1.4	Overview-5	Approved	F

Ensure if there is no valid parking product present on the PRESTO Card that e-Purse can be used.

If no parking product is found, the Customer will have a choice to either use their e-Purse (if there is one present on the PRESTO Card) or cash or credit/Debit Card.

REQ-PRK-1.5	Overview-6	Approved	F

Ensure the parking device is capable of triggering the gate to open or printing a receipt for pay-and-display.

REQ-PRK-1.6	Overview-7	Approved	F

TTC commuter parking lots are generally for commuters that will be using the TTC transit system. TTC policies / business rules and requirements will reflect this.

REQ-PRK-2	Parking product scope	Approved	F

Support a parking product that can be used at any TTC commuter parking lot.   This parking product is both flexible and adaptable to accommodate changing polices and future fare products. TTC commuter parking lots are either gated lots or pay and display lots.

REQ-PRK-3	General payment options	Approved	F

The PRESTO System will support the following parking payment options:

REQ-PRK-3.1	General payment options-2	Approved	F

- pass product with parking product

REQ-PRK-3.2	General payment options-3	Approved	F

- e-Purse with parking product

REQ-PRK-3.3	General payment options-4	Approved	F

- direct payment for parking with e-Purse

REQ-PRK-3.4	General payment options-5	Approved	F

- cash

REQ-PRK-3.5	General payment options-6	Approved	F

- credit/Debit Card

REQ-PRK-4	Parking Fees and Policies	Approved	F

Parking fees and polices will be programmable and will be determined by the TTC.

REQ-PRK-5	Parking product types	Approved	F

Parking product types may include, but not be limited to:

REQ-PRK-5.1	Parking product types-2	Approved	F

- monthly parking pass

REQ-PRK-5.2	Parking product types-3	Approved	F

- weekly parking pass

REQ-PRK-5.3	Parking product types-4	Approved	F

- day pass

REQ-PRK-6	Parking pass only product	Approved	F

The PRESTO Card must have at least an e-Purse and/or TTC pass product installed.   in order to have a parking pass.

REQ-PRK-7	e-Pass with parking product	Approved	F

Ensure a pass product parking product will be supported at all TTC commuter parking lots.

The TTC will determine the policy on whether e-pass will be acceptable for use at TTC commuter lots in the future, but the PRESTO System will support the e-pass option.

REQ-PRK-8	e-Pass and parking product combinations	Approved	F

Ensure that period of parking product is equal or less than pass product period. Product combinations are as follows:

REQ-PRK-8.1	e-Pass and parking product combinations-2	Approved	F

- weekly pass product with weekly parking product

REQ-PRK-8.2	e-Pass and parking product combinations-3	Approved	F

- weekly pass product with a day parking product

REQ-PRK-8.3	e-Pass and parking product combinations-4	Approved	F

- monthly pass product with monthly parking product

REQ-PRK-8.4	e-Pass and parking product combinations-5	Approved	F

- monthly pass product with weekly parking product

REQ-PRK-8.5	**e-Pass and parking product combinations-6**	**Approved**	**F**

- monthly pass product with a day parking product

For these combinations, the pass product duration is at least as long as the parking product duration. Other product combinations such as,

weekly pass products with monthly parking product, etc.

May either:

- not be allowed or,
- be allowed but at a different price point for the parking product.

REQ-PRK-9	**e-Purse and parking product combinations**	**Approved**	**F**

Ensure the PRESTO System is flexible enough to accommodate e-Purse balance when adding a parking product. Product combinations are as follows:

REQ-PRK-9.1	**e-Purse and parking product combinations-2**	**Approved**	**F**

- e-Purse with a positive balance and a weekly parking product

REQ-PRK-9.2	**e-Purse and parking product combinations-3**	**Approved**	**F**

- e-Purse with a positive balance and a day parking product

REQ-PRK-9.3	**e-Purse and parking product combinations-4**	**Approved**	**F**

- e-Purse with a positive balance and a monthly parking product

In each case the cost and fees associated with the e-Purse and parking product will be determined by the TTC.   For example, this pricing scheme may be designed with price breaks that reflect lower parking product costs with same day transit usage and/or increased e-Purse loads.   Such a policy would encourage commuters using the TTC transit system to use the TTC commuter parking, while at the same time charging non-transit users a premium for using the parking lot.

REQ-PRK-10	**Current Commuter Parking Lot Types and Policies**	**Approved**	**F**

The PRESTO System shall be integrated with both gated and pay and display lots.   Current commuter parking lot types, fees and polices are illustrated in the table below. There are 16 pay and display parking lots and 14 gated parking lots.

For the excel version of the TTC Specifications this table is located in PRK-10 in the document Appendix B for Excel Version of TTC Specifications.

SUMMARY OF COMMUTER PARKING LOTS
As of: January 17, 2011

Parking Lot	Type	Normal Capacity	Weekdays 5 am - 3 pm	Weekdays 3 pm - 2 am	Weekends / Holidays 5 am - 3 pm	Weekends / Holidays 3 pm - 2 am	Hours of Paid Parking	
Don Mills	G	366	$5	Free	Free	Free	Mon. - Fri.	5 am - 9:30 am
Downsview	G	641	$4	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Eglinton West - East	P	102	$6 $2/hr, 10 am - 3 pm	$4	Free	Free	Mon. - Fri.	5 am - 2 am
Eglinton West - West	P	56	$6	$4	Free	Free	Mon. - Fri.	5 am - 2 am
Ellesmere	P	68	$3	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Finch - East	G	1,683	$5	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Finch - West	G	1,562	$5	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Islington - Cordova	G	473	$4	$4	$4	$4	Mon. - Sun.	5 am - 2 am
Islington - Fieldway	P	270	$3	$2	$2	$2	Mon. - Sun.	5 am - 2 am
Islington - Lomond	P	283	$7	$4	$7	$4	Mon. - Sun.	5 am - 2 am
Islington - Main	G	543	$5	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Keele	P	221	$4	$4	Free	Free	Mon. - Fri.	5 am - 2 am
Kennedy - East	P	151	$3	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Kennedy - North	P	112	$5	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Kennedy - North Service Rd.	P	199	$5	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Kennedy - South	G	676	$5	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Kipling - North	G	564	$5	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Kipling - South	G	852	$5	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Kipling - Subway Cr.	P	72	$5	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Lawrence East	P	90	$2	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Leslie	P	102	$6 $2/hr	$6 $2/hr	$6 $2/hr	$6 $2/hr	Mon. - Sun.	5 am - 2 am
Victoria Park	P	180	$4	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Warden - North	G	899	$3	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Warden - South	P	151	$4	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Wilson - Main	G	932	$4	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Wilson - South	G	645	$3	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Wilson - Transit Rd.	P	72	$4	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
Wilson - West	G	608	$3	Free	Free	Free	Mon. - Fri.	5 am - 3 pm
York Mills	P	260	$7	$4	$4	$4	Mon. - Sun.	5 am - 2 am
Yorkdale	G	1,144	$5	Free	Free	Free	Mon. - Fri.	5 am - 9:30 am
Total (30 lots)		13,977	Lot info is available at: www3.ttc.ca/Riding_the_TTC/Parking/index.jsp					

Type: P - Pay and Display, G - Gated

Table TTC Parking Fares and Policies as listed by Parking Lot
Note: TTC Parking Fares and Policies listed in the above table are subject to change.

REQ-PRK-11	Payment at gated lots	Approved	F

Payment at gated lots needs to be quick and efficient in order to achieve any significant throughput for cars. Parking payments at Reader Assemblies must occur within the same transaction speed as all other Reader Assemblies , and are subject to the same SLAs listed in Schedule A.

REQ-PRK-11.1	Payment at gated lots-2	Approved	F

The following payment types shall be supported at gated lots:

 - e-Pass with Parking product;
 - e-Purse with Parking product;

- e-Purse (as a cash equivalent);
- cash; and
- credit/Debit Card.

REQ-PRK-11.2	Payment at gated lots-3	Approved	F

Tapping PRESTO Media at the Reader Assembly that results in a valid transactions shall raise the gate.

REQ-PRK-12	Reader Assemblies at Gated Lots	Approved	F

Reader Assemblies used for gated Commuter Parking shall function identically to reader Assemblies used for transit:

- off-line Mode will be supported;
- Hotlists will be processed.
- All valid PRESTO Media except LUM can be used for parking.

REQ-PRK-13	Reader Assembly Interface at Gated Lots	Approved	F

Reader assembly shall interface with the parking gates at gated lots via a standard serial port (such as USB, RS232) similar to the turnstile release mechanism used in the turnstiles).

REQ-PRK-14	Payment at pay and display lots	Approved	F

Ensure the following payment types are supported at pay-and-display parking lots:

REQ-PRK-14.1	Payment at pay and display lots-2	Approved	F

- pass product with parking product

REQ-PRK-14.2	Payment at pay and display lots-3	Approved	F

- e-Purse with parking product

REQ-PRK-14.3	Payment at pay and display lots-4	Approved	F

- e-Purse

REQ-PRK-14.4	Payment at pay and display lots-5	Approved	F

- cash

REQ-PRK-14.5	Payment at pay and display lots-6	Approved	F

- credit/Debit Card

REQ-PRK-14.6	Payment at pay and display lots-7	Approved	F

Ensure the PRESTO Device will print a paper receipt showing: Date; Time of Purchase.

The use and implementation of PRESTO at TTC's existing pay and display lots will need to take into consideration TTC's current agreements with City of Toronto Parking Authority.

REQ-PRK-15	Third party commuter parking lots	Approved	F

Provide flexibility so that the PRESTO can be adopted by independently operated commuter parking lots.

REQ-PRK-16	Parking product purchase	Approved	F

Ensure parking products are available for purchase through the same channels as other PRESTO and

TTC Fare Products.

For example, an adult monthly pass product, monthly parking product can, among other channels, be purchased via the PRESTO website.

REQ-PRK-17	Parking product reload	Approved	F

Enable parking products to be reloaded through all the channels allowed for PRESTO Card reloads, including Autoload.

REQ-PRK-18	Monthly parking product grace period	Approved	F

For the monthly parking product, an exception may be made to allow the Customer a 'days grace' if their monthly parking product expires before they have had a chance to renew.   A Customer in this situation would be alerted by the Reader Assembly that their pass has expired and they need to renew immediately.   The Reader Assembly will open the gate or print a valid ticket (at pay and display lots).

Enable one (1) day grace period for monthly parking pass holders whose pass has expired.

REQ-PRK-18.1	Monthly parking product grace period-2	Approved	F

Ensure the PRESTO reader alerts the Customer of expired pass and need to renew. The Reader Assembly will open the faregate or print a ticket for the first time that the Customer the Customer tries to use an expired pass product.

REQ-PRK-18.2	Monthly parking product grace period-3	Approved	F

Set maximum number of grace periods to two (2) months per year.

Customer must renew their monthly parking pass product or purchase another fare product in order to use the TTC commuter parking lot in the future.

Ensure that the fare gate at gated parking lots opens when a valid payment method is used by the Customer (PRESTO Card with e-Purse, PRESTO Card with valid parking pass, open payment card, cash).

REQ-PRK-19	Notification of parking product expiry	Approved	F

Ensure Reader Assembly alerts Customers 4 days prior to expiry of parking product.

REQ-PRK-20	e-Purse parking payment	Approved	F

Ensure the parking fee is deducted from e-Purse if there is no parking product on the PRESTO Card.

REQ-PRK-21	e-Purse payment with NSF	Approved	F

Prompt Customer for alternative payment method when insufficient funds available on e-Purse.

REQ-PRK-21.1	e-Purse payment with NSF-2	Approved	F

Display current e-Purse value.

REQ-PRK-22	e-Purse notification of insufficient funds for transit fare	Approved	F

Reader assembly at gated lots and the pay and display devices shall notify the PRESTO Card Customer when the balance on the PRESTO Card is in-sufficient for purchasing a transit fare.

REQ-PRK-22.1	e-Purse notification of insufficient funds for transit fare-2	Approved	F

The meter shall provide a visible (and audible) alert to the Customer so that the Customer is not surprised to learn at the TTC transit vehicle Boarding that they do not have sufficient funds.

REQ-PRK-23	Control of parking parameters	Approved	F

The TTC will control and set the fees and availability of all fare parking products.

REQ-PRK-24	Parking times and exemptions	Approved	F

Enable each parking lot to set the following variables for non-parking pass holders on a parking lot by parking lot basis:

REQ-PRK-24.1	Parking times and exemptions-2	Approved	F

- parking lot ID

REQ-PRK-24.2	Parking times and exemptions-3	Approved	F

- fixed rate - start time (yyyy/mm/dd/hh/mm); end time (yyyy/mm/dd/hh/mm); rate (

REQ-PRK-24.3	Parking times and exemptions-4	Approved	F

- hourly rate- start time (yyyy/mm/dd/hh/mm); end time (yyyy/mm/dd/hh/mm); rate (

REQ-PRK-24.4	Parking times and exemptions-5	Approved	F

- free parking- start time (yyyy/mm/dd/hh/mm); end time (yyyy/mm/dd/hh/mm); rate (

REQ-PRK-25	Parking fee refunds	Approved	F

Refunds for parking will be handled in accordance with TTC fare policy.

REQ-PRK-26	Fare Group integration	Approved	F

Parking lots, along with their associated parking parameters, are to be considered as part of the common parameters associated with fare groups as described by the fare group requirements.

REQ-PRK-27	Usage tracking	Approved	F

Track and record parking lot usage.   Information to track will include at a minimum:

- parking time
- PRESTO Card type used, (e-Purse, pass product)
- cash and credit/Debit Card transactions
- parking lot location
- graces granted (pass product)

REQ-PRK-28	Storage of Parking Information	Approved	F

The PRESTO System will collect, store and report on paid commuter parking usage. All commuter parking data will be stored in the Data Mart. The PRESTO System will also collect, store and report on any unpaid commuter parking lot usage.

(i.e. where certain cardholders such as employees are provided free access to TTC commuter parking lots in accordance with TTC parking policies).

REQ-PRK-29	Usage reporting	Approved	F

Provide parking lot usage by PRESTO Card Customers, Cash Customers and credit/debit Customers will be detailed in a TTC designed parking report(s). The reporting will include both paid and unpaid usage of the lots.

REQ-PRK-30	List processing	Approved	F

Reader assembly and pay and display devices shall be capable of handling any TTC Private Fare Cards, as appropriate.

Note: TTC policy may enable certain TTC Private Fare Cards (e.g. employees) access to lots without requiring the payment of parking fees.

REQ-PRK-30.1	List processing-2	Approved	F

Reader assembly and pay and display devices (i.e. parking devices) shall process:

 - Hotlist
 - Load value list
 - Action List

PRESTO and TTC will mutually determine policies with regards to processing lists at parking devices.

REQ-PRK-31	Pay and display and gate devices	Approved	F

All reader Assemblies and pay and display devices shall:

 - be PCI/INTERAC certified;
 - be EMV certified;
 - contactless payment;
 - meet all relevant accessibility standards;
 - meet TTC usability / MMI standards;
 - meet all outdoor equipment standards;
 - multi-Acquirer capable;
 - multi-language capable;
 - adaptable to new parking products and parking product price tables;
 - be monitored, by the monitoring services for alerts ;
 - be monitored for consumable levels (paper, money);
 - support CCTV interfacing for security checks; and
 - be audited.

This functionality will be further discussed during Design Review.

REQ-PRK-32	Support for contactless financial payments	Approved	F

Ensure all TTC commuter parking lots shall support contactless financial payment schemes. Available at both pay-and-display and gated parking lots.

REQ-PRK-33	Parking device management	Approved	F

Ensure the device management system manages all parking devices (Reader Assemblies and pay and display devices) and monitors:

 - alerts;
 - device tampering;
 - error conditions;
 - consumable levels; and
 - counts (card swipes, taps).

REQ-PRK-34	Parking device data and control interfaces	Approved	F

Provide the following data and control interfaces for parking devices (Reader Assemblies and pay and display devices):

REQ-PRK-34.1	Parking device data and control interfaces-2	Approved	F

- interface to the central services

REQ-PRK-34.2	Parking device data and control interfaces-3	Approved	F

- interface to data concentrators that are in turn interfaced to the central service

REQ-PRK-34.3	Parking device data and control interfaces-4	Approved	F

- interface to the device management/monitoring system

REQ-PRK-34.4	Parking device data and control interfaces-5	Approved	F

- interface(s) to financial Acquirer(s)

REQ-PRK-34.5	Parking device data and control interfaces-6	Approved	F

Enable authorized TTC personnel to configure parking lot parameters via a portal to the central server that will then push them out to devices.

REQ-PRK-34.6	Parking device data and control interfaces-7	Approved	F

Ensure that all device monitoring, maintenance and auditing passes through the device management interface.

REQ-PRK-34.7	Parking device data and control interfaces-8	Approved	F

Ensure that financial transaction data and control is via the secure Acquirer interface which will be determined during consultation between PRESTO and TTC.

REQ-PRK-35	Additional Commuter Parking Functionality	Approved	F

Enable time based pricing and off peak rates.

REQ-PRK-36	Support for Loyalty	Approved	F

Enable loyalty schemes for parking (e.g. Monthly Passes may be tied to parking privileges or discounts).

11 Wheel-Trans

REQ-WTS-1	Wheel-Trans Support	Approved	F

Support the fare payments for TTC Wheel-Trans transportation services, and support all TTC fare policies that govern the use of Wheel-Trans and the interface between Wheel-Trans and the TTC's conventional system.

REQ-WTS-2	Scope of Wheel-Trans Service	Approved	F

The Wheel-Trans solution provided by PRESTO shall include all modes of transportation used and service provided across the City of Toronto.

REQ-WTS-3	Support for all Wheel-Trans Vehicles	Approved	F

The PRESTO System shall support all vehicles used by Wheel-Trans in it's fleet consists of a mix of TTC - owned vehicles and contracted accessible taxis and sedan taxis.

REQ-WTS-4	PRESTO Media Support	Approved	F

The PRESTO solution for Wheel-Trans shall support all PRESTO Media and all TTC Fare Products.

REQ-WTS-5	Customer Usage	Approved	F

Customers using Wheel-Trans shall be able to tap their PRESTO Media to a Reader Assembly on the Wheel-Trans Vehicle.

REQ-WTS-5.1	Customer Usage-2	Approved	F

The Reader Assembly on Wheel-Trans Vehicles shall operate as specified in the reader Assemblies on Surface Vehicles Section in this Schedule.

REQ-WTS-6	Use of HHPOS	Approved	F

Optional - The HHPOS shall function as a surface reader Assemblies or portable reader Assemblies for contracted taxis and sedans.

REQ-WTS-7	Integration with Conventional TTC Transportation	Approved	F

Enable Customers to transfer from Wheel-Trans to any other TTC conventional mode of transportation using their PRESTO Media as defined by TTC fare policies.

REQ-WTS-8	Transfers to - from Transit Expansion	Approved	F

Enable Customers using Wheel-Trans to seamlessly transfer to/from Transit Expansion as per TEO-2

REQ-WTS-9	Transfers to-from Other GTA Transit Services	Approved	F

Enable Customers to transfer from Wheel-Trans to any other GTA transit service provider, as necessary, in accordance with cross-boundary service agreements.

REQ-WTS-10	Support Person Support	Approved	F

The PRESTO solution for Wheel-Trans will allow for a support person to accompany a disabled person without charging the support person a fare.   This support person must also be allowed to transfer throughout the TTC system with the disabled person.

REQ-WTS-13	Accessibility and AODA	Approved	F

The Wheel-Trans solution shall adhere AODA standards, and other relevant accessibility standards, policies and directives.

12 Third Party Network

REQ-TPN-1	Provide and Support a Third Party Network	Approved	F

Provide and support a third party network that enables Customers to obtain PRESTO Media outside TTC sites and properties.

REQ-TPN-2	City Wide Third Party Network	Approved	F

Ensure the third party network extends across the city of Toronto.

REQ-TPN-3	Same Accessibility as Current Third Party Network	Approved	F

Ensure third party agents are located outside the TTC subway system and provide the same convenience and accessibility as TTC's current sales network.

REQ-TPN-4	Third Party Network Locations	Approved	F

Ensure the third party network is located in known and convenient physical locations that are:

 - proximate to TTC surface vehicle stops
 - located in retail and other "destination" locations

REQ-TPN-5	Hours of Operation	Approved	F

Enable Customers to purchase PRESTO Media with transit products throughout the normal operating hours of the business / location the purchase is being made.

REQ-TPN-6	Minimum Third Party Functionality	Approved	F

Ensure the third party network will enable Customers to:

 - purchase PRESTO Media
 - purchase TTC Fare Product(s) on the PRESTO Media
 - Future functionality to be mutually agreed upon by PRESTO and TTC

REQ-TPN-7	Immediate Use	Approved	F

Ensure that Customers that purchase PRESTO Media at a third party agents will be able to use it immediately on all TTC transportation services.

REQ-TPN-8	Additional Functionality	Approved	F

At a minimum, Incorporate the following functionality into the third party network:

REQ-TPN-8.1	Additional Functionality-2	Approved	F

 - reloading PRESTO Cards

REQ-TPN-8.2	Additional Functionality-3	Approved	F

 - querying PRESTO Cards

REQ-TPN-8.3	Additional Functionality-4	Approved	F

 - purchasing LUM

REQ-TPN-9	Customer Considerations	Approved	F

Design a third party network taking into consideration:

- TTC Customer demand for PRESTO Media at third party agents
- TTC Customer demand by TTC Fare Products at third party agents including TTC passes as well as e-Purse
- minimizing any extra costs to TTC Customers
- minimizing cost to third party agents

REQ-TPN-10	No Concession Cards	Approved	F

Ensure the third party network cannot sell Concessions but will allow the loading and reloading of value on both adult and valid Concession cards.

REQ-TPN-11	No Third Party Network Only PRESTO Card	Approved	F

A PRESTO Card purchased from a third party agent will be the same as a PRESTO Card purchased from any other channel.

REQ-TPN-12	Processes and Logistics	Approved	F

Ensure the following processes and logistics shall be included in the third party network

REQ-TPN-12.1	Processes and Logistics-2	Approved	F

- ordering of PRESTO Media to third party agents

REQ-TPN-12.2	Processes and Logistics-3	Approved	F

- packaging of PRESTO Media

REQ-TPN-12.3	Processes and Logistics-4	Approved	F

- distribution and delivery of PRESTO Media to third party agents

REQ-TPN-12.4	Processes and Logistics-5	Approved	F

- returns of third party media

REQ-TPN-12.5	Processes and Logistics-6	Approved	F

- third party agency support

REQ-TPN-12.6	Processes and Logistics-7	Approved	F

- Customer support at third party agent locations

REQ-TPN-12.7	Processes and Logistics-8	Approved	F

- activation / pre-activation of PRESTO Media and TTC Fare Products

REQ-TPN-12.8	Processes and Logistics-9	Approved	F

- security of PRESTO Media

REQ-TPN-12.9	Processes and Logistics-10	Approved	F

- reconciliation / settlement of funds

REQ-TPN-12.10	Processes and Logistics-11	Approved	F

- fraud prevention

| REQ-TPN-13 | Performance Monitoring | Approved | F |

Implement a performance monitoring program for the third party network. At a minimum, These performance measures will include:

| REQ-TPN-13.1 | Performance Monitoring-2 | Approved | F |

 - the availability of PRESTO Media

| REQ-TPN-13.2 | Performance Monitoring-3 | Approved | F |

 - Customer complaints registered against the third party network location

| REQ-TPN-14 | Design Review | Approved | F |

Develop a third party network that will be fully supported by the PRESTO System.

| REQ-TPN-15 | Mutual Agreement | Approved | F |

The Final Design for the PRESTO System third party network will be mutually agreed upon by TTC and PRESTO.

13   Open Payments

REQ-OPY-1	PRESTO Open Payments	Approved	F

PRESTO System shall support the use of Open Payments Media as outlined in Schedule G - PRESTO Open Payments.

A TTC Turnstile Information

The following figures below provide the general sizing and dimensions of one of the TTC entrance turnstiles (Tomsed Turnstile). Please note that,

- Drawings are not to scale,
- All dimensions are in inches,
- Tolerances are,
    o Fractional +/- 1/32
    o Two Decimal Place +/- 0.01
    o Three Decimal Place +/- 0.005
    o Angular +/- ½"

Direction of
Customers Entering
Fare
Paid Area

Figure Tomsed Turnstile
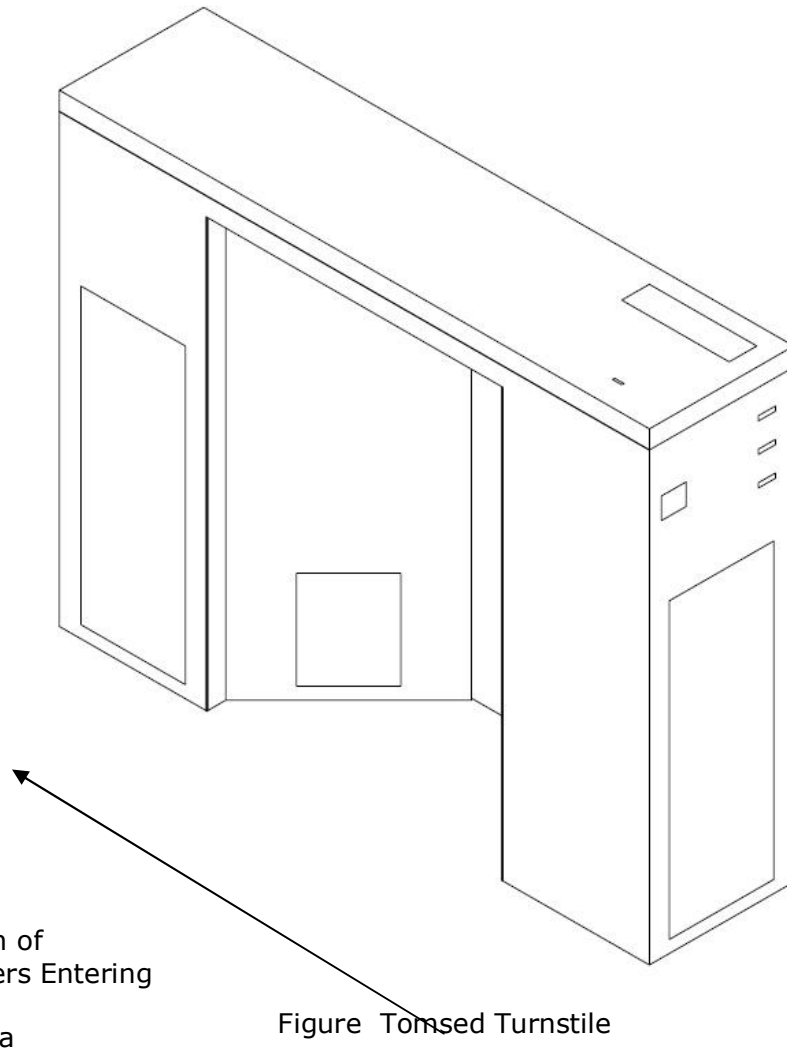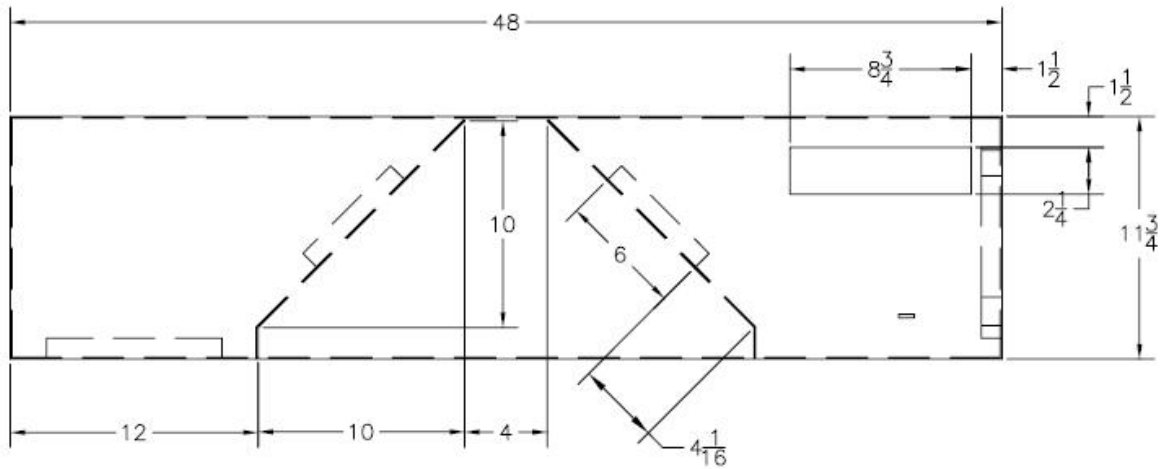
Figure Tomsed Turnstile – Top View
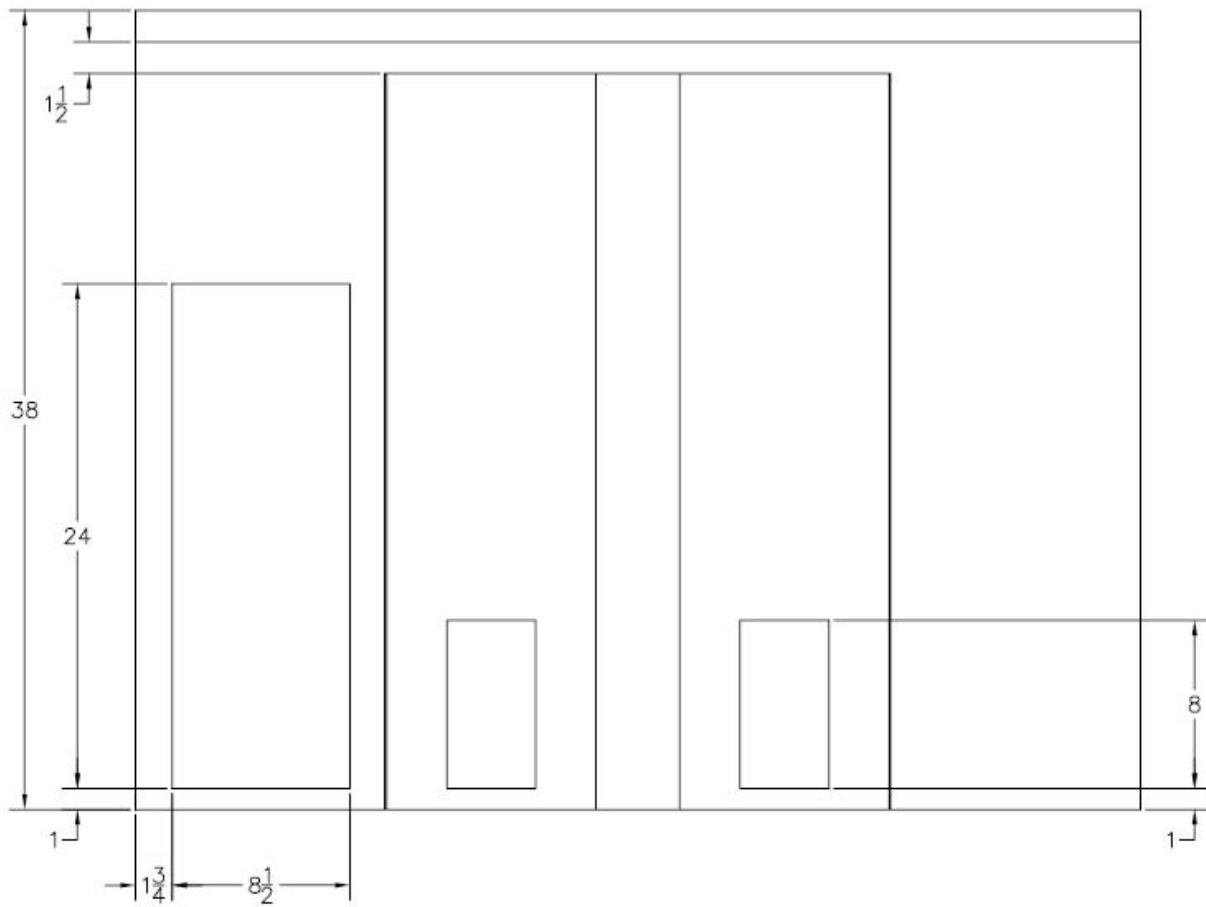
Figure Tomsed Turnstile - Side View
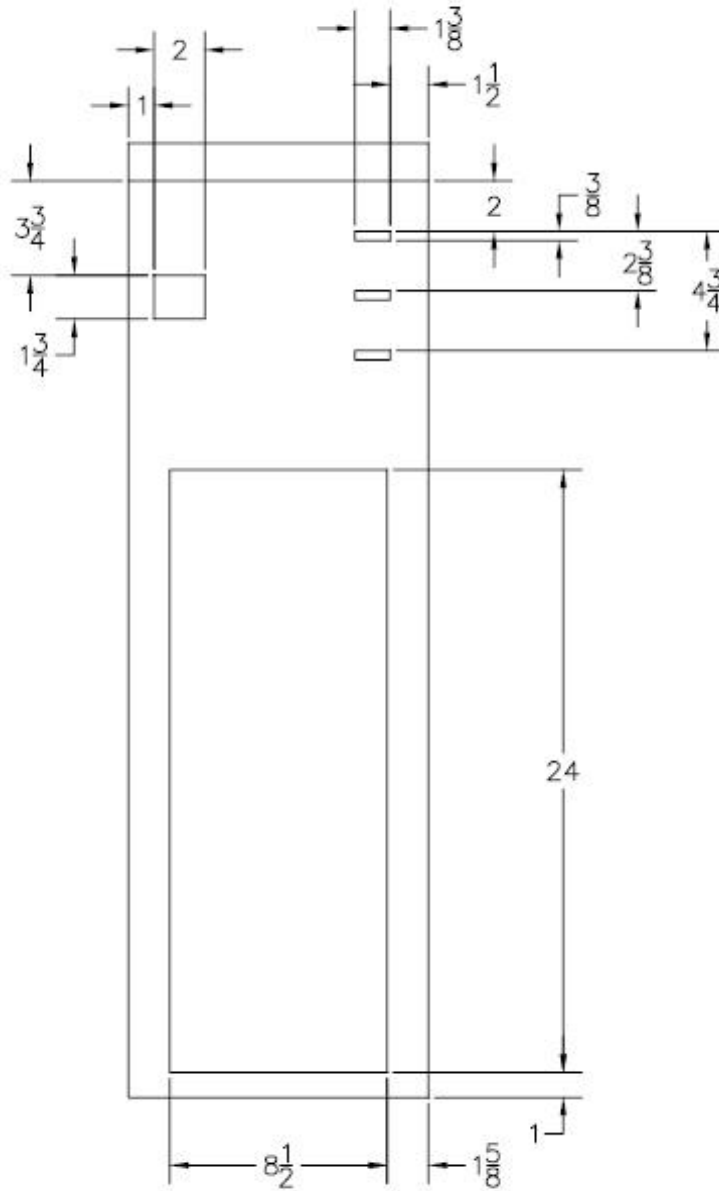
Figure Tomsed Turnstile - Front View

Figure Tomsed Turnstile - Back View

Cross Reference Table

This cross reference table matches PRESTO information to TTC Business Requirements. This table is in document order as defined in this document.

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-SYS-1	SYS	REQ-SYS-1/1	Other - Program Management	NF	*Approved*	R?.?
REQ-SYS-2	SYS	REQ-SYS-2/1	Reporting	F	*Approved*	R?.?
REQ-SYS-4	SYS	REQ-SYS-4/1	Other - Program Management	F	*Approved*	R?.?
REQ-SYS-4.1	SYS	REQ-SYS-4.1/1	Devices	F	*Approved*	R?.?
REQ-SYS-4.2	SYS	REQ-SYS-4.2/1	Devices	F	*Approved*	R?.?
REQ-SYS-5	SYS	REQ-SYS-5/1	Card/Media Management	F	*Approved*	R?.?
REQ-SYS-5.1	SYS	REQ-SYS-5.1/1	Fare Management	F	*Approved*	R?.?
REQ-SYS-6	SYS	REQ-SYS-6/1	Card/Media Management	F	*Approved*	R?.?
REQ-SYS-6.1	SYS	REQ-SYS-6/2	Card/Media Management	F	*Approved*	R?.?
REQ-SYS-6.2	SYS	REQ-SYS-6/3	Card/Media Management	F	*Approved*	R?.?
REQ-SYS-7	SYS	REQ-SYS-7/1	Reporting	F	*Approved*	R?.?
REQ-SYS-7.1	SYS	REQ-SYS-7.1/1	Reporting	F	*Approved*	R?.?
REQ-SYS-7.2	SYS	REQ-SYS-7.2/1	Reporting	F	*Approved*	R?.?
REQ-SYS-7.3	SYS	REQ-SYS-7.3/1	Reporting	F	*Approved*	R?.?
REQ-SYS-8	SYS	REQ-SYS-8/1	Financial Management	F	*Approved*	R?.?
REQ-SYS-8.1	SYS	REQ-SYS-8.1/1	Reporting	F	*Approved*	R?.?
REQ-SYS-8.2	SYS	REQ-SYS-8.2/1	Financial Management	F	*Approved*	R?.?
REQ-SYS-8.3	SYS	REQ-SYS-8.3/1	Reporting	F	*Approved*	R?.?
REQ-SYS-9	SYS	REQ-SYS-9/1	Other - Program Management	NF	*Approved*	R?.?
REQ-SYS-9.1	SYS	REQ-SYS-9.1/1	Devices	F	*Approved*	R?.?
REQ-SYS-9.2	SYS	REQ-SYS-9.2/1	Other - Program Management	NF	*Approved*	R?.?
REQ-SYS-9.3	SYS	REQ-SYS-9.3/1	Security	F	*Approved*	R?.?
REQ-SYS-9.3.1	SYS	REQ-SYS-9.3.1/1	Other - Program Management	NF	*Approved*	R?.?
REQ-SYS-9.4	SYS	REQ-SYS-9.4/1	Other - Program Management	NF	*Approved*	R?.?
REQ-SYS-9.5	SYS	REQ-SYS-9.5/1	Other - Program Management	NF	*Approved*	R?.?
REQ-SYS-10	SYS	REQ-SYS-10/1	Devices	F	*Approved*	R?.?
REQ-SYS-10.1	SYS	REQ-SYS-10.1/1	Devices	F	*Approved*	R?.?
REQ-SYS-11	SYS	REQ-SYS-11/1	Other - Implementation	F	*Approved*	R?.?
REQ-SYS-11.1	SYS	REQ-SYS-11.1/1	Other - Implementation	F	*Approved*	R?.?
REQ-SYS-12	SYS	REQ-SYS-12/1	Devices	F	*Approved*	R?.?
REQ-GES-1	GES	REQ-GES-1/1	Devices	F	*Approved*	R?.?
REQ-GES-2	GES	REQ-GES-2/1	Devices	F	*Approved*	R?.?
REQ-GES-2.1	GES	REQ-GES-2/2	Devices	F	*Approved*	R?.?
REQ-GES-3	GES	REQ-GES-3/1	Devices	F	*Approved*	R?.?
REQ-GES-4	GES	REQ-GES-4/1	Devices	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-GES-5	GES	REQ-GES-5/1	Devices	F	*Approved*	R?.?
REQ-GES-6	GES	REQ-GES-6/1	Devices	F	*Approved*	R?.?
REQ-GES-7	GES	REQ-GES-7/1	Devices	F	*Approved*	R?.?
REQ-GES-8	GES	REQ-GES-8/1	Devices	F	*Approved*	R?.?
REQ-GES-9	GES	REQ-GES-9/1	Asset Management	F	*Approved*	R?.?
REQ-GES-9.1	GES	REQ-GES-9/2	Asset Management	F	*Approved*	R?.?
REQ-GES-10	GES	REQ-GES-10/1	Asset Management	F	*Approved*	R?.?
REQ-GES-11	GES	REQ-GES-11/1	Devices	F	*Approved*	R?.?
REQ-GES-12	GES	REQ-GES-12/1	Devices	F	*Approved*	R?.?
REQ-GES-14	GES	REQ-GES-14/1	Devices	F	*Approved*	R?.?
REQ-GES-15	GES	REQ-GES-15/1	Devices	F	*Approved*	R?.?
REQ-GES-16	GES	REQ-GES-16/1	Devices	F	*Approved*	R?.?
REQ-GES-16.1	GES	REQ-GES-16/2	Devices	F	*Approved*	R?.?
REQ-GES-17	GES	REQ-GES-17/1	Devices	F	*Approved*	R?.?
REQ-GES-18	GES	REQ-GES-18/1	Devices	F	*Approved*	R?.?
REQ-GES-19	GES	REQ-GES-19/1	Devices	F	*Approved*	R?.?
REQ-GES-20	GES	REQ-GES-20/1	Devices	F	*Approved*	R?.?
REQ-GES-21	GES	REQ-GES-21/1	Devices	F	*Approved*	R?.?
REQ-GES-21.1	GES	REQ-GES-21/2	Devices	F	*Approved*	R?.?
REQ-GES-21.2	GES	REQ-GES-21/3	Devices	F	*Approved*	R?.?
REQ-GES-21.3	GES	REQ-GES-21/4	Devices	F	*Approved*	R?.?
REQ-GES-21.4	GES	REQ-GES-21/5	Devices	F	*Approved*	R?.?
REQ-GES-22	GES	REQ-GES-22/1	Devices	F	*Approved*	R?.?
REQ-GES-23	GES	REQ-GES-23/1	Devices	F	*Approved*	R?.?
REQ-GES-24	GES	REQ-GES-24/1	Devices	F	*Approved*	R?.?
REQ-GES-25	GES	REQ-GES-25/1	Devices	F	*Approved*	R?.?
REQ-GES-26	GES	REQ-GES-26/1	Devices	F	*Approved*	R?.?
REQ-GES-27	GES	REQ-GES-27/1	Devices	F	*Approved*	R?.?
REQ-GES-28	GES	REQ-GES-28/1	Devices	F	*Approved*	R?.?
REQ-GES-29	GES	REQ-GES-29/1	Devices	F	*Approved*	R?.?
REQ-GES-30	GES	REQ-GES-30/1	Security	F	*Approved*	R?.?
REQ-GES-31	GES	REQ-GES-31/1	Security	F	*Approved*	R?.?
REQ-GES-32	GES	REQ-GES-32/1	Asset Management	F	*Approved*	R?.?
REQ-GES-33	GES	REQ-GES-33/1	Devices	F	*Approved*	R?.?
REQ-GES-34	GES	REQ-GES-34/1	Devices	F	*Approved*	R?.?
REQ-GES-35	GES	REQ-GES-35/1	Devices	F	*Approved*	R?.?
REQ-GES-36	GES	REQ-GES-36/1	Devices	F	*Approved*	R?.?
REQ-GES-37	GES	REQ-GES-37/1	Devices	F	*Approved*	R?.?
REQ-GES-38	GES	REQ-GES-38/1	Devices	F	*Approved*	R?.?
REQ-GES-39	GES	REQ-GES-39/1	Devices	F	*Approved*	R?.?
REQ-GES-39.1	GES	REQ-GES-39/2	Devices	F	*Approved*	R?.?
REQ-GES-39.2	GES	REQ-GES-39/3	Devices	F	*Approved*	R?.?
REQ-GES-40	GES	REQ-GES-40/1	Devices	F	*Approved*	R?.?
REQ-GES-41	GES	REQ-GES-41/1	Security	F	*Approved*	R?.?
REQ-GES-42	GES	REQ-GES-42/1	Devices	F	*Approved*	R?.?
REQ-GES-43	GES	REQ-GES-43/1	Devices	F	*Approved*	R?.?
REQ-GES-43.1	GES	REQ-GES-43.1/1	Devices	F	*Approved*	R?.?
REQ-GES-43.2	GES	REQ-GES-43.2/1	Devices	F	*Approved*	R?.?
REQ-GES-43.3	GES	REQ-GES-43.3/1	Devices	F	*Approved*	R?.?
REQ-GES-43.4	GES	REQ-GES-43.4/1	Devices	F	*Approved*	R?.?
REQ-GES-43.5	GES	REQ-GES-43.5/1	Devices	F	*Approved*	R?.?
REQ-GES-44	GES	REQ-GES-44/1	Devices	F	*Approved*	R?.?
REQ-GES-45	GES	REQ-GES-45/1	Devices	F	*Approved*	R?.?
REQ-GES-45.1	GES	REQ-GES-45.1/1	Devices	F	*Approved*	R?.?
REQ-GES-45.2	GES	REQ-GES-45.2/1	Devices	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-GES-45.3	GES	REQ-GES-45.3/1	Devices	F	*Approved*	R?.?
REQ-GES-45.4	GES	REQ-GES-45.4/1	Devices	F	*Approved*	R?.?
REQ-GES-45.5	GES	REQ-GES-45.5/1	Devices	F	*Approved*	R?.?
REQ-GES-46	GES	REQ-GES-46/1	Devices	F	*Approved*	R?.?
REQ-GES-46.1	GES	REQ-GES-46/2	Devices	F	*Approved*	R?.?
REQ-GES-47	GES	REQ-GES-47/1	Devices	F	*Approved*	R?.?
REQ-GES-47.1	GES	REQ-GES-47.1/1	Devices	F	*Approved*	R?.?
REQ-GES-47.2	GES	REQ-GES-47.2/1	Devices	F	*Approved*	R?.?
REQ-GES-47.3	GES	REQ-GES-47.3/1	Devices	F	*Approved*	R?.?
REQ-GES-47.4	GES	REQ-GES-47.4/1	Devices	F	*Approved*	R?.?
REQ-GES-47.5	GES	REQ-GES-47.5/1	Devices	F	*Approved*	R?.?
REQ-GES-48	GES	REQ-GES-48/1	Devices	F	*Approved*	R?.?
REQ-GES-49	GES	REQ-GES-49/1	Devices	F	*Approved*	R?.?
REQ-GES-50	GES	REQ-GES-50/1	Devices	F	*Approved*	R?.?
REQ-GES-51	GES	REQ-GES-51/1	Devices	F	*Approved*	R?.?
REQ-GES-52	GES	REQ-GES-52/1	Devices	F	*Approved*	R?.?
REQ-GES-53	GES	REQ-GES-53/1	Devices	F	*Approved*	R?.?
REQ-GES-54	GES	REQ-GES-54/1	Devices	F	*Approved*	R?.?
REQ-GES-55	GES	REQ-GES-55/1	TBD	NF	*Approved*	R?.?
REQ-GES-56	GES	REQ-GES-56/1	Devices	F	*Approved*	R?.?
REQ-GES-56.1	GES	REQ-GES-56.1/1	Other - Testing	NF	*Approved*	R?.?
REQ-GES-56.3	GES	REQ-GES-56.3/1	Devices	F	*Approved*	R?.?
REQ-GES-119	GES	REQ-GES-119/1	Devices	F	*Approved*	R?.?
REQ-GES-57	GES	REQ-GES-57/1	Asset Management	F	*Approved*	R?.?
REQ-GES-58	GES	REQ-GES-58/1	Asset Management	F	*Approved*	R?.?
REQ-GES-59	GES	REQ-GES-59/1	Reporting	F	*Approved*	R?.?
REQ-GES-60	GES	REQ-GES-60/1	Devices	F	*Approved*	R?.?
REQ-GES-61	GES	REQ-GES-61/1	Devices	F	*Approved*	R?.?
REQ-GES-62	GES	REQ-GES-62/1	Devices	F	*Approved*	R?.?
REQ-GES-63	GES	REQ-GES-63/1	Devices	F	*Approved*	R?.?
REQ-GES-64	GES	REQ-GES-64/1	Security	F	*Approved*	R?.?
REQ-GES-65	GES	REQ-GES-65/1	Devices	F	*Approved*	R?.?
REQ-GES-66	GES	REQ-GES-66/1	Devices	F	*Approved*	R?.?
REQ-GES-67	GES	REQ-GES-67/1	Devices	F	*Approved*	R?.?
REQ-GES-68	GES	REQ-GES-68/1	Devices	F	*Approved*	R?.?
REQ-GES-69	GES	REQ-GES-69/1	Security	F	*Approved*	R?.?
REQ-GES-69.1	GES	REQ-GES-69/2	Security	F	*Approved*	R?.?
REQ-GES-70	GES	REQ-GES-70/1	Devices	F	*Approved*	R?.?
REQ-GES-70.1	GES	REQ-GES-70/2	Devices	F	*Approved*	R?.?
REQ-GES-71	GES	REQ-GES-71/1	Devices	F	*Approved*	R?.?
REQ-GES-72	GES	REQ-GES-72/1	Devices	F	*Approved*	R?.?
REQ-GES-74	GES	REQ-GES-74/1	Devices	F	*Approved*	R?.?
REQ-GES-74.1	GES	REQ-GES-74.1/1	Devices	F	*Approved*	
REQ-GES-74.2	GES	REQ-GES-74.2/1	Devices	F	*Approved*	
REQ-GES-75	GES	REQ-GES-75/1	Asset Management	F	*Approved*	R?.?
REQ-GES-76	GES	REQ-GES-76/1	Asset Management	F	*Approved*	R?.?
REQ-GES-77	GES	REQ-GES-77/1	Asset Management	F	*Approved*	R?.?
REQ-GES-78	GES	REQ-GES-78/1	Devices	F	*Approved*	R?.?
REQ-GES-78.1	GES	REQ-GES-78/2	Devices	F	*Approved*	R?.?
REQ-GES-78.2	GES	REQ-GES-78/3	Devices	F	*Approved*	R?.?
REQ-GES-78.3	GES	REQ-GES-78/4	Devices	F	*Approved*	R?.?
REQ-GES-79	GES	REQ-GES-79/1	Devices	F	*Approved*	R?.?
REQ-GES-79.1	GES	REQ-GES-79/2	Devices	F	*Approved*	R?.?
REQ-GES-80	GES	REQ-GES-80/1	Devices	F	*Approved*	R?.?
REQ-GES-81	GES	REQ-GES-81/1	Asset Management	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-GES-82	GES	REQ-GES-82/1	Reporting	F	*Approved*	R?.?
REQ-GES-83	GES	REQ-GES-83/1	Asset Management	F	*Approved*	R?.?
REQ-GES-83.1	GES	REQ-GES-83/2	Asset Management	F	*Approved*	R?.?
REQ-GES-83.2	GES	REQ-GES-83/3	Asset Management	F	*Approved*	R?.?
REQ-GES-83.3	GES	REQ-GES-83/4	Asset Management	F	*Approved*	R?.?
REQ-GES-84	GES	REQ-GES-84/1	Devices	F	*Approved*	R?.?
REQ-GES-84.1	GES	REQ-GES-84/2	Devices	F	*Approved*	R?.?
REQ-GES-84.2	GES	REQ-GES-84/3	Devices	F	*Approved*	R?.?
REQ-GES-84.3	GES	REQ-GES-84/4	Devices	F	*Approved*	R?.?
REQ-GES-84.4	GES	REQ-GES-84/5	Devices	F	*Approved*	R?.?
REQ-GES-84.5	GES	REQ-GES-84/6	Devices	F	*Approved*	R?.?
REQ-GES-84.6	GES	REQ-GES-84/7	Devices	F	*Approved*	R?.?
REQ-GES-84.7	GES	REQ-GES-84/8	Devices	F	*Approved*	R?.?
REQ-GES-84.8	GES	REQ-GES-84/9	Devices	F	*Approved*	R?.?
REQ-GES-84.9	GES	REQ-GES-84/10	Devices	F	*Approved*	R?.?
REQ-GES-85	GES	REQ-GES-85/1	Reporting	F	*Approved*	R?.?
REQ-GES-86	GES	REQ-GES-86/1	Asset Management	F	*Approved*	R?.?
REQ-GES-87	GES	REQ-GES-87/1	Devices	F	*Approved*	R?.?
REQ-GES-88	GES	REQ-GES-88/1	Devices	F	*Approved*	R?.?
REQ-GES-89	GES	REQ-GES-89/1	Devices	F	*Approved*	R?.?
REQ-GES-89.1	GES	REQ-GES-89.1/1	Devices	F	*Approved*	R?.?
REQ-GES-89.2	GES	REQ-GES-89.2/1	Asset Management	F	*Approved*	R?.?
REQ-GES-89.2.1	GES	REQ-GES-89.2/2	Asset Management	F	*Approved*	R?.?
REQ-GES-89.2.2	GES	REQ-GES-89.2/3	Asset Management	F	*Approved*	R?.?
REQ-GES-89.2.3	GES	REQ-GES-89.2/4	Asset Management	F	*Approved*	R?.?
REQ-GES-89.2.4	GES	REQ-GES-89.2/5	Asset Management	F	*Approved*	R?.?
REQ-GES-89.2.5	GES	REQ-GES-89.2/6	Asset Management	F	*Approved*	R?.?
REQ-GES-89.2.6	GES	REQ-GES-89.2/7	Asset Management	F	*Approved*	R?.?
REQ-GES-89.2.7	GES	REQ-GES-89.2/8	Asset Management	F	*Approved*	R?.?
REQ-GES-89.2.8	GES	REQ-GES-89.2/9	Asset Management	F	*Approved*	R?.?
REQ-GES-90	GES	REQ-GES-90/1	Devices	F	*Approved*	R?.?
REQ-GES-90.1	GES	REQ-GES-90/2	Devices	F	*Approved*	R?.?
REQ-GES-90.2	GES	REQ-GES-90/3	Devices	F	*Approved*	R?.?
REQ-GES-91	GES	REQ-GES-91/1	Devices	F	*Approved*	R?.?
REQ-GES-91.1	GES	REQ-GES-91/2	Devices	F	*Approved*	R?.?
REQ-GES-91.2	GES	REQ-GES-91/3	Devices	F	*Approved*	R?.?
REQ-GES-92	GES	REQ-GES-92/1	Devices	F	*Approved*	R?.?
REQ-GES-93	GES	REQ-GES-93/1	Devices	F	*Approved*	R?.?
REQ-GES-94	GES	REQ-GES-94/1	Devices	F	*Approved*	R?.?
REQ-GES-94.1	GES	REQ-GES-94/2	Devices	F	*Approved*	R?.?
REQ-GES-95	GES	REQ-GES-95/1	Devices	F	*Approved*	R?.?
REQ-GES-95.1	GES	REQ-GES-95/2	Devices	F	*Approved*	R?.?
REQ-GES-95.2	GES	REQ-GES-95/3	Devices	F	*Approved*	R?.?
REQ-GES-95.3	GES	REQ-GES-95/4	Devices	F	*Approved*	R?.?
REQ-GES-95.4	GES	REQ-GES-95/5	Devices	F	*Approved*	R?.?
REQ-GES-96	GES	REQ-GES-96/1	Asset Management	F	*Approved*	R?.?
REQ-GES-96.1	GES	REQ-GES-96/2	Asset Management	F	*Approved*	R?.?
REQ-GES-97	GES	REQ-GES-97/1	Asset Management	F	*Approved*	R?.?
REQ-GES-98	GES	REQ-GES-98/1	Asset Management	F	*Approved*	R?.?
REQ-GES-99	GES	REQ-GES-99/1	Asset Management	F	*Approved*	R?.?
REQ-GES-100	GES	REQ-GES-100/1	Asset Management	F	*Approved*	R?.?
REQ-GES-101	GES	REQ-GES-101/1	Asset Management	F	*Approved*	R?.?
REQ-GES-102	GES	REQ-GES-102/1	Asset Management	F	*Approved*	R?.?
REQ-GES-103	GES	REQ-GES-103/1	Asset Management	F	*Approved*	R?.?
REQ-GES-104	GES	REQ-GES-104/1	Devices	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-GES-105	GES	REQ-GES-105/1	Devices	F	*Approved*	R?.?
REQ-GES-106	GES	REQ-GES-106/1	Asset Management	F	*Approved*	R?.?
REQ-GES-107	GES	REQ-GES-107/1	Devices	F	*Approved*	R?.?
REQ-GES-108	GES	REQ-GES-108/1	Devices	F	*Approved*	R?.?
REQ-GES-109	GES	REQ-GES-109/1	Asset Management	F	*Approved*	R?.?
REQ-GES-110	GES	REQ-GES-110/1	Devices	F	*Approved*	R?.?
REQ-GES-111	GES	REQ-GES-111/1	Devices	F	*Approved*	R?.?
REQ-GES-111.1	GES	REQ-GES-111/2	Devices	F	*Approved*	R?.?
REQ-GES-111.2	GES	REQ-GES-111/3	Devices	F	*Approved*	R?.?
REQ-GES-112	GES	REQ-GES-112/1	Asset Management	F	*Approved*	R?.?
REQ-GES-113	GES	REQ-GES-113/1	Asset Management	F	*Approved*	R?.?
REQ-GES-114	GES	REQ-GES-114/1	Network	F	*Approved*	R?.?
REQ-GES-115	GES	REQ-GES-115/1	Network	F	*Approved*	R?.?
REQ-GES-116	GES	REQ-GES-116/1	Devices	F	*Approved*	R?.?
REQ-GES-116.1	GES	REQ-GES-116/2	Devices	F	*Approved*	R?.?
REQ-GES-117	GES	REQ-GES-117/1	Customer Management	F	*Approved*	R?.?
REQ-GES-118	GES	REQ-GES-118/1	Card/Media Management	F	*Approved*	R?.?
REQ-RAS-1	RAS	REQ-RAS-1/1	Devices	F	Approved	R?.?
REQ-RAS-2	RAS	REQ-RAS-2/1	Devices	F	Approved	R?.?
REQ-RAS-3	RAS	REQ-RAS-3/1	Devices	F	Approved	R?.?
REQ-RAS-3.1	RAS	REQ-RAS-3/2	Devices	F	Approved	R?.?
REQ-RAS-3.2	RAS	REQ-RAS-3/3	Devices	F	Approved	R?.?
REQ-RAS-3.3	RAS	REQ-RAS-3/4	Devices	F	Approved	R?.?
REQ-RAS-3.4	RAS	REQ-RAS-3/5	Devices	F	Approved	R?.?
REQ-RAS-4	RAS	REQ-RAS-4/1	Devices	F	Approved	R?.?
REQ-RAS-4.1	RAS	REQ-RAS-4.1/1	Devices	F	Approved	R?.?
REQ-RAS-4.2	RAS	REQ-RAS-4.2/1	Devices	F	Approved	R?.?
REQ-RAS-4.3	RAS	REQ-RAS-4.3/1	Devices	F	Approved	R?.?
REQ-RAS-4.4	RAS	REQ-RAS-4.4/1	Devices	F	Approved	R?.?
REQ-RAS-5	RAS	REQ-RAS-5/1	Devices	F	Approved	R?.?
REQ-RAS-6	RAS	REQ-RAS-6/1	Data Management	F	Approved	R?.?
REQ-RAS-7	RAS	REQ-RAS-7/1	Devices	F	Approved	R?.?
REQ-RAS-8	RAS	REQ-RAS-8/1	Devices	F	Approved	R?.?
REQ-RAS-9	RAS	REQ-RAS-9/1	Devices	F	Approved	R?.?
REQ-RAS-10	RAS	REQ-RAS-10/1	Devices	F	Approved	R?.?
REQ-RAS-11	RAS	REQ-RAS-11/1	Devices	F	Approved	R?.?
REQ-RAS-11.1	RAS	REQ-RAS-11/2	Devices	F	Approved	R?.?
REQ-RAS-11.2	RAS	REQ-RAS-11/3	Devices	F	Approved	R?.?
REQ-RAS-12	RAS	REQ-RAS-12/1	Devices	F	Approved	R?.?
REQ-RAS-13	RAS	REQ-RAS-13/1	Data Management	F	Approved	R?.?
REQ-RAS-13.1	RAS	REQ-RAS-13/2	Data Management	F	Approved	R?.?
REQ-RAS-13.2	RAS	REQ-RAS-13/3	Data Management	F	Approved	R?.?
REQ-RAS-13.3	RAS	REQ-RAS-13/4	Data Management	F	Approved	R?.?
REQ-RAS-13.4	RAS	REQ-RAS-13/5	Data Management	F	Approved	R?.?
REQ-RAS-13.5	RAS	REQ-RAS-13/6	Data Management	F	Approved	R?.?
REQ-RAS-13.6	RAS	REQ-RAS-13/7	Data Management	F	Approved	R?.?
REQ-RAS-13.7	RAS	REQ-RAS-13/8	Data Management	F	Approved	R?.?
REQ-RAS-13.8	RAS	REQ-RAS-13/9	Data Management	F	Approved	R?.?
REQ-RAS-13.9	RAS	REQ-RAS-13/10	Data Management	F	Approved	R?.?
REQ-RAS-13.10	RAS	REQ-RAS-13/11	Data Management	F	Approved	R?.?
REQ-RAS-13.11	RAS	REQ-RAS-13/12	Data Management	F	Approved	R?.?
REQ-RAS-13.12	RAS	REQ-RAS-13/13	Data Management	F	Approved	R?.?
REQ-RAS-13.13	RAS	REQ-RAS-13/14	Data Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-RAS-13.14	RAS	REQ-RAS-13/15	Data Management	F	Approved	R?.?
REQ-RAS-13.15	RAS	REQ-RAS-13/16	Data Management	F	Approved	R?.?
REQ-RAS-14	RAS	REQ-RAS-14/1	Devices	F	Approved	R?.?
REQ-RAS-14.1	RAS	REQ-RAS-14.1/1	Devices	F	Approved	R?.?
REQ-RAS-14.2	RAS	REQ-RAS-14.2/1	Devices	F	Approved	R?.?
REQ-RAS-14.3	RAS	REQ-RAS-14.3/1	Devices	F	Approved	R?.?
REQ-RAS-14.4	RAS	REQ-RAS-14.4/1	Devices	F	Approved	R?.?
REQ-RAS-14.5	RAS	REQ-RAS-14.5/1	Devices	F	Approved	R?.?
REQ-RAS-14.6	RAS	REQ-RAS-14.6/1	Devices	F	Approved	R?.?
REQ-RAS-14.7	RAS	REQ-RAS-14.7/1	Devices	F	Approved	R?.?
REQ-RAS-14.7.1	RAS	REQ-RAS-14.7/2	Devices	F	Approved	R?.?
REQ-RAS-14.8	RAS	REQ-RAS-14.8/1	Devices	F	Approved	R?.?
REQ-RAS-14.8.1	RAS	REQ-RAS-14.8/2	Devices	F	Approved	R?.?
REQ-RAS-14.9	RAS	REQ-RAS-14.9/1	Data Management	F	Approved	R?.?
REQ-RAS-14.9.1	RAS	REQ-RAS-14.9/2	Data Management	F	Approved	R?.?
REQ-RAS-14.10	RAS	REQ-RAS-14.10/1	Devices	F	Approved	R?.?
REQ-RAS-15	RAS	REQ-RAS-15/1	Devices	F	Approved	R?.?
REQ-RAS-15.1	RAS	REQ-RAS-15.1/1	Devices	F	Approved	R?.?
REQ-RAS-15.1.1	RAS	REQ-RAS-15.1/2	Devices	F	Approved	R?.?
REQ-RAS-15.1.2	RAS	REQ-RAS-15.1/3	Devices	F	Approved	R?.?
REQ-RAS-15.2	RAS	REQ-RAS-15.2/1	Devices	F	Approved	R?.?
REQ-RAS-15.3	RAS	REQ-RAS-15.3/1	Devices	F	Approved	R?.?
REQ-RAS-15.4	RAS	REQ-RAS-15.4/1	Devices	F	Approved	R?.?
REQ-RAS-15.5	RAS	REQ-RAS-15.5/1	Devices	F	Approved	R?.?
REQ-RAS-15.6	RAS	REQ-RAS-15.6/1	Devices	F	Approved	R?.?
REQ-RAS-15.7	RAS	REQ-RAS-15.7/1	Devices	F	Approved	R?.?
REQ-RAS-15.7.1	RAS	REQ-RAS-15.7/2	Devices	F	Approved	R?.?
REQ-RAS-16	RAS	REQ-RAS-16/1	Reporting	F	Approved	R?.?
REQ-RAS-17	RAS	REQ-RAS-17/1	Devices	F	Approved	R?.?
REQ-RAS-17.1	RAS	REQ-RAS-17/2	Devices	F	Approved	R?.?
REQ-RAS-17.2	RAS	REQ-RAS-17/3	Devices	F	Approved	R?.?
REQ-RAS-17.3	RAS	REQ-RAS-17/4	Devices	F	Approved	R?.?
REQ-RAS-17.4	RAS	REQ-RAS-17/5	Devices	F	Approved	R?.?
REQ-RAS-18	RAS	REQ-RAS-18/1	Devices	F	Approved	R?.?
REQ-RAS-19	RAS	REQ-RAS-19/1	Devices	F	Approved	R?.?
REQ-RAS-19.1	RAS	REQ-RAS-19.1/1	Devices	F	Approved	R?.?
REQ-RAS-19.1.1	RAS	REQ-RAS-19.1/2	Devices	F	Approved	R?.?
REQ-RAS-19.1.2	RAS	REQ-RAS-19.1/3	Devices	F	Approved	R?.?
REQ-RAS-19.1.3	RAS	REQ-RAS-19.1/4	Devices	F	Approved	R?.?
REQ-RAS-19.2	RAS	REQ-RAS-19.2/1	Devices	F	Approved	R?.?
REQ-RAS-19.2.1	RAS	REQ-RAS-19.2/2	Devices	F	Approved	R?.?
REQ-RAS-19.2.2	RAS	REQ-RAS-19.2/3	Devices	F	Approved	R?.?
REQ-RAS-19.3	RAS	REQ-RAS-19.3/1	Devices	F	Approved	R?.?
REQ-RAS-19.3.1	RAS	REQ-RAS-19.3/2	Devices	F	Approved	R?.?
REQ-RAS-19.3.2	RAS	REQ-RAS-19.3/3	Devices	F	Approved	R?.?
REQ-RAS-19.3.3	RAS	REQ-RAS-19.3/4	Devices	F	Approved	R?.?
REQ-RAS-19.4	RAS	REQ-RAS-19.4/1	Devices	F	Approved	R?.?
REQ-RAS-19.4.1	RAS	REQ-RAS-19.4/2	Devices	F	Approved	R?.?
REQ-RAS-19.4.2	RAS	REQ-RAS-19.4/3	Devices	F	Approved	R?.?
REQ-RAS-20	RAS	REQ-RAS-20/1	Devices	F	Approved	R?.?
REQ-RAS-20.1	RAS	REQ-RAS-20.1/1	Devices	F	Approved	R?.?
REQ-RAS-20.2	RAS	REQ-RAS-20.2/1	Devices	F	Approved	R?.?
REQ-RAS-20.2.1	RAS	REQ-RAS-20.2/2	Devices	F	Approved	R?.?
REQ-RAS-20.3	RAS	REQ-RAS-20.3/1	Devices	F	Approved	R?.?
REQ-RAS-20.4	RAS	REQ-RAS-20.4/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-RAS-20.5	RAS	REQ-RAS-20.5/1	Devices	F	Approved	R?.?
REQ-RAS-20.5.1	RAS	REQ-RAS-20.5/2	Devices	F	Approved	R?.?
REQ-RAS-20.6	RAS	REQ-RAS-20.6/1	Devices	F	Approved	R?.?
REQ-RAS-20.7	RAS	REQ-RAS-20.7/1	Devices	F	Approved	R?.?
REQ-RAS-21	RAS	REQ-RAS-21/1	Devices	F	Approved	R?.?
REQ-RAS-21.1	RAS	REQ-RAS-21.1/1	Devices	F	Approved	R?.?
REQ-RAS-21.2	RAS	REQ-RAS-21.2/1	Devices	F	Approved	R?.?
REQ-RAS-21.3	RAS	REQ-RAS-21.3/1	Devices	F	Approved	R?.?
REQ-RAS-21.4	RAS	REQ-RAS-21.4/1	Devices	F	Approved	R?.?
REQ-RAS-21.5	RAS	REQ-RAS-21.5/1	Devices	F	Approved	R?.?
REQ-RAS-22	RAS	REQ-RAS-22/1	Card/Media Management	F	Approved	R?.?
REQ-RAS-22.1	RAS	REQ-RAS-22.1/1	Devices	F	Approved	R?.?
REQ-RAS-22.1.1	RAS	REQ-RAS-22.2/2	Data Management	F	Approved	R?.?
REQ-RAS-22.1.2	RAS	REQ-RAS-22.1/2	Devices	F	Approved	R?.?
REQ-RAS-22.2	RAS	REQ-RAS-22.2/1	Data Management	F	Approved	R?.?
REQ-RAS-22.3	RAS	REQ-RAS-22.3/1	Data Management	F	Approved	R?.?
REQ-RAS-22.4	RAS	REQ-RAS-22.4/1	Devices	F	Approved	R?.?
REQ-RAS-22.5	RAS	REQ-RAS-22.5/1	Data Management	F	Approved	R?.?
REQ-RAS-22.5.1	RAS	REQ-RAS-22.5/2	Data Management	F	Approved	R?.?
REQ-RAS-22.6	RAS	REQ-RAS-22.6/1	Fare Management	F	Approved	R?.?
REQ-RAS-23	RAS	REQ-RAS-23/1	Devices	F	Approved	R?.?
REQ-RAS-23.1	RAS	REQ-RAS-23.1/1	Devices	F	Approved	R?.?
REQ-RAS-23.1.1	RAS	REQ-RAS-23.1/2	Devices	F	Approved	R?.?
REQ-RAS-23.2	RAS	REQ-RAS-23.2/1	Data Management	F	Approved	R?.?
REQ-RAS-23.3	RAS	REQ-RAS-23.3/1	Data Management	F	Approved	R?.?
REQ-RAS-23.3.1	RAS	REQ-RAS-23.3/2	Data Management	F	Approved	R?.?
REQ-RAS-23.3.2	RAS	REQ-RAS-23.3/3	Data Management	F	Approved	R?.?
REQ-RAS-24	RAS	REQ-RAS-24/1	Devices	F	Approved	R?.?
REQ-RAS-24.1	RAS	REQ-RAS-24.1/1	Devices	F	Approved	R?.?
REQ-RAS-24.2	RAS	REQ-RAS-24.2/1	Devices	F	Approved	R?.?
REQ-RAS-24.3	RAS	REQ-RAS-24.3/1	Asset Management	F	Approved	R?.?
REQ-RAS-24.4	RAS	REQ-RAS-24.4/1	Devices	F	Approved	R?.?
REQ-RAS-24.5	RAS	REQ-RAS-24.5/1	TBD	F	Approved	R?.?
REQ-RAS-25	RAS	REQ-RAS-25/1	Devices	F	Approved	R?.?
REQ-RAS-25.1	RAS	REQ-RAS-25.1/1	Devices	F	Approved	R?.?
REQ-RAS-25.3	RAS	REQ-RAS-25.3/1	Devices	F	Approved	R?.?
REQ-RAS-25.4	RAS	REQ-RAS-25.4/1	Devices	F	Approved	R?.?
REQ-RAS-25.5	RAS	REQ-RAS-25.5/1	Devices	F	Approved	R?.?
REQ-RAS-25.6	RAS	REQ-RAS-25.6/1	Devices	F	Approved	R?.?
REQ-RAS-25.7	RAS	REQ-RAS-25.7/1	Devices	F	Approved	R?.?
REQ-RAS-51	RAS	REQ-RAS-51/1	Devices	F	Approved	R?.?
REQ-RAS-135	RAS	REQ-RAS-135/1	Other - Testing	NF	Approved	R?.?
REQ-RAS-26	RAS	REQ-RAS-26/1	Devices	F	Approved	R?.?
REQ-RAS-27	RAS	REQ-RAS-27/1	Devices	F	Approved	R?.?
REQ-RAS-27.1	RAS	REQ-RAS-27.1/1	Devices	F	Approved	R?.?
REQ-RAS-27.2	RAS	REQ-RAS-27.2/1	Devices	F	Approved	R?.?
REQ-RAS-28	RAS	REQ-RAS-28/1	Devices	F	Approved	R?.?
REQ-RAS-29	RAS	REQ-RAS-29/1	Devices	F	Approved	R?.?
REQ-RAS-30	RAS	REQ-RAS-30/1	Devices	F	Approved	R?.?
REQ-RAS-31	RAS	REQ-RAS-31/1	Devices	F	Approved	R?.?
REQ-RAS-32	RAS	REQ-RAS-32/1	Devices	F	Approved	R?.?
REQ-RAS-33	RAS	REQ-RAS-33/1	Devices	F	Approved	R?.?
REQ-RAS-34	RAS	REQ-RAS-34/1	Devices	F	Approved	R?.?
REQ-RAS-138	RAS	REQ-RAS-138/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-RAS-138.2	RAS	REQ-RAS-138.2/1	Devices	F	Approved	R?.?
REQ-RAS-138.3	RAS	REQ-RAS-138.3/1	Devices	F	Approved	R?.?
REQ-RAS-139	RAS	REQ-RAS-139/1	Devices	F	Approved	R?.?
REQ-RAS-35	RAS	REQ-RAS-35/1	Devices	F	Approved	R?.?
REQ-RAS-36	RAS	REQ-RAS-36/1	Devices	F	Approved	R?.?
REQ-RAS-37	RAS	REQ-RAS-37/1	Devices	F	Approved	R?.?
REQ-RAS-38	RAS	REQ-RAS-38/1	Devices	F	Approved	R?.?
REQ-RAS-38.1	RAS	REQ-RAS-38/2	Devices	F	Approved	R?.?
REQ-RAS-39	RAS	REQ-RAS-39/1	Devices	F	Approved	R?.?
REQ-RAS-40	RAS	REQ-RAS-40/1	Devices	F	Approved	R?.?
REQ-RAS-41	RAS	REQ-RAS-41/1	Devices	F	Approved	R?.?
REQ-RAS-42	RAS	REQ-RAS-42/1	Devices	F	Approved	R?.?
REQ-RAS-43	RAS	REQ-RAS-43/1	Devices	F	Approved	R?.?
REQ-RAS-44	RAS	REQ-RAS-44/1	Devices	NF	Approved	R?.?
REQ-RAS-45	RAS	REQ-RAS-45/1	Devices	F	Approved	R?.?
REQ-RAS-46	RAS	REQ-RAS-46/1	Devices	F	Approved	R?.?
REQ-RAS-47	RAS	REQ-RAS-47/1	Devices	F	Approved	R?.?
REQ-RAS-48	RAS	REQ-RAS-48/1	Devices	F	Approved	R?.?
REQ-RAS-49	RAS	REQ-RAS-49/1	Data Management	F	Approved	R?.?
REQ-RAS-49.1	RAS	REQ-RAS-49/2	Data Management	F	Approved	R?.?
REQ-RAS-50	RAS	REQ-RAS-50/1	Devices	F	Approved	R?.?
REQ-RAS-52	RAS	REQ-RAS-52/1	Devices	F	Approved	R?.?
REQ-RAS-53	RAS	REQ-RAS-53/1	Devices	F	Approved	R?.?
REQ-RAS-53.1	RAS	REQ-RAS-53/2	Devices	F	Approved	R?.?
REQ-RAS-53.2	RAS	REQ-RAS-53.1/1	Devices	F	Approved	R?.?
REQ-RAS-53.3	RAS	REQ-RAS-53.2/1	Devices	F	Approved	R?.?
REQ-RAS-53.3.1	RAS	REQ-RAS-53.2.1/1	Devices	F	Approved	R?.?
REQ-RAS-53.3.2	RAS	REQ-RAS-53.2.2/1	Data Management	F	Approved	R?.?
REQ-RAS-53.3.2.1	RAS	REQ-RAS-53.2.2/2	Data Management	F	Approved	R?.?
REQ-RAS-53.3.2.2	RAS	REQ-RAS-53.2.3/1	Devices	F	Approved	R?.?
REQ-RAS-54	RAS	REQ-RAS-54/1	Devices	F	Approved	R?.?
REQ-RAS-54.1	RAS	REQ-RAS-54.1/1	Devices	F	Approved	R?.?
REQ-RAS-54.2	RAS	REQ-RAS-54.2/1	Devices	F	Approved	R?.?
REQ-RAS-54.3	RAS	REQ-RAS-54.3/1	Security	F	Approved	R?.?
REQ-RAS-54.3.1	RAS	REQ-RAS-54.3/2	Security	F	Approved	R?.?
REQ-RAS-54.3.2	RAS	REQ-RAS-54.3/3	Security	F	Approved	R?.?
REQ-RAS-54.3.3	RAS	REQ-RAS-54.3/4	Security	F	Approved	R?.?
REQ-RAS-55	RAS	REQ-RAS-55/1	Devices	F	Approved	R?.?
REQ-RAS-55.1	RAS	REQ-RAS-55.1/1	Devices	F	Approved	R?.?
REQ-RAS-56	RAS	REQ-RAS-56/1	Devices	F	Approved	R?.?
REQ-RAS-56.1	RAS	REQ-RAS-56/2	Devices	F	Approved	R?.?
REQ-RAS-57	RAS	REQ-RAS-57/1	Devices	F	Approved	R?.?
REQ-RAS-58	RAS	REQ-RAS-58/1	Devices	F	Approved	R?.?
REQ-RAS-59	RAS	REQ-RAS-59/1	Devices	F	Approved	R?.?
REQ-RAS-60	RAS	REQ-RAS-60/1	Devices	F	Approved	R?.?
REQ-RAS-61	RAS	REQ-RAS-61/1	Devices	F	Approved	R?.?
REQ-RAS-62	RAS	REQ-RAS-62/1	Devices	F	Approved	R?.?
REQ-RAS-63	RAS	REQ-RAS-63/1	Devices	F	Approved	R?.?
REQ-RAS-63.1	RAS	REQ-RAS-63/2	Devices	F	Approved	R?.?
REQ-RAS-63.2	RAS	REQ-RAS-63/3	Devices	F	Approved	R?.?
REQ-RAS-64	RAS	REQ-RAS-64/1	Devices	F	Approved	R?.?
REQ-RAS-65	RAS	REQ-RAS-65/1	Devices	F	Approved	R?.?
REQ-RAS-65.1	RAS	REQ-RAS-65/2	Devices	F	Approved	R?.?
REQ-RAS-66	RAS	REQ-RAS-66/1	Devices	F	Approved	R?.?
REQ-RAS-67	RAS	REQ-RAS-67/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-RAS-68	RAS	REQ-RAS-68/1	Devices	F	Approved	R?.?
REQ-RAS-69	RAS	REQ-RAS-69/1	Devices	F	Approved	R?.?
REQ-RAS-69.1	RAS	REQ-RAS-69/2	Devices	F	Approved	R?.?
REQ-RAS-70	RAS	REQ-RAS-70/1	Devices	F	Approved	R?.?
REQ-RAS-71	RAS	REQ-RAS-71/1	Devices	F	Approved	R?.?
REQ-RAS-72	RAS	REQ-RAS-72/1	Devices	F	Approved	R?.?
REQ-RAS-73	RAS	REQ-RAS-73/1	Devices	F	Approved	R?.?
REQ-RAS-74	RAS	REQ-RAS-74/1	Devices	F	Approved	R?.?
REQ-RAS-75	RAS	REQ-RAS-75/1	Devices	F	Approved	R?.?
REQ-RAS-76	RAS	REQ-RAS-76/1	Devices	F	Approved	R?.?
REQ-RAS-76.1	RAS	REQ-RAS-76.1/1	Devices	F	Approved	R?.?
REQ-RAS-76.2	RAS	REQ-RAS-76.2/1	Devices	F	Approved	R?.?
REQ-RAS-77	RAS	REQ-RAS-77/1	Devices	F	Approved	R?.?
REQ-RAS-78	RAS	REQ-RAS-78/1	Devices	F	Approved	R?.?
REQ-RAS-79	RAS	REQ-RAS-79/1	Devices	F	Approved	R?.?
REQ-RAS-80	RAS	REQ-RAS-80/1	Devices	F	Approved	R?.?
REQ-RAS-81	RAS	REQ-RAS-81/1	Devices	F	Approved	R?.?
REQ-RAS-82	RAS	REQ-RAS-82/1	Devices	F	Approved	R?.?
REQ-RAS-83	RAS	REQ-RAS-83/1	Devices	F	Approved	R?.?
REQ-RAS-84	RAS	REQ-RAS-84/1	Devices	F	Approved	R?.?
REQ-RAS-85	RAS	REQ-RAS-85/1	Devices	F	Approved	R?.?
REQ-RAS-86	RAS	REQ-RAS-86/1	Devices	F	Approved	R?.?
REQ-RAS-87	RAS	REQ-RAS-87/1	Devices	F	Approved	R?.?
REQ-RAS-87.1	RAS	REQ-RAS-87.1/1	Devices	F	Approved	R?.?
REQ-RAS-88	RAS	REQ-RAS-88/1	Devices	F	Approved	R?.?
REQ-RAS-88.1	RAS	REQ-RAS-88.1/1	Devices	F	Approved	R?.?
REQ-RAS-88.2	RAS	REQ-RAS-88.2/1	Devices	F	Approved	R?.?
REQ-RAS-88.3	RAS	REQ-RAS-88.3/1	Data Management	F	Approved	R?.?
REQ-RAS-88.4	RAS	REQ-RAS-88.4/1	Devices	F	Approved	R?.?
REQ-RAS-89	RAS	REQ-RAS-89/1	Devices	F	Approved	R?.?
REQ-RAS-89.1	RAS	REQ-RAS-89/2	Devices	F	Approved	R?.?
REQ-RAS-90	RAS	REQ-RAS-90/1	Devices	F	Approved	R?.?
REQ-RAS-91	RAS	REQ-RAS-91/1	Devices	F	Approved	R?.?
REQ-RAS-91.1	RAS	REQ-RAS-91.1/1	Devices	F	Approved	R?.?
REQ-RAS-91.1.1	RAS	REQ-RAS-91.1/2	Devices	F	Approved	R?.?
REQ-RAS-91.2	RAS	REQ-RAS-91.2/1	Devices	F	Approved	R?.?
REQ-RAS-91.3	RAS	REQ-RAS-91.3/1	Devices	F	Approved	R?.?
REQ-RAS-91.4	RAS	REQ-RAS-91.4/1	Devices	F	Approved	R?.?
REQ-RAS-92	RAS	REQ-RAS-92/1	Devices	F	Approved	R?.?
REQ-RAS-93	RAS	REQ-RAS-93/1	Devices	F	Approved	R?.?
REQ-RAS-94	RAS	REQ-RAS-94/1	Devices	F	Approved	R?.?
REQ-RAS-95	RAS	REQ-RAS-95/1	TBD	F	Approved	R?.?
REQ-RAS-96	RAS	REQ-RAS-96/1	Devices	F	Approved	R?.?
REQ-RAS-97	RAS	REQ-RAS-97/1	Card/Media Management	F	Approved	R?.?
REQ-RAS-97.1	RAS	REQ-RAS-97.1/1	Card/Media Management	F	Approved	R?.?
REQ-RAS-97.2	RAS	REQ-RAS-97.2/1	Devices	F	Approved	R?.?
REQ-RAS-98	RAS	REQ-RAS-98/1	Devices	F	Approved	R?.?
REQ-RAS-98.1	RAS	REQ-RAS-98/2	Devices	F	Approved	R?.?
REQ-RAS-99	RAS	REQ-RAS-99/1	Fare Management	F	Approved	R?.?
REQ-RAS-100	RAS	REQ-RAS-100/1	Devices	F	Approved	R?.?
REQ-RAS-100.1	RAS	REQ-RAS-100.1/1	Devices	F	Approved	R?.?
REQ-RAS-100.2	RAS	REQ-RAS-100.2/1	Devices	F	Approved	R?.?
REQ-RAS-100.3	RAS	REQ-RAS-100.3/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-RAS-100.4	RAS	REQ-RAS-100.4/1	Devices	F	Approved	R?.?
REQ-RAS-100.4.1	RAS	REQ-RAS-100.4/2	Devices	F	Approved	R?.?
REQ-RAS-100.5	RAS	REQ-RAS-100.5/1	Devices	F	Approved	R?.?
REQ-RAS-100.5.1	RAS	REQ-RAS-100.5/2	Devices	F	Approved	R?.?
REQ-RAS-100.6	RAS	REQ-RAS-100.6/1	Devices	F	Approved	R?.?
REQ-RAS-100.7	RAS	REQ-RAS-100.7/1	Devices	F	Approved	R?.?
REQ-RAS-101	RAS	REQ-RAS-101/1	Devices	F	Approved	R?.?
REQ-RAS-102	RAS	REQ-RAS-102/1	Devices	F	Approved	R?.?
REQ-RAS-103	RAS	REQ-RAS-103/1	Devices	F	Approved	R?.?
REQ-RAS-103.1	RAS	REQ-RAS-103/2	Devices	F	Approved	R?.?
REQ-RAS-103.2	RAS	REQ-RAS-103.1/1	Devices	F	Approved	R?.?
REQ-RAS-103.3	RAS	REQ-RAS-103.2/1	Devices	F	Approved	R?.?
REQ-RAS-103.3.1	RAS	REQ-RAS-103.2.1/1	Devices	F	Approved	R?.?
REQ-RAS-103.3.2	RAS	REQ-RAS-103.2.2/1	Devices	F	Approved	R?.?
REQ-RAS-103.3.3	RAS	REQ-RAS-103.2.3/1	Devices	F	Approved	R?.?
REQ-RAS-104	RAS	REQ-RAS-104/1	Devices	F	Approved	R?.?
REQ-RAS-104.1	RAS	REQ-RAS-104.1/1	Devices	F	Approved	R?.?
REQ-RAS-107	RAS	REQ-RAS-107/1	Devices	F	Approved	R?.?
REQ-RAS-107.1	RAS	REQ-RAS-107/2	Devices	F	Approved	R?.?
REQ-RAS-108	RAS	REQ-RAS-108/1	Devices	F	Approved	R?.?
REQ-RAS-109	RAS	REQ-RAS-109/1	Devices	F	Approved	R?.?
REQ-RAS-110	RAS	REQ-RAS-110/1	Devices	F	Approved	R?.?
REQ-RAS-110.1	RAS	REQ-RAS-110/2	Devices	F	Approved	R?.?
REQ-RAS-111	RAS	REQ-RAS-111/1	Asset Management	F	Approved	R?.?
REQ-RAS-112	RAS	REQ-RAS-112/1	Devices	F	Approved	R?.?
REQ-RAS-112.1	RAS	REQ-RAS-112/2	Devices	F	Approved	R?.?
REQ-RAS-113	RAS	REQ-RAS-113/1	Devices	F	Approved	R?.?
REQ-RAS-114	RAS	REQ-RAS-114/1	Devices	F	Approved	R?.?
REQ-RAS-115	RAS	REQ-RAS-115/1	Devices	F	Approved	R?.?
REQ-RAS-116	RAS	REQ-RAS-116/1	Devices	F	Approved	R?.?
REQ-RAS-117	RAS	REQ-RAS-117/1	Devices	F	Approved	R?.?
REQ-RAS-118	RAS	REQ-RAS-118/1	Devices	F	Approved	R?.?
REQ-RAS-119	RAS	REQ-RAS-119/1	Devices	F	Approved	R?.?
REQ-RAS-120	RAS	REQ-RAS-120/1	Devices	F	Approved	R?.?
REQ-RAS-121	RAS	REQ-RAS-121/1	Devices	F	Approved	R?.?
REQ-RAS-122	RAS	REQ-RAS-122/1	Devices	F	Approved	R?.?
REQ-RAS-123	RAS	REQ-RAS-123/1	Devices	F	Approved	R?.?
REQ-RAS-124	RAS	REQ-RAS-124/1	Devices	F	Approved	R?.?
REQ-RAS-125	RAS	REQ-RAS-125/1	Devices	F	Approved	R?.?
REQ-RAS-126	RAS	REQ-RAS-126/1	Devices	F	Approved	R?.?
REQ-RAS-127	RAS	REQ-RAS-127/1	Devices	F	Approved	R?.?
REQ-RAS-127.1	RAS	REQ-RAS-127/2	Devices	F	Approved	R?.?
REQ-RAS-128	RAS	REQ-RAS-128/1	Devices	F	Approved	R?.?
REQ-RAS-128.1	RAS	REQ-RAS-128.1/1	Devices	F	Approved	R?.?
REQ-RAS-128.2	RAS	REQ-RAS-128.2/1	Devices	F	Approved	R?.?
REQ-RAS-128.4	RAS	REQ-RAS-128.4/1	Devices	F	Approved	R?.?
REQ-RAS-129	RAS	REQ-RAS-129/1	Devices	F	Approved	R?.?
REQ-RAS-130	RAS	REQ-RAS-130/1	Devices	F	Approved	R?.?
REQ-RAS-130.1	RAS	REQ-RAS-130/2	Devices	F	Approved	R?.?
REQ-RAS-130.2	RAS	REQ-RAS-130/3	Devices	F	Approved	R?.?
REQ-RAS-131	RAS	REQ-RAS-131/1	Devices	F	Approved	R?.?
REQ-RAS-132	RAS	REQ-RAS-132/1	Devices	F	Approved	R?.?
REQ-RAS-133	RAS	REQ-RAS-133/1	Devices	F	Approved	R?.?
REQ-RAS-133.1	RAS	REQ-RAS-133.1/1	Devices	F	Approved	R?.?
REQ-RAS-133.2	RAS	REQ-RAS-133.2/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-RAS-133.3	RAS	REQ-RAS-133.3/1	Devices	F	Approved	R?.?
REQ-RAS-133.4	RAS	REQ-RAS-133.4/1	Fare Management	F	Approved	R?.?
REQ-RAS-133.5	RAS	REQ-RAS-133.5/1	Devices	F	Approved	R?.?
REQ-GSR-1	GSR	REQ-GSR-1/1	Devices	F	Approved	R?.?
REQ-GSR-2	GSR	REQ-GSR-2/1	Devices	F	Approved	R?.?
REQ-GSR-3	GSR	REQ-GSR-3/1	Devices	F	Approved	R?.?
REQ-GSR-4	GSR	REQ-GSR-4/1	Devices	F	Approved	R?.?
REQ-GSR-5	GSR	REQ-GSR-5/1	Devices	F	Approved	R?.?
REQ-GSR-6	GSR	REQ-GSR-6/1	Devices	F	Approved	R?.?
REQ-GSR-7	GSR	REQ-GSR-7/1	Devices	F	Approved	R?.?
REQ-GSR-8	GSR	REQ-GSR-8/1	Devices	F	Approved	R?.?
REQ-GSR-8.1	GSR	REQ-GSR-8.1/1	Devices	F	Approved	R?.?
REQ-GSR-8.2	GSR	REQ-GSR-8.2/1	Devices	F	Approved	R?.?
REQ-GSR-8.3	GSR	REQ-GSR-8.3/1	Devices	F	Approved	R?.?
REQ-GSR-8.4	GSR	REQ-GSR-8.4/1	Financial Management	F	Approved	R?.?
REQ-GSR-9	GSR	REQ-GSR-9/1	Devices	F	Approved	R?.?
REQ-GSR-9.1	GSR	REQ-GSR-9.1/1	Devices	F	Approved	R?.?
REQ-GSR-9.2	GSR	REQ-GSR-9.2/1	Devices	F	Approved	R?.?
REQ-GSR-10	GSR	REQ-GSR-10/1	Devices	F	Approved	R?.?
REQ-GSR-10.1	GSR	REQ-GSR-10.1/1	Devices	F	Approved	R?.?
REQ-GSR-10.2	GSR	REQ-GSR-10.2/1	Devices	F	Approved	R?.?
REQ-GSR-10.3	GSR	REQ-GSR-10.3/1	Devices	F	Approved	R?.?
REQ-GSR-10.4	GSR	REQ-GSR-10.4/1	Devices	F	Approved	R?.?
REQ-GSR-10.5	GSR	REQ-GSR-10.5/1	Devices	F	Approved	R?.?
REQ-GSR-10.6	GSR	REQ-GSR-10.6/1	Other - Program Management	NF	Approved	R?.?
REQ-GSR-11	GSR	REQ-GSR-11/1	Devices	F	Approved	R?.?
REQ-GSR-11.1	GSR	REQ-GSR-11.1/1	Devices	F	Approved	R?.?
REQ-GSR-11.2	GSR	REQ-GSR-11.2/1	Devices	F	Approved	R?.?
REQ-GSR-12	GSR	REQ-GSR-12/1	Devices	F	Approved	R?.?
REQ-GSR-12.1	GSR	REQ-GSR-12/2	Devices	F	Approved	R?.?
REQ-GSR-12.2	GSR	REQ-GSR-12/3	Devices	F	Approved	R?.?
REQ-GSR-13	GSR	REQ-GSR-13/1	Data Management	F	Approved	R?.?
REQ-GSR-13.1	GSR	REQ-GSR-13.1/1	Devices	F	Approved	R?.?
REQ-GSR-13.2	GSR	REQ-GSR-13.2/1	Data Management	F	Approved	R?.?
REQ-GSR-14	GSR	REQ-GSR-14/1	Data Management	F	Approved	R?.?
REQ-GSR-15	GSR	REQ-GSR-15/1	Data Management	F	Approved	R?.?
REQ-GSR-15.2	GSR	REQ-GSR-15/2	Data Management	F	Approved	R?.?
REQ-GSR-15.2.1	GSR	REQ-GSR-15.1/1	Fare Management	F	Approved	R?.?
REQ-GSR-15.3	GSR	REQ-GSR-15/3	Data Management	F	Approved	R?.?
REQ-GSR-15.3.1	GSR	REQ-GSR-15.2/1	Fare Management	F	Approved	R?.?
REQ-GSR-15.4	GSR	REQ-GSR-15/4	Data Management	F	Approved	R?.?
REQ-GSR-15.4.1	GSR	REQ-GSR-15.3/1	Fare Management	F	Approved	R?.?
REQ-GSR-15.5	GSR	REQ-GSR-15/5	Data Management	F	Approved	R?.?
REQ-GSR-15.5.1	GSR	REQ-GSR-15.4/1	Fare Management	F	Approved	R?.?
REQ-GSR-15.6	GSR	REQ-GSR-15/6	Data Management	F	Approved	R?.?
REQ-GSR-15.6.1	GSR	REQ-GSR-15.5/1	Fare Management	F	Approved	R?.?
REQ-GSR-15.7	GSR	REQ-GSR-15/7	Data Management	F	Approved	R?.?
REQ-GSR-15.7.1	GSR	REQ-GSR-15.6/1	Devices	F	Approved	R?.?
REQ-GSR-15.7.2	GSR	REQ-GSR-15.7/1	Data Management	F	Approved	R?.?
REQ-GSR-15.7.3	GSR	REQ-GSR-15.7/2	Data Management	F	Approved	R?.?
REQ-GSR-15.7.4	GSR	REQ-GSR-15.7/3	Data Management	F	Approved	R?.?
REQ-GSR-15.7.5	GSR	REQ-GSR-15.7/4	Data Management	F	Approved	R?.?
REQ-GSR-15.7.6	GSR	REQ-GSR-15.7/5	Data Management	F	Approved	R?.?
REQ-GSR-16	GSR	REQ-GSR-16/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-GSR-16.1	GSR	REQ-GSR-16.1/1	Devices	F	Approved	R?.?
REQ-GSR-16.1.1	GSR	REQ-GSR-16.1/2	Devices	F	Approved	R?.?
REQ-GSR-17	GSR	REQ-GSR-17/1	Security	F	Approved	R?.?
REQ-GSR-17.1	GSR	REQ-GSR-17.1/1	Security	F	Approved	R?.?
REQ-GSR-17.2	GSR	REQ-GSR-17.2/1	Devices	F	Approved	R?.?
REQ-GSR-17.3	GSR	REQ-GSR-17.3/1	Devices	F	Approved	R?.?
REQ-GSR-17.4	GSR	REQ-GSR-17.4/1	Devices	F	Approved	R?.?
REQ-GSR-17.4.1	GSR	REQ-GSR-17.4/2	Devices	F	Approved	R?.?
REQ-GSR-17.4.2	GSR	REQ-GSR-17.4/3	Devices	F	Approved	R?.?
REQ-GSR-18	GSR	REQ-GSR-18/1	Devices	F	Approved	R?.?
REQ-GSR-19	GSR	REQ-GSR-19/1	Security	F	Approved	R?.?
REQ-GSR-20	GSR	REQ-GSR-20/1	Reporting	F	Approved	R?.?
REQ-GSR-20.1	GSR	REQ-GSR-20.1/1	Reporting	F	Approved	R?.?
REQ-GSR-20.2	GSR	REQ-GSR-20.2/1	Reporting	F	Approved	R?.?
REQ-GSR-20.3	GSR	REQ-GSR-20.3/1	Reporting	F	Approved	R?.?
REQ-GSR-20.3.1	GSR	REQ-GSR-20.3/2	Reporting	F	Approved	R?.?
REQ-GSR-20.3.2	GSR	REQ-GSR-20.3/3	Reporting	F	Approved	R?.?
REQ-GSR-20.3.3	GSR	REQ-GSR-20.3/4	Reporting	F	Approved	R?.?
REQ-GSR-20.3.4	GSR	REQ-GSR-20.3/5	Reporting	F	Approved	R?.?
REQ-GSR-20.3.5	GSR	REQ-GSR-20.3/6	Reporting	F	Approved	R?.?
REQ-GSR-20.3.6	GSR	REQ-GSR-20.3/7	Reporting	F	Approved	R?.?
REQ-GSR-20.3.7	GSR	REQ-GSR-20.3/8	Reporting	F	Approved	R?.?
REQ-GSR-20.3.8	GSR	REQ-GSR-20.3/9	Reporting	F	Approved	R?.?
REQ-GSR-20.3.9	GSR	REQ-GSR-20.3/10	Reporting	F	Approved	R?.?
REQ-GSR-20.4	GSR	REQ-GSR-20.4/1	Reporting	F	Approved	R?.?
REQ-GSR-20.4.1	GSR	REQ-GSR-20.4/2	Reporting	F	Approved	R?.?
REQ-GSR-21	GSR	REQ-GSR-21/1	Devices	F	Approved	R?.?
REQ-GSR-22	GSR	REQ-GSR-22/1	Devices	F	Approved	R?.?
REQ-GSR-23	GSR	REQ-GSR-23/1	Devices	F	Approved	R?.?
REQ-GSR-24	GSR	REQ-GSR-24/1	Security	F	Approved	R?.?
REQ-GSR-25	GSR	REQ-GSR-25/1	Security	F	Approved	R?.?
REQ-GSR-26	GSR	REQ-GSR-26/1	Devices	F	Approved	R?.?
REQ-GSR-27	GSR	REQ-GSR-27/1	Devices	F	Approved	R?.?
REQ-GSR-28	GSR	REQ-GSR-28/1	Devices	F	Approved	R?.?
REQ-GSR-28.1	GSR	REQ-GSR-28/2	Devices	F	Approved	R?.?
REQ-GSR-29	GSR	REQ-GSR-29/1	Devices	F	Approved	R?.?
REQ-GSR-29.1	GSR	REQ-GSR-29/2	Devices	F	Approved	R?.?
REQ-GSR-30	GSR	REQ-GSR-30/1	Devices	F	Approved	R?.?
REQ-GSR-31	GSR	REQ-GSR-31/1	Devices	F	Approved	R?.?
REQ-GSR-32	GSR	REQ-GSR-32/1	Devices	F	Approved	R?.?
REQ-GSR-33	GSR	REQ-GSR-33/1	Devices	F	Approved	R?.?
REQ-GSR-34	GSR	REQ-GSR-34/1	Devices	F	Approved	R?.?
REQ-GSR-35	GSR	REQ-GSR-35/1	Devices	F	Approved	R?.?
REQ-GSR-36	GSR	REQ-GSR-36/1	Devices	F	Approved	R?.?
REQ-GSR-37	GSR	REQ-GSR-37/1	Devices	F	Approved	R?.?
REQ-GSR-38	GSR	REQ-GSR-38/1	Devices	F	Approved	R?.?
REQ-GSR-38.1	GSR	REQ-GSR-38/2	Devices	F	Approved	R?.?
REQ-GSR-38.2	GSR	REQ-GSR-38/35	Devices	F	Approved	R?.?
REQ-GSR-38.3	GSR	REQ-GSR-38/47	Devices	F	Approved	R?.?
REQ-GSR-38.4	GSR	REQ-GSR-38/59	Devices	F	Approved	R?.?
REQ-GSR-39	GSR	REQ-GSR-39/1	Devices	F	Approved	R?.?
REQ-GSR-39.1	GSR	REQ-GSR-39/2	Devices	F	Approved	R?.?
REQ-GSR-39.2	GSR	REQ-GSR-39/3	Devices	F	Approved	R?.?
REQ-GSR-39.3	GSR	REQ-GSR-39/4	Devices	F	Approved	R?.?
REQ-GSR-39.4	GSR	REQ-GSR-39/5	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-GSR-39.5	GSR	REQ-GSR-39/6	Devices	F	Approved	R?.?
REQ-GSR-39.6	GSR	REQ-GSR-39/7	Devices	F	Approved	R?.?
REQ-GSR-39.7	GSR	REQ-GSR-39/8	Devices	F	Approved	R?.?
REQ-GSR-39.8	GSR	REQ-GSR-39/9	Devices	F	Approved	R?.?
REQ-GSR-40	GSR	REQ-GSR-40/1	Devices	F	Approved	R?.?
REQ-GSR-40.1	GSR	REQ-GSR-40/2	Devices	F	Approved	R?.?
REQ-GSR-40.2	GSR	REQ-GSR-40/3	Devices	F	Approved	R?.?
REQ-GSR-40.3	GSR	REQ-GSR-40/4	Devices	F	Approved	R?.?
REQ-GSR-40.4	GSR	REQ-GSR-40/5	Devices	F	Approved	R?.?
REQ-GSR-41	GSR	REQ-GSR-41/1	Devices	F	Approved	R?.?
REQ-GSR-41.1	GSR	REQ-GSR-41/2	Devices	F	Approved	R?.?
REQ-GSR-42	GSR	REQ-GSR-42/1	Card/Media Management	F	Approved	R?.?
REQ-GSR-43	GSR	REQ-GSR-43/1	Devices	F	Approved	R?.?
REQ-GSR-44	GSR	REQ-GSR-44/1	Devices	F	Approved	R?.?
REQ-GSR-45	GSR	REQ-GSR-45/1	Devices	F	Approved	R?.?
REQ-GSR-45.1	GSR	REQ-GSR-45.1/1	Devices	F	Approved	R?.?
REQ-GSR-45.2	GSR	REQ-GSR-45.2/1	Devices	F	Approved	R?.?
REQ-GSR-45.3	GSR	REQ-GSR-45.3/1	Devices	F	Approved	R?.?
REQ-GSR-45.4	GSR	REQ-GSR-45.4/1	Devices	F	Approved	R?.?
REQ-GSR-45.5	GSR	REQ-GSR-45.5/1	Devices	F	Approved	R?.?
REQ-GSR-45.6	GSR	REQ-GSR-45.6/1	Devices	F	Approved	R?.?
REQ-GSR-45.6.1	GSR	REQ-GSR-45.6/2	Devices	F	Approved	R?.?
REQ-GSR-45.7	GSR	REQ-GSR-45.7/1	Devices	F	Approved	R?.?
REQ-GSR-45.8	GSR	REQ-GSR-45.8/1	Devices	F	Approved	R?.?
REQ-GSR-45.9	GSR	REQ-GSR-45.9/1	Devices	F	Approved	R?.?
REQ-GSR-45.9.1	GSR	REQ-GSR-45.9/2	Devices	F	Approved	R?.?
REQ-GSR-45.9.2	GSR	REQ-GSR-45.9/3	Devices	F	Approved	R?.?
REQ-GSR-45.9.3	GSR	REQ-GSR-45.9/4	Devices	F	Approved	R?.?
REQ-GSR-45.9.4	GSR	REQ-GSR-45.9/5	Devices	F	Approved	R?.?
REQ-GSR-45.9.5	GSR	REQ-GSR-45.9/6	Devices	F	Approved	R?.?
REQ-GSR-45.9.6	GSR	REQ-GSR-45.9/7	Devices	F	Approved	R?.?
REQ-GSR-45.9.7	GSR	REQ-GSR-45.9/8	Devices	F	Approved	R?.?
REQ-GSR-45.9.8	GSR	REQ-GSR-45.9/9	Devices	F	Approved	R?.?
REQ-GSR-45.9.9	GSR	REQ-GSR-45.9/10	Devices	F	Approved	R?.?
REQ-GSR-45.9.10	GSR	REQ-GSR-45.9/11	Devices	F	Approved	R?.?
REQ-GSR-45.10	GSR	REQ-GSR-45.10/1	Devices	F	Approved	R?.?
REQ-GSR-45.10.1	GSR	REQ-GSR-45.10/2	Devices	F	Approved	R?.?
REQ-GSR-45.10.2	GSR	REQ-GSR-45.10/3	Devices	F	Approved	R?.?
REQ-GSR-45.10.3	GSR	REQ-GSR-45.10/4	Devices	F	Approved	R?.?
REQ-GSR-45.10.4	GSR	REQ-GSR-45.10/5	Devices	F	Approved	R?.?
REQ-GSR-45.10.5	GSR	REQ-GSR-45.10/6	Devices	F	Approved	R?.?
REQ-GSR-45.10.6	GSR	REQ-GSR-45.10/7	Devices	F	Approved	R?.?
REQ-GSR-45.10.7	GSR	REQ-GSR-45.10/8	Devices	F	Approved	R?.?
REQ-GSR-45.10.8	GSR	REQ-GSR-45.10/9	Devices	F	Approved	R?.?
REQ-GSR-45.10.9	GSR	REQ-GSR-45.10/10	Devices	F	Approved	R?.?
REQ-GSR-45.10.10	GSR	REQ-GSR-45.10/11	Devices	F	Approved	R?.?
REQ-GSR-45.10.11	GSR	REQ-GSR-45.10/12	Devices	F	Approved	R?.?
REQ-GSR-45.10.12	GSR	REQ-GSR-45.10/13	Devices	F	Approved	R?.?
REQ-GSR-45.11	GSR	REQ-GSR-45.11/1	Devices	F	Approved	R?.?
REQ-GSR-45.11.1	GSR	REQ-GSR-45.11/2	Devices	F	Approved	R?.?
REQ-GSR-45.12	GSR	REQ-GSR-45.12/1	Devices	F	Approved	R?.?
REQ-GSR-45.13	GSR	REQ-GSR-45.13/1	Devices	F	Approved	R?.?
REQ-GSR-45.14	GSR	REQ-GSR-45.14/1	Devices	F	Approved	R?.?
REQ-GSR-46	GSR	REQ-GSR-46/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-GSR-46.1	GSR	REQ-GSR-46/2	Devices	F	Approved	R?.?
REQ-GSR-47	GSR	REQ-GSR-47/1	Devices	F	Approved	R?.?
REQ-GSR-48	GSR	REQ-GSR-48/1	Devices	F	Approved	R?.?
REQ-GSR-48.1	GSR	REQ-GSR-48.1/1	Devices	F	Approved	R?.?
REQ-GSR-48.2	GSR	REQ-CBD-48.2/1	Devices	F	Approved	R?.?
REQ-GSR-49	GSR	REQ-GSR-49/1	Devices	F	Approved	R?.?
REQ-GSR-50	GSR	REQ-GSR-50/1	Devices	F	Approved	R?.?
REQ-GSR-57	GSR	REQ-GSR-57/1	Devices	F	Approved	R?.?
REQ-GSR-51	GSR	REQ-GSR-51/1	Devices	F	Approved	R?.?
REQ-GSR-51.1	GSR	REQ-GSR-51.1/1	Devices	F	Approved	R?.?
REQ-GSR-51.2	GSR	REQ-GSR-51.2/1	Devices	F	Approved	R?.?
REQ-GSR-51.3	GSR	REQ-GSR-51.3/1	Devices	F	Approved	R?.?
REQ-GSR-51.4	GSR	REQ-GSR-51.4/1	Devices	F	Approved	R?.?
REQ-GSR-51.5	GSR	REQ-GSR-51.5/1	Devices	F	Approved	R?.?
REQ-GSR-51.5.1	GSR	REQ-GSR-51.5/2	Devices	F	Approved	R?.?
REQ-GSR-51.6	GSR	REQ-GSR-51.6/1	Devices	F	Approved	R?.?
REQ-GSR-52	GSR	REQ-GSR-52/1	Devices	F	Approved	R?.?
REQ-GSR-52.1	GSR	REQ-GSR-52.1/1	Devices	F	Approved	R?.?
REQ-GSR-52.2	GSR	REQ-GSR-52.2/1	Devices	F	Approved	R?.?
REQ-GSR-52.3	GSR	REQ-GSR-52.3/1	Devices	F	Approved	R?.?
REQ-GSR-52.4	GSR	REQ-GSR-52.4/1	Devices	F	Approved	R?.?
REQ-GSR-52.5	GSR	REQ-GSR-52.5/1	Devices	F	Approved	R?.?
REQ-GSR-52.6	GSR	REQ-GSR-52.6/1	Devices	F	Approved	R?.?
REQ-GSR-52.6.1	GSR	REQ-GSR-52.6/2	Devices	F	Approved	R?.?
REQ-GSR-52.7	GSR	REQ-GSR-52.7/1	Devices	F	Approved	R?.?
REQ-GSR-52.8	GSR	REQ-GSR-52.8/1	Devices	F	Approved	R?.?
REQ-GSR-52.9	GSR	REQ-GSR-52.9/1	Devices	F	Approved	R?.?
REQ-GSR-53	GSR	REQ-GSR-53/1	Devices	F	Approved	R?.?
REQ-GSR-53.1	GSR	REQ-GSR-53.1/1	Devices	F	Approved	R?.?
REQ-GSR-53.2	GSR	REQ-GSR-53.2/1	Devices	F	Approved	R?.?
REQ-GSR-53.2.1	GSR	REQ-GSR-53.2/2	Devices	F	Approved	R?.?
REQ-GSR-53.2.2	GSR	REQ-GSR-53.2/3	Devices	F	Approved	R?.?
REQ-GSR-53.2.3	GSR	REQ-GSR-53.2/4	Devices	F	Approved	R?.?
REQ-GSR-53.2.4	GSR	REQ-GSR-53.2/5	Devices	F	Approved	R?.?
REQ-GSR-53.3	GSR	REQ-GSR-53.3/1	Devices	F	Approved	R?.?
REQ-GSR-54	GSR	REQ-GSR-54/1	Devices	F	Approved	R?.?
REQ-GSR-54.1	GSR	REQ-GSR-54.1/1	Devices	F	Approved	R?.?
REQ-GSR-54.2	GSR	REQ-GSR-54.2/1	Devices	F	Approved	R?.?
REQ-GSR-55	GSR	REQ-GSR-55/1	Devices	F	Approved	R?.?
REQ-GSR-56	GSR	REQ-GSR-56/1	Devices	F	Approved	R?.?
REQ-FMV-1	FMV	REQ-FMV-1/1	Devices	F	Approved	R?.?
REQ-FMV-2	FMV	REQ-FMV-2/1	Devices	F	Approved	R?.?
REQ-FMV-3	FMV	REQ-FMV-3/1	Devices	F	Approved	R?.?
REQ-FMV-4	FMV	REQ-FMV-4/1	Devices	F	Approved	R?.?
REQ-FMV-5	FMV	REQ-FMV-5/1	Devices	F	Approved	R?.?
REQ-FMV-6	FMV	REQ-FMV-6/1	Devices	F	Approved	R?.?
REQ-FMV-7	FMV	REQ-FMV-7/1	Devices	F	Approved	R?.?
REQ-FMV-7.1	FMV	REQ-FMV-7.1/1	Devices	F	Approved	R?.?
REQ-FMV-7.2	FMV	REQ-FMV-7.2/1	Devices	F	Approved	R?.?
REQ-FMV-8	FMV	REQ-FMV-8/1	Devices	F	Approved	R?.?
REQ-FMV-8.1	FMV	REQ-FMV-8.1/1	Devices	F	Approved	R?.?
REQ-FMV-8.2	FMV	REQ-FMV-8.2/1	Devices	F	Approved	R?.?
REQ-FMV-8.3	FMV	REQ-FMV-8.3/1	Devices	F	Approved	R?.?
REQ-FMV-8.3.1	FMV	REQ-FMV-8.3/2	Devices	F	Approved	R?.?
REQ-FMV-8.4	FMV	REQ-FMV-8.4/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FMV-9	FMV	REQ-FMV-9/1	Devices	F	Approved	R?.?
REQ-FMV-9.1	FMV	REQ-FMV-9.1/1	Devices	F	Approved	R?.?
REQ-FMV-9.2	FMV	REQ-FMV-9.2/1	Devices	F	Approved	R?.?
REQ-FMV-9.3	FMV	REQ-FMV-9.3/1	Devices	F	Approved	R?.?
REQ-FMV-9.3.1	FMV	REQ-FMV-9.3/2	Devices	F	Approved	R?.?
REQ-FMV-10	FMV	REQ-FMV-10/1	Devices	F	Approved	R?.?
REQ-FMV-10.1	FMV	REQ-FMV-10.1/1	Devices	F	Approved	R?.?
REQ-FMV-10.2	FMV	REQ-FMV-10.2/1	Devices	F	Approved	R?.?
REQ-FMV-10.2.1	FMV	REQ-FMV-10.2/2	Devices	F	Approved	R?.?
REQ-FMV-10.3	FMV	REQ-FMV-10.3/1	Devices	F	Approved	R?.?
REQ-FMV-10.4	FMV	REQ-FMV-10.4/1	Devices	F	Approved	R?.?
REQ-FMV-10.5	FMV	REQ-FMV-10.5/1	Devices	F	Approved	R?.?
REQ-FMV-10.6	FMV	REQ-FMV-10.6/1	Devices	F	Approved	R?.?
REQ-FMV-10.7	FMV	REQ-FMV-10.7/1	Devices	F	Approved	R?.?
REQ-FMV-10.8	FMV	REQ-FMV-10.8/1	Devices	F	Approved	R?.?
REQ-FMV-10.9	FMV	REQ-FMV-10.9/1	Devices	F	Approved	R?.?
REQ-FMV-11	FMV	REQ-FMV-11/1	Devices	F	Approved	R?.?
REQ-FMV-11.1	FMV	REQ-FMV-11.1/1	Devices	F	Approved	R?.?
REQ-FMV-11.1.1	FMV	REQ-FMV-11/2	Devices	F	Approved	R?.?
REQ-FMV-11.1.2	FMV	REQ-FMV-11/3	Devices	F	Approved	R?.?
REQ-FMV-12	FMV	REQ-FMV-12/1	Devices	F	Approved	R?.?
REQ-FMV-12.1	FMV	REQ-FMV-12.1/1	Devices	F	Approved	R?.?
REQ-FMV-12.1.1	FMV	REQ-FMV-12.1/2	Devices	F	Approved	R?.?
REQ-FMV-12.2	FMV	REQ-FMV-12.2/1	Devices	F	Approved	R?.?
REQ-FMV-12.3	FMV	REQ-FMV-12.3/1	Devices	F	Approved	R?.?
REQ-FMV-12.4	FMV	REQ-FMV-12.4/1	Devices	F	Approved	R?.?
REQ-FMV-12.5	FMV	REQ-FMV-12.5/1	Devices	F	Approved	R?.?
REQ-FMV-12.6	FMV	REQ-FMV-12.6/1	Devices	F	Approved	R?.?
REQ-FMV-12.7	FMV	REQ-FMV-12.7/1	Devices	F	Approved	R?.?
REQ-FMV-12.7.1	FMV	REQ-FMV-12.7/2	Devices	F	Approved	R?.?
REQ-FMV-13	FMV	REQ-FMV-13/1	Devices	F	Approved	R?.?
REQ-FMV-13.1	FMV	REQ-FMV-13.1/1	Devices	F	Approved	R?.?
REQ-FMV-13.2	FMV	REQ-FMV-13.2/1	Devices	F	Approved	R?.?
REQ-FMV-13.3	FMV	REQ-FMV-13.3/1	Devices	F	Approved	R?.?
REQ-FMV-13.4	FMV	REQ-FMV-13.4/1	Devices	F	Approved	R?.?
REQ-FMV-14	FMV	REQ-FMV-14/1	Devices	F	Approved	R?.?
REQ-FMV-15	FMV	REQ-FMV-15/1	Devices	F	Approved	R?.?
REQ-FMV-15.1	FMV	REQ-FMV-15.1/1	Devices	F	Approved	R?.?
REQ-FMV-15.2	FMV	REQ-FMV-15.2/1	Devices	F	Approved	R?.?
REQ-FMV-15.3	FMV	REQ-FMV-15.3/1	Devices	F	Approved	R?.?
REQ-FMV-15.4	FMV	REQ-FMV-15.4/1	Devices	F	Approved	R?.?
REQ-FMV-15.5	FMV	REQ-FMV-15.5/1	Devices	F	Approved	R?.?
REQ-FMV-15.6	FMV	REQ-FMV-15.6/1	Devices	F	Approved	R?.?
REQ-FMV-15.7	FMV	REQ-FMV-15.7/1	Devices	F	Approved	R?.?
REQ-FMV-16	FMV	REQ-FMV-16/1	Devices	F	Approved	R?.?
REQ-FMV-16.1	FMV	REQ-FMV-16.1/1	Devices	F	Approved	R?.?
REQ-FMV-16.2	FMV	REQ-FMV-16.2/1	Devices	F	Approved	R?.?
REQ-FMV-16.3	FMV	REQ-FMV-16.3/1	Devices	F	Approved	R?.?
REQ-FMV-16.4	FMV	REQ-FMV-16.4/1	Devices	F	Approved	R?.?
REQ-FMV-16.5	FMV	REQ-FMV-16.5/1	Devices	F	Approved	R?.?
REQ-FMV-16.5.1	FMV	REQ-FMV-16.5/2	Devices	F	Approved	R?.?
REQ-FMV-17	FMV	REQ-FMV-17/1	Devices	F	Approved	R?.?
REQ-FMV-17.1	FMV	REQ-FMV-17.1/1	Devices	F	Approved	R?.?
REQ-FMV-17.2	FMV	REQ-FMV-17.2/1	Devices	F	Approved	R?.?
REQ-FMV-17.3	FMV	REQ-FMV-17.3/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FMV-17.4	FMV	REQ-FMV-17.4/1	Devices	F	Approved	R?.?
REQ-FMV-17.5	FMV	REQ-FMV-17.5/1	Devices	F	Approved	R?.?
REQ-FMV-18	FMV	REQ-FMV-18/1	Devices	F	Approved	R?.?
REQ-FMV-18.1	FMV	REQ-FMV-18.1/1	Devices	F	Approved	R?.?
REQ-FMV-18.2	FMV	REQ-FMV-18.2/1	Devices	F	Approved	R?.?
REQ-FMV-18.3	FMV	REQ-FMV-18.3/1	Devices	F	Approved	R?.?
REQ-FMV-18.4	FMV	REQ-FMV-18.4/1	Devices	F	Approved	R?.?
REQ-FMV-18.5	FMV	REQ-FMV-18.5/1	Devices	F	Approved	R?.?
REQ-FMV-18.6	FMV	REQ-FMV-18.6/1	Devices	F	Approved	R?.?
REQ-FMV-19	FMV	REQ-FMV-19/1	Devices	F	Approved	R?.?
REQ-FMV-20	FMV	REQ-FMV-20/1	Devices	F	Approved	R?.?
REQ-FMV-21	FMV	REQ-FMV-21/1	Devices	F	Approved	R?.?
REQ-FMV-21.1	FMV	REQ-FMV-21.1/1	Devices	F	Approved	R?.?
REQ-FMV-21.2	FMV	REQ-FMV-21.2/1	Devices	F	Approved	R?.?
REQ-FMV-21.3	FMV	REQ-FMV-21.3/1	Customer Management	F	Approved	R?.?
REQ-FMV-21.4	FMV	REQ-FMV-21.4/1	Devices	F	Approved	R?.?
REQ-FMV-21.5	FMV	REQ-FMV-21.5/1	Customer Management	F	Approved	R?.?
REQ-FMV-22	FMV	REQ-FMV-22/1	Devices	F	Approved	R?.?
REQ-FMV-22.1	FMV	REQ-FMV-22.1/1	Devices	F	Approved	R?.?
REQ-FMV-22.1.1	FMV	REQ-FMV-22.1/2	Devices	F	Approved	R?.?
REQ-FMV-22.2	FMV	REQ-FMV-22.2/1	Customer Management	F	Approved	R?.?
REQ-FMV-23	FMV	REQ-FMV-23/1	Devices	F	Approved	R?.?
REQ-FMV-23.1	FMV	REQ-FMV-23.1/1	Devices	F	Approved	R?.?
REQ-FMV-23.2	FMV	REQ-FMV-23.2/1	Devices	F	Approved	R?.?
REQ-FMV-23.3	FMV	REQ-FMV-23.3/1	Devices	F	Approved	R?.?
REQ-FMV-23.4	FMV	REQ-FMV-23.4/1	Devices	F	Approved	R?.?
REQ-FMV-23.5	FMV	REQ-FMV-23.5/1	Devices	F	Approved	R?.?
REQ-FMV-23.6	FMV	REQ-FMV-23.6/1	Devices	F	Approved	R?.?
REQ-FMV-23.7	FMV	REQ-FMV-23.7/1	Devices	F	Approved	R?.?
REQ-FMV-23.8	FMV	REQ-FMV-23.8/1	Devices	F	Approved	R?.?
REQ-FMV-23.9	FMV	REQ-FMV-23.9/1	Devices	F	Approved	R?.?
REQ-FMV-23.10	FMV	REQ-FMV-23.10/1	Devices	F	Approved	R?.?
REQ-FMV-23.11	FMV	REQ-FMV-23.11/1	Devices	F	Approved	R?.?
REQ-FMV-23.12	FMV	REQ-FMV-23.12/1	Customer Management	F	Approved	R?.?
REQ-FMV-24	FMV	REQ-FMV-24/1	Devices	F	Approved	R?.?
REQ-FMV-24.1	FMV	REQ-FMV-24.1/1	Devices	F	Approved	R?.?
REQ-FMV-24.2	FMV	REQ-FMV-24.2/1	Devices	F	Approved	R?.?
REQ-FMV-24.3	FMV	REQ-FMV-24.3/1	Devices	F	Approved	R?.?
REQ-FMV-24.4	FMV	REQ-FMV-24.4/1	Devices	F	Approved	R?.?
REQ-FMV-24.4.1	FMV	REQ-FMV-24.4/2	Devices	F	Approved	R?.?
REQ-FMV-24.5	FMV	REQ-FMV-24.5/1	Devices	F	Approved	R?.?
REQ-FMV-24.6	FMV	REQ-FMV-24.6/1	Devices	F	Approved	R?.?
REQ-FMV-24.7	FMV	REQ-FMV-24.7/1	Devices	F	Approved	R?.?
REQ-FMV-24.8	FMV	REQ-FMV-24.8/1	Devices	F	Approved	R?.?
REQ-FMV-25	FMV	REQ-FMV-25/1	Devices	F	Approved	R?.?
REQ-FMV-26	FMV	REQ-FMV-26/1	Devices	F	Approved	R?.?
REQ-FMV-27	FMV	REQ-FMV-27/1	Devices	F	Approved	R?.?
REQ-FMV-28	FMV	REQ-FMV-28/1	Devices	F	Approved	R?.?
REQ-FMV-29	FMV	REQ-FMV-29/1	Devices	F	Approved	R?.?
REQ-FMV-30	FMV	REQ-FMV-30/1	Devices	F	Approved	R?.?
REQ-FMV-30.1	FMV	REQ-FMV-30.1/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FMV-30.1.1	FMV	REQ-FMV-30.1/2	Devices	F	Approved	R?.?
REQ-FMV-30.2	FMV	REQ-FMV-30.2/1	Devices	F	Approved	R?.?
REQ-FMV-30.3	FMV	REQ-FMV-30.3/1	Devices	F	Approved	R?.?
REQ-FMV-30.4	FMV	REQ-FMV-30.4/1	Devices	F	Approved	R?.?
REQ-FMV-30.5	FMV	REQ-FMV-30.5/1	Devices	F	Approved	R?.?
REQ-FMV-31	FMV	REQ-FMV-31/1	Devices	F	Approved	R?.?
REQ-FMV-32	FMV	REQ-FMV-32/1	Devices	F	Approved	R?.?
REQ-FMV-32.1	FMV	REQ-FMV-32/2	Devices	F	Approved	R?.?
REQ-FMV-32.2	FMV	REQ-FMV-32/3	Devices	F	Approved	R?.?
REQ-FMV-32.3	FMV	REQ-FMV-32/4	Devices	F	Approved	R?.?
REQ-FMV-32.4	FMV	REQ-FMV-32.1/1	Devices	F	Approved	R?.?
REQ-FMV-32.4.1	FMV	REQ-FMV-32.1/2	Devices	F	Approved	R?.?
REQ-FMV-32.5	FMV	REQ-FMV-32.2/1	Devices	F	Approved	R?.?
REQ-FMV-32.6	FMV	REQ-FMV-32.3/1	Reporting	F	Approved	R?.?
REQ-FMV-33	FMV	REQ-FMV-33/1	Devices	F	Approved	R?.?
REQ-FMV-34	FMV	REQ-FMV-34/1	Devices	F	Approved	R?.?
REQ-FMV-34.1	FMV	REQ-FMV-34.1/1	Devices	F	Approved	R?.?
REQ-FMV-34.2	FMV	REQ-FMV-34.2/1	Devices	F	Approved	R?.?
REQ-FMV-34.2.1	FMV	REQ-FMV-34.2/2	Devices	F	Approved	R?.?
REQ-FMV-34.2.2	FMV	REQ-FMV-34.2.1/1	Devices	F	Approved	R?.?
REQ-FMV-34.2.3	FMV	REQ-FMV-34.2.2/1	Devices	F	Approved	R?.?
REQ-FMV-34.2.4	FMV	REQ-FMV-34.2.3/1	Devices	F	Approved	R?.?
REQ-FMV-34.2.5	FMV	REQ-FMV-34.2.3/2	Devices	F	Approved	R?.?
REQ-FMV-35	FMV	REQ-FMV-35/1	Devices	F	Approved	R?.?
REQ-FMV-35.1	FMV	REQ-FMV-35.1/1	Devices	F	Approved	R?.?
REQ-FMV-36	FMV	REQ-FMV-36/1	Devices	F	Approved	R?.?
REQ-FMV-37	FMV	REQ-FMV-37/1	Devices	F	Approved	R?.?
REQ-FMV-38	FMV	REQ-FMV-38/1	Devices	F	Approved	R?.?
REQ-FMV-39	FMV	REQ-FMV-39/1	Devices	F	Approved	R?.?
REQ-FMV-40	FMV	REQ-FMV-40/1	Devices	F	Approved	R?.?
REQ-FMV-41	FMV	REQ-FMV-41/1	Devices	F	Approved	R?.?
REQ-FMV-42	FMV	REQ-FMV-42/1	Devices	F	Approved	R?.?
REQ-FMV-43	FMV	REQ-FMV-43/1	Devices	F	Approved	R?.?
REQ-FMV-43.1	FMV	REQ-FMV-43/2	Devices	F	Approved	R?.?
REQ-FMV-43.2	FMV	REQ-FMV-43/3	Devices	F	Approved	R?.?
REQ-FMV-43.3	FMV	REQ-FMV-43/4	Devices	F	Approved	R?.?
REQ-FMV-44	FMV	REQ-FMV-44/1	Devices	F	Approved	R?.?
REQ-FMV-45	FMV	REQ-FMV-45/1	Devices	F	Approved	R?.?
REQ-FMV-46	FMV	REQ-FMV-46/1	Devices	F	Approved	R?.?
REQ-FMV-47	FMV	REQ-FMV-47/1	Devices	F	Approved	R?.?
REQ-FMV-48	FMV	REQ-FMV-48/1	Devices	F	Approved	R?.?
REQ-FMV-49	FMV	REQ-FMV-49/1	Devices	F	Approved	R?.?
REQ-FMV-50	FMV	REQ-FMV-50/1	Devices	F	Approved	R?.?
REQ-FMV-51	FMV	REQ-FMV-51/1	Devices	F	Approved	R?.?
REQ-FMV-51.1	FMV	REQ-FMV-51/2	Devices	F	Approved	R?.?
REQ-FMV-52	FMV	REQ-FMV-52/1	Devices	F	Approved	R?.?
REQ-FMV-52.1	FMV	REQ-FMV-52/2	Devices	F	Approved	R?.?
REQ-FMV-52.2	FMV	REQ-FMV-52/3	Devices	F	Approved	R?.?
REQ-FMV-52.3	FMV	REQ-FMV-52/4	Devices	F	Approved	R?.?
REQ-FMV-53	FMV	REQ-FMV-53/1	Devices	F	Approved	R?.?
REQ-FMV-54	FMV	REQ-FMV-54/1	Devices	F	Approved	R?.?
REQ-FMV-55	FMV	REQ-FMV-55/1	Devices	F	Approved	R?.?
REQ-FMV-57	FMV	REQ-FMV-57/1	Network	F	Approved	R?.?
REQ-FMV-57.1	FMV	REQ-FMV-57.1/1	Devices	F	Approved	R?.?
REQ-FMV-57.2	FMV	REQ-FMV-57.2/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FMV-58	FMV	REQ-FMV-58/1	Devices	F	Approved	R?.?
REQ-AVM-1	AVM	REQ-AVM-1/1	Devices	F	Approved	R?.?
REQ-AVM-2	AVM	REQ-AVM-2/1	Devices	F	Approved	R?.?
REQ-AVM-3	AVM	REQ-AVM-3/1	Devices	F	Approved	R?.?
REQ-AVM-4	AVM	REQ-AVM-4/1	Devices	F	Approved	R?.?
REQ-AVM-5	AVM	REQ-AVM-5/1	Devices	F	Approved	R?.?
REQ-AVM-6	AVM	REQ-AVM-6/1	Devices	F	Approved	R?.?
REQ-AVM-7	AVM	REQ-AVM-7/1	Devices	F	Approved	R?.?
REQ-AVM-7.1	AVM	REQ-AVM-7.1/1	Devices	F	Approved	R?.?
REQ-AVM-7.2	AVM	REQ-AVM-7.2/1	Devices	F	Approved	R?.?
REQ-AVM-8	AVM	REQ-AVM-8/1	Devices	F	Approved	R?.?
REQ-AVM-9	AVM	REQ-AVM-9/1	Devices	F	Approved	R?.?
REQ-AVM-10	AVM	REQ-AVM-10/1	Devices	F	Approved	R?.?
REQ-AVM-11	AVM	REQ-AVM-11/1	Devices	F	Approved	R?.?
REQ-AVM-12	AVM	REQ-AVM-12/1	Devices	F	Approved	R?.?
REQ-AVM-12.1	AVM	REQ-AVM-12/2	Devices	F	Approved	R?.?
REQ-AVM-13	AVM	REQ-AVM-13/1	Devices	F	Approved	R?.?
REQ-AVM-14	AVM	REQ-AVM-14/1	Devices	F	Approved	R?.?
REQ-AVM-15	AVM	REQ-AVM-15/1	Devices	F	Approved	R?.?
REQ-AVM-15.1	AVM	REQ-AVM-15.1/1	Devices	F	Approved	R?.?
REQ-AVM-15.1.1	AVM	REQ-AVM-15.1/2	Devices	F	Approved	R?.?
REQ-AVM-16	AVM	REQ-AVM-16/1	Devices	F	Approved	R?.?
REQ-AVM-17	AVM	REQ-AVM-17/1	Devices	F	Approved	R?.?
REQ-AVM-18	AVM	REQ-AVM-18/1	Devices	F	Approved	R?.?
REQ-AVM-19	AVM	REQ-AVM-19/1	Devices	F	Approved	R?.?
REQ-AVM-19.1	AVM	REQ-AVM-19/2	Devices	F	Approved	R?.?
REQ-AVM-19.2	AVM	REQ-AVM-19/3	Devices	F	Approved	R?.?
REQ-AVM-20	AVM	REQ-AVM-20/1	Fare Management	F	Approved	R?.?
REQ-AVM-21	AVM	REQ-AVM-21/1	Devices	F	Approved	R?.?
REQ-AVM-22	AVM	REQ-AVM-22/1	Reporting	F	Approved	R?.?
REQ-AVM-23	AVM	REQ-AVM-23/1	Devices	F	Approved	R?.?
REQ-AVM-24	AVM	REQ-AVM-24/1	Devices	F	Approved	R?.?
REQ-AVM-24.1	AVM	REQ-AVM-24.1/1	Devices	F	Approved	R?.?
REQ-AVM-24.2	AVM	REQ-AVM-24.2/1	Devices	F	Approved	R?.?
REQ-AVM-24.2.1	AVM	REQ-AVM-24.2.1/1	Devices	F	Approved	R?.?
REQ-AVM-24.2.2	AVM	REQ-AVM-24.2.2/1	Fare Management	F	Approved	R?.?
REQ-AVM-24.2.3	AVM	REQ-AVM-24.2.3/1	Devices	F	Approved	R?.?
REQ-AVM-25	AVM	REQ-AVM-25/1	Devices	F	Approved	R?.?
REQ-AVM-25.1	AVM	REQ-AVM-25.1/1	Devices	F	Approved	R?.?
REQ-AVM-26	AVM	REQ-AVM-26/1	Devices	F	Approved	R?.?
REQ-AVM-27	AVM	REQ-AVM-27/1	Devices	F	Approved	R?.?
REQ-AVM-28	AVM	REQ-AVM-28/1	Devices	F	Approved	R?.?
REQ-AVM-29	AVM	REQ-AVM-29/1	Asset Management	F	Approved	R?.?
REQ-AVM-30	AVM	REQ-AVM-30/1	Devices	F	Approved	R?.?
REQ-AVM-31	AVM	REQ-AVM-31/1	Devices	F	Approved	R?.?
REQ-AVM-32	AVM	REQ-AVM-32/1	Devices	F	Approved	R?.?
REQ-AVM-32.1	AVM	REQ-AVM-32/2	Devices	F	Approved	R?.?
REQ-AVM-33	AVM	REQ-AVM-33/1	Devices	F	Approved	R?.?
REQ-AVM-34	AVM	REQ-AVM-34/1	Devices	F	Approved	R?.?
REQ-AVM-35	AVM	REQ-AVM-35/1	Devices	F	Approved	R?.?
REQ-AVM-36	AVM	REQ-AVM-36/1	Devices	F	Approved	R?.?
REQ-AVM-37	AVM	REQ-AVM-37/1	Devices	F	Approved	R?.?
REQ-AVM-38	AVM	REQ-AVM-38/1	Devices	F	Approved	R?.?
REQ-AVM-39	AVM	REQ-AVM-39/1	Devices	F	Approved	R?.?
REQ-AVM-40	AVM	REQ-AVM-40/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-AVM-41	AVM	REQ-AVM-41/1	Devices	F	Approved	R?.?
REQ-AVM-42	AVM	REQ-AVM-42/1	Devices	F	Approved	R?.?
REQ-AVM-43	AVM	REQ-AVM-43/1	Network	F	Approved	R?.?
REQ-AVM-44	AVM	REQ-AVM-44/1	Network	F	Approved	R?.?
REQ-AVM-45	AVM	REQ-AVM-45/1	Network	F	Approved	R?.?
REQ-AVM-46	AVM	REQ-AVM-46/1	Network	F	Approved	R?.?
REQ-AVM-46.1	AVM	REQ-AVM-46/2	Network	F	Approved	R?.?
REQ-AVM-46.2	AVM	REQ-AVM-46.1/1	Network	F	Approved	R?.?
REQ-AVM-46.3	AVM	REQ-AVM-46.2/1	Network	F	Approved	R?.?
REQ-AVM-47	AVM	REQ-AVM-47/1	Devices	F	Approved	R?.?
REQ-OBS-1	OBS	REQ-OBS-1/1	Devices	F	Approved	R?.?
REQ-OBS-2	OBS	REQ-OBS-2/1	Devices	F	Approved	R?.?
REQ-OBS-3	OBS	REQ-OBS-3/1	Devices	F	Approved	R?.?
REQ-OBS-4	OBS	REQ-OBS-4/1	Devices	F	Approved	R?.?
REQ-OBS-5	OBS	REQ-OBS-5/1	Devices	F	Approved	R?.?
REQ-OBS-5.1	OBS	REQ-OBS-5/2	Devices	F	Approved	R?.?
REQ-OBS-6	OBS	REQ-OBS-6/1	Devices	F	Approved	R?.?
REQ-OBS-6.1	OBS	REQ-OBS-6/21	Devices	F	Approved	R?.?
REQ-OBS-7	OBS	REQ-OBS-7/1	Devices	F	Approved	R?.?
REQ-OBS-8	OBS	REQ-OBS-8/1	Devices	F	Approved	R?.?
REQ-OBS-8.1	OBS	REQ-OBS-8.1/1	Devices	F	Approved	R?.?
REQ-OBS-8.2	OBS	REQ-OBS-8.2/1	Devices	F	Approved	R?.?
REQ-OBS-9	OBS	REQ-OBS-9/1	Devices	F	Approved	R?.?
REQ-OBS-9.1	OBS	REQ-OBS-9.1/1	Devices	F	Approved	R?.?
REQ-OBS-9.2	OBS	REQ-OBS-9.2/1	Devices	F	Approved	R?.?
REQ-OBS-9.2.1	OBS	REQ-OBS-9.2/2	Devices	F	Approved	R?.?
REQ-OBS-9.3	OBS	REQ-OBS-9.3/1	Devices	F	Approved	R?.?
REQ-OBS-10	OBS	REQ-OBS-10/1	Devices	F	Approved	R?.?
REQ-OBS-10.1	OBS	REQ-OBS-10.1/1	Devices	F	Approved	R?.?
REQ-OBS-10.2	OBS	REQ-OBS-10.2/1	Devices	F	Approved	R?.?
REQ-OBS-11	OBS	REQ-OBS-11/1	Devices	F	Approved	R?.?
REQ-OBS-12	OBS	REQ-OBS-12/1	Devices	F	Approved	R?.?
REQ-OBS-12.1	OBS	REQ-OBS-12.1/1	Devices	F	Approved	R?.?
REQ-OBS-12.2	OBS	REQ-OBS-12.2/1	Devices	F	Approved	R?.?
REQ-OBS-12.3	OBS	REQ-OBS-12.3/1	Devices	F	Approved	R?.?
REQ-OBS-12.4	OBS	REQ-OBS-12.4/1	Devices	F	Approved	R?.?
REQ-OBS-12.5	OBS	REQ-OBS-12.5/1	Devices	F	Approved	R?.?
REQ-OBS-12.6	OBS	REQ-OBS-12.6/1	Devices	F	Approved	R?.?
REQ-OBS-12.7	OBS	REQ-OBS-12.7/1	Devices	F	Approved	R?.?
REQ-OBS-13	OBS	REQ-OBS-13/1	Devices	F	Approved	R?.?
REQ-OBS-13.1	OBS	REQ-OBS-13.1/1	Devices	F	Approved	R?.?
REQ-OBS-13.2	OBS	REQ-OBS-13.2/1	Devices	F	Approved	R?.?
REQ-OBS-13.3	OBS	REQ-OBS-13.3/1	Devices	F	Approved	R?.?
REQ-OBS-13.4	OBS	REQ-OBS-13.4/1	Devices	F	Approved	R?.?
REQ-OBS-13.5	OBS	REQ-OBS-13.5/1	Devices	F	Approved	R?.?
REQ-OBS-13.5.1	OBS	REQ-OBS-13.5/2	Devices	F	Approved	R?.?
REQ-OBS-14	OBS	REQ-OBS-14/1	Devices	F	Approved	R?.?
REQ-OBS-14.1	OBS	REQ-OBS-14.1/1	Devices	F	Approved	R?.?
REQ-OBS-14.2	OBS	REQ-OBS-14/2	Devices	F	Approved	R?.?
REQ-OBS-15	OBS	REQ-OBS-15/1	Devices	F	Approved	R?.?
REQ-OBS-15.1	OBS	REQ-OBS-15.1/1	Devices	F	Approved	R?.?
REQ-OBS-15.2	OBS	REQ-OBS-15.2/1	Devices	F	Approved	R?.?
REQ-OBS-15.3	OBS	REQ-OBS-15.3/1	Devices	F	Approved	R?.?
REQ-OBS-15.4	OBS	REQ-OBS-15.4/1	Devices	F	Approved	R?.?
REQ-OBS-15.5	OBS	REQ-OBS-15.5/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-OBS-15.5.1	OBS	REQ-OBS-15.5/2	Devices	F	Approved	R?.?
REQ-OBS-15.6	OBS	REQ-OBS-15.6/1	Devices	F	Approved	R?.?
REQ-OBS-16	OBS	REQ-OBS-16/1	Devices	F	Approved	R?.?
REQ-OBS-16.1	OBS	REQ-OBS-16.1/1	Fare Management	F	Approved	R?.?
REQ-OBS-17	OBS	REQ-OBS-17/1	Devices	F	Approved	R?.?
REQ-OBS-18	OBS	REQ-OBS-18/1	Devices	F	Approved	R?.?
REQ-OBS-18.1	OBS	REQ-OBS-18.1/1	Fare Management	F	Approved	R?.?
REQ-OBS-18.2	OBS	REQ-OBS-18.2/1	Devices	F	Approved	R?.?
REQ-OBS-18.2.1	OBS	REQ-OBS-18.2/2	Devices	F	Approved	R?.?
REQ-OBS-19	OBS	REQ-OBS-19/1	Fare Management	F	Approved	R?.?
REQ-OBS-19.1	OBS	REQ-OBS-19.1/1	Customer Management	F	Approved	R?.?
REQ-OBS-19.1.1	OBS	REQ-OBS-19.1/2	Customer Management	F	Approved	R?.?
REQ-OBS-19.2	OBS	REQ-OBS-19.2/1	Devices	F	Approved	R?.?
REQ-OBS-19.3	OBS	REQ-OBS-19.3/1	Fare Management	F	Approved	R?.?
REQ-OBS-19.4	OBS	REQ-OBS-19.4/1	Devices	F	Approved	R?.?
REQ-OBS-19.5	OBS	REQ-OBS-19.5/1	Devices	F	Approved	R?.?
REQ-OBS-19.6	OBS	REQ-OBS-19.6/1	Devices	F	Approved	R?.?
REQ-OBS-19.7	OBS	REQ-OBS-19.7/1	Devices	F	Approved	R?.?
REQ-OBS-19.8	OBS	REQ-OBS-19.8/1	Devices	F	Approved	R?.?
REQ-OBS-19.9	OBS	REQ-OBS-19.9/1	Devices	F	Approved	R?.?
REQ-OBS-19.10	OBS	REQ-OBS-19.10/1	Devices	F	Approved	R?.?
REQ-OBS-20	OBS	REQ-OBS-20/1	Devices	F	Approved	R?.?
REQ-OBS-20.1	OBS	REQ-OBS-20.1/1	Devices	F	Approved	R?.?
REQ-OBS-20.2	OBS	REQ-OBS-20.2/1	Devices	F	Approved	R?.?
REQ-OBS-20.3	OBS	REQ-OBS-20.3/1	Devices	F	Approved	R?.?
REQ-OBS-20.4	OBS	REQ-OBS-20.4/1	Devices	F	Approved	R?.?
REQ-OBS-20.5	OBS	REQ-OBS-20.5/1	Devices	F	Approved	R?.?
REQ-OBS-20.6	OBS	REQ-OBS-20.6/1	Devices	F	Approved	R?.?
REQ-OBS-20.7	OBS	REQ-OBS-20.7/1	Devices	F	Approved	R?.?
REQ-OBS-20.8	OBS	REQ-OBS-20.8/1	Devices	F	Approved	R?.?
REQ-OBS-21	OBS	REQ-OBS-21/1	Devices	F	Approved	R?.?
REQ-OBS-22	OBS	REQ-OBS-22/1	Devices	F	Approved	R?.?
REQ-OBS-23	OBS	REQ-OBS-23/1	Devices	F	Approved	R?.?
REQ-OBS-24	OBS	REQ-OBS-24/1	Devices	F	Approved	R?.?
REQ-OBS-25	OBS	REQ-OBS-25/1	Devices	F	Approved	R?.?
REQ-OBS-26	OBS	REQ-OBS-26/1	Card/Media Management	F	Approved	R?.?
REQ-OBS-27	OBS	REQ-OBS-27/1	Fare Management	F	Approved	R?.?
REQ-OBS-28	OBS	REQ-OBS-28/1	Devices	F	Approved	R?.?
REQ-OBS-29	OBS	REQ-OBS-29/1	Devices	F	Approved	R?.?
REQ-OBS-29.1	OBS	REQ-OBS-29/2	Devices	F	Approved	R?.?
REQ-OBS-29.2	OBS	REQ-OBS-29.1/1	Devices	F	Approved	R?.?
REQ-OBS-29.3	OBS	REQ-OBS-29.2/1	Devices	F	Approved	R?.?
REQ-OBS-29.3.1	OBS	REQ-OBS-29.2/2	Devices	F	Approved	R?.?
REQ-OBS-30	OBS	REQ-OBS-30/1	Devices	F	Approved	R?.?
REQ-OBS-31	OBS	REQ-OBS-31/1	Devices	F	Approved	R?.?
REQ-OBS-32	OBS	REQ-OBS-32/1	Devices	F	Approved	R?.?
REQ-OBS-33	OBS	REQ-OBS-33/1	Devices	F	Approved	R?.?
REQ-OBS-34	OBS	REQ-OBS-34/1	Devices	F	Approved	R?.?
REQ-OBS-34.1	OBS	REQ-OBS-34.1/1	Devices	F	Approved	R?.?
REQ-OBS-34.2	OBS	REQ-OBS-34.2/1	Network	F	Approved	R?.?
REQ-OBS-34.3	OBS	REQ-OBS-34.3/1	Network	F	Approved	R?.?
REQ-OBS-34.3.1	OBS	REQ-OBS-34.3/2	Network	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-OBS-34.4	OBS	REQ-OBS-34.4/1	Network	F	Approved	R?.?
REQ-OBS-35	OBS	REQ-OBS-35/1	Devices	F	Approved	R?.?
REQ-OBS-36	OBS	REQ-OBS-36/1	Devices	F	Approved	R?.?
REQ-OBS-37	OBS	REQ-OBS-37/1	Devices	F	Approved	R?.?
REQ-OBS-38	OBS	REQ-OBS-38/1	Devices	F	Approved	R?.?
REQ-OBS-39	OBS	REQ-OBS-39/1	Devices	F	Approved	R?.?
REQ-OBS-40	OBS	REQ-OBS-40/1	Devices	F	Approved	R?.?
REQ-OBS-41	OBS	REQ-OBS-41/1	Devices	F	Approved	R?.?
REQ-OBS-42	OBS	REQ-OBS-42/1	Devices	F	Approved	R?.?
REQ-OBS-42.1	OBS	REQ-OBS-42/2	Devices	F	Approved	R?.?
REQ-OBS-43	OBS	REQ-OBS-43/1	Devices	F	Approved	R?.?
REQ-OBS-44	OBS	REQ-OBS-44/1	Devices	F	Approved	R?.?
REQ-OBS-45	OBS	REQ-OBS-45/1	Devices	F	Approved	R?.?
REQ-OBS-46	OBS	REQ-OBS-46/1	Devices	F	Approved	R?.?
REQ-OBS-46.1	OBS	REQ-OBS-46/2	Devices	F	Approved	R?.?
REQ-OBS-47	OBS	REQ-OBS-47/1	Network	F	Approved	R?.?
REQ-OBS-47.1	OBS	REQ-OBS-47/2	Network	F	Approved	R?.?
REQ-OBS-47.2	OBS	REQ-OBS-47/3	Network	F	Approved	R?.?
REQ-OBS-47.3	OBS	REQ-OBS-47/4	Network	F	Approved	R?.?
REQ-OBS-47.4	OBS	REQ-OBS-47/5	Network	F	Approved	R?.?
REQ-OBS-48	OBS	REQ-OBS-48/1	Devices	F	Approved	R?.?
REQ-OBS-49	OBS	REQ-OBS-49/1	Devices	F	Approved	R?.?
REQ-OBS-49.1	OBS	REQ-OBS-49/2	Devices	F	Approved	R?.?
REQ-OBS-49.2	OBS	REQ-OBS-49/3	Devices	F	Approved	R?.?
REQ-OBS-49.3	OBS	REQ-OBS-49/4	Devices	F	Approved	R?.?
REQ-OBS-50	OBS	REQ-OBS-50/1	Devices	F	Approved	R?.?
REQ-OBS-51	OBS	REQ-OBS-51/1	Devices	F	Approved	R?.?
REQ-ONS-1	ONS	REQ-ONS-1/1	Devices	F	Approved	R?.?
REQ-ONS-2	ONS	REQ-ONS-2/1	Devices	F	Approved	R?.?
REQ-ONS-3	ONS	REQ-ONS-3/1	Devices	F	Approved	R?.?
REQ-ONS-4	ONS	REQ-ONS-4/1	Devices	F	Approved	R?.?
REQ-ONS-5	ONS	REQ-ONS-5/1	Devices	F	Approved	R?.?
REQ-ONS-5.1	ONS	REQ-ONS-5/2	Devices	F	Approved	R?.?
REQ-ONS-6	ONS	REQ-ONS-6/1	Devices	F	Approved	R?.?
REQ-ONS-6.1	ONS	REQ-ONS-6/2	Devices	F	Approved	R?.?
REQ-ONS-7	ONS	REQ-ONS-7/1	Devices	F	Approved	R?.?
REQ-ONS-8	ONS	REQ-ONS-8/1	Devices	F	Approved	R?.?
REQ-ONS-9	ONS	REQ-ONS-9/1	Devices	F	Approved	R?.?
REQ-ONS-10	ONS	REQ-ONS-10/1	Devices	F	Approved	R?.?
REQ-ONS-11	ONS	REQ-ONS-11/1	Devices	F	Approved	R?.?
REQ-ONS-12	ONS	REQ-ONS-12/1	Devices	F	Approved	R?.?
REQ-ONS-13	ONS	REQ-ONS-13/1	Devices	F	Approved	R?.?
REQ-ONS-14	ONS	REQ-ONS-14/1	Devices	F	Approved	R?.?
REQ-ONS-15	ONS	REQ-ONS-15/1	Devices	F	Approved	R?.?
REQ-ONS-16	ONS	REQ-ONS-16/1	Devices	F	Approved	R?.?
REQ-ONS-17	ONS	REQ-ONS-17/1	Devices	F	Approved	R?.?
REQ-ONS-18	ONS	REQ-ONS-18/1	Devices	F	Approved	R?.?
REQ-ONS-19	ONS	REQ-ONS-19/1	Devices	F	Approved	R?.?
REQ-ONS-20	ONS	REQ-ONS-20/1	Devices	F	Approved	R?.?
REQ-ONS-21	ONS	REQ-ONS-21/1	Devices	F	Approved	R?.?
REQ-ONS-21.1	ONS	REQ-ONS-21/2	Devices	F	Approved	R?.?
REQ-ONS-22	ONS	REQ-ONS-22/1	Devices	F	Approved	R?.?
REQ-ONS-23	ONS	REQ-ONS-23/1	Devices	F	Approved	R?.?
REQ-ONS-23.1	ONS	REQ-ONS-23/2	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-ONS-24	ONS	REQ-ONS-24/1	Devices	F	Approved	R?.?
REQ-ONS-24.1	ONS	REQ-ONS-24/2	Devices	F	Approved	R?.?
REQ-ONS-24.2	ONS	REQ-ONS-24/3	Devices	F	Approved	R?.?
REQ-ONS-24.3	ONS	REQ-ONS-24/4	Devices	F	Approved	R?.?
REQ-ONS-25	ONS	REQ-ONS-25/1	Devices	F	Approved	R?.?
REQ-ONS-26	ONS	REQ-ONS-26/1	Devices	F	Approved	R?.?
REQ-ONS-26.1	ONS	REQ-ONS-26/2	Devices	F	Approved	R?.?
REQ-ONS-26.2	ONS	REQ-ONS-26/3	Devices	F	Approved	R?.?
REQ-HHP-1	HHP	REQ-HHP-1/1	Devices	F	Approved	R?.?
REQ-HHP-2	HHP	REQ-HHP-2/1	Devices	F	Approved	R?.?
REQ-HHP-3	HHP	REQ-HHP-3/1	Devices	F	Approved	R?.?
REQ-HHP-3.1	HHP	REQ-HHP-3.1/1	Devices	F	Approved	R?.?
REQ-HHP-4	HHP	REQ-HHP-4/1	Devices	F	Approved	R?.?
REQ-HHP-4.1	HHP	REQ-HHP-4.1/1	Devices	F	Approved	R?.?
REQ-HHP-4.1.1	HHP	REQ-HHP-4.1/2	Devices	F	Approved	R?.?
REQ-HHP-4.2	HHP	REQ-HHP-4.2/1	Devices	F	Approved	R?.?
REQ-HHP-4.3	HHP	REQ-HHP-4.3/1	Devices	F	Approved	R?.?
REQ-HHP-4.4	HHP	REQ-HHP-4.4/1	Devices	F	Approved	R?.?
REQ-HHP-5	HHP	REQ-HHP-5/1	Devices	F	Approved	R?.?
REQ-HHP-6	HHP	REQ-HHP-6/1	Devices	F	Approved	R?.?
REQ-HHP-6.1	HHP	REQ-HHP-6.1/1	Devices	F	Approved	R?.?
REQ-HHP-6.2	HHP	REQ-HHP-6.2/1	Devices	F	Approved	R?.?
REQ-HHP-6.3	HHP	REQ-HHP-6.3/1	Devices	F	Approved	R?.?
REQ-HHP-6.4	HHP	REQ-HHP-6.4/1	Devices	F	Approved	R?.?
REQ-HHP-6.5	HHP	REQ-HHP-6.5/1	Devices	F	Approved	R?.?
REQ-HHP-6.5.1	HHP	REQ-HHP-6.5/2	Devices	F	Approved	R?.?
REQ-HHP-7	HHP	REQ-HHP-7/1	Devices	F	Approved	R?.?
REQ-HHP-7.1	HHP	REQ-HHP-7.1/1	Devices	F	Approved	R?.?
REQ-HHP-7.2	HHP	REQ-HHP-7.2/1	Devices	F	Approved	R?.?
REQ-HHP-7.3	HHP	REQ-HHP-7.3/1	Devices	F	Approved	R?.?
REQ-HHP-7.4	HHP	REQ-HHP-7.4/1	Devices	F	Approved	R?.?
REQ-HHP-8	HHP	REQ-HHP-8/1	Devices	F	Approved	R?.?
REQ-HHP-8.1	HHP	REQ-HHP-8.1/1	Devices	F	Approved	R?.?
REQ-HHP-8.1.1	HHP	REQ-HHP-8.1/2	Devices	F	Approved	R?.?
REQ-HHP-8.1.2	HHP	REQ-HHP-8.1/3	Devices	F	Approved	R?.?
REQ-HHP-8.2	HHP	REQ-HHP-8.2/1	Devices	F	Approved	R?.?
REQ-HHP-9	HHP	REQ-HHP-9/1	Devices	F	Approved	R?.?
REQ-HHP-10	HHP	REQ-HHP-10/1	Devices	F	Approved	R?.?
REQ-HHP-10.1	HHP	REQ-HHP-10/2	Devices	F	Approved	R?.?
REQ-HHP-11	HHP	REQ-HHP-11/1	Devices	F	Approved	R?.?
REQ-HHP-11.1	HHP	REQ-HHP-11/2	Devices	F	Approved	R?.?
REQ-HHP-11.2	HHP	REQ-HHP-11/3	Devices	F	Approved	R?.?
REQ-HHP-12	HHP	REQ-HHP-12/1	Devices	F	Approved	R?.?
REQ-HHP-13	HHP	REQ-HHP-13/1	Devices	F	Approved	R?.?
REQ-HHP-14	HHP	REQ-HHP-14/1	Devices	F	Approved	R?.?
REQ-HHP-15	HHP	REQ-HHP-15/1	Devices	F	Approved	R?.?
REQ-HHP-16	HHP	REQ-HHP-16/1	Devices	F	Approved	R?.?
REQ-HHP-17	HHP	REQ-HHP-17/1	Devices	F	Approved	R?.?
REQ-HHP-18	HHP	REQ-HHP-18/1	Devices	F	Approved	R?.?
REQ-HHP-19	HHP	REQ-HHP-19/1	Devices	F	Approved	R?.?
REQ-HHP-19.1	HHP	REQ-HHP-19.1/1	Devices	F	Approved	R?.?
REQ-HHP-20	HHP	REQ-HHP-20/1	Devices	F	Approved	R?.?
REQ-HHP-21	HHP	REQ-HHP-21/1	Devices	F	Approved	R?.?
REQ-HHP-21.1	HHP	REQ-HHP-21.1/1	Devices	F	Approved	R?.?
REQ-HHP-21.2	HHP	REQ-HHP-21.2/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-HHP-21.2.1	HHP	REQ-HHP-21.2.1/1	Financial Management	F	Approved	R?.?
REQ-HHP-21.2.2	HHP	REQ-HHP-21.2.2/1	Devices	F	Approved	R?.?
REQ-HHP-22	HHP	REQ-HHP-22/1	Devices	F	Approved	R?.?
REQ-HHP-22.1	HHP	REQ-HHP-22.1/1	Devices	F	Approved	R?.?
REQ-HHP-23	HHP	REQ-HHP-23/1	Devices	F	Approved	R?.?
REQ-HHP-23.1	HHP	REQ-HHP-23/2	Devices	F	Approved	R?.?
REQ-HHP-24	HHP	REQ-HHP-24/1	Devices	F	Approved	R?.?
REQ-HHP-25	HHP	REQ-HHP-25/1	Devices	F	Approved	R?.?
REQ-HHP-25.1	HHP	REQ-HHP-25/2	Devices	F	Approved	R?.?
REQ-HHP-26	HHP	REQ-HHP-26/1	Devices	F	Approved	R?.?
REQ-HHP-27	HHP	REQ-HHP-27/1	Devices	F	Approved	R?.?
REQ-LBD-1	LBD	REQ-LBD-1/1	Devices	F	Approved	R?.?
REQ-LBD-2	LBD	REQ-LBD-2/1	Other - Implementation	F	Approved	R?.?
REQ-LBD-3	LBD	REQ-LBD-3/1	Other - Implementation	F	Approved	R?.?
REQ-LBD-4	LBD	REQ-LBD-4/1	Devices	F	Approved	R?.?
REQ-LBD-5	LBD	REQ-LBD-5/1	Devices	F	Approved	R?.?
REQ-LBD-6	LBD	REQ-LBD-6/1	Devices	F	Approved	R?.?
REQ-LBD-7	LBD	REQ-LBD-7/1	Devices	F	Approved	R?.?
REQ-LBD-8	LBD	REQ-LBD-8/1	Devices	F	Approved	R?.?
REQ-LBD-9	LBD	REQ-LBD-9/1	Other - Implementation	F	Approved	R?.?
REQ-LBD-10	LBD	REQ-LBD-10/1	Other - Implementation	F	Approved	R?.?
REQ-DEQ-1	DEQ	REQ-DEQ-1/1	Card/Media Management	F	Approved	R?.?
REQ-DEQ-2	DEQ	REQ-DEQ-2/1	Devices	F	Approved	R?.?
REQ-DEQ-3	DEQ	REQ-DEQ-3/1	Devices	F	Approved	R?.?
REQ-DEQ-4	DEQ	REQ-DEQ-4/1	TBD	F	Approved	R?.?
REQ-DEQ-5	DEQ	REQ-DEQ-5/1	TBD	NF	Approved	R?.?
REQ-DEQ-6	DEQ	REQ-DEQ-6/1	Card/Media Management	F	Approved	R?.?
REQ-POS-1	POS	REQ-POS-1/1	Devices	F	Approved	R?.?
REQ-POS-2	POS	REQ-POS-2/1	Devices	F	Approved	R?.?
REQ-POS-3	POS	REQ-POS-3/1	Devices	F	Approved	R?.?
REQ-POS-4	POS	REQ-POS-4/1	Devices	F	Approved	R?.?
REQ-POS-4.1	POS	REQ-POS-4/2	Devices	F	Approved	R?.?
REQ-POS-4.2	POS	REQ-POS-4/3	Devices	F	Approved	R?.?
REQ-POS-4.3	POS	REQ-POS-4/4	Devices	F	Approved	R?.?
REQ-POS-4.4	POS	REQ-POS-4/5	Devices	F	Approved	R?.?
REQ-POS-4.5	POS	REQ-POS-4/6	Devices	F	Approved	R?.?
REQ-POS-4.6	POS	REQ-POS-4/7	Devices	F	Approved	R?.?
REQ-POS-4.7	POS	REQ-POS-4/8	Devices	F	Approved	R?.?
REQ-POS-5	POS	REQ-POS-5/1	Devices	F	Approved	R?.?
REQ-POS-6	POS	REQ-POS-6/1	Devices	F	Approved	R?.?
REQ-POS-7	POS	REQ-POS-7/1	Devices	F	Approved	R?.?
REQ-POS-8	POS	REQ-POS-8/1	Devices	F	Approved	R?.?
REQ-POS-8.1	POS	REQ-POS-8/2	Devices	F	Approved	R?.?
REQ-POS-9	POS	REQ-POS-9/1	Devices	F	Approved	R?.?
REQ-POS-10	POS	REQ-POS-10/1	Devices	F	Approved	R?.?
REQ-POS-11	POS	REQ-POS-11/1	Card/Media Management	F	Approved	R?.?
REQ-POS-12	POS	REQ-POS-12/1	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-IOF-2	IOF	REQ-IOF-2/1	Other - Implementation	NF	Approved	R?.?
REQ-IOF-3	IOF	REQ-IOF-3/1	Other - Implementation	NF	Approved	R?.?
REQ-IOF-4	IOF	REQ-IOF-4/1	Other - Implementation	NF	Approved	R?.?
REQ-IOF-5	IOF	REQ-IOF-5/1	Other - Implementation	F	Approved	R?.?
REQ-IOF-5.1	IOF	REQ-IOF-5/2	Other - Implementation	F	Approved	R?.?
REQ-IOF-5.2	IOF	REQ-IOF-5/3	Other - Implementation	F	Approved	R?.?
REQ-IOF-6	IOF	REQ-IOF-6/1	Other - Implementation	NF	Approved	R?.?
REQ-IOF-7	IOF	REQ-IOF-7/1	Other - Implementation	F	Approved	R?.?
REQ-IOF-7.1	IOF	REQ-IOF-7/2	Other - Implementation	F	Approved	R?.?
REQ-IOF-7.2	IOF	REQ-IOF-7/3	Other - Implementation	F	Approved	R?.?
REQ-IOF-7.3	IOF	REQ-IOF-7/4	Other - Implementation	F	Approved	R?.?
REQ-IOF-7.4	IOF	REQ-IOF-7/5	Other - Implementation	F	Approved	R?.?
REQ-IOF-7.5	IOF	REQ-IOF-7/6	Other - Implementation	F	Approved	R?.?
REQ-IOF-7.6	IOF	REQ-IOF-7/7	Other - Implementation	F	Approved	R?.?
REQ-IOF-7.7	IOF	REQ-IOF-7/8	Other - Implementation	F	Approved	R?.?
REQ-IOF-8	IOF	REQ-IOF-8/1	Other - Implementation	F	Approved	R?.?
REQ-IOF-9	IOF	REQ-IOF-9/1	Other - Implementation	NF	Approved	R?.?
REQ-IOF-10	IOF	REQ-IOF-10/1	Other - Implementation	NF	Approved	R?.?
REQ-IOF-11	IOF	REQ-IOF-11/1	Other - Implementation	NF	Approved	R?.?
REQ-IOF-12	IOF	REQ-IOF-12/1	Other - Implementation	F	Approved	R?.?
REQ-IOF-13	IOF	REQ-IOF-13/1	Other - Implementation	F	Approved	R?.?
REQ-IOF-14	IOF	REQ-IOF-14/1	Other - Implementation	NF	Approved	R?.?
REQ-IOF-15	IOF	REQ-IOF-15/1	Other - Implementation	F	Approved	R?.?
REQ-IOF-16	IOF	REQ-IOF-16/1	Other - Implementation	F	Approved	R?.?
REQ-IOF-29	IOF	REQ-IOF-29/1	Network	F	Approved	R?.?
REQ-IOF-30	IOF	REQ-IOF-30/1	Network	F	Approved	R?.?
REQ-IOF-31	IOF	REQ-IOF-31/1	Network	F	Approved	R?.?
REQ-IOF-25	IOF	REQ-IOF-25/1	Network	F	Approved	R?.?
REQ-IOF-26	IOF	REQ-IOF-26/1	Network	F	Approved	R?.?
REQ-IOF-32	IOF	REQ-IOF-32/1	Network	F	Approved	R?.?
REQ-IOF-17	IOF	REQ-IOF-17/1	Other - Implementation	F	Approved	R?.?

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REQ-IOF-18	IOF	REQ-IOF-18/1	Other - Implementation	F	Approved	R?.?
REQ-IOF-19	IOF	REQ-IOF-19/1	Other - Implementation	F	Approved	R?.?
REQ-IOF-20	IOF	REQ-IOF-20/1	Other - Implementation	F	Approved	R?.?
REQ-IOF-21	IOF	REQ-IOF-21/1	Other - Implementation	NF	Approved	R?.?
REQ-IOF-24	IOF	REQ-IOF-24/1	Other - Implementation	F	Approved	R?.?
REQ-EOE-1	EOE	REQ-EOE-1/1	Devices	F	Approved	R?.?
REQ-EOE-1.1	EOE	REQ-EOE-1/2	Devices	F	Approved	R?.?
REQ-EOE-1.2	EOE	REQ-EOE-1/3	Devices	F	Approved	R?.?
REQ-FRP-1	FRP	REQ-FRP-1/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-2	FRP	REQ-FRP-2/1	Fare Management	F	Approved	R?.?
REQ-FRP-3	FRP	REQ-FRP-3/1	Fare Management	F	Approved	R?.?
REQ-FRP-4	FRP	REQ-FRP-4/1	Fare Management	F	Approved	R?.?
REQ-FRP-5	FRP	REQ-FRP-5/1	Fare Management	F	Approved	R?.?
REQ-FRP-6	FRP	REQ-FRP-6/1	Fare Management	F	Approved	R?.?
REQ-FRP-7	FRP	REQ-FRP-7/1	Fare Management	F	Approved	R?.?
REQ-FRP-8	FRP	REQ-FRP-8/1	Fare Management	F	Approved	R?.?
REQ-FRP-9	FRP	REQ-FRP-9/1	Fare Management	F	Approved	R?.?
REQ-FRP-9.1	FRP	REQ-FRP-9/2	Fare Management	F	Approved	R?.?
REQ-FRP-10	FRP	REQ-FRP-10/1	Fare Management	F	Approved	R?.?
REQ-FRP-11	FRP	REQ-FRP-11/1	Fare Management	F	Approved	R?.?
REQ-FRP-12	FRP	REQ-FRP-12/1	Fare Management	F	Approved	R?.?
REQ-FRP-13	FRP	REQ-FRP-13/1	Fare Management	F	Approved	R?.?
REQ-FRP-14	FRP	REQ-FRP-14/1	Fare Management	F	Approved	R?.?
REQ-FRP-15	FRP	REQ-FRP-15/1	Fare Management	F	Approved	R?.?
REQ-FRP-16	FRP	REQ-FRP-16/1	Fare Management	F	Approved	R?.?
REQ-FRP-16.1	FRP	REQ-FRP-16/2	Fare Management	F	Approved	R?.?
REQ-FRP-16.1.1	FRP	REQ-FRP-16/3	Fare Management	F	Approved	R?.?
REQ-FRP-16.1.2	FRP	REQ-FRP-16/4	Fare Management	F	Approved	R?.?
REQ-FRP-16.1.3	FRP	REQ-FRP-16/5	Fare Management	F	Approved	R?.?
REQ-FRP-17	FRP	REQ-FRP-17/1	Fare Management	F	Approved	R?.?
REQ-FRP-18	FRP	REQ-FRP-18/1	Fare Management	F	Approved	R?.?
REQ-FRP-19	FRP	REQ-FRP-19/1	Fare Management	F	Approved	R?.?
REQ-FRP-20	FRP	REQ-FRP-20/1	Fare Management	F	Approved	R?.?
REQ-FRP-21	FRP	REQ-FRP-21/1	Fare Management	F	Approved	R?.?
REQ-FRP-22	FRP	REQ-FRP-22/1	Fare Management	F	Approved	R?.?
REQ-FRP-23	FRP	REQ-FRP-23/1	Fare Management	F	Approved	R?.?
REQ-FRP-24	FRP	REQ-FRP-24/1	Fare Management	F	Approved	R?.?
REQ-FRP-25	FRP	REQ-FRP-25/1	Fare Management	F	Approved	R?.?
REQ-FRP-26	FRP	REQ-FRP-26/1	Fare Management	F	Approved	R?.?
REQ-FRP-27	FRP	REQ-FRP-27/1	Fare Management	F	Approved	R?.?
REQ-FRP-27.1	FRP	REQ-FRP-27/2	Fare Management	F	Approved	R?.?
REQ-FRP-27.2	FRP	REQ-FRP-27/3	Fare Management	F	Approved	R?.?
REQ-FRP-27.3	FRP	REQ-FRP-27/4	Fare Management	F	Approved	R?.?
REQ-FRP-27.4	FRP	REQ-FRP-27/5	Fare Management	F	Approved	R?.?
REQ-FRP-28	FRP	REQ-FRP-28/1	Fare Management	F	Approved	R?.?
REQ-FRP-28.1	FRP	REQ-FRP-28/2	Fare Management	F	Approved	R?.?
REQ-FRP-28.2	FRP	REQ-FRP-28/3	Fare Management	F	Approved	R?.?
REQ-FRP-28.3	FRP	REQ-FRP-28/4	Fare Management	F	Approved	R?.?
REQ-FRP-28.4	FRP	REQ-FRP-28/5	Fare Management	F	Approved	R?.?

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REQ-FRP-29	FRP	REQ-FRP-29/1	Fare Management	F	Approved	R?.?
REQ-FRP-30	FRP	REQ-FRP-30/1	Fare Management	F	Approved	R?.?
REQ-FRP-31	FRP	REQ-FRP-31/1	Customer Management	F	Approved	R?.?
REQ-FRP-32	FRP	REQ-FRP-32/1	Fare Management	F	Approved	R?.?
REQ-FRP-33	FRP	REQ-FRP-33/1	Fare Management	F	Approved	R?.?
REQ-FRP-33.1	FRP	REQ-FRP-33/2	Fare Management	F	Approved	R?.?
REQ-FRP-34	FRP	REQ-FRP-34/1	Fare Management	F	Approved	R?.?
REQ-FRP-35	FRP	REQ-FRP-35/1	Devices	F	Approved	R?.?
REQ-FRP-36	FRP	REQ-FRP-36/1	Devices	F	Approved	R?.?
REQ-FRP-37	FRP	REQ-FRP-37/1	Fare Management	F	Approved	R?.?
REQ-FRP-37.1	FRP	REQ-FRP-37/2	Fare Management	F	Approved	R?.?
REQ-FRP-37.2	FRP	REQ-FRP-37/3	Fare Management	F	Approved	R?.?
REQ-FRP-37.3	FRP	REQ-FRP-37/4	Fare Management	F	Approved	R?.?
REQ-FRP-37.4	FRP	REQ-FRP-37/5	Fare Management	F	Approved	R?.?
REQ-FRP-38	FRP	REQ-FRP-38/1	Fare Management	F	Approved	R?.?
REQ-FRP-38.1	FRP	REQ-FRP-38/2	Fare Management	F	Approved	R?.?
REQ-FRP-38.2	FRP	REQ-FRP-38/3	Fare Management	F	Approved	R?.?
REQ-FRP-38.3	FRP	REQ-FRP-38/4	Fare Management	F	Approved	R?.?
REQ-FRP-38.4	FRP	REQ-FRP-38/5	Fare Management	F	Approved	R?.?
REQ-FRP-38.5	FRP	REQ-FRP-38/6	Fare Management	F	Approved	R?.?
REQ-FRP-39	FRP	REQ-FRP-39/1	Reporting	F	Approved	R?.?
REQ-FRP-40	FRP	REQ-FRP-40/1	Data Management	F	Approved	R?.?
REQ-FRP-41	FRP	REQ-FRP-41/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-42	FRP	REQ-FRP-42/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-42.1	FRP	REQ-FRP-42/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-42.2	FRP	REQ-FRP-42/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-42.3	FRP	REQ-FRP-42/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-42.4	FRP	REQ-FRP-42/5	Card/Media Management	F	Approved	R?.?
REQ-FRP-43	FRP	REQ-FRP-43/1	Devices	F	Approved	R?.?
REQ-FRP-44	FRP	REQ-FRP-44/1	Devices	F	Approved	R?.?
REQ-FRP-45	FRP	REQ-FRP-45/1	Financial Management	F	Approved	R?.?
REQ-FRP-46	FRP	REQ-FRP-46/1	Data Management	F	Approved	R?.?
REQ-FRP-47	FRP	REQ-FRP-47/1	Data Management	F	Approved	R?.?
REQ-FRP-48	FRP	REQ-FRP-48/1	Channels	F	Approved	R?.?
REQ-FRP-49	FRP	REQ-FRP-49/1	Channels	F	Approved	R?.?
REQ-FRP-49.1	FRP	REQ-FRP-49/2	Channels	F	Approved	R?.?
REQ-FRP-50	FRP	REQ-FRP-50/1	Fare Management	F	Approved	R?.?
REQ-FRP-51	FRP	REQ-FRP-51/1	Fare Management	F	Approved	R?.?
REQ-FRP-51.1	FRP	REQ-FRP-51/2	Fare Management	F	Approved	R?.?
REQ-FRP-51.2	FRP	REQ-FRP-51/3	Fare Management	F	Approved	R?.?
REQ-FRP-51.3	FRP	REQ-FRP-51/4	Fare Management	F	Approved	R?.?
REQ-FRP-52	FRP	REQ-FRP-52/1	Fare Management	F	Approved	R?.?
REQ-FRP-53	FRP	REQ-FRP-53/1	Fare Management	F	Approved	R?.?
REQ-FRP-54	FRP	REQ-FRP-54/1	Fare Management	F	Approved	R?.?
REQ-FRP-55	FRP	REQ-FRP-55/1	Fare Management	F	Approved	R?.?
REQ-FRP-56	FRP	REQ-FRP-56/1	Fare Management	F	Approved	R?.?
REQ-FRP-57	FRP	REQ-FRP-57/1	Fare Management	F	Approved	R?.?
REQ-FRP-58	FRP	REQ-FRP-58/1	Fare Management	F	Approved	R?.?

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REQ-FRP-58.1	FRP	REQ-FRP-58/2	Fare Management	F	Approved	R?.?
REQ-FRP-58.2	FRP	REQ-FRP-58/3	Fare Management	F	Approved	R?.?
REQ-FRP-58.3	FRP	REQ-FRP-58/4	Fare Management	F	Approved	R?.?
REQ-FRP-58.4	FRP	REQ-FRP-58/5	Fare Management	F	Approved	R?.?
REQ-FRP-59	FRP	REQ-FRP-59/1	Fare Management	F	Approved	R?.?
REQ-FRP-60	FRP	REQ-FRP-60/1	Fare Management	F	Approved	R?.?
REQ-FRP-61	FRP	REQ-FRP-61/1	Fare Management	F	Approved	R?.?
REQ-FRP-62	FRP	REQ-FRP-62/1	Fare Management	F	Approved	R?.?
REQ-FRP-63	FRP	REQ-FRP-63/1	Fare Management	F	Approved	R?.?
REQ-FRP-64	FRP	REQ-FRP-64/1	Fare Management	F	Approved	R?.?
REQ-FRP-65	FRP	REQ-FRP-65/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-65.1	FRP	REQ-FRP-65/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-65.2	FRP	REQ-FRP-65/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-66	FRP	REQ-FRP-66/1	Customer Management	F	Approved	R?.?
REQ-FRP-66.1	FRP	REQ-FRP-66/2	Customer Management	F	Approved	R?.?
REQ-FRP-67	FRP	REQ-FRP-67/1	Customer Management	F	Approved	R?.?
REQ-FRP-67.1	FRP	REQ-FRP-67/2	Customer Management	F	Approved	R?.?
REQ-FRP-68	FRP	REQ-FRP-68/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-69	FRP	REQ-FRP-69/1	Customer Management	F	Approved	R?.?
REQ-FRP-70	FRP	REQ-FRP-70/1	Customer Management	F	Approved	R?.?
REQ-FRP-71	FRP	REQ-FRP-71/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-72	FRP	REQ-FRP-72/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-72.1	FRP	REQ-FRP-72/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-72.2	FRP	REQ-FRP-72/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-72.3	FRP	REQ-FRP-72/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-72.4	FRP	REQ-FRP-72/5	Card/Media Management	F	Approved	R?.?
REQ-FRP-72.5	FRP	REQ-FRP-72/6	Card/Media Management	F	Approved	R?.?
REQ-FRP-73	FRP	REQ-FRP-73/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-74	FRP	REQ-FRP-74/1	Customer Management	F	Approved	R?.?
REQ-FRP-74.1	FRP	REQ-FRP-74/2	Customer Management	F	Approved	R?.?
REQ-FRP-74.2	FRP	REQ-FRP-74/3	Customer Management	F	Approved	R?.?
REQ-FRP-74.3	FRP	REQ-FRP-74/4	Customer Management	F	Approved	R?.?
REQ-FRP-74.4	FRP	REQ-FRP-74/5	Customer Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FRP-75	FRP	REQ-FRP-75/1	Customer Management	F	Approved	R?.?
REQ-FRP-75.1	FRP	REQ-FRP-75/2	Customer Management	F	Approved	R?.?
REQ-FRP-76	FRP	REQ-FRP-76/1	Customer Management	F	Approved	R?.?
REQ-FRP-77	FRP	REQ-FRP-77/1	Fare Management	F	Approved	R?.?
REQ-FRP-78	FRP	REQ-FRP-78/1	Fare Management	F	Approved	R?.?
REQ-FRP-79	FRP	REQ-FRP-79/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-80	FRP	REQ-FRP-80/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-81	FRP	REQ-FRP-81/1	Customer Management	F	Approved	R?.?
REQ-FRP-82	FRP	REQ-FRP-82/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-83	FRP	REQ-FRP-83/1	Fare Management	F	Approved	R?.?
REQ-FRP-84	FRP	REQ-FRP-84/1	Fare Management	F	Approved	R?.?
REQ-FRP-85	FRP	REQ-FRP-85/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-86	FRP	REQ-FRP-86/1	Customer Management	F	Approved	R?.?
REQ-FRP-87	FRP	REQ-FRP-87/1	Customer Management	F	Approved	R?.?
REQ-FRP-88	FRP	REQ-FRP-88/1	Fare Management	F	Approved	R?.?
REQ-FRP-89	FRP	REQ-FRP-89/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-90	FRP	REQ-FRP-90/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-91	FRP	REQ-FRP-91/1	Customer Management	F	Approved	R?.?
REQ-FRP-92	FRP	REQ-FRP-92/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-93	FRP	REQ-FRP-93/1	Fare Management	F	Approved	R?.?
REQ-FRP-94	FRP	REQ-FRP-94/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-95	FRP	REQ-FRP-95/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-96	FRP	REQ-FRP-96/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-97	FRP	REQ-FRP-97/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-98	FRP	REQ-FRP-98/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-98.1	FRP	REQ-FRP-98/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-98.2	FRP	REQ-FRP-98/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-98.3	FRP	REQ-FRP-98/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-98.4	FRP	REQ-FRP-98/5	Card/Media Management	F	Approved	R?.?
REQ-FRP-99	FRP	REQ-FRP-99/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-100	FRP	REQ-FRP-100/1	Customer Management	F	Approved	R?.?

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REQ-FRP-101	FRP	REQ-FRP-101/1	Fare Management	F	Approved	R?.?
REQ-FRP-102	FRP	REQ-FRP-102/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-102.1	FRP	REQ-FRP-102/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-102.2	FRP	REQ-FRP-102/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-103	FRP	REQ-FRP-103/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-104	FRP	REQ-FRP-104/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-105	FRP	REQ-FRP-105/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-106	FRP	REQ-FRP-106/1	Customer Management	F	Approved	R?.?
REQ-FRP-107	FRP	REQ-FRP-107/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-108	FRP	REQ-FRP-108/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-109	FRP	REQ-FRP-109/1	Customer Management	F	Approved	R?.?
REQ-FRP-110	FRP	REQ-FRP-110/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-110.1	FRP	REQ-FRP-110/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-110.2	FRP	REQ-FRP-110/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-110.3	FRP	REQ-FRP-110/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-110.4	FRP	REQ-FRP-110/5	Card/Media Management	F	Approved	R?.?
REQ-FRP-111	FRP	REQ-FRP-111/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-112	FRP	REQ-FRP-112/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-113	FRP	REQ-FRP-113/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-113.1	FRP	REQ-FRP-113/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-114	FRP	REQ-FRP-114/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-115	FRP	REQ-FRP-115/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-116	FRP	REQ-FRP-116/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-117	FRP	REQ-FRP-117/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-118	FRP	REQ-FRP-118/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-119	FRP	REQ-FRP-119/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-120	FRP	REQ-FRP-120/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-121	FRP	REQ-FRP-121/1	Card/Media Management	F	Approved	R?.?

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REQ-FRP-122	FRP	REQ-FRP-122/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-123	FRP	REQ-FRP-123/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-123.1	FRP	REQ-FRP-123/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-123.2	FRP	REQ-FRP-123/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-123.3	FRP	REQ-FRP-123/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-123.4	FRP	REQ-FRP-123/5	Card/Media Management	F	Approved	R?.?
REQ-FRP-124	FRP	REQ-FRP-124/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-125	FRP	REQ-FRP-125/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-126	FRP	REQ-FRP-126/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-127	FRP	REQ-FRP-127/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-128	FRP	REQ-FRP-128/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-129	FRP	REQ-FRP-129/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-130	FRP	REQ-FRP-130/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-131	FRP	REQ-FRP-131/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-132	FRP	REQ-FRP-132/1	Order Management	F	Approved	R?.?
REQ-FRP-133	FRP	REQ-FRP-133/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-134	FRP	REQ-FRP-134/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-135	FRP	REQ-FRP-135/1	Fare Management	F	Approved	R?.?
REQ-FRP-136	FRP	REQ-FRP-136/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-137	FRP	REQ-FRP-137/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-138	FRP	REQ-FRP-138/1	Reporting	F	Approved	R?.?
REQ-FRP-139	FRP	REQ-FRP-139/1	Customer Management	F	Approved	R?.?
REQ-FRP-140	FRP	REQ-FRP-140/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-141	FRP	REQ-FRP-141/1	Fare Management	F	Approved	R?.?
REQ-FRP-142	FRP	REQ-FRP-142/1	Fare Management	F	Approved	R?.?
REQ-FRP-142.1	FRP	REQ-FRP-142/2	Fare Management	F	Approved	R?.?
REQ-FRP-142.2	FRP	REQ-FRP-142/3	Fare Management	F	Approved	R?.?
REQ-FRP-143	FRP	REQ-FRP-143/1	Fare Management	F	Approved	R?.?
REQ-FRP-144	FRP	REQ-FRP-144/1	Fare Management	F	Approved	R?.?
REQ-FRP-145	FRP	REQ-FRP-145/1	Fare Management	F	Approved	R?.?
REQ-FRP-146	FRP	REQ-FRP-146/1	Fare Management	F	Approved	R?.?
REQ-FRP-146.1	FRP	REQ-FRP-146/2	Fare Management	F	Approved	R?.?
REQ-FRP-147	FRP	REQ-FRP-147/1	Fare Management	F	Approved	R?.?
REQ-FRP-148	FRP	REQ-FRP-148/1	Card/Media Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FRP-149	FRP	REQ-FRP-149/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-150	FRP	REQ-FRP-150/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-151	FRP	REQ-FRP-151/1	Customer Management	F	Approved	R?.?
REQ-FRP-152	FRP	REQ-FRP-152/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-153	FRP	REQ-FRP-153/1	Reporting	F	Approved	R?.?
REQ-FRP-154	FRP	REQ-FRP-154/1	Customer Management	F	Approved	R?.?
REQ-FRP-155	FRP	REQ-FRP-155/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-156	FRP	REQ-FRP-156/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-156.1	FRP	REQ-FRP-156/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-156.2	FRP	REQ-FRP-156/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-156.3	FRP	REQ-FRP-156/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-156.4	FRP	REQ-FRP-156/5	Card/Media Management	F	Approved	R?.?
REQ-FRP-156.5	FRP	REQ-FRP-156/6	Card/Media Management	F	Approved	R?.?
REQ-FRP-156.6	FRP	REQ-FRP-156/7	Card/Media Management	F	Approved	R?.?
REQ-FRP-156.7	FRP	REQ-FRP-156/8	Card/Media Management	F	Approved	R?.?
REQ-FRP-156.8	FRP	REQ-FRP-156/9	Card/Media Management	F	Approved	R?.?
REQ-FRP-156.9	FRP	REQ-FRP-156/10	Card/Media Management	F	Approved	R?.?
REQ-FRP-157	FRP	REQ-FRP-157/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-158	FRP	REQ-FRP-158/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-159	FRP	REQ-FRP-159/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-160	FRP	REQ-FRP-160/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-161	FRP	REQ-FRP-161/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-162	FRP	REQ-FRP-162/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-163	FRP	REQ-FRP-163/1	Security	F	Approved	R?.?
REQ-FRP-163.1	FRP	REQ-FRP-163/2	Security	F	Approved	R?.?
REQ-FRP-163.2	FRP	REQ-FRP-163/3	Security	F	Approved	R?.?
REQ-FRP-163.3	FRP	REQ-FRP-163/4	Security	F	Approved	R?.?
REQ-FRP-164	FRP	REQ-FRP-164/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-165	FRP	REQ-FRP-165/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-166	FRP	REQ-FRP-166/1	Card/Media Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FRP-167	FRP	REQ-FRP-167/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-167.1	FRP	REQ-FRP-167/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-167.2	FRP	REQ-FRP-167/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-167.3	FRP	REQ-FRP-167/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-167.4	FRP	REQ-FRP-167/5	Card/Media Management	F	Approved	R?.?
REQ-FRP-167.5	FRP	REQ-FRP-167/6	Card/Media Management	F	Approved	R?.?
REQ-FRP-168	FRP	REQ-FRP-168/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-168.1	FRP	REQ-FRP-168/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-168.2	FRP	REQ-FRP-168/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-169	FRP	REQ-FRP-169/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-169.1	FRP	REQ-FRP-169/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-169.2	FRP	REQ-FRP-169/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-169.3	FRP	REQ-FRP-169/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-170	FRP	REQ-FRP-170/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-171	FRP	REQ-FRP-171/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-172	FRP	REQ-FRP-172/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-173	FRP	REQ-FRP-173/1	Fare Management	F	Approved	R?.?
REQ-FRP-174	FRP	REQ-FRP-174/1	Fare Management	F	Approved	R?.?
REQ-FRP-174.1	FRP	REQ-FRP-174/2	Fare Management	F	Approved	R?.?
REQ-FRP-174.2	FRP	REQ-FRP-174/3	Fare Management	F	Approved	R?.?
REQ-FRP-174.3	FRP	REQ-FRP-174/4	Fare Management	F	Approved	R?.?
REQ-FRP-175	FRP	REQ-FRP-175/1	Fare Management	F	Approved	R?.?
REQ-FRP-176	FRP	REQ-FRP-176/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-176.1	FRP	REQ-FRP-176/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-176.2	FRP	REQ-FRP-176/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-176.3	FRP	REQ-FRP-176/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-177	FRP	REQ-FRP-177/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-177.1	FRP	REQ-FRP-177/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-177.2	FRP	REQ-FRP-177/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-178	FRP	REQ-FRP-178/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-178.1	FRP	REQ-FRP-178/2	Card/Media Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FRP-178.2	FRP	REQ-FRP-178/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-178.3	FRP	REQ-FRP-178/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-178.4	FRP	REQ-FRP-178/5	Card/Media Management	F	Approved	R?.?
REQ-FRP-178.5	FRP	REQ-FRP-178/6	Card/Media Management	F	Approved	R?.?
REQ-FRP-178.6	FRP	REQ-FRP-178/7	Card/Media Management	F	Approved	R?.?
REQ-FRP-178.7	FRP	REQ-FRP-178/8	Card/Media Management	F	Approved	R?.?
REQ-FRP-179	FRP	REQ-FRP-179/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-180	FRP	REQ-FRP-180/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-180.1	FRP	REQ-FRP-180/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-180.2	FRP	REQ-FRP-180/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-180.3	FRP	REQ-FRP-180/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-181	FRP	REQ-FRP-181/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-182	FRP	REQ-FRP-182/1	Reporting	F	Approved	R?.?
REQ-FRP-183	FRP	REQ-FRP-183/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-183.1	FRP	REQ-FRP-183/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-183.2	FRP	REQ-FRP-183.1/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-184	FRP	REQ-FRP-184/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-184.1	FRP	REQ-FRP-184/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-184.2	FRP	REQ-FRP-184/3	Card/Media Management	F	Approved	R?.?
REQ-FRP-184.3	FRP	REQ-FRP-184/4	Card/Media Management	F	Approved	R?.?
REQ-FRP-185	FRP	REQ-FRP-185/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-185.1	FRP	REQ-FRP-185/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-186	FRP	REQ-FRP-186/1	Fare Management	F	Approved	R?.?
REQ-FRP-187	FRP	REQ-FRP-187/1	Fare Management	F	Approved	R?.?
REQ-FRP-188	FRP	REQ-FRP-188/1	Fare Management	F	Approved	R?.?
REQ-FRP-189	FRP	REQ-FRP-189/1	Fare Management	F	Approved	R?.?
REQ-FRP-190	FRP	REQ-FRP-190/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-191	FRP	REQ-FRP-191/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-192	FRP	REQ-FRP-192/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-193	FRP	REQ-FRP-193/1	Reporting	F	Approved	R?.?
REQ-FRP-194	FRP	REQ-FRP-194/1	Fare Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FRP-195	FRP	REQ-FRP-195/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-196	FRP	REQ-FRP-196/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-197	FRP	REQ-FRP-197/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-198	FRP	REQ-FRP-198/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-199	FRP	REQ-FRP-199/1	Reporting	F	Approved	R?.?
REQ-FRP-200	FRP	REQ-FRP-200/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-201	FRP	REQ-FRP-201/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-202	FRP	REQ-FRP-202/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-203	FRP	REQ-FRP-203/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-204	FRP	REQ-FRP-204/1	Fare Management	F	Approved	R?.?
REQ-FRP-205	FRP	REQ-FRP-205/1	Fare Management	F	Approved	R?.?
REQ-FRP-206	FRP	REQ-FRP-206/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-207	FRP	REQ-FRP-207/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-208	FRP	REQ-FRP-208/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-209	FRP	REQ-FRP-209/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-210	FRP	REQ-FRP-210/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-211	FRP	REQ-FRP-211/1	Fare Management	F	Approved	R?.?
REQ-FRP-212	FRP	REQ-FRP-212/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-212.1	FRP	REQ-FRP-212.1/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-213	FRP	REQ-FRP-213/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-214	FRP	REQ-FRP-214/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-215	FRP	REQ-FRP-215/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-215.1	FRP	REQ-FRP-215.1/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-216	FRP	REQ-FRP-216/1	Reporting	F	Approved	R?.?
REQ-FRP-217	FRP	REQ-FRP-217/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-218	FRP	REQ-FRP-218/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-219	FRP	REQ-FRP-219/1	Fare Management	F	Approved	R?.?
REQ-FRP-219.1	FRP	REQ-FRP-219/2	Fare Management	F	Approved	R?.?
REQ-FRP-219.2	FRP	REQ-FRP-219/3	Fare Management	F	Approved	R?.?
REQ-FRP-220	FRP	REQ-FRP-220/1	Fare Management	F	Approved	R?.?
REQ-FRP-220.1	FRP	REQ-FRP-220/2	Fare Management	F	Approved	R?.?
REQ-FRP-220.2	FRP	REQ-FRP-220/3	Fare Management	F	Approved	R?.?
REQ-FRP-220.3	FRP	REQ-FRP-220/4	Fare Management	F	Approved	R?.?
REQ-FRP-220.4	FRP	REQ-FRP-220/5	Fare Management	F	Approved	R?.?
REQ-FRP-220.5	FRP	REQ-FRP-220/6	Fare Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FRP-220.6	FRP	REQ-FRP-220/7	Fare Management	F	Approved	R?.?
REQ-FRP-221	FRP	REQ-FRP-221/1	Fare Management	F	Approved	R?.?
REQ-FRP-222	FRP	REQ-FRP-222/1	Fare Management	F	Approved	R?.?
REQ-FRP-222.1	FRP	REQ-FRP-222/2	Fare Management	F	Approved	R?.?
REQ-FRP-222.2	FRP	REQ-FRP-222/3	Fare Management	F	Approved	R?.?
REQ-FRP-222.3	FRP	REQ-FRP-222/4	Fare Management	F	Approved	R?.?
REQ-FRP-222.4	FRP	REQ-FRP-222/5	Fare Management	F	Approved	R?.?
REQ-FRP-223	FRP	REQ-FRP-223/1	Fare Management	F	Approved	R?.?
REQ-FRP-224	FRP	REQ-FRP-224/1	Fare Management	F	Approved	R?.?
REQ-FRP-225	FRP	REQ-FRP-225/1	Fare Management	F	Approved	R?.?
REQ-FRP-226	FRP	REQ-FRP-226/1	Fare Management	F	Approved	R?.?
REQ-FRP-227	FRP	REQ-FRP-227/1	Fare Management	F	Approved	R?.?
REQ-FRP-227.1	FRP	REQ-FRP-227/2	Fare Management	F	Approved	R?.?
REQ-FRP-227.2	FRP	REQ-FRP-227/3	Fare Management	F	Approved	R?.?
REQ-FRP-227.3	FRP	REQ-FRP-227/4	Fare Management	F	Approved	R?.?
REQ-FRP-227.4	FRP	REQ-FRP-227/5	Fare Management	F	Approved	R?.?
REQ-FRP-228	FRP	REQ-FRP-228/1	Fare Management	F	Approved	R?.?
REQ-FRP-228.1	FRP	REQ-FRP-228/2	Fare Management	F	Approved	R?.?
REQ-FRP-228.2	FRP	REQ-FRP-228/3	Fare Management	F	Approved	R?.?
REQ-FRP-228.3	FRP	REQ-FRP-228/4	Fare Management	F	Approved	R?.?
REQ-FRP-228.4	FRP	REQ-FRP-228/5	Fare Management	F	Approved	R?.?
REQ-FRP-228.5	FRP	REQ-FRP-228/6	Fare Management	F	Approved	R?.?
REQ-FRP-228.6	FRP	REQ-FRP-228/7	Fare Management	F	Approved	R?.?
REQ-FRP-228.7	FRP	REQ-FRP-228/8	Fare Management	F	Approved	R?.?
REQ-FRP-228.8	FRP	REQ-FRP-228/9	Fare Management	F	Approved	R?.?
REQ-FRP-229	FRP	REQ-FRP-229/1	Fare Management	F	Approved	R?.?
REQ-FRP-230	FRP	REQ-FRP-230/1	Fare Management	F	Approved	R?.?
REQ-FRP-230.1	FRP	REQ-FRP-230/2	Fare Management	F	Approved	R?.?
REQ-FRP-230.2	FRP	REQ-FRP-230/3	Fare Management	F	Approved	R?.?
REQ-FRP-230.3	FRP	REQ-FRP-230/4	Fare Management	F	Approved	R?.?
REQ-FRP-231	FRP	REQ-FRP-231/1	Reporting	F	Approved	R?.?
REQ-FRP-232	FRP	REQ-FRP-232/1	Reporting	F	Approved	R?.?
REQ-FRP-233	FRP	REQ-FRP-233/1	Fare Management	F	Approved	R?.?
REQ-FRP-233.1	FRP	REQ-FRP-233/2	Fare Management	F	Approved	R?.?
REQ-FRP-233.2	FRP	REQ-FRP-233/3	Fare Management	F	Approved	R?.?
REQ-FRP-234	FRP	REQ-FRP-234/1	Fare Management	F	Approved	R?.?
REQ-FRP-234.1	FRP	REQ-FRP-234/2	Fare Management	F	Approved	R?.?
REQ-FRP-234.2	FRP	REQ-FRP-234/3	Fare Management	F	Approved	R?.?
REQ-FRP-234.3	FRP	REQ-FRP-234/4	Fare Management	F	Approved	R?.?
REQ-FRP-234.4	FRP	REQ-FRP-234/5	Fare Management	F	Approved	R?.?
REQ-FRP-234.5	FRP	REQ-FRP-234/6	Fare Management	F	Approved	R?.?
REQ-FRP-235	FRP	REQ-FRP-235/1	Fare Management	F	Approved	R?.?
REQ-FRP-236	FRP	REQ-FRP-236/1	Fare Management	F	Approved	R?.?
REQ-FRP-237	FRP	REQ-FRP-237/1	Fare Management	F	Approved	R?.?
REQ-FRP-237.1	FRP	REQ-FRP-237/2	Fare Management	F	Approved	R?.?
REQ-FRP-237.2	FRP	REQ-FRP-237/3	Fare Management	F	Approved	R?.?
REQ-FRP-237.3	FRP	REQ-FRP-237/4	Fare Management	F	Approved	R?.?
REQ-FRP-237.4	FRP	REQ-FRP-237/5	Fare Management	F	Approved	R?.?
REQ-FRP-238	FRP	REQ-FRP-238/1	Fare Management	F	Approved	R?.?
REQ-FRP-238.1	FRP	REQ-FRP-238/2	Fare Management	F	Approved	R?.?
REQ-FRP-238.2	FRP	REQ-FRP-238/3	Fare Management	F	Approved	R?.?
REQ-FRP-238.3	FRP	REQ-FRP-238/4	Fare Management	F	Approved	R?.?
REQ-FRP-238.4	FRP	REQ-FRP-238/5	Fare Management	F	Approved	R?.?
REQ-FRP-238.5	FRP	REQ-FRP-238/6	Fare Management	F	Approved	R?.?
REQ-FRP-239	FRP	REQ-FRP-239/1	Fare Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FRP-239.1	FRP	REQ-FRP-239/2	Fare Management	F	Approved	R?.?
REQ-FRP-239.2	FRP	REQ-FRP-239/3	Fare Management	F	Approved	R?.?
REQ-FRP-239.3	FRP	REQ-FRP-239/4	Fare Management	F	Approved	R?.?
REQ-FRP-239.4	FRP	REQ-FRP-239/5	Fare Management	F	Approved	R?.?
REQ-FRP-240	FRP	REQ-FRP-240/1	Fare Management	F	Approved	R?.?
REQ-FRP-241	FRP	REQ-FRP-241/1	Fare Management	F	Approved	R?.?
REQ-FRP-241.1	FRP	REQ-FRP-241/2	Fare Management	F	Approved	R?.?
REQ-FRP-241.2	FRP	REQ-FRP-241/3	Fare Management	F	Approved	R?.?
REQ-FRP-242	FRP	REQ-FRP-242/1	Fare Management	F	Approved	R?.?
REQ-FRP-242.1	FRP	REQ-FRP-242/2	Fare Management	F	Approved	R?.?
REQ-FRP-242.2	FRP	REQ-FRP-242/3	Fare Management	F	Approved	R?.?
REQ-FRP-243	FRP	REQ-FRP-243/1	Fare Management	F	Approved	R?.?
REQ-FRP-243.1	FRP	REQ-FRP-243/2	Fare Management	F	Approved	R?.?
REQ-FRP-243.2	FRP	REQ-FRP-243/3	Fare Management	F	Approved	R?.?
REQ-FRP-243.3	FRP	REQ-FRP-243/4	Fare Management	F	Approved	R?.?
REQ-FRP-243.4	FRP	REQ-FRP-243/5	Fare Management	F	Approved	R?.?
REQ-FRP-243.5	FRP	REQ-FRP-243/6	Fare Management	F	Approved	R?.?
REQ-FRP-244	FRP	REQ-FRP-244/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-245	FRP	REQ-FRP-245/1	Security	F	Approved	R?.?
REQ-FRP-246	FRP	REQ-FRP-246/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-247	FRP	REQ-FRP-247/1	Fare Management	F	Approved	R?.?
REQ-FRP-247.1	FRP	REQ-FRP-247/2	Fare Management	F	Approved	R?.?
REQ-FRP-247.2	FRP	REQ-FRP-247/3	Fare Management	F	Approved	R?.?
REQ-FRP-247.3	FRP	REQ-FRP-247/4	Fare Management	F	Approved	R?.?
REQ-FRP-247.4	FRP	REQ-FRP-247/5	Fare Management	F	Approved	R?.?
REQ-FRP-247.5	FRP	REQ-FRP-247/6	Fare Management	F	Approved	R?.?
REQ-FRP-248	FRP	REQ-FRP-248/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-249	FRP	REQ-FRP-249/1	Fare Management	F	Approved	R?.?
REQ-FRP-250	FRP	REQ-FRP-250/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-251	FRP	REQ-FRP-251/1	Card/Media Management	F	Approved	R?.?
REQ-FRP-251.1	FRP	REQ-FRP-251/2	Card/Media Management	F	Approved	R?.?
REQ-FRP-252	FRP	REQ-FRP-252/1	Fare Management	F	Approved	R?.?
REQ-FRP-252.1	FRP	REQ-FRP-252/2	Fare Management	F	Approved	R?.?
REQ-FRP-252.2	FRP	REQ-FRP-252/3	Fare Management	F	Approved	R?.?
REQ-FRP-252.3	FRP	REQ-FRP-252/4	Fare Management	F	Approved	R?.?
REQ-FRP-253	FRP	REQ-FRP-253/1	Fare Management	F	Approved	R?.?
REQ-FRP-253.1	FRP	REQ-FRP-253/2	Fare Management	F	Approved	R?.?
REQ-FRP-253.2	FRP	REQ-FRP-253/3	Fare Management	F	Approved	R?.?
REQ-FRP-253.3	FRP	REQ-FRP-253/4	Fare Management	F	Approved	R?.?
REQ-FRP-254	FRP	REQ-FRP-254/1	Fare Management	F	Approved	R?.?
REQ-FRP-255	FRP	REQ-FRP-255/1	Fare Management	F	Approved	R?.?
REQ-FRP-256	FRP	REQ-FRP-256/1	Fare Management	F	Approved	R?.?
REQ-FRP-257	FRP	REQ-FRP-257/1	Fare Management	F	Approved	R?.?
REQ-FRP-258	FRP	REQ-FRP-258/1	Fare Management	F	Approved	R?.?
REQ-FRP-258.1	FRP	REQ-FRP-258/2	Fare Management	F	Approved	R?.?
REQ-FRP-259	FRP	REQ-FRP-259/1	Fare Management	F	Approved	R?.?
REQ-FRP-260	FRP	REQ-FRP-260/1	Fare Management	F	Approved	R?.?
REQ-FRP-260.1	FRP	REQ-FRP-260/2	Fare Management	F	Approved	R?.?
REQ-FRP-261	FRP	REQ-FRP-261/1	Fare Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FRP-262	FRP	REQ-FRP-262/1	Fare Management	F	Approved	R?.?
REQ-FRP-262.1	FRP	REQ-FRP-262/2	Fare Management	F	Approved	R?.?
REQ-FRP-262.2	FRP	REQ-FRP-262/3	Fare Management	F	Approved	R?.?
REQ-FRP-263	FRP	REQ-FRP-263/1	Fare Management	F	Approved	R?.?
REQ-FRP-263.1	FRP	REQ-FRP-263/2	Fare Management	F	Approved	R?.?
REQ-FRP-264	FRP	REQ-FRP-264/1	Fare Management	F	Approved	R?.?
REQ-FRP-265	FRP	REQ-FRP-265/1	Fare Management	F	Approved	R?.?
REQ-FRP-266	FRP	REQ-FRP-266/1	Fare Management	F	Approved	R?.?
REQ-FRP-267	FRP	REQ-FRP-267/1	Fare Management	F	Approved	R?.?
REQ-FRP-268	FRP	REQ-FRP-268/1	Fare Management	F	Approved	R?.?
REQ-FRP-269	FRP	REQ-FRP-269/1	Fare Management	F	Approved	R?.?
REQ-FRP-270	FRP	REQ-FRP-270/1	Fare Management	F	Approved	R?.?
REQ-FRP-271	FRP	REQ-FRP-271/1	Fare Management	F	Approved	R?.?
REQ-FRP-271.1	FRP	REQ-FRP-271/2	Fare Management	F	Approved	R?.?
REQ-CSC-1	CSC	REQ-CSC-1/1	Customer Management	F	Approved	R?.?
REQ-CSC-2	CSC	REQ-CSC-2/1	Other Operations	F	Approved	R?.?
REQ-CSC-3	CSC	REQ-CSC-3/1	Customer Management	F	Approved	R?.?
REQ-CSC-3.1	CSC	REQ-CSC-3/1	Customer Management	F	Approved	R?.?
REQ-CSC-3.1.1	CSC	REQ-CSC-3/2	Customer Management	F	Approved	R?.?
REQ-CSC-3.1.11	CSC	REQ-CSC-3/3	Customer Management	F	Approved	R?.?
REQ-CSC-3.1.2	CSC	REQ-CSC-3/4	Customer Management	F	Approved	R?.?
REQ-CSC-3.1.3	CSC	REQ-CSC-3/5	Customer Management	F	Approved	R?.?
REQ-CSC-3.1.4	CSC	REQ-CSC-3/6	Customer Management	F	Approved	R?.?
REQ-CSC-3.1.5	CSC	REQ-CSC-3/7	Customer Management	F	Approved	R?.?
REQ-CSC-3.1.6	CSC	REQ-CSC-3/8	Customer Management	F	Approved	R?.?
REQ-CSC-3.1.7	CSC	REQ-CSC-3/9	Customer Management	F	Approved	R?.?
REQ-CSC-3.1.8	CSC	REQ-CSC-3/10	Customer Management	F	Approved	R?.?
REQ-CSC-3.1.9	CSC	REQ-CSC-3/11	Customer Management	F	Approved	R?.?
REQ-CSC-3.1.10	CSC	REQ-CSC-3/12	Customer Management	F	Approved	R?.?
REQ-CSC-4	CSC	REQ-CSC-4/1	Other - Operations	NF	Approved	R?.?
REQ-CSC-5	CSC	REQ-CSC-5/1	Devices	F	Approved	R?.?
REQ-CSC-6	CSC	REQ-CSC-6/1	Devices	F	Approved	R?.?
REQ-CSC-7	CSC	REQ-CSC-7/1	Reporting	F	Approved	R?.?
REQ-CSC-7.1	CSC	REQ-CSC-7/2	Reporting	F	Approved	R?.?
REQ-CSC-7.2	CSC	REQ-CSC-7/3	Reporting	F	Approved	R?.?
REQ-CSC-7.3	CSC	REQ-CSC-7/4	Reporting	F	Approved	R?.?
REQ-CSC-8	CSC	REQ-CSC-8/1	Devices	F	Approved	R?.?
REQ-CSC-8.1	CSC	REQ-CSC-8/2	Devices	F	Approved	R?.?
REQ-CSC-9	CSC	REQ-CSC-9/1	Devices	F	Approved	R?.?
REQ-CSC-10	CSC	REQ-CSC-10/1	Other - Training	F	Approved	R?.?
REQ-CSC-11	CSC	REQ-CSC-11/1	Devices	F	Approved	R?.?
REQ-CSC-11.1	CSC	REQ-CSC-11/2	Devices	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-CSC-12	CSC	REQ-CSC-12/1	Other - Testing	F	Approved	R?.?
REQ-CSC-13	CSC	REQ-CSC-13/1	Other - Training	F	Approved	R?.?
REQ-CSC-14	CSC	REQ-CSC-14/1	Customer Management	F	Approved	R?.?
REQ-CSC-15	CSC	REQ-CSC-15/1	Asset Management	F	Approved	R?.?
REQ-CSC-16	CSC	REQ-CSC-16/1	Card/Media Management	F	Approved	R?.?
REQ-CSC-17	CSC	REQ-CSC-17/1	Customer Management	F	Approved	R?.?
REQ-CSC-18	CSC	REQ-CSC-18/1	Other - Operations	F	Approved	R?.?
REQ-CSC-19	CSC	REQ-CSC-19/1	Other - Operations	F	Approved	R?.?
REQ-CSC-20	CSC	REQ-CSC-20/1	Other - Training	F	Approved	R?.?
REQ-CSC-21	CSC	REQ-CSC-21/1	Other - Training	NF	Approved	R?.?
REQ-CSC-24	CSC	REQ-CSC-24/1	Other - Training	F	Approved	R?.?
REQ-CSC-25	CSC	REQ-CSC-25/1	Other - Training	F	Approved	R?.?
REQ-CAC-1	CAC	REQ-CAC-1/1	Fare Management	F	Approved	R?.?
REQ-CAC-2	CAC	REQ-CAC-2/1	Fare Management	F	Approved	R?.?
REQ-CAC-3	CAC	REQ-CAC-3/1	Customer Management	F	Approved	R?.?
REQ-CAC-4	CAC	REQ-CAC-4/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-4.1	CAC	REQ-CAC-4/2	Card/Media Management	F	Approved	R?.?
REQ-CAC-7	CAC	REQ-CAC-7/1	Fare Management	F	Approved	R?.?
REQ-CAC-8	CAC	REQ-CAC-8/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-8.1	CAC	REQ-CAC-8/2	Card/Media Management	F	Approved	R?.?
REQ-CAC-8.2	CAC	REQ-CAC-8/3	Card/Media Management	F	Approved	R?.?
REQ-CAC-9	CAC	REQ-CAC-9/1	Fare Management	F	Approved	R?.?
REQ-CAC-9.1	CAC	REQ-CAC-9/2	Fare Management	F	Approved	R?.?
REQ-CAC-10	CAC	REQ-CAC-10/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-11	CAC	REQ-CAC-11/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-11.1	CAC	REQ-CAC-11/2	Card/Media Management	F	Approved	R?.?
REQ-CAC-12	CAC	REQ-CAC-12/1	Customer Management	F	Approved	R?.?
REQ-CAC-13	CAC	REQ-CAC-13/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-13.1	CAC	REQ-CAC-13/2	Card/Media Management	F	Approved	R?.?
REQ-CAC-13.2	CAC	REQ-CAC-13/3	Card/Media Management	F	Approved	R?.?
REQ-CAC-14	CAC	REQ-CAC-14/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-14.1	CAC	REQ-CAC-14/2	Card/Media Management	F	Approved	R?.?
REQ-CAC-14.2	CAC	REQ-CAC-14/3	Card/Media Management	F	Approved	R?.?
REQ-CAC-14.3	CAC	REQ-CAC-14/4	Card/Media Management	F	Approved	R?.?
REQ-CAC-14.4	CAC	REQ-CAC-14/5	Card/Media Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-CAC-14.5	CAC	REQ-CAC-14/6	Card/Media Management	F	Approved	R?.?
REQ-CAC-15	CAC	REQ-CAC-15/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-15.1	CAC	REQ-CAC-15/2	Card/Media Management	F	Approved	R?.?
REQ-CAC-16	CAC	REQ-CAC-16/1	Customer Management	F	Approved	R?.?
REQ-CAC-17	CAC	REQ-CAC-17/1	Fare Management	F	Approved	R?.?
REQ-CAC-18	CAC	REQ-CAC-18/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-19	CAC	REQ-CAC-19/1	Devices	F	Approved	R?.?
REQ-CAC-20	CAC	REQ-CAC-20/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-21	CAC	REQ-CAC-21/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-22	CAC	REQ-CAC-22/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-22.1	CAC	REQ-CAC-22/2	Card/Media Management	F	Approved	R?.?
REQ-CAC-23	CAC	REQ-CAC-23/1	Customer Management	F	Approved	R?.?
REQ-CAC-23.1	CAC	REQ-CAC-23/2	Customer Management	F	Approved	R?.?
REQ-CAC-24	CAC	REQ-CAC-24/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-24.1	CAC	REQ-CAC-24/2	Card/Media Management	F	Approved	R?.?
REQ-CAC-24.2	CAC	REQ-CAC-24/3	Card/Media Management	F	Approved	R?.?
REQ-CAC-25	CAC	REQ-CAC-25/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-25.1	CAC	REQ-CAC-25/2	Card/Media Management	F	Approved	R?.?
REQ-CAC-25.2	CAC	REQ-CAC-25/3	Card/Media Management	F	Approved	R?.?
REQ-CAC-25.3	CAC	REQ-CAC-25/4	Card/Media Management	F	Approved	R?.?
REQ-CAC-25.4	CAC	REQ-CAC-25/5	Card/Media Management	F	Approved	R?.?
REQ-CAC-25.5	CAC	REQ-CAC-25/6	Card/Media Management	F	Approved	R?.?
REQ-CAC-26	CAC	REQ-CAC-26/1	Card/Media Management	F	Approved	R?.?
REQ-CAC-26.1	CAC	REQ-CAC-26/2	Card/Media Management	F	Approved	R?.?
REQ-TTL-1	TTL	REQ-TTL-1/1	Other - Testing	NF	Approved	R?.?
REQ-TTL-2	TTL	REQ-TTL-2/1	Other - Testing	NF	Approved	R?.?
REQ-TTL-3	TTL	REQ-TTL-3/1	Other - Testing	NF	Approved	R?.?
REQ-TTL-4	TTL	REQ-TTL-4/1	Other - Testing	NF	Approved	R?.?
REQ-TTL-5	TTL	REQ-TTL-5/1	Other - Testing	NF	Approved	R?.?
REQ-TTL-6	TTL	REQ-TTL-6/1	Other - Testing	NF	Approved	R?.?
REQ-TTL-7	TTL	REQ-TTL-7/1	Other - Testing	NF	Approved	R?.?
REQ-TTL-8	TTL	REQ-TTL-8/1	Other - Testing	NF	Approved	R?.?
REQ-TTL-9	TTL	REQ-TTL-9/1	Other - Testing	NF	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-TTL-11	TTL	REQ-TTL-11/1	Card/Media Management	F	Approved	R?.?
REQ-TTL-12	TTL	REQ-TTL-12/1	Other - Testing	NF	Approved	R?.?
REQ-TTL-13	TTL	REQ-TTL-13/1	Other - Testing	NF	Approved	R?.?
REQ-TTL-14	TTL	REQ-TTL-14/1	Other - Testing	NF	Approved	
REQ-CBD-1	CBD	REQ-CBD-1/1	Fare Management	F	Approved	R?.?
REQ-CBD-2	CBD	REQ-CBD-2/1	Fare Management	F	Approved	R?.?
REQ-CBD-3	CBD	REQ-CBD-3/1	Devices	F	Approved	R?.?
REQ-CBD-4	CBD	REQ-CBD-4/1	Devices	F	Approved	R?.?
REQ-CBD-5	CBD	REQ-CBD-5/1	Fare Management	F	Approved	R?.?
REQ-CBD-6	CBD	REQ-CBD-6/1	Devices	F	Approved	R?.?
REQ-CBD-7	CBD	REQ-CBD-7/1	Fare Management	F	Approved	R?.?
REQ-CBD-8	CBD	REQ-CBD-8/1	Other - Training	F	Approved	R?.?
REQ-CBD-9	CBD	REQ-CBD-9/1	Other - Deployment	F	Approved	R?.?
REQ-CBD-10	CBD	REQ-CBD-10/1	Customer Management	F	Approved	R?.?
REQ-CBD-11	CBD	REQ-CBD-11/1	Customer Management	F	Approved	R?.?
REQ-CBD-12	CBD	REQ-CBD-12/1	Financial Management	F	Approved	R?.?
REQ-CBD-13	CBD	REQ-CBD-13/1	Reporting	F	Approved	R?.?
REQ-CBD-14	CBD	REQ-CBD-14/1	Reporting	F	Approved	R?.?
REQ-CBD-15	CBD	REQ-CBD-15/1	Fare Management	F	Approved	R?.?
REQ-CBD-16	CBD	REQ-CBD-16/1	Fare Management	F	Approved	R?.?
REQ-CBD-17	CBD	REQ-CBD-17/1	Fare Management	F	Approved	R?.?
REQ-CBD-18	CBD	REQ-CBD-18/1	Fare Management	F	Approved	R?.?
REQ-CBD-19	CBD	REQ-CBD-19/1	Devices	F	Approved	R?.?
REQ-CBD-20	CBD	REQ-CBD-20/1	Customer Management	F	Approved	R?.?
REQ-CBD-21	CBD	REQ-CBD-21/1	Fare Management	F	Approved	R?.?
REQ-CBD-22	CBD	REQ-CBD-22/1	Reporting	F	Approved	R?.?
REQ-CBD-23	CBD	REQ-CBD-23/1	Devices	F	Approved	R?.?
REQ-CBD-24	CBD	REQ-CBD-24/1	Card/Media Management	F	Approved	R?.?
REQ-CBD-41	CBD	REQ-CBD-41/1	Fare Management	F	Approved	R?.?
REQ-CBD-25	CBD	REQ-CBD-25/1	N/A	F	Approved	R?.?
REQ-CBD-26	CBD	REQ-CBD-26/1	Card/Media Management	F	Approved	R?.?
REQ-CBD-27	CBD	REQ-CBD-27/1	Card/Media Management	F	Approved	R?.?
REQ-CBD-28	CBD	REQ-CBD-28/1	Fare Management	F	Approved	R?.?
REQ-CBD-29	CBD	REQ-CBD-29/1	Fare Management	F	Approved	R?.?
REQ-CBD-30	CBD	REQ-CBD-30/1	Card/Media Management	F	Approved	R?.?
REQ-CBD-31	CBD	REQ-CBD-31/1	Fare Management	F	Approved	R?.?
REQ-CBD-32	CBD	REQ-CBD-32/1	Fare Management	F	Approved	R?.?
REQ-CBD-33	CBD	REQ-CBD-33/1	Card/Media Management	F	Approved	R?.?
REQ-CBD-34	CBD	REQ-CBD-34/1	N/A	F	Approved	R?.?
REQ-CBD-35	CBD	REQ-CBD-35/1	Card/Media Management	F	Approved	R?.?
REQ-CBD-36	CBD	REQ-CBD-36/1	Card/Media Management	F	Approved	R?.?
REQ-CBD-37	CBD	REQ-CBD-37/1	Fare Management	F	Approved	R?.?
REQ-CBD-38	CBD	REQ-CBD-38/1	Card/Media Management	F	Approved	R?.?
REQ-CBD-39	CBD	REQ-CBD-39/1	Fare Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-CBD-40	CBD	REQ-CBD-40/1	Fare Management	F	Approved	R?.?
REQ-PRK-1	PRK	REQ-PRK-1/1	Fare Management	F	Approved	R?.?
REQ-PRK-1.1	PRK	REQ-PRK-1/2	Fare Management	F	Approved	R?.?
REQ-PRK-1.2	PRK	REQ-PRK-1/3	Fare Management	F	Approved	R?.?
REQ-PRK-1.3	PRK	REQ-PRK-1/4	Fare Management	F	Approved	R?.?
REQ-PRK-1.4	PRK	REQ-PRK-1/5	Fare Management	F	Approved	R?.?
REQ-PRK-1.5	PRK	REQ-PRK-1/6	Fare Management	F	Approved	R?.?
REQ-PRK-1.6	PRK	REQ-PRK-1/7	Fare Management	F	Approved	R?.?
REQ-PRK-2	PRK	REQ-PRK-2/1	Fare Management	F	Approved	R?.?
REQ-PRK-3	PRK	REQ-PRK-3/1	Fare Management	F	Approved	R?.?
REQ-PRK-3.1	PRK	REQ-PRK-3/2	Fare Management	F	Approved	R?.?
REQ-PRK-3.2	PRK	REQ-PRK-3/3	Fare Management	F	Approved	R?.?
REQ-PRK-3.3	PRK	REQ-PRK-3/4	Fare Management	F	Approved	R?.?
REQ-PRK-3.4	PRK	REQ-PRK-3/5	Fare Management	F	Approved	R?.?
REQ-PRK-3.5	PRK	REQ-PRK-3/6	Fare Management	F	Approved	R?.?
REQ-PRK-4	PRK	REQ-PRK-4/1	Fare Management	F	Approved	R?.?
REQ-PRK-5	PRK	REQ-PRK-5/1	Fare Management	F	Approved	R?.?
REQ-PRK-5.1	PRK	REQ-PRK-5/2	Fare Management	F	Approved	R?.?
REQ-PRK-5.2	PRK	REQ-PRK-5/3	Fare Management	F	Approved	R?.?
REQ-PRK-5.3	PRK	REQ-PRK-5/4	Fare Management	F	Approved	R?.?
REQ-PRK-6	PRK	REQ-PRK-6/1	Fare Management	F	Approved	R?.?
REQ-PRK-7	PRK	REQ-PRK-7/1	Fare Management	F	Approved	R?.?
REQ-PRK-8	PRK	REQ-PRK-8/1	Fare Management	F	Approved	R?.?
REQ-PRK-8.1	PRK	REQ-PRK-8/2	Fare Management	F	Approved	R?.?
REQ-PRK-8.2	PRK	REQ-PRK-8/3	Fare Management	F	Approved	R?.?
REQ-PRK-8.3	PRK	REQ-PRK-8/4	Fare Management	F	Approved	R?.?
REQ-PRK-8.4	PRK	REQ-PRK-8/5	Fare Management	F	Approved	R?.?
REQ-PRK-8.5	PRK	REQ-PRK-8/6	Fare Management	F	Approved	R?.?
REQ-PRK-9	PRK	REQ-PRK-9/1	Fare Management	F	Approved	R?.?
REQ-PRK-9.1	PRK	REQ-PRK-9/2	Fare Management	F	Approved	R?.?
REQ-PRK-9.2	PRK	REQ-PRK-9/3	Fare Management	F	Approved	R?.?
REQ-PRK-9.3	PRK	REQ-PRK-9/4	Fare Management	F	Approved	R?.?
REQ-PRK-10	PRK	REQ-PRK-10/1	Devices	F	Approved	R?.?
REQ-PRK-11	PRK	REQ-PRK-11/1	Devices	F	Approved	R?.?
REQ-PRK-11.1	PRK	REQ-PRK-11/2	Devices	F	Approved	R?.?
REQ-PRK-11.2	PRK	REQ-PRK-11/3	Devices	F	Approved	R?.?
REQ-PRK-12	PRK	REQ-PRK-12/1	Devices	F	Approved	R?.?
REQ-PRK-13	PRK	REQ-PRK-13/1	Devices	F	Approved	R?.?
REQ-PRK-14	PRK	REQ-PRK-14/1	Fare Management	F	Approved	R?.?
REQ-PRK-14.1	PRK	REQ-PRK-14/2	Fare Management	F	Approved	R?.?
REQ-PRK-14.2	PRK	REQ-PRK-14/3	Fare Management	F	Approved	R?.?
REQ-PRK-14.3	PRK	REQ-PRK-14/4	Fare Management	F	Approved	R?.?
REQ-PRK-14.4	PRK	REQ-PRK-14/5	Fare Management	F	Approved	R?.?
REQ-PRK-14.5	PRK	REQ-PRK-14/6	Fare Management	F	Approved	R?.?
REQ-PRK-14.6	PRK	REQ-PRK-14/7	Fare Management	F	Approved	R?.?
REQ-PRK-15	PRK	REQ-PRK-15/1	Channels	F	Approved	R?.?
REQ-PRK-16	PRK	REQ-PRK-16/1	Channels	F	Approved	R?.?
REQ-PRK-17	PRK	REQ-PRK-17/1	Channels	F	Approved	R?.?
REQ-PRK-18	PRK	REQ-PRK-18/1	Fare Management	F	Approved	R?.?
REQ-PRK-18.1	PRK	REQ-PRK-18/2	Fare Management	F	Approved	R?.?
REQ-PRK-18.2	PRK	REQ-PRK-18/3	Fare Management	F	Approved	R?.?
REQ-PRK-19	PRK	REQ-PRK-19/1	Fare Management	F	Approved	R?.?
REQ-PRK-20	PRK	REQ-PRK-20/1	Fare Management	F	Approved	R?.?
REQ-PRK-21	PRK	REQ-PRK-21/1	Fare Management	F	Approved	R?.?
REQ-PRK-21.1	PRK	REQ-PRK-21/2	Fare Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-PRK-22	PRK	REQ-PRK-22/1	Devices	F	Approved	R?.?
REQ-PRK-22.1	PRK	REQ-PRK-22/2	Devices	F	Approved	R?.?
REQ-PRK-23	PRK	REQ-PRK-23/1	Fare Management	F	Approved	R?.?
REQ-PRK-24	PRK	REQ-PRK-24/1	Fare Management	F	Approved	R?.?
REQ-PRK-24.1	PRK	REQ-PRK-24/2	Fare Management	F	Approved	R?.?
REQ-PRK-24.2	PRK	REQ-PRK-24/3	Fare Management	F	Approved	R?.?
REQ-PRK-24.3	PRK	REQ-PRK-24/4	Fare Management	F	Approved	R?.?
REQ-PRK-24.4	PRK	REQ-PRK-24/5	Fare Management	F	Approved	R?.?
REQ-PRK-25	PRK	REQ-PRK-25/1	Fare Management	F	Approved	R?.?
REQ-PRK-26	PRK	REQ-PRK-26/1	Fare Management	F	Approved	R?.?
REQ-PRK-27	PRK	REQ-PRK-27/1	Reporting	F	Approved	R?.?
REQ-PRK-28	PRK	REQ-PRK-28/1	Data Management	F	Approved	R?.?
REQ-PRK-29	PRK	REQ-PRK-29/1	Reporting	F	Approved	R?.?
REQ-PRK-30	PRK	REQ-PRK-30/1	Devices	F	Approved	R?.?
REQ-PRK-30.1	PRK	REQ-PRK-30/2	Devices	F	Approved	R?.?
REQ-PRK-31	PRK	REQ-PRK-31/1	Devices	F	Approved	R?.?
REQ-PRK-32	PRK	REQ-PRK-32/1	Fare Management	F	Approved	R?.?
REQ-PRK-33	PRK	REQ-PRK-33/1	Devices	F	Approved	R?.?
REQ-PRK-34	PRK	REQ-PRK-34/1	Data Management	F	Approved	R?.?
REQ-PRK-34.1	PRK	REQ-PRK-34/2	Data Management	F	Approved	R?.?
REQ-PRK-34.2	PRK	REQ-PRK-34/3	Data Management	F	Approved	R?.?
REQ-PRK-34.3	PRK	REQ-PRK-34/4	Data Management	F	Approved	R?.?
REQ-PRK-34.4	PRK	REQ-PRK-34/5	Data Management	F	Approved	R?.?
REQ-PRK-34.5	PRK	REQ-PRK-34/6	Data Management	F	Approved	R?.?
REQ-PRK-34.6	PRK	REQ-PRK-34/7	Data Management	F	Approved	R?.?
REQ-PRK-34.7	PRK	REQ-PRK-34/8	Data Management	F	Approved	R?.?
REQ-PRK-35	PRK	REQ-PRK-35/1	Fare Management	F	Approved	R?.?
REQ-PRK-36	PRK	REQ-PRK-36/1	Fare Management	F	Approved	R?.?
REQ-WTS-1	WTS	REQ-WTS-1/1	Devices	F	Approved	R?.?
REQ-WTS-2	WTS	REQ-WTS-2/1	Devices	F	Approved	R?.?
REQ-WTS-3	WTS	REQ-WTS-3/1	Devices	F	Approved	R?.?
REQ-WTS-4	WTS	REQ-WTS-4/1	Devices	F	Approved	R?.?
REQ-WTS-5	WTS	REQ-WTS-5/1	Devices	F	Approved	R?.?
REQ-WTS-5.1	WTS	REQ-WTS-5/2	Devices	F	Approved	R?.?
REQ-WTS-6	WTS	REQ-WTS-6/1	Devices	F	Approved	R?.?
REQ-WTS-7	WTS	REQ-WTS-7/1	Devices	F	Approved	R?.?
REQ-WTS-8	WTS	REQ-WTS-8/1	Fare Management	F	Approved	R?.?
REQ-WTS-9	WTS	REQ-WTS-9/1	Devices	F	Approved	R?.?
REQ-WTS-10	WTS	REQ-WTS-10/1	Devices	F	Approved	R?.?
REQ-WTS-13	WTS	REQ-WTS-13/1	Devices	F	Approved	R?.?
REQ-TPN-1	TPN	REQ-TPN-1/1	Asset Management	F	Approved	R?.?
REQ-TPN-2	TPN	REQ-TPN-2/1	Asset Management	F	Approved	R?.?
REQ-TPN-3	TPN	REQ-TPN-3/1	Asset Management	F	Approved	R?.?
REQ-TPN-4	TPN	REQ-TPN-4/1	Asset Management	F	Approved	R?.?
REQ-TPN-5	TPN	REQ-TPN-5/1	Customer Management	F	Approved	R?.?
REQ-TPN-6	TPN	REQ-TPN-6/1	Asset Management	F	Approved	R?.?
REQ-TPN-7	TPN	REQ-TPN-7/1	Network	F	Approved	R?.?
REQ-TPN-8	TPN	REQ-TPN-8/1	Asset Management	F	Approved	R?.?
REQ-TPN-8.1	TPN	REQ-TPN-8/2	Asset Management	F	Approved	R?.?
REQ-TPN-8.2	TPN	REQ-TPN-8/3	Asset Management	F	Approved	R?.?
REQ-TPN-8.3	TPN	REQ-TPN-8/4	Asset Management	F	Approved	R?.?
REQ-TPN-9	TPN	REQ-TPN-9/1	Network	F	Approved	R?.?
REQ-TPN-10	TPN	REQ-TPN-10/1	Card/Media Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-TPN-11	TPN	REQ-TPN-11/1	Card/Media Management	F	Approved	R?.?
REQ-TPN-12	TPN	REQ-TPN-12/1	Card/Media Management	F	Approved	R?.?
REQ-TPN-12.1	TPN	REQ-TPN-12/2	Card/Media Management	F	Approved	R?.?
REQ-TPN-12.2	TPN	REQ-TPN-12/3	Card/Media Management	F	Approved	R?.?
REQ-TPN-12.3	TPN	REQ-TPN-12/4	Card/Media Management	F	Approved	R?.?
REQ-TPN-12.4	TPN	REQ-TPN-12/5	Card/Media Management	F	Approved	R?.?
REQ-TPN-12.5	TPN	REQ-TPN-12/6	Card/Media Management	F	Approved	R?.?
REQ-TPN-12.6	TPN	REQ-TPN-12/7	Card/Media Management	F	Approved	R?.?
REQ-TPN-12.7	TPN	REQ-TPN-12/8	Card/Media Management	F	Approved	R?.?
REQ-TPN-12.8	TPN	REQ-TPN-12/9	Card/Media Management	F	Approved	R?.?
REQ-TPN-12.9	TPN	REQ-TPN-12/10	Card/Media Management	F	Approved	R?.?
REQ-TPN-12.10	TPN	REQ-TPN-12/11	Card/Media Management	F	Approved	R?.?
REQ-TPN-13	TPN	REQ-TPN-13/1	Asset Management	F	Approved	R?.?
REQ-TPN-13.1	TPN	REQ-TPN-13/2	Asset Management	F	Approved	R?.?
REQ-TPN-13.2	TPN	REQ-TPN-13/3	Asset Management	F	Approved	R?.?
REQ-TPN-14	TPN	REQ-TPN-14/1	Asset Management	F	Approved	R?.?
REQ-TPN-15	TPN	REQ-TPN-15/1	Asset Management	F	Approved	R?.?
REQ-OPY-1	OPY	REQ-OPY-1/1	Devices	F	Approved	R?.?

TTC Fare Card Group

Exhibit C

TTC Business Requirements

Service

Version **Final 8.0**

Date: 121210

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Document Version History

Page	Ver.	Version Date	Details
NA	Draft 1.0	110919	Includes the following sections: • 110919 - Customer Management Rev 1.2 • 110919 - Data Management Rev 1.2 • 110915 – Fare Management Rev 1.1 • 110919 - Revenue Management Rev 1.2 • 110919 - Order and Distribution Management Rev 1.1 • 110919 - Training Rev 1.2
NA	Draft 1.1	110921	In addition to the sections above, this release includes: • 110921 - Business Intelligence Rev 1.1 • Field System Management Rev 1.1 • 110921 - System Management Rev 1.2
NA	Draft 1.2	110927	In addition to the sections above, this release includes: • 110927 - Roles and Responsibilities Rev 1.1 • REQ-ODM-15 Media Distribution and Collection for MDP and VIP in Section Order and Distribution Management • Deferred all of Marketing Specifications to Master Agreement
NA	Draft 1.3	111013	Added / Modified the following • CMG-20.2, CMG-20.4
NA	Draft 1.4	111028	Added / Modified the following • CMG-17, CMG-23,CMG-105,BIN-97,BIN-177,FAM-10,FAM-38,RVM-1
NA	Draft 2.0	120221	• Intermediate files – TTC/PRESTO requirements process
NA	Draft 3.0	120327	• Incorporated PRESTO/TTC changes from the PRESTO/TTC Business Requirements review process • Changed format of the Requirements as per Format section. • Added Cross Reference table at the end of the document to map TTC IDs to PRESTO IDs.
NA	Draft 4.0	120427	• Clean up
NA	Draft 5.0	120619	• Changed MA to NF / F (non-functional / functional) • Removed the MA Reference – changed it to Cross Reference • Cross Reference table has been changed to include F/NF, whether the requirement is in the Device RFP and if so the Device Spec IDs are listed. • Change the Format of the TTC Specification slightly o NF with the PRESTO reference means it is a nonfunctional specification o If a functional specification is part of the PRESTO Device RFP it is highlighted with a green Y next to the PRESTO NG release number
NA	Draft 6.0	121116	• Deleted TRN-7, CMG-49, TRN-5, RAR-3, RAR-4, RAR-10, RAR-2, RAR-8, RAR-9, RAR-10, CMG-45.3,CMG-49, FAM-32.2, TRN-5 • Modified NFRs via mutual agreement with PRESTO • Changed the format of the document to remove any reference to RFP • Change Specifications to TTC Business Requirements
NA	FRC 7.0	121201	• Metadata is now a defined term hence the capitalization in DMG-27.3, DMG-47 • Changed name of document to Exhibit – now aligns with Master Agreement • Change release name to Final Release Candidate
NA	Final 8.0	121210	• Changed version to Final and increased release number

Table of Contents

List of Tables

Format

Each TTC Business Requirement has the following format:

TTC ID	Name of TTC Business Requirement	Status	Type
Description			

Definitions

TTC ID: Unique TTC Business Requirement Identification Number

Name of Specification: Name of TTC Business Requirement

Status: Review status of the TTC Business Requirement:

Approved: TTC and PRESTO mutually agreed on TTC Business Requirement

Pending: TTC and PRESTO are currently developing a mutually agreeable TTC Business Requirement

Type: **F**: functional; **NF**: Non-Functional

Description: Description of the Requirement including figures, charts, tables etc. if used in defining and describing the TTC Business Requirement.

Additionally, the cross-reference table at the end of the document will include the additional information:

TTC Area: Three letter identification code for the TTC Area the TTC Business Requirement applies to.

PLA: PRESTO Logical Area (PLA) the TTC Business Requirement applies to as determined by PRESTO.

PID: PRESTO Identification Number

TYPE[1]: **NF**: nonfunctional Requirement
 F: functional Specification

Release[2]: PRESTO NG release number

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[1] As classified by PRESTO
[2] PRESTO to provide PRESTO NG release information

Document Order of Specifications

Requirements in this document (including the cross reference table at the end of the document) are presented in their TTC logical order. Logical order here means:

- Related requirements are grouped by document sections;
- Sections that deal with overall or general requirements are presented first;
- Within each section, general / overall requirements are presented first with detailed requirements following;
- Requirements are hierarchal (i.e. requirements that are presented later in the document are dependent on earlier presented requirements); and
- Requirements can refer to other requirements or document sections (i.e. named sections and all the requirements contained therein).

Note that TTC ID numbering does not necessarily reflect the document order of how the TTC requirements are presented.

1 Roles and Responsibilities

1.1 General

REQ-RAR-1	TTC Fare Card Group	Approved	NF

The implementation and operation of the PRESTO System at TTC is a large project which will affect virtually all aspects of the TTC operations and business processes. To facilitate this change and to ensure that implementation and subsequent operation proceeds smoothly and that it addresses TTC business needs the TTC Fare Card Group will be the interface to PRESTO.

1.2 Implementation

REQ-RAR-11	Installation of Related Power Items	Approved	F

PRESTO is responsible for the installation of any power related items such as switches, plugs, receptacles, panels, etc. required to install, operate, service and maintain the PRESTO System at TTC. To be clear, this includes all PRESTO field devices as well as any and all PRESTO System equipment required for supporting the PRESTO System at TTC. For example, PRESTO will be responsible for installing the receptacles or switches for FMVDs and AVMs at stations.

1.3 Operations

This section covers the roles and responsibilities of the PRESTO System during the Operating Phase of the PRESTO System.

REQ-RAR-6	PRESTO System Infrastructure	Approved	NF

PRESTO System Infrastructure will be operated, serviced and maintained by PRESTO.

REQ-RAR-7	PRESTO Central System	Approved	NF

PRESTO Central System will be operated, serviced and maintained by PRESTO.

2   Customer Management

2.1   Customer Experience

REQ-CMG-1	Enhancement of Customer Experience	Approved	F
Adopt familiar, proven Customer service principles and procedures used in making retail purchases for all PRESTO sales and reload channels.			

REQ-CMG-1.1	Enhancement of Customer Experience-2	Approved	F
Provide options for purchasing and reloading PRESTO fare media.			

REQ-CMG-1.2	Enhancement of Customer Experience-3	Approved	F
Enable the use of alternative forms of contactless payment media.			

REQ-CMG-2	Simplifying the Experience for TTC Customers	Approved	F
Make it simple for Customers to: - interpret PRESTO fare rules and policies; - purchase PRESTO Media including method of payment and channels; - purchase, load and use transit products with PRESTO fare media; - access Customer information about Customer interactions with the TTC;			

REQ-CMG-3	Ensuring Access to Affordable Fare Media	Approved	F
Ensure Customers have access to and use of PRESTO fare media at all transit service locations during revenue service.			

REQ-CMG-4	Alternative Payment Options	Approved	F
PRESTO will provide a range of alternative fare payment options including open payments and payment using NFC enabled phone are supported.			

REQ-CMG-5	Reaction to Business Innovations	Approved	F
PRESTO and the PRESTO System will be flexible and will be able to react in a timely manner to business, technical and Customer service innovations in transit and related markets when accepting fare payments, and financial purchases as well as when accessing and exchanging all PRESTO collected information via the Data Mart with the TTC.			

REQ-CMG-6	Enhancement of Fare Media Use, Accuracy and Reliability	Approved	F
Enhance the Customer experience by making it easy to purchase and use PRESTO fare media.			

REQ-CMG-6.1	Enhancement of Fare Media Use, Accuracy and Reliability-2	Approved	F
Ensure accurate and reliable acceptance of PRESTO Media for fare payment enabling Customers to board vehicles quickly and conveniently.			

2.2   Customer Service Policies

REQ-CMG-7	Customer Service Policies	Approved	F

Ensure that the PRESTO System design and implementation adheres to TTC Customer service policies.

TTC policies are provided in Schedule 12.1.1 of the Agreement.

REQ-CMG-8	Customer Service Guidelines	Approved	F

Ensure established TTC guidelines governing payment of fares by Customers are incorporated into the functionality and procedures of the PRESTO System.

REQ-CMG-8.1	Media Used to Pay Fares	Approved	F

Accepted payment means for Customers travelling on TTC are:

REQ-CMG-8.1.1	Media Used to Pay Fares-2	Approved	F

 - PRESTO Media

REQ-CMG-8.1.2	Media Used to Pay Fares-3	Approved	F

 - cash (deposited into a fare box in accordance with TTC fare rules and policy)

REQ-CMG-8.1.3	Media Used to Pay Fares-4	Approved	F

- open payment media

REQ-CMG-8.2	Fare Payment by Another Customer	Approved	F

TTC Customers may allow another person to pay their fare in accordance with TTC's policies and procedures. TTC Customers choosing to do so will need to be informed of any other applicable rules and regulations regarding the use of PRESTO Media issued to them.

REQ-CMG-8.3	Concession Fares	Approved	F

Accept Authorization for eligibility for Concession based reduced fares from TTC or other authorized entities.

Configure the PRESTO System and its component services and functionalities to accept and charge reduced and/or Concession fares to eligible Customers based on TTC rules and regulations.

Eligibility for reduced and Concession fares will be determined by TTC.

REQ-CMG-8.3.1	Concession Fares-2	Approved	F

Enable purchasing of Concession LUM at SRVMs and FMVDs.

REQ-CMG-8.4	TTC Private Fare Products Use	Approved	F

Support TTC private fare products on PRESTO Media for all access to TTC transit.

REQ-CMG-9	Students and School Children Distribution	Approved	F

Support the distribution of PRESTO Media to children of school age and other students enrolled at academic institutions.

REQ-CMG-9.1	Students and School Children Distribution-2	Approved	F

Support the initialization and registration of PRESTO Media for children of school age and students.

REQ-CMG-9.2	Students and School Children Distribution-3	Approved	F

Support photo ID printing on PRESTO Cards if required through the use of Distribution Equipment (see DEQ-2).

REQ-CMG-9.3	Students and School Children Distribution-4	Approved	F

Support business and technical methods that are consistent with the desired functionality of PRESTO System.

REQ-CMG-10	TTC employees, contractors etc.	Approved	F

Furnish equipment as specified in the Distribution Equipment section of Schedule B and configure the PRESTO System to permit issuance of PRESTO Media to authorized individuals as determined by the TTC in a manner consistent with the overall specifications in this agreement.

REQ-CMG-11	PRESTO Media for TTC Access	Approved	F

Configure the PRESTO System to allow TTC to control the following:

REQ-CMG-11.1	PRESTO Media for TTC Access-2	Approved	F

 - issuance of PRESTO Media as a building access pass

REQ-CMG-11.2	PRESTO Media for TTC Access-3	Approved	F

 - issuance of TTC private fare card media for TTC transportation services

REQ-CMG-12	TTC Building Access Pass Usage	Approved	F

Provide TTC with technical details about the configuration and operation of PRESTO Media and PRESTO Devices in order to assist the TTC with building access passes.

REQ-CMG-12.3	TTC Building Access Pass Usage-2	Approved	F

Do not implement or manage TTC's facilities access system.

REQ-CMG-12.1	TTC Building Access Pass Usage-3	Approved	F

Design the system so that TTC or a service provider of TTC's choosing, has the capability and Authorization to enable the use of the PRESTO Card as a building access pass.

REQ-CMG-12.2	TTC Building Access Pass Usage-4	Approved	F

Ensure that the PRESTO System recognizes and includes building access devices. These devices will be accepted as having no payment functionality or capability.

REQ-CMG-13	Alternative Registration Solutions	Approved	F

OPTIONAL - Propose alternative solutions for PRESTO fare media distribution and registration for automating registration, authenticating eligibility and distributing media.

REQ-CMG-14	Provide Balance Protection	Approved	F

Ensure for registered Customers, that the balance on their PRESTO Card is protected provided the Customer reports their card lost or stolen immediately on discovery. The Customer is liable for any charges/use of the card on the TTC within 90 minutes of the card being hot listed.

REQ-CMG-15	Negative Balance Protection	Approved	F

PRESTO and the PRESTO System will implement a negative balance protection scheme that will allow Customers to complete their journey if the e-Purse balance is insufficient. Parameters will be built into the scheme so that misuse does not occur in accordance with PRESTO policy.

Enable journey completion (negative balance protection) for Customers that have insufficient funds in their e-Purse.

REQ-CMG-16	Complaints and Disputes Management	Approved	F

Provide a Customer complaint and resolution process that records, tracks and reports Customer complaints on a monthly basis that are made via mail, the PRESTO call centre, MSP call centre, TTC Customer Centre or PRESTO website.

REQ-CMG-17	Single Registration for Multiple Cards	Approved	F

Support the purchase and reload of multiple PRESTO Cards on a single registration.

For example, either a parent may register PRESTO Cards for each member of their family with their respective names but managed under a single common registration; or a parent may elect to register all of their family PRESTO Cards under their own name (i.e. multiple cards under a single name).

REQ-CMG-18	Added Functionality for Registered Users	Approved	F

Provide additional features for registered users such as automated reminders to top up, access to special deals and loyalty programs.

REQ-CMG-19	PRESTO Media Expiry Date	Approved	F

Inform Customers at the time of purchase when their PRESTO Media will expire either by printing the expiry date on the PRESTO Media or providing it on a separate piece of paper.

REQ-CMG-20	Auto Reloads	Approved	F

Enable auto loading of e-Purse and all prepaid transit products for registered Customers.

REQ-CMG-20.1	Periodic Autoloads	Approved	F

Enable periodic, Autoload of pass products using a credit or Debit Card for registered Customers. For Debit Cards, ensure that all Canadian banking rules concerning periodic withdrawal of funds from a Customers bank account are met.

REQ-CMG-20.2	Non-periodic auto-loading	Approved	F

Enable reloading based on usage or threshold amounts, of transit products using a credit or Debit Card. For Debit Cards, ensure that all Canadian banking rules concerning periodic withdrawal of funds from a Customers bank account are met.

REQ-CMG-20.3	Auto-reload for multiple registered cards	Approved	F

Support TTC Fare Product reloads on multiple PRESTO Cards from a single Customer account (credit / Debit Card). For example, a Customer may wish to load their children's cards from their own bank account.

REQ-CMG-20.4	Pre-Authorized Debits	Approved	F

Ensure the PRESTO System adheres to Canadian Payment Association rules and regulations for processing of pre-authorized debit and provides adequate protection against improper withdrawals.

REQ-CMG-21	PRESTO System Bill Payment	Approved	F

Enable Customers to use a bill payment method (in person or online banking) to pay (or pre-pay) for their transit product.

2.3   PRESTO Customer Transit Accounts

REQ-CMG-22	Management of Customers Accounts	Approved	F

Enable Customers to manage their transit accounts through self-directed means, or aided by Customer service agents.

REQ-CMG-23	Addressing of Customer Account Issues	Approved	F

Enable the following transit account management functionality:

REQ-CMG-23.1	Addressing of Customer Account Issues-2	Approved	F

- provide refund processing, for claims adjustments and other actions.

REQ-CMG-23.2	Addressing of Customer Account Issues-3	Approved	F

- enable transfers of card balances, dollars or time, between transit accounts, to new transit accounts, and between processing categories

REQ-CMG-23.3	Addressing of Customer Account Issues-4	Approved	F

- capture usage of all contactless media and devices processed by the PRESTO System and include the capability to analyze and settle issues regarding usage

REQ-CMG-23.4	Addressing of Customer Account Issues-5	Approved	F

- provide reports of lost or stolen (Hotlisted) PRESTO Media

REQ-CMG-23.5	Addressing of Customer Account Issues-6	Approved	F

- accept alternative payment methodologies, provided that these methodologies and systems are compatible with Open Standards and rely on financial processes for processing of funds between Customers and the PRESTO System, and for the deposit of funds to TTC's bank accounts.

REQ-CMG-24	Report of all Transit Account Activity	Approved	F

Record and report on all transit account activity including those initiated as a result of Customer inquiry, Customer interaction, or otherwise executed by PRESTO.

REQ-CMG-24.1	Report of all Transit Account Activity-2	Approved	F

Provide capability to access information on the status of Customer accounts, pending activities initiated by either the Customer or PRESTO.

REQ-CMG-25	Detailed Design of Transit Accounts	Approved	F

Present details of the business solution, business processes and Customer support procedures for Customer transit account management to the TTC for review prior to Final Design.

REQ-CMG-26	Automation of Transit Account Management	Approved	F

Automate transit account management to the fullest extent possible.

TTC's performance requirements are explicitly set to correspond to levels achievable through comprehensive automation and administrative streamlining. PRESTO must minimize all manual tasks

that could impact TTC operations, revenues and/or cause TTC to incur costs in its role providing oversight, monitoring, and support for PRESTO System activities and performance.

REQ-CMG-27	Reporting and Reconciliation of Transit Accounts	Approved	F

Report and reconcile all payment and usage activities through the PRESTO System Central Back Office and Data Mart.

2.4   Customer Service Channels

REQ-CMG-28	TTC Customer Functionality by Fare Category	Approved	F

The PRESTO System will support the Customer functionality by fare type, and service channel as illustrated in the following table.

For the excel version of the TTC Specifications this table is located in CMG-28 in the document Appendix C for Excel Version of TTC Specifications.

Specifically:

Customer Action	Fare Type	FMVD	AVMs	SRVMs (LUM)	Website	Call Centre	TTC Customer Centre	Non-TTC Sales Locations	Mail
Purchase Media	Adult	✓		✓	✓	✓	✓	✓	✓
	Child			✓			✓		
	Senior			✓			✓		
	Student			✓			✓		
	Post-Secondary						✓		
Reload - Pre-Funded Fare Products - e-purse	Adult	✓	✓		✓	✓	✓	TBD	
	Child	✓	✓		✓	✓	✓	TBD	
	Senior	✓	✓		✓	✓	✓	TBD	
	Student	✓	✓		✓	✓	✓	TBD	
	Post-Secondary	✓	✓		✓	✓	✓	TBD	
Registration	Adult				✓	✓	✓		✓
	Child				TBD	TBD	✓		
	Senior				TBD	TBD	✓		
	Student				TBD	TBD	✓		
	Post-Secondary				TBD	TBD	✓		
Customer transit account management (e.g. Autoload, history, queries, etc.)	Adult	✓			✓	✓	✓		
	Child	✓			✓	✓	✓		
	Senior	✓			✓	✓	✓		
	Student	✓			✓	✓	✓		
	Post-Secondary	✓			✓	✓	✓		
Other Customer Service Functions	Adult				✓	✓	✓		
	Child				✓	✓	✓		

Customer Action	Fare Type	FMVD	AVMs	SRVMs (LUM)	Website	Call Centre	TTC Customer Centre	Non-TTC Sales Locations	Mail
- report lost/stolen card - receive and resolve complaints	Senior				✓	✓	✓		
	Student				✓	✓	✓		
	Post-Secondary				✓	✓	✓		✓

Table Customer Service Functionality by Customer Service Channel

REQ-CMG-28.1	TTC Customer Functionality by Fare Category-2	Approved	F

- Fare Media Vending Machine (FMVD)

REQ-CMG-28.2	TTC Customer Functionality by Fare Category-3	Approved	F

- Add Value Machine (AVM)

REQ-CMG-28.3	TTC Customer Functionality by Fare Category-4	Approved	F

- Single Ride Vending Machine (SRVM)

REQ-CMG-28.4	TTC Customer Functionality by Fare Category-5	Approved	F

- PRESTO web site

REQ-CMG-28.5	TTC Customer Functionality by Fare Category-6	Approved	F

- PRESTO call centre

REQ-CMG-28.6	TTC Customer Functionality by Fare Category-7	Approved	F

- TTC Customer centres

REQ-CMG-28.7	TTC Customer Functionality by Fare Category-8	Approved	F

- mail

REQ-CMG-28.8	TTC Customer Functionality by Fare Category-9	Approved	F

- non-TTC sales locations

2.4.1   Customer Service Call Centre

2.4.1.1   Overview

REQ-CMG-29	PRESTO Customer Service Call Centre (CSCC)	Approved	F

Establish staff and operate a PRESTO call centre to provide Customer support for the PRESTO System.

REQ-CMG-30	Functional Scope of the CSCC	Approved	F

Provide Customers using PRESTO call centre with the same services that are available on the PRESTO website.

REQ-CMG-31	Provisioning of CSCC	Approved	F

Provide equipment, technology, and physical space to house staff and equipment to conduct business, along with proper training of professional staff to enhance the performance of the CSCC and ensure compliance with SLAs as specified in Schedule A - SLAs.

REQ-CMG-32	Independent From TTC Customer Service Centre	Approved	F

Operate the PRESTO call centre separately from the TTC's Customer Service Centre.

REQ-CMG-32.1	Independent From TTC Customer Service Centre-2	Approved	F

Provide a Warm Transfer between the PRESTO call centre and the TTC's call centre. Warm transfer is defined as transferring a Customer to the top of the call queue.

REQ-CMG-32.2	Independent From TTC Customer Service Centre-3	Approved	F

Fulfill Warm Transfer requirements in compliance with relevant SLAs in Schedule A.

REQ-CMG-33	Addressing PRESTO System Issues Only	Approved	F

Ensure that the PRESTO call centre addresses Customer service issues related to the PRESTO System and transfers inquiries about TTC transportation services and all other non-fare payment issues to TTC.

REQ-CMG-34	Ability to Speak to Customer Agent	Approved	F

Enable Customers to opt out of the IVR and speak with a live agent during normal business hours.

REQ-CMG-35	Multi-language Capabilities	Approved	F

Provide multi-language capabilities in the PRESTO call centre.

Languages to be supported at the CSCC will be defined by TTC during the detailed Design Review. Further details on Multi-Language support are provided in the Multi-Language Section of this Schedule.

REQ-CMG-36	Use of State-of-the-Art Technology	Approved	F

Incorporate state-of-the-art technology and best practices from call centres supporting managed service operations in the PRESTO call centre.

2.4.1.2   IVR Functionality

REQ-CMG-37	State-of-the-Art IVR System	Approved	F

Implement a state of the art IVR system.

REQ-CMG-37.1	State-of-the-Art IVR System-2	Approved	F

Equip the IVR with an Automated Call Director (ACD) to route inbound calls to the IVR.

REQ-CMG-38	Addresses a Core Set Of Functionality	Approved	F

Equip the IVR to handle a core set of PRESTO functionality that will at a minimum include:

REQ-CMG-38.1	Pre-Funded Purchases	Approved	F

- enable Customers to make Pre-Funded purchases of all available regular, full-fare transit products through the IVR

REQ-CMG-38.2	Reload of Any Pre-Funded Account	Approved	F

- enable Customers to reload a Pre-Funded account through the IVR

REQ-CMG-38.3	Inquiries Account Activities	Approved	F

- enable Customers to inquire about recent account activities through the IVR

REQ-CMG-38.4	Set/Reset a Password	Approved	F

- enable Customers to set/reset their password via the IVR

REQ-CMG-38.5	Use of Credit/Debit Cards	Approved	F

- support secure credit and Debit Card payments through the IVR (e.g. Address Verification Services).

REQ-CMG-38.6	Verifying Registered Customer Details	Approved	F

- enable IVR to compare previous Customer account information with recently changed Customer account information

REQ-CMG-39	Concession Transit Accounts	Approved	F

Require all Concessions to be set locally at Customer service centres.

REQ-CMG-39.1	Concession Transit Accounts-2	Approved	F

Enable the IVR to provide Customers with detailed instructions on becoming eligible for Concession fares. Additionally, provide the option for Customers requesting Concession cards to speak with a live agent.

REQ-CMG-40	Use Standard Techniques	Approved	F

Incorporate standard techniques and menus for handling calls in an interactive environment into the IVR.

REQ-CMG-40.1	Single Key Prompt	Approved	F

- support a single key request to repeat an IVR prompt

REQ-CMG-40.2	Help Access	Approved	F

- enable Customers to access generic or specific help from anywhere within the IVR

REQ-CMG-40.3	Re-prompting Capability	Approved	F

- enable the IVR to re-prompt a Customer if there is no response or the response is wrong

REQ-CMG-40.4	Prompt for Speaking to a Live Agent	Approved	F

- include a prompt in the IVR to speak with a live agent, automatically forwarding information captured by the IVR to that agent

REQ-CMG-40.5	Skip Menu Functionality	Approved	F

- support the capability to skip menus or type in the correct sequence of keyed entries at any time in the IVR

REQ-CMG-40.6	Multi-Language Support	Approved	F

- provide multi-language support within the IVR beyond English and French.

REQ-CMG-40.7	After Hours Functionality	Approved	F

- enable the IVR to accept voice messages and automatically forward them to Customer agents' voice mail after normal business hours

REQ-CMG-40.8	TTY Enabled	Approved	F

- equip the IVR with Talk to You (TTY)

REQ-CMG-41	Printed Texts of IVR Speech	Approved	F

Enable the IVR to produce printed texts of IVR speech to ensure accuracy and for speech improvement purposes.

REQ-CMG-42	Use of Voice Recognition Technology	Approved	F

OPTIONAL - Incorporate voice recognition technology with default capability to transfer to a live agent into the IVR.

REQ-CMG-43	Use of Customer Agents	Approved	F

Employ PRESTO call centre agents to handle incoming calls from Customers.

REQ-CMG-44	Number of Customer Agents	Approved	F

Ensure that PRESTO employs enough PRESTO call centre agents to handle call volumes in accordance with Schedule A.

REQ-CMG-44.1	Number of Customer Agents-2	Approved	F

Provide multi-language support in the PRESTO call centre as specified in the Multilanguage section of Schedule B.

REQ-CMG-45	Training for Customer Agents	Approved	F

Provide comprehensive training for PRESTO call centre agents on all aspects of the PRESTO System, specifically:

- PRESTO System
- TTC's fare policy and fare payment options
- PRESTO Media
- PRESTO Device recognition and usage
- typical Customer usage issues, questions and complaints

REQ-CMG-45.1	Specific Training Topics	Approved	F

Ensure PRESTO call centre agents are proficient on a wide variety of PRESTO topics including:

REQ-CMG-45.1.1	Fare Purchase Options and Pricings-3	Approved	F

- explaining transit fare options and corresponding prices

REQ-CMG-45.1.2	Single Ride Trip Purchases at SRVMs-4	Approved	F

- purchasing a single ride through SRVMs

REQ-CMG-45.1.3	Inquiries On Use of LUMs -5	Approved	F

- using LUM for single ride trips and transfers

REQ-CMG-45.1.4	Inquiries About Proof-of-Payment -6	Approved	F

- complying with TTC fare rules and policies including proof-of-payment rules

REQ-CMG-45.1.5	Inquiries About fare Payment Procedures-7	Approved	F

- paying fares on all modes of transportation, including but not limited to Concession fares, transfers, cross-boundary services, Transit Expansion, legacy LRV and Wheel-Trans

REQ-CMG-45.1.6	Payment Issues Verses Usage Issues-8	Approved	F

- resolving payment and usage issues

REQ-CMG-45.1.7	PRESTO Media replacement issues.-9	Approved	F

- replacing PRESTO Cards

REQ-CMG-45.1.8	Refund and Chargeback Requests-10	Approved	F

- providing refunds and charge backs

REQ-CMG-45.1.9	Reports of Lost or Stolen Media-11	Approved	F

- reporting lost or stolen PRESTO Cards

REQ-CMG-45.1.10	Registration of TTC Customers-12	Approved	F

- registering Customers including procedures for determining eligibility and setting a Concession

REQ-CMG-45.1.11	Enabling - Disabling Autoload-13	Approved	F

- suspending and reinstating Autoload

REQ-CMG-45.1.12	Inquiries about Concession Fares-14	Approved	F

- handling inquiries about Concession fares: qualifying for and obtaining a Concession

REQ-CMG-45.1.13	Customer Complaints-15	Approved	F

- resolving Customer complaints

REQ-CMG-45.1.14	Customer Web Site Use-16	Approved	F

- using the PRESTO Customer website

REQ-CMG-45.1.15	PRESTO Device Inquiries-17	Approved	F

- answering questions about the use of PRESTO FMVDs, AVMs, SRVMs and fare payment devices across all modes of transportation

REQ-CMG-45.1.16	Multiple Transit Account Payment-18	Approved	F

- paying fares for several individuals using a single transit account

REQ-CMG-45.2	Training Documentation and Equipment	Approved	F

Provide documentation and equipment required for all PRESTO call centre training activities.

REQ-CMG-46	Use of Call Scripts	Approved	F

Develop Call Scripts for PRESTO call centre agents that anticipate and document potential communications between Customers and PRESTO call centre agents.

REQ-CMG-46.1	Proactive Revision of Call Scripts	Approved	F

Proactively revise Call Scripts based on actual interactions between Customers and PRESTO Customer agents.

REQ-CMG-46.2	Ongoing Evaluation of Customer Agents	Approved	F

Provide ongoing evaluation and remediation, including further training, for PRESTO call centre agents.

2.4.1.3   Customer Service Call Centre Performance

REQ-CMG-47	IVR Volume Capacity	Approved	F

Ensure that the IVR accommodates at least 200% of projected call volume.

REQ-CMG-48	Detailed CSCC Demand Plan	Approved	F

Provide a description of how the PRESTO System monitors and evaluates Customer demand and how demand thresholds will be met with specific adjustments to resources available at the CSCC.   TTC recognizes that decreases in TTC Customer demand for CSCC services may also occur, and that the proposed plan from PRESTO for CSCC resources should also include steps to address this circumstance.

REQ-CMG-49.1	IVR User Success Rate	Approved	F

Ensure an IVR success rate of greater than 99.5%. IVR User Success Rate is fully defined in SLA CC-1 in Schedule A.

REQ-CMG-49.2	IVR Sales Availability	Approved	F

Ensure an IVR Sales Availability of greater than 99.5%. IVR Sales Availability is fully defined in SLA CC-2 in Schedule A

REQ-CMG-49.3	IVR Transfer Out Success Rate	Approved	F

Ensure an IVR transfer out success rate of 99.9% or greater IVR Transfer Out Success Rate is fully defined in SLA CC-5 in Schedule A

2.4.2 Web Site for PRESTO System

2.4.2.1 Overview

REQ-CMG-50	PRESTO Web Site for Customers	Approved	F

Implement, operate, repair, refresh, fund and maintain a dedicated Customer web site for the PRESTO System.

REQ-CMG-51	Independent from TTC Web Site	Approved	F

Provide links on the PRESTO web site that direct Customers to the TTC web site.

REQ-CMG-52	Location of Web Site	Approved	F

Host the PRESTO web site in Canada.

REQ-CMG-53	Compliance to Applicable Standards	Approved	F

Comply with applicable web site financial, security and privacy standards as required by Canadian laws such as PCI DSS, MFIPPA and PIPEDA.

REQ-CMG-54	Capability for External Links	Approved	F

Provide the capability to introduce links to other web sites that, by mutual agreement between MSPs and PRESTO, enhance Customer service.

REQ-CMG-55	Web Site Content	Approved	F

Collaborate with TTC to develop effective and appropriate PRESTO web site content specific to Customers.

REQ-CMG-56	Review of Web Site Content	Approved	F

Submit all related TTC-specific content to TTC for TTC's review before implementation.

REQ-CMG-57	Timeline of TTC Content on Web Site	Approved	F

Synchronize the PRESTO web site with the PRESTO rollout for TTC that includes the status and functionality of the system.

REQ-CMG-58	Central Customer Access Point	Approved	F

Ensure the PRESTO web site:
 - has the functionality specified in CMG-28.
 - acts as a portal for sale and reload of fare products
 - provides account status and travel history, and
 - is an access point for other useful information presented as either integral to the Web Site, or as accessible through links to other web sites.

REQ-CMG-59	Web Site Appearance	Approved	F

Propose a solution for how Customers will be accommodated via the PRESTO web site, i.e. how they will purchase transit products in a familiar, easy to use manner similar to a commercial e-commerce web site.

REQ-CMG-60	Multi-Browser, Mobile Phone Capable	Approved	F

Support a variety of browsers for both desktop and handheld devices (e.g.. mobile phones).

REQ-CMG-61	Comprehensive Customer Security and Privacy	Approved	F

Ensure security and privacy for Customers using the PRESTO web site.

REQ-CMG-62	WCAG 2.0 Level AA Compliant	Approved	F

Ensure the web site is WCAG 2.0, Level AA and Colour Level 3 compliant.

REQ-CMG-63	AODA Compliant	Approved	F

Ensure the web site is AODA compliant and meets all other relevant accessibility standards.

REQ-CMG-64	Payment Industry Standards	Approved	F

Ensure the web site is PCI-DSS compliant if Customer financial data is stored electronically.

REQ-CMG-65	Flexible and Extensible	Approved	F

Ensure that the PRESTO web site is maintainable, extensible, scalable, and allows remote updates and functionality changes.

REQ-CMG-66	Usability and Auditing of Web Site	Approved	F

Carry out an independent usability and accessibility review of the changes to the PRESTO web site which are necessary to meet TTC requirements and review these changes with the TTC for mutual approval in Design Review.

REQ-CMG-67	Multiple Transit Merchants	Approved	F

Accommodate multiple transit Merchants. For example, a Customer must be fully aware of differing MSP fare rules and products.

2.4.2.2   Web Site Functionality

REQ-CMG-68	Key Functionality	Approved	F

Provide at a minimum the following functionality on the PRESTO web site:

REQ-CMG-68.1	E-Commerce Site	Approved	F

 - enable sale and reload of all transit products

REQ-CMG-68.1.1	E-Commerce Site-2	Approved	F

 - enable Customers to enrol/sign up for service options.

REQ-CMG-68.1.2	E-Commerce Site-3	Approved	F

 - enable the fulfillment and administration of eligibility requirements for Concession fares

REQ-CMG-68.2	Portal for Customer Account Management	Approved	F

 - enable Customers to manage their transit account(s) via the PRESTO web site, which will act as a portal for Customers to, at a minimum, review their balances and transfer balances to new accounts

REQ-CMG-68.3	Customer Access to Their Data	Approved	F

 - enable Customers to access real-time information about their transit accounts and perform self-directed service, including but not limited to: detailed account histories of fare payment, Autoloads, reloads, and usage

REQ-CMG-68.4	Customer Inquiries and Support	Approved	F

 - enable Customers to communicate with PRESTO and submit e-mail inquiries about their transit accounts, request refunds or other actions on the part of PRESTO, or be referred to a live agent

REQ-CMG-68.5	Customer Information Portal	Approved	F

 - provide general information about the PRESTO System along with FAQs, help with search function and contact points

REQ-CMG-68.6	Portal for TTC Transportation Service Information	Approved	F

 - provide links on the PRESTO web site to enable Customers to access information about MSPs' transportation services and other information.

REQ-CMG-68.7	Customer Message Centre	Approved	F

 - enable MSPs and PRESTO to communicate with Customers

REQ-CMG-68.8	AODA Instructions On-Line	Approved	F

 - provide AODA compliant instructions on how to use the PRESTO Devices

REQ-CMG-69	Multi-Language	Approved	F

Provide multi-language support on the PRESTO web site.

REQ-CMG-69.1	Additional Languages	Approved	F

Enable additional languages to be added with minimal effort to the PRESTO web site.

REQ-CMG-70	e-commerce Design Practices	Approved	F

Adhere to standard e-commerce web site design practices and conventions for the PRESTO web site.

REQ-CMG-70.1	e-commerce Design Practices-2	Approved	F

Provide a secure, auditable interface that supports all aspects of Customers' interaction with the PRESTO web site.

REQ-CMG-70.2	e-commerce Design Practices-3	Approved	F

Design the PRESTO web site to facilitate Customer use, build on Customers' familiarity with e-commerce web sites and instill confidence in the security, accuracy, and Reliability of the PRESTO web site.

REQ-CMG-71	Educational Messaging	Approved	F

Provide instructions on the PRESTO web site on how to use and interact with the PRESTO System.

REQ-CMG-71.1	Educational Messaging-2	Approved	F

Provide information on the PRESTO web site about PRESTO products, availability, terms and conditions of use and payment options, as well as links to additional materials or sites that provide additional information and support.

REQ-CMG-72	Data Entry Security	Approved	F

Employ standard conventions for keyed data entry that comply with all applicable security requirements for a retail payment on the PRESTO web site.

REQ-CMG-73	Web Site Buttons and Tabs	Approved	F

Enable the PRESTO web site with buttons or on-screen tabs that support navigation of the site.

REQ-CMG-74	Key Web site Functionality	Approved	F

At a minimum, Equip the PRESTO web site with the following navigation buttons:

REQ-CMG-74.1	Key Web site Functionality-2	Approved	F

- home

REQ-CMG-74.2	Key Web site Functionality-3	Approved	F

- log-off

REQ-CMG-74.3	Key Web site Functionality-4	Approved	F

- create account

REQ-CMG-74.4	Key Web site Functionality-5	Approved	F

- review account history

REQ-CMG-74.5	Key Web site Functionality-6	Approved	F

- shopping cart

REQ-CMG-74.6	Key Web site Functionality-7	Approved	F

- Customer trip usage report to support tax receipts

REQ-CMG-74.7	Key Web site Functionality-8	Approved	F

- print

REQ-CMG-74.8	Key Web site Functionality-9	Approved	F

- search

REQ-CMG-74.9	Key Web site Functionality-10	Approved	F

- back

REQ-CMG-74.10	Key Web site Functionality-11	Approved	F

- check out

REQ-CMG-74.11	Key Web site Functionality-12	Approved	F

- cancel/start over

REQ-CMG-74.12	Key Web site Functionality-13	Approved	F

- help

REQ-CMG-74.13	Key Web site Functionality-14	Approved	F

- multi-language selection functionality

REQ-CMG-75	Time Out Functionality	Approved	F

Equip the PRESTO web site with a time out function that returns the Customer to the home page. This time out function will be a table driven parameter or similar.

REQ-CMG-76	Site Maps	Approved	F

Provide a site map on the PRESTO web site that identifies logical steps to follow for each function.

REQ-CMG-77	Unique Web Site Pages	Approved	F

Provide web pages for Pre-Funded sales, reload, and account management, such as:

REQ-CMG-77.1	Unique Web Site Pages-2	Approved	F

 - home - destination for starting e-commerce activities and providing of baseline information about the PRESTO System. The page will provide a series of steps as fill-in blank with instructions on how to proceed;

REQ-CMG-77.2	Unique Web Site Pages-3	Approved	F

 - provide a series of steps as fill-in blank with instructions on how to proceed

REQ-CMG-77.3	Unique Web Site Pages-4	Approved	F

 - transit product options - provide a descriptive menu of product options and prices, with appropriate interface to enable selections

REQ-CMG-77.4	Unique Web Site Pages-5	Approved	F

- account creation - Pre-Funded

REQ-CMG-77.5	Unique Web Site Pages-6	Approved	F

- account access

REQ-CMG-77.6	Unique Web Site Pages-7	Approved	F

- account password creation, modification, and re-establishment

REQ-CMG-77.7	Unique Web Site Pages-8	Approved	F

- forgot password

REQ-CMG-77.8	Unique Web Site Pages-9	Approved	F

- account login

REQ-CMG-77.9	Unique Web Site Pages-10	Approved	F

- fare option selection

| REQ-CMG-77.10 | Unique Web Site Pages-11 | Approved | F |

- shopping cart contents

| REQ-CMG-77.11 | Unique Web Site Pages-12 | Approved | F |

- description of payment options

| REQ-CMG-77.12 | Unique Web Site Pages-13 | Approved | F |

- Autoload option

| REQ-CMG-77.13 | Unique Web Site Pages-14 | Approved | F |

- balance protection option (registered cardholders)

| REQ-CMG-77.14 | Unique Web Site Pages-15 | Approved | F |

- selection of preferred payment method

| REQ-CMG-77.15 | Unique Web Site Pages-16 | Approved | F |

- entry of security codes (i.e., address verification, card validation codes)

| REQ-CMG-77.16 | Unique Web Site Pages-17 | Approved | F |

- secure checkout

| REQ-CMG-77.17 | Unique Web Site Pages-18 | Approved | F |

- confirmation of purchase

| REQ-CMG-77.18 | Unique Web Site Pages-19 | Approved | F |

- Customer account inquiry or claim

| REQ-CMG-77.19 | Unique Web Site Pages-20 | Approved | F |

- password Email

| REQ-CMG-77.20 | Unique Web Site Pages-21 | Approved | F |

- password confirmation

| REQ-CMG-77.21 | Unique Web Site Pages-22 | Approved | F |

- print / Report functionality (local printer, PDF)

| REQ-CMG-77.22 | Unique Web Site Pages-23 | Approved | F |

- export functionality - to Excel, text, and other common Software formats

Additional functionality will be determined during Design Review.

| REQ-CMG-78 | **Processing of Financial Transactions** | Approved | F |

Provide the capability to process financial transactions in compliance with all applicable standards of the financial services and payments industries.

REQ-CMG-78.1	Financial Payment Media Accepted	Approved	F

- enable Customers to pay for products ordered via the PRESTO web site using:

REQ-CMG-78.1.1	Financial Payment Media Accepted-2	Approved	F

- American Express

REQ-CMG-78.1.2	Financial Payment Media Accepted-3	Approved	F

- Discover

REQ-CMG-78.1.3	Financial Payment Media Accepted-4	Approved	F

- INTERAC

REQ-CMG-78.1.4	Financial Payment Media Accepted-5	Approved	F

- MasterCard

REQ-CMG-78.1.5	Financial Payment Media Accepted-6	Approved	F

- VISA

REQ-CMG-78.2	Acceptance of Alternative Payment Systems	Approved	F

- enable the PRESTO web site to accept payment using alternative payment systems that conform to standards for electronic funds transfers and financial standards.

REQ-CMG-79	Easy Configurable Web Site Pages	Approved	F

Ensure that PRESTO web site pages are easily configurable to reflect changes to fare products, Customer accounts, and general information.

REQ-CMG-80	Change Management Procedures	Approved	F

PRESTO will provide a secure technical protocol and change management procedures to control and monitor configuration of the Web Site, and that allow changes to be made easily and efficiently in a timely manner.

REQ-CMG-81	Web Site Database	Approved	F

PRESTO will equip the Web Site with a database capable of recording and reporting on all activity on the Web Site. This capability will include all TTC Customer-initiated activity as well as all administrative activity initiated by PRESTO.

REQ-CMG-81.1	Web Site SQL Database	Approved	F

Provide ability to extract/download data from the Data Mart using common extraction/export methods.

REQ-CMG-81.2	Creation and Storage of Records	Approved	F

All records will be created and stored automatically. Records created will have the purpose of reporting on transactions and access to the Web Site.

REQ-CMG-81.2.1	Creation and Storage of Records-2	Approved	F

Additionally, records will be sufficient to support TTC Customer inquiries about their accounts and any resolution of issues initiated by TTC Customers through the Web Site.

REQ-CMG-81.3	Payment Transactions	Approved	F

 - process all payment transactions and record all activity through the PRESTO System Central Back Office

REQ-CMG-81.3.1	Payment Transactions-2	Approved	F

 - enable authorized users to upload changes to fares, products, Customer information, and emergency notifications from MSPs to the PRESTO web site

REQ-CMG-81.4	History of All Fare Transactions	Approved	F

 - capture and record all fare transactions and products on a Customer's PRESTO Card

REQ-CMG-81.4.1	History of All Fare Transactions-2	Approved	F

Delineate all fare transactions and products within a Customer's transit account record that is accessible either through the PRESTO web site or call centre.

REQ-CMG-81.5	Transit Account History	Approved	F

Provide Customers with account history that shows payment history, and usage history that indicates points of entry or Boarding transit.

REQ-CMG-81.5.1	Transit Account History-2	Approved	F

Ensure that the Customer account data provided via the PRESTO web site or call centre is in compliance PCI-DSS and Canadian banking rules.

REQ-CMG-81.6	Historic Data	Approved	F

At a minimum, make the following account history available to Customers via the PRESTO web site:

REQ-CMG-81.6.1	Historic Data-2	Approved	F

 - payment transaction date

REQ-CMG-81.6.2	Historic Data-3	Approved	F

 - payment clearing date

REQ-CMG-81.6.3	Historic Data-4	Approved	F

 - last four digits of payment media

REQ-CMG-81.6.4	Historic Data-5	Approved	F

- fare type: Pre-Funded or PAYG

REQ-CMG-81.6.5	Historic Data-6	Approved	F

- Pre-Funded purchase type

REQ-CMG-81.6.6	Historic Data-7	Approved	F

- amount of payment

REQ-CMG-81.6.7	Historic Data-8	Approved	F

- usage date

REQ-CMG-81.6.8	Historic Data-9	Approved	F

- usage location

REQ-CMG-82	Customer Account Information	Approved	F

Ensure that Customers have secure access to their transit account information and history.

REQ-CMG-82.2	Customer Account Information-2	Approved	F

Allow Customers to choose to remain anonymous.

REQ-CMG-82.3	Customer Account Information-3	Approved	F

Enable Customers to establish a PIN without identifying themselves personally.

REQ-CMG-83	Web Site Information Features	Approved	F

Provide the following information via the PRESTO web site:

REQ-CMG-83.1	Information on Customer Billing and Transit History	Approved	F

As a unique menu selection, the Web Site must provide detailed information to ensure that all TTC Customers are informed about how their Pre-Funded purchases and travel history will appear on the Web Site as reports and billing history.

REQ-CMG-83.2	Information on Sales and Reload Locations	Approved	F

- All PRESTO sale and reload locations including those outside of the TTC system.

REQ-CMG-83.2.1	Information on Sales and Reload Locations-2	Approved	F

- mapping and way-finding to the all sales and reload locations

REQ-CMG-83.3	Information on PRESTO System Security	Approved	F

- security of PRESTO System, including privacy concerns and personal security when using payment media

REQ-CMG-83.4	Information on PRESTO Media	Approved	F

- general information about PRESTO Media

REQ-CMG-83.5	Information on Fare Payment and Use	Approved	F

- provide information on where PRESTO Media and TTC products are accepted and clear instructions how to use PRESTO Media, including LUM, using graphical representations and instructional text

REQ-CMG-83.6	Web Site FAQ	Approved	F

- Frequently Asked Questions (FAQ) to help Customers understand the PRESTO System and to use the PRESTO web site

REQ-CMG-84	Compliance with Privacy Laws	Approved	F

Ensure the PRESTO web site complies with all relevant Canadian privacy laws, including MFIPPA and PIPEDA.

REQ-CMG-85	Cookies Opt-In	Approved	F

Allow Customers who enable their browsers to store cookies to store information to help them with subsequent access to the PRESTO web site.

REQ-CMG-85.1	Cookies Opt-In-2	Approved	F

Exclude any information that could be used to complete a payment transaction from being stored in a cookie.

REQ-CMG-86	No Cookies Required	Approved	F

Make certain that the PRESTO web site functions when cookies are blocked by a Customer.

REQ-CMG-87	TTC Content Requirements	Approved	NF

TTC will work with PRESTO with regards to specific TTC content requirements.

REQ-CMG-88	Secure Hosting	Approved	F

Provide secure hosting services for the PRESTO web site.

REQ-CMG-89	Encryption of Customer Data	Approved	F

Encrypt all data processed via the Customer website in compliance with PCI-DSS requirements. This includes data generated via administrative work, claims and work order processing.

REQ-CMG-89.1	Encryption of Customer Data-2	Approved	F

Conduct security/security vulnerability tests including ethical and unethical hacks. Provide security testing plan to the TTC for review prior to Final Design.

REQ-CMG-90	PCI Compliance	Approved	F

Ensure that the PRESTO web site and hosting service meet relevant PCI-DSS compliance.

REQ-CMG-91	Testing of Web Site	Approved	F

Execute comprehensive testing of the PRESTO web site to ensure that it functions according to acceptable performance and specifications.

REQ-CMG-92	Vulnerability Testing	Approved	F

Commit the PRESTO web site to independent testing and certification of its strength against malevolent attacks and ethical hacks. Provide test plan for implementation and operation to the TTC for review prior to Final Design.

REQ-CMG-93	Documentation Needs	Approved	NF

Documentation requirements will be provided by TTC and finalized during Design Review.

REQ-CMG-94	Use of TTC's Logos and Trademarks	Approved	NF

Guidelines for use of TTC's logos and trademarks will be determined during Design Review.

REQ-CMG-95	Information on TTC Operations	Approved	NF

Use of information about TTC operations will be determined during Design Review.

REQ-CMG-96	All Web Pages Printable	Approved	F

Ensure all web pages on the PRESTO web site to be printed in a properly formatted, easily readable document.

REQ-CMG-97	Printout of Customer Records	Approved	F

Ensure Customer records are formatted for printing in accordance with tax regulations and policies.

REQ-CMG-98	e-Pass web site interface	Approved	F

Display the status of all transit products: when transit products are active, days left in the active period, and when future transit products will become active.

2.4.2.3   Web Site Performance

REQ-CMG-99	Performance	Approved	F

Ensure that the PRESTO web site performs according to the Service Levels and specific performance standards in Schedule A.

REQ-CMG-100	Verification of Web Site Response Time	Approved	F

Confirm PRESTO web site response time performance through an automated, independent monitoring service.

REQ-CMG-101	Open Web Standards	Approved	F

Employ standard programming and design languages in the PRESTO web site.

REQ-CMG-101.1	Open Web Standards-2	Approved	F

Support the same web browsers that are supported by the TTC's web site site: www.ttc.ca

REQ-CMG-101.2	Open Web Standards-3	Approved	F

 Employ open web standards to ensure broadcast compatibility with modern browsers and devices, while preserving compliance with AODA and applicable accessibility and privacy standards.

REQ-CMG-101.3	Open Web Standards-4	Approved	F

Enable Customers to access the PRESTO web site through:

| REQ-CMG-101.4 | Open Web Standards-5 | Approved | F |

- personal computers

| REQ-CMG-101.5 | Open Web Standards-6 | Approved | F |

- smart phones

| REQ-CMG-101.6 | Open Web Standards-7 | Approved | F |

- other portable devices with internet access capabilities

| REQ-CMG-102 | Capacity | Approved | F |

Provide the ability to support 200% of TTC's total system transaction volumes for any given day without noticeable impact on transaction speed.

| REQ-CMG-103 | Upgrading of Capacity | Approved | F |

Expand the capacity of the PRESTO web site on an as needed basis.

2.4.3   Mail

| REQ-CMG-104 | Mail Service Channel | Approved | F |

Support a mail service channel for Customers in accordance with CMG-28.

2.5   Multi-Language

| REQ-CMG-105 | Scope | Approved | F |

Provide multi-language services in printed materials, on the PRESTO web site, through the PRESTO IVR, and potentially at PRESTO vending machines.

| REQ-CMG-105.1 | Scope-2 | Approved | F |

Design the PRESTO System to accommodate additional languages as required.

| REQ-CMG-106 | Default language | Approved | F |

The default language will always be English.

| REQ-CMG-107 | Multi-Language at Customer Access Points | Approved | F |

Provide multi-language support for the PRESTO call centre, PRESTO web site and printed materials

| REQ-CMG-108 | Core language support | Approved | F |

The PRESTO System will support both English and French as core languages.

| REQ-CMG-109 | Multi-Language flexibility | Approved | F |

Design the system to allow changes to be easily made without requiring extensive re-working, redesign or re-certification to the following:

| REQ-CMG-109.1 | Multi-Language flexibility-2 | Approved | F |

- language

| REQ-CMG-109.2 | Multi-Language flexibility-3 | Approved | F |

- content

| REQ-CMG-109.3 | Multi-Language flexibility-4 | Approved | F |

- format

| REQ-CMG-110 | Customer service centres | Approved | F |

Allow municipal transit Customer service centres to use the PRESTO call centre translation service when multi-language support is required.

| REQ-CMG-111 | Web site language | Approved | F |

Provide multi-language capability for static PRESTO web pages.

| REQ-CMG-111.1 | Web site language-2 | Approved | F |

Review and update PRESTO web site content as required.

| REQ-CMG-111.2 | Web site language-3 | Approved | F |

Display the PRESTO call centre telephone number prominently on the PRESTO web page where a Customer may obtain more information in their language of choice.

| REQ-CMG-112 | Static web page support | Approved | F |

Ensure that an appropriate range of information is available to Customers in a variety of languages on the PRESTO web site.

| REQ-CMG-113 | Call centre fallback | Approved | F |

Ensure Customers can obtain help through the PRESTO call centre when a multi-language presentation on the web site or a field device is inadequate.

| REQ-CMG-114 | Number of Customer call centre | Approved | F |

Display the PRESTO call centre phone number on all devices, displays, and in literature (indicate special steps for multi-language support) as mutually agreed to by PRESTO and TTC.

2.6   Refunds

| REQ-CMG-115 | Refund Policy | Approved | F |

Support e-Purse refunds in accordance with PRESTO policy and procedures; and TTC transit product refunds in accordance with TTC policy.

| REQ-CMG-116 | Fare refund scope and policy | Approved | F |

Enable two types of PRESTO refunds:

| REQ-CMG-116.1 | Fare refund scope and policy-2 | Approved | F |

 - automatic refunds for events that impact all Customers and/or identifiable Customer segments for individual municipal transit agencies

| REQ-CMG-116.2 | Fare refund scope and policy-3 | Approved | F |

- individual refunds for individual circumstances and/or Customers

REQ-CMG-117	System wide refunds	Approved	F

Enable refunds to be processed for all Customers when a disruption or shutdown of TTC service occurs.

A disruption of service includes but is not limited to:

 - strike,
 - maintenance and repair,
 - accident,
 - etc.

System wide refunds include all applicable TTC Customers.

REQ-CMG-118	Fare type refunds	Approved	F

Enable refunds to be targeted to a particular TTC Pre-Funded product such as a monthly pass or weekly pass.

REQ-CMG-119	Execution of refunds	Approved	F

Enable refunds to be scheduled and executed via the PRESTO System.

REQ-CMG-120	Dynamic refund status report/dashboard	Approved	F

Provide a refund status report and / or dashboard which includes at a minimum:

 - the total number of refunds eligible
 - the current number of refunds granted
 - if possible a breakdown of the those granted by fare types
 - time span of the refund Incident

REQ-CMG-121	Anonymous card holder refunds	Approved	F

Entitle registered and anonymous cardholders to obtain e-Purse refunds in accordance with PRESTO policy.

REQ-CMG-122	Automatic refunds	Approved	F

Enable TTC initiated fare refunds for all PRESTO Media, except LUM, in accordance with TTC policy.

REQ-CMG-122.1	Automatic refunds-2	Approved	F

Enable system wide refunds to be issued via PRESTO Devices and TTC Customer service centres.

REQ-CMG-123	System refund availability time window	Approved	F

Ensure all refunds including system-wide refunds are available to all PRESTO Cards within five Business Days from when the refund is announced.

REQ-CMG-124	Duration of the system refund	Approved	F

Allow the TTC to stipulate the time span during which system wide refunds will be available to Customers.

REQ-CMG-125	Prevention of multiple refunds	Approved	F

Prevent the same refund from being duplicated on a PRESTO Card.

REQ-CMG-126	Refunds for e-Pass holders	Approved	F

Enable refunds for period pass holders to be added to e-Purse or used to extend the validity period of a pass product.

REQ-CMG-127	Indication of a refund	Approved	F

This refunded value (and any new e-Purse product) can be confirmed at an AVM, FMVD, and Customer Service Centre.   Furthermore, a refund amount will appear on the Customers Web Site list of last transactions.

Provide Customers with refund details:

REQ-CMG-127.1	Indication of a refund-2	Approved	F

 - when a cardholder presents their card to the card reader that applies the refund

REQ-CMG-127.2	Indication of a refund-3	Approved	F

 - when a cardholder queries their transaction history via the PRESTO call centre or website

REQ-CMG-127.3	Indication of a refund-4	Approved	F

Enable Customers to verify their refund via AVM, FMVD or Customer service centre.

REQ-CMG-128	Refund event report	Approved	F

Provide a refund report(s) that specifies:

 - refund amounts by card type
 - refunds by Concession type
 - total refund numbers

Subsequent changes to the report will be possible after the refund has been awarded.

Note that this refund report is for a specific refund event.   It is not for all refunds awarded over a particular time period.

REQ-CMG-128.1	Refund event report-2	Approved	F

Provide a refund report that includes:

 - refund amounts by card type
 - refunds by Concession type
 - total refund numbers

 Note that this refund report is for a specific refund event.   It is not for all refunds awarded over a particular time period.

REQ-CMG-129	Tracking and financial reporting	Approved	F

Track and report all refunds awarded to the ridership as part of the financial and ridership group of reports. Show refunds as a separate category for financial/auditing purposes.

REQ-CMG-129.1	Tracking and financial reporting-2	Approved	F

Define and generate refund reports as necessary.   The reports may span time frames of up to two years.

3   Field System Management

3.1   Maintenance Management System

REQ-FSM-1	Maintenance Management System (MMS)	Approved	F

Furnish, install, adapt and operate, a commercially available, off-the shelf Maintenance Management System.

REQ-FSM-1.3	Use of COTS Systems for MMS	Approved	F

Ensure that all components of the Maintenance Management System are commercially available, off-the-shelf systems that can be interfaced with each other using Open Standards in order to provide a comprehensive and complete Maintenance Management System.

REQ-FSM-1.2	Maintenance Management System (MMS)	Approved	F

Provide on-going preventative and Corrective Maintenance for all Hardware, Software and/or systems forming part of the PRESTO System.

REQ-FSM-1.4	Timely PRESTO System Status Updates	Approved	F

Ensure the Maintenance Management System is able to broadcast a timely status update to all stakeholders in the operation of the PRESTO System, including those stakeholders specifically identified by TTC via:

REQ-FSM-1.4.1	Timely PRESTO System Status Updates-2	Approved	F

 - Email

REQ-FSM-1.4.2	Timely PRESTO System Status Updates-3	Approved	F

 - SMS/text message

REQ-FSM-1.4.3	Timely PRESTO System Status Updates-4	Approved	F

 - automated phone messaging to all stakeholders in the operation of the PRESTO System

REQ-FSM-1.5	Use of Best Industry Standards	Approved	F

The PRESTO Maintenance Management System will incorporate and maintain industry best practices across the range of functionalities offered.

REQ-FSM-1.6	Support for all PRESTO Managed System	Approved	F

Provide an Maintenance Management System that will provide monitoring and reporting on the condition and operation of:

REQ-FSM-1.6.1	Support for all PRESTO Managed System-2	Approved	F

 - Hardware

REQ-FSM-1.6.2	Support for all PRESTO Managed System-3	Approved	F

 - Software and/or systems

REQ-FSM-1.6.3	Support for all PRESTO Managed System-4	Approved	F

- equipment

REQ-FSM-1.6.4	Support for all PRESTO Managed System-5	Approved	F

- sub-systems

REQ-FSM-1.6.5	Support for all PRESTO Managed System-6	Approved	F

- functionalities

REQ-FSM-1.6.6	Support for all PRESTO Managed System-7	Approved	F

- support services (such as telecommunications, transaction processing by the central processor)

needed for normal, in-service operation of the PRESTO System and the achievement of required SLA's

REQ-FSM-1.7	Availability of Maintenance Management Data and Reports	Approved	F

Ensure that reports are uploaded, as well as raw data, from the PRESTO Maintenance Management System to the Data Mart.

REQ-FSM-1.8	Frequency of MMS Data Uploads	Approved	F

At a minimum, the MMS data and reports will be uploaded to the Data Mart on a daily basis throughout the Term. PRESTO will ensure that the Maintenance Management System will enable PRESTO to upload data at other intervals and with greater frequency at its discretion through direct access to the MMS reporting and data management engine.

REQ-FSM-1.9	MMS Reporting	Approved	F

Provide Maintenance Management System reports that encompass all system and equipment events that result in or have an impact on preventative and Corrective Maintenance.

REQ-FSM-1.9.1	Specific Maintenance Report Details	Approved	F

Capture and report all maintenance activity.

For example:
 - start and end dates and time;
 - locations of event;
 - specific equipment affected, and
 - all other necessary details to support assessment of equipment and system status, and manage and report on remediation efforts.

REQ-FSM-1.9.2	Maintenance Impact on Sales Availability	Approved	F

Monitor and report on the impact of all Field Maintenance and Revenue Collection / Servicing activity on Sales Availability as defined in the SL A Schedule A.

REQ-FSM-1.10	Support for Field Maintenance Staff	Approved	F

Provide a Maintenance Management System that can be used on handheld devices and communications equipment by maintenance staff performing preventative and Corrective Maintenance work in the field.

Maintenance and maintenance repair will be automated to the greatest extent possible.

REQ-FSM-1.10.1	Support for Field Maintenance Staff-2	Approved	F

Ensure the handheld Maintenance Management System includes the following:

REQ-FSM-1.10.2	Support for Field Maintenance Staff-3	Approved	F

- screens for data entry that capture maintenance activity performed

REQ-FSM-1.10.3	Support for Field Maintenance Staff-4	Approved	F

- access to manuals, procedures, historical data on equipment performance and repairs

REQ-FSM-2	MMS Components	Approved	F

Provide an Maintenance Management System comprised of a set of sub-system components that include at a minimum:

REQ-FSM-2.1	MMS Components-2	Approved	F

- a device management and monitoring system

REQ-FSM-2.2	MMS Components-3	Approved	F

- a work order system

REQ-FSM-2.3	MMS Components-4	Approved	F

- an application and services management and monitoring system

REQ-FSM-2.4	MMS Components-5	Approved	F

- an inventory system

REQ-FSM-2.5	MMS Components-6	Approved	F

- an ordering system

REQ-FSM-2.6	MMS Components-7	Approved	F

- a problem Incident and management system

REQ-FSM-2.7	MMS Components-8	Approved	F

- a payment device management system

REQ-FSM-3	Device Management and Monitoring System	Approved	F

The PRESTO System device management and monitoring system will specifically manage PRESTO in-field devices.

REQ-FSM-3.1	Scope of Monitoring	Approved	F

Provide device management and monitoring system capable of monitoring all:

REQ-FSM-3.1.1	Scope of Monitoring-2	Approved	F

- events

REQ-FSM-3.1.2	Scope of Monitoring-3	Approved	F

- Incidents

REQ-FSM-3.1.3	Scope of Monitoring-4	Approved	F

- counts

as specified in this Agreement for the purposes that include but not limited to, performance, maintenance, revenue collection /servicing

REQ-FSM-3.2	Events - Alarms - Presentation	Approved	F

Provide a device management and monitoring system that uses:

REQ-FSM-3.2.1	Events - Alarms - Presentation-2	Approved	F

- intelligent event / alarm filtering

REQ-FSM-3.2.2	Events - Alarms - Presentation-3	Approved	F

- escalation rules (e.g. allowing time critical events to have high priority)

REQ-FSM-3.2.3	Events - Alarms - Presentation-4	Approved	F

- clear, unambiguous presentation to device monitoring personnel

REQ-FSM-3.3	Flexible and Robust	Approved	F

PRESTO will ensure that the device management and monitoring system will be both flexible and robust for all PRESTO equipment.

REQ-FSM-3.4	Scalable	Approved	F

Provide a scalable device management and monitoring system, capable of growing with TTC services.

REQ-FSM-3.5	Availability	Approved	F

Ensure the device management and monitoring system is available 24x7, 365 days / year.

REQ-FSM-3.6	COTS Open Standards	Approved	F

Provide a device management and monitoring system that is:

REQ-FSM-3.6.1	COTS Open Standards-2	Approved	F

- based on Open Standards

REQ-FSM-3.6.2	COTS Open Standards-3	Approved	F

- a COTS system that may be easily interfaced to other PRESTO System services(i.e. loosely coupled)

REQ-FSM-3.7	Remote Testing and Diagnostics	Approved	F

Ensure the device management and monitoring system will provide remote diagnostics and testing.

REQ-FSM-3.8	Remote Changing of Parameters Monitored	Approved	F

Ensure that the device management and monitoring system is capable of remotely changing parameters monitored.

REQ-FSM-3.9	Independence of Equipment Type and Make	Approved	F

Ensure that the device management and monitoring system will work independently of the type and make of the field equipment monitored.

REQ-FSM-3.10	Independence to Transportation Mode	Approved	F

Ensure that the device management and monitoring system for PRESTO Devices will work independent of the location and mode of transit.

REQ-FSM-3.11	Calculation of Preventative Maintenance Cycles	Approved	F

Provide a device management and monitoring system that will calculate preventive maintenance cycles based on actual performance of equipment.

REQ-FSM-3.12	Maintenance Reporting	Approved	F

Ensure the device management and monitoring system has the capacity to report on the nature, components, and other relevant tasks performed during corrective or preventive maintenance, or according to time, cycles, and other parameters as identified either by the OEM or other authoritative source or entity.

REQ-FSM-3.13	Automatic Device and Component Information Updating	Approved	F

PRESTO will ensure that all installation, repair, and replacement of PRESTO equipment or components is identified and tracked by the device management and monitoring system and that any information required by the PRESTO System CBO is automatically updated.

REQ-FSM-4	Work Order System	Approved	F

The PRESTO work order system will be used for generating PRESTO System work orders that will be used by maintenance personnel for logging, investigating, repairing and /or replacing PRESTO field equipment.

REQ-FSM-4.1	Automated Generation of Work Orders	Approved	F

Provide a work order system that will automatically generate work orders and dispatch PRESTO's maintenance personnel for preventative and Corrective Maintenance or issues requiring further local investigation of devices.

REQ-FSM-4.2	Work Order Delivery	Approved	F

Provide a work order system that is capable of sending work orders to designated maintainers in the field on any commercially available wireless communications device via the following:

REQ-FSM-4.2.1	Work Order Delivery-2	Approved	F

 - SMS

REQ-FSM-4.2.2	Work Order Delivery-3	Approved	F

 - web page

REQ-FSM-4.2.3	Work Order Delivery-4	Approved	F

 - Email

REQ-FSM-4.3	Work Order Identification	Approved	F

Ensure that work orders provide complete equipment location, PRESTO identification and TTC identification numbers.

REQ-FSM-5	Application and Services Management and Monitoring System	Approved	F

Provide an application and services management and monitoring system that will specifically manage PRESTO Services and applications.

REQ-FSM-5.1	Network Monitoring	Approved	F

Monitor all PRESTO networks, network infrastructures and networks provided by third party in order to provide at a minimum:

 - PRESTO network status
 - Network alerts
 - Determination of network Fixes

As per network SLAs as defined in Schedule A.

REQ-FSM-6	Inventory System	Approved	F

Provide an inventory system that will track and inventory all devices, components, and PRESTO Media that comprise the PRESTO System.

REQ-FSM-6.1	Interacts with the Inventory Management System	Approved	F

Ensure the Maintenance Management System is capable of interacting with inventory systems and other logistics programs.

REQ-FSM-6.1.1	Interacts with the Inventory Management System-2	Approved	F

Ensure an adequate supply of devices, components, parts, consumables, and media is maintained for the PRESTO System in order to sustain operations according to TTC's SLA's and performance criteria stated in Schedule A.

REQ-FSM-7	Ordering System	Approved	F

Provide an order system that is integrated with the MMS and in particular the inventory system.

REQ-FSM-7.1	Use of Ordering System	Approved	F

 Provide a fully automated ordering system with the capability to at a minimum:

REQ-FSM-7.1.1	Use of Ordering System-2	Approved	F

 - place orders with third party suppliers

REQ-FSM-7.1.2	Use of Ordering System-3	Approved	F

 - interface with third party suppliers systems

REQ-FSM-7.1.3	Use of Ordering System-4	Approved	F

 - track orders to fulfillment

REQ-FSM-7.1.4	Use of Ordering System-5	Approved	F

 - use notifications (email, txt, web) for the status of orders

REQ-FSM-7.1.5	Use of Ordering System-6	Approved	F

- validate the delivery

- allow for returns

REQ-FSM-7.1.6	Use of Ordering System-7	Approved	F

- Interface with the MMS and in particular the Inventory System

REQ-FSM-7.2	Additional Functionality	Approved	F

Enable the PRESTO order management system to:

REQ-FSM-7.2.1	Additional Functionality-2	Approved	F

- register the loss (undelivered) of any media (LUM, revenue and non revenue cards)

REQ-FSM-7.2.2	Additional Functionality-3	Approved	F

- allow TTC to place orders for TTC Private Fare Cards.

REQ-FSM-7.3	Estimating Orders	Approved	F

Provide an ordering processes that is integrated to the MMS and Inventory system in such a manner as to allow the ordering system to automatically estimate demand for PRESTO Media (cards and LUMs) and consumables (paper, ink, etc).

REQ-FSM-8	Problem Incident and Management System	Approved	F

Provide a problem Incident and management system that will automatically track and report on all PRESTO System Incidents.

REQ-FSM-8.1	Problem and Incident Management System Scope	Approved	NF

The PRESTO Problem Incident and Management System will be based on industry best practice and will include but not be limited to:

- automatically recording all PRESTO System incidents;
- allow manual input of data;
- track and tag all user access and activity;
- access real time incident data;
- attach files to incidents; and
- automatically generate incident reports (Word, emails, texts).

REQ-FSM-9	Payment Device Management System	Approved	F

Provide a payment device management system that will be used for managing all payment certified devices such as PIN Pads and point of sale devices.

REQ-FSM-9.1	PDM System Uses	Approved	F

Ensure the payment device management system includes at a minimum:

REQ-FSM-9.1.1	PDM System Uses-2	Approved	F

- all payment device key loadings/exchanges

REQ-FSM-9.1.2	PDM System Uses-3	Approved	F

- in-field secure encrypted device application loads/reloads

REQ-FSM-10	Provision of Detailed Description of the MMS	Approved	F

Provide a detailed description of the Maintenance Management System proposed for the PRESTO System, along with supporting operating protocols for preventative and Corrective Maintenance that are supported by and fully leverage the capabilities of the Maintenance Management System.

REQ-FSM-11	Validation of the MMS	Approved	F

TTC and PRESTO will validate and finalize the required business and operational functionalities of the Maintenance Management System prior to Final Design.

3.2 Maintenance of Field System

REQ-FSM-12	Responsibility of Maintenance	Approved	F

Perform all maintenance on equipment and systems that comprise the PRESTO System for a period of time to be specified in the terms of TTC's agreement with PRESTO.

REQ-FSM-13	Maintenance Manual	Approved	F

Develop, test, and publish a maintenance manual that will document all procedures, protocols, equipment, tools, and parts necessary for maintaining the PRESTO System in a State of Good Repair and for achieving TTC's required performance standards and service levels.

The Maintenance Manual shall be subject to the written approval of TTC and PRESTO and will include in the Maintenance Manual any reasonable suggestions made by TTC.

REQ-FSM-14	No Maintenance of Current Legacy System	Approved	F

PRESTO will not perform maintenance for any part or aspect of TTC's current legacy fare system. The PRESTO System will be Layered On to TTC's Current System.

REQ-FSM-15	Daily, Automated Generation of Maintenance Reports	Approved	F

For any maintenance activities, such as,

 - device swap outs;
 - repairs that involve removal of equipment, etc;

That may affect the data collected at the device, PRESTO will ensure that the PRESTO System generates automated maintenance activity reports at least on a daily basis in order for TTC to maintain data integrity, audit process, and any data integration with either the PRESTO System or Current System.

REQ-FSM-16	Device Management and Monitoring System	Approved	F

Provide a device management and monitoring system that will be a part of PRESTO's service offering in connection with the PRESTO System solution.

REQ-FSM-16.1	Device Management and Monitoring System-2	Approved	F

Ensure the device management and monitoring solution will be part of the Maintenance Management System described in the Maintenance Management System section of this schedule.

REQ-FSM-17	Availability of TTC Vehicles for PRESTO Maintenance	Approved	F

TTC will at its sole discretion, and acting reasonably, make all final decisions with respect to the availability of TTC vehicles for maintenance to be done by PRESTO personnel.

REQ-FSM-18	Inventory Storage and Repair Facilities	Approved	F

PRESTO is responsible for all inventory, storage and repair facilities required to operate and maintain the PRESTO System. All equipment spares, replacement parts, consumables (paper rolls, and LUM stock) repair area / equipment required to operate the PRESTO System will be provided by PRESTO. Very limited storage or repair facilities may be available on-site at TTC.

REQ-FSM-19	TTC Support for PRESTO Maintenance at Field Trial and Post Commissioning	Approved	NF

During Field Trials and for a minimum of 3 months after Commissioning, TTC will provide as deemed necessary by TTC, supervised access to all maintenance personnel employed by PRESTO for the purpose of servicing the PRESTO System and all PRESTO equipment installed on TTC property. During this period, TTC will provide as deemed necessary by TTC, supervision monitoring, and guidance on proper procedures when working on the PRESTO System for TTC, and when accessing fare payment equipment installed on legacy TTC fare system equipment (e.g. turnstiles) or on TTC vehicles

REQ-FSM-20	Conduct while on TTC Property	Approved	NF

While on TTC property, the conduct of PRESTO designated personnel must conform to all applicable safety laws, regulations and TTC Policies.

As an example, the following TTC guidelines, which are subject to confirmation and change by TTC during Design Review, are for on-site work for personal safety and regard for customers using TTC's transportation services apply to all contractors performing work on TTC property. Personal Protective Equipment (PPE) must be worn, including: safety shoes bearing the green emblem of certification under CAN/CSA Z195; hard hats; reflective vest; and safety glasses. Prior to starting work on a TTC site, TTC staff will meet with each contractor to communicate important safety expectations.

REQ-FSM-21	Familiarity of TTC Policies and Reviews	Approved	NF

After the initial three-month period, PRESTO will be required to be familiar with and comply with all applicable laws, regulations and TTC Policies and procedures for access to TTC facilities by private contractors. Periodic reviews of PRESTO's compliance with all applicable laws, regulations and TTC Policies and procedures, will continue. However, TTC is responsible to ensure any change to TTC Policies and Procedures for access to TTC facilities and to carry out work on TTC facilities is clearly communicated in a timely manner and where necessary TTC is to provide appropriate training at its cost.

REQ-FSM-22	Availability of Maintenance Operations Data	Approved	F

Store all data captured, reported, analyzed and otherwise resulting from all maintenance operations and available through the Maintenance Management System in the Data Mart according to TTC requirements.

REQ-FSM-23	Maintenance Project Desk	Approved	F

Establish, furnish, and support the operation of a contact point which shall be referred to as the maintenance project desk which will be the single point of contact for TTC field Device Maintenance issues and activities.

REQ-FSM-23.1	Role of Maintenance Project Desk	Approved	F

Establish a maintenance project desk that will be responsible for the implementation, management and coordination of all maintenance support activities for the PRESTO System according to agreed-upon procedures that will include at a minimum:

REQ-FSM-23.1.1	Role of Maintenance Project Desk-2	Approved	F

- oversight of all preventative and Corrective Maintenance activities

REQ-FSM-23.1.2	Role of Maintenance Project Desk-3	Approved	F

- co-ordination with TTC for supervised access to TTC facilities to minimize operational impacts

REQ-FSM-23.1.3	Role of Maintenance Project Desk-4	Approved	F

- operational and business oversight of the Maintenance Management System

REQ-FSM-23.1.4	Role of Maintenance Project Desk-5	Approved	F

- acceptance and disposition of trouble calls either generated by the Maintenance Management System, originating with Field Maintenance personnel, or reported by Customers via the web site or Customer call centre, and/or through other channels

REQ-FSM-23.2	Field Maintenance Personnel	Approved	F

Ensure that Field Maintenance personnel can communicate in real-time directly with the maintenance project desk.

REQ-FSM-23.2.1	Field Maintenance Personnel-2	Approved	F

Dispatch Field Maintenance personnel in response to PRESTO System events.

REQ-FSM-23.3	Access to PRESTO System Data	Approved	F

Ensure that the maintenance project desk will have direct access to information about the status of the PRESTO System, including access to information from the PRESTO System back office, the web site and the Customer call centre.

REQ-FSM-23.3.1	Access to PRESTO System Data-2	Approved	F

Ensure the maintenance project desk will be capable of receiving information directly from TTC about its services and business operations.

REQ-FSM-23.4	Staffing of the Maintenance Project Desk	Approved	F

Ensure the maintenance project desk is available on a 24 by 7 basis for the first six months of operations after initial commissioning.

REQ-FSM-23.4.1	Staffing of the Maintenance Project Desk-2	Approved	F

Ensure the maintenance project desk is available via:

REQ-FSM-23.4.2	Staffing of the Maintenance Project Desk-3	Approved	F

- toll-free telephone number

REQ-FSM-23.4.3	Staffing of the Maintenance Project Desk-4	Approved	F

- Email

REQ-FSM-23.4.4	Staffing of the Maintenance Project Desk-5	Approved	F

- SMS text messaging

REQ-FSM-23.4.5	Staffing of the Maintenance Project Desk-6	Approved	F

After the initial six-month period, subject to mutual agreement between TTC and PRESTO, PRESTO may propose an alternative staffing schedule to better reflect actual performance of the PRESTO System, the Maintenance Management System, and the Field Maintenance personnel.

| REQ-FSM-24 | Provision of Maintenance Equipment | Approved | F |

Provide necessary equipment required by maintenance personnel for in-field servicing of PRESTO equipment.

3.2.1   Corrective Maintenance

| REQ-FSM-25 | Corrective Maintenance Plan | Approved | F |

Develop and execute a Corrective Maintenance plan for all Hardware, Software and/or services forming part of the PRESTO System.

| REQ-FSM-25.1 | Conformity to TTC Protocols | Approved | F |

Ensure the Corrective Maintenance plan conforms to TTC's requirements and protocols for authorized access to TTC facilities by outside contractors and vendors.

| REQ-FSM-25.2 | Corrective Maintenance Plan Contents | Approved | F |

Ensure the Corrective Maintenance plan includes goals, procedural details and resource commitments that demonstrate PRESTO's ability to achieve TTC's performance standards for the PRESTO System.

| REQ-FSM-25.2.1 | Corrective Maintenance Plan Contents-2 | Approved | F |

Provide all necessary manuals and documentation required to support Corrective Maintenance of PRESTO equipment.

| REQ-FSM-25.3 | Development of Corrective Maintenance Plan | Approved | F |

Provide a complete and upgraded Corrective Maintenance plan during the course of each phase of Design Review

| REQ-FSM-25.3.1 | Development of Corrective Maintenance Plan-2 | Approved | F |

Provide a final Corrective Maintenance plan subject to TTC's approval.

| REQ-FSM-26 | Replacement of Components | Approved | F |

Ensure that all Corrective Maintenance consists of in-field replacement of components.

Replacement of components includes all specific device configurations required for that particular device location and security (including any banking and operating keys).

| REQ-FSM-26.1 | Components Replacement Time Constraints | Approved | F |

Design all equipment to enable replacement of all components necessary to return the equipment to revenue service according to the time constraints stipulated in Schedule A.

| REQ-FSM-26.2 | Resources Used for Component Replacement | Approved | F |

Design equipment so that replacement of components will require only one person to execute all replacement tasks within the allotted time.

| REQ-FSM-27 | Complete In-Field Maintenance | Approved | F |

Design the support services for equipment and system maintenance to allow all equipment and components to be:

REQ-FSM-27.1	Complete In-Field Maintenance-2	Approved	F

 - fully serviced

REQ-FSM-27.2	Complete In-Field Maintenance-3	Approved	F

 - swapped out/replaced

REQ-FSM-27.3	Complete In-Field Maintenance-4	Approved	F

 - configured

REQ-FSM-27.4	Complete In-Field Maintenance-5	Approved	F

 - key injected (financial and/or PRESTO System)

REQ-FSM-27.5	Complete In-Field Maintenance-6	Approved	F

 - initiated

REQ-FSM-27.6	Complete In-Field Maintenance-7	Approved	F

 - made fully revenue service capable by a field service technician without requiring additional PRESTO System back office steps or processes

REQ-FSM-28	End-to-End Testing	Approved	NF

Once the installation/replacement of any PRESTO equipment or component has been complete, the PRESTO System will allow a complete, end-to-end test to be completed in order to ensure proper operation. This end-to-end test may be comprised of several smaller tests. However all tests will demonstrate the effectiveness of the maintenance procedure and will be used to demonstrate completeness of the maintenance.

Such end-to-end tests will include, but not be limited to,

- test fare transactions (e.g. at Reader Assemblies);
- test purchase transactions (e.g. at FMVDs); and
- test device alert generation.

Details of the test procedures will be mutually agreed as part of the Maintenance Plan.

3.2.2   Preventative Maintenance

REQ-FSM-29	Preventative Maintenance Plan	Approved	F

Develop and execute a Preventative Maintenance plan for all Hardware, Software and/or services forming part of the PRESTO System.

REQ-FSM-29.1	Preventative Maintenance Plan Contents	Approved	F

Develop a Preventative Maintenance plan that includes goals, procedural details, and resource commitments that demonstrate PRESTO's ability to achieve TTC's performance standards for the PRESTO System..

REQ-FSM-29.1.1	Preventative Maintenance Plan Contents-2	Approved	F

Provide all necessary manuals and documentation required to support Preventative Maintenance of PRESTO equipment.

| REQ-FSM-29.2 | **Preventative Maintenance Plan by Equipment Type** | Approved | F |

Ensure that the Preventative Maintenance plan identifies tasks for each piece of equipment, along with support materials and tools needed to accomplish Preventative Maintenance tasks.

| REQ-FSM-29.3 | **Development of Preventative Maintenance Plan** | Approved | F |

Provide a complete and upgraded Preventative Maintenance plan during the course of each phase of Design Review

| REQ-FSM-29.3.1 | **Development of Preventative Maintenance Plan-2** | Approved | F |

Develop a final Preventative Maintenance plan approved by TTC.

3.3   Revenue Collection/Servicing

| REQ-FSM-30 | **Revenue Collection and Servicing** | Approved | F |

PRESTO will be responsible for all revenue collection and servicing of all PRESTO equipment.

| REQ-FSM-31 | **Revenue Collection and Servicing Plan** | Approved | F |

Develop a revenue collection and servicing plan that includes at a minimum:

| REQ-FSM-31.1 | **Revenue Collection and Servicing Plan-2** | Approved | F |

 - Revenue Collection / Servicing at all subway stations including bus platforms

| REQ-FSM-31.2 | **Revenue Collection and Servicing Plan-3** | Approved | F |

 - Revenue Collection / Servicing on all surface vehicles.

| REQ-FSM-31.3 | **Revenue Collection and Servicing Plan-4** | Approved | F |

 - Revenue Collection / Servicing at all LRV stops

| REQ-FSM-31.4 | **Revenue Collection and Servicing Plan-5** | Approved | F |

 - revenue collecting/servicing of all other locations and PRESTO Devices used by the TTC including HHpoint of sale, TTC CSC, and test lab

| REQ-FSM-32 | **Revenue Collection and Servicing Constraints** | Approved | F |

Ensure that the Revenue Collection / Servicing plan works within TTC operation constraints that include but not limited to:

| REQ-FSM-32.1 | **Revenue Collection and Servicing Constraints-2** | Approved | F |

 - Revenue Collection / Servicing time constraints associated with each mode of transportation and location

| REQ-FSM-32.2 | **Revenue Collection and Servicing Constraints-3** | Approved | F |

 - service constraints associated with each mode of transportation

| REQ-FSM-32.3 | **Revenue Collection and Servicing Constraints-4** | Approved | F |

 - SLA specifications as defined in Schedule A

| REQ-FSM-32.4 | Revenue Collection and Servicing Constraints-5 | Approved | F |

- TTC policies and rules regarding idling times, on property work and security

| REQ-FSM-33 | Revenue Collection and Servicing Design Review | Approved | F |

The Revenue Collection / Servicing plan will be reviewed by TTC.

4   Business Intelligence

4.1   General

REQ-BIN-1	Provide and Support Business Intelligence	Approved	F

Provide and support Business Intelligence reporting and processing across all business and functional processes.

REQ-BIN-2	Scope of Business Intelligence Service	Approved	F

Provide a Business Intelligence service that includes all PRESTO System data and associated tools required to generate reports, charts and dashboards.

REQ-BIN-3	Role of Business Intelligence in PRESTO System	Approved	F

Enable the Business Intelligence service to allow investigations into a wide range of topics including: how the PRESTO System is working; identifying ways to improve the system; addressing TTC Customer issues; and how to improve transit service and operations for Customers

REQ-BIN-4	Support for all TTC Operations	Approved	F

At a minimum, support all financial and planning functions in addition to the following three areas used to analyze, evaluate, and plan short and long term business operations:

 - transactional integrity
 - operations performance
 - Customer satisfaction

REQ-BIN-5	Provision for a Data Mart	Approved	F

Provide a data repository (Data Mart) to capture all data from transaction processing and operating chain. This Data Mart is described in the Data Mart Section (DMG-XX requirements).

REQ-BIN-6	Timely, Accurate and Relevant Business Intelligence	Approved	F

Ensure that all reports are timely, accurate, and are based on relevant daily data and that the ETL (Extract, Transform, Load) process achieves the required Service Level..

REQ-BIN-7	Scalable and Redundant	Approved	F

The Business Intelligence and reporting function shall be scalable and fully redundant.

4.2   Reporting

REQ-BIN-8	Overview	Approved	F

Provide the following components:

 - report functionality
 - report databases
 - report data and types

Note that reporting covers all types of reports and operations.   This includes PRESTO Media transactions, auditing, inventory, field device management as well as all ridership and revenue

reporting.

TTC and PRESTO will determine both current and desired reporting needs.

4.2.1   Report Functionality

REQ-BIN-9	Overview	Approved	F

This section defines the requirements for the functionality of the reporting services. In short, the reporting services are flexible, scalable and extensible providing a dynamic service for the PRESTO System.

REQ-BIN-10	Provision of Reporting Tools	Approved	F

Provide standard reports using tools that simplify access and use of reports.

REQ-BIN-10.1	Provision of Reporting Tools-2	Approved	F

Provide TTC with direct access to the report generation facility.

REQ-BIN-10.2	Provision of Reporting Tools-3	Approved	F

Provide capability for standard and ad-hoc reports using tools that simplify access and use of reports.

REQ-BIN-11	Reporting functionality scope	Approved	F

Provide reporting functionality, specifically:

 - report generation
 - dashboard generation
 - ad-hoc reports
 - design of reports
 - import/export capabilities
 - integration of reports into third party applications
 - delivery mechanisms
 - flexibility of report generation
 - logical data models
 - cross functional capabilities
 - alerts

REQ-BIN-12	Scalability	Approved	F

Ensure the reporting service is modular and scalable allowing support for a computationally intensive environment. This environment is computational intensive due to,

  - large number of standard and ad hoc reports,
  - substantial number of interactive reports,
  - high amount of report data processing due to volume of data,
  - both fine scale and summary reports required,
  - relatively fast turn-around time for daily reports,

Furthermore, report generation and in general all other reporting services may not impact the operation of any other part of the PRESTO System (e.g. slow down data collection, and exception processing).

REQ-BIN-13	Availability	Approved	F

Reporting services shall be available 24 x 7 x 365 days with no limitations as to when a report can be generated (base on available data).

REQ-BIN-14	Redundancy	Approved	F

Ensure the reporting services are redundant with automatic fail-over.

Automatic fall-over is an automatic process where in case of a system or server failure, the control of data and applications will automatically fall-over to a secondary system or server.

REQ-BIN-15	Open, extensible reporting service	Approved	F

Ensure the reporting service is:

 - open
 - flexible
 - menu-driven
 - modular
 - supports a published API

REQ-BIN-16	Web based reporting services	Approved	F

Provide interactive reporting via the internet or private network.

REQ-BIN-16.1	Web based reporting services-2	Approved	F

Support client server architecture.

REQ-BIN-16.2	Web based reporting services-3	Approved	F

Ensure that web based services communicating via XML messages follow the SOAP standard.

REQ-BIN-17	Enterprise reporting	Approved	F

Provide reporting functionality to:

 - finance/accounting
 - operations
 - marketing
 - IT
 - planning

Each of these departments and/or operations will have a plethora of common and specialized reporting needs. This will be reflected in the various types of data and reports each business group will require. The key point here is that the reporting functionality must be capable of all the organizations reporting needs; hence it must be enterprise capable.

Further to the point on enterprise level reporting, all reports may be published directly to the desired TTC corporate portal for delivery to individuals as defined by the TTC.

REQ-BIN-18	Embedded reporting	Approved	F

Ensure standard or ad-hoc reports are embeddable in other applications.

These reports may be used as is, customized or re-created from the original report on an as needed basis without exporting and importing across business services.

REQ-BIN-19	General report types	Approved	F

Provide both standard and ad-hoc reports.

REQ-BIN-20	Reporting management and life cycle	Approved	F

Support report management and report life cycle processes. Management and life cycle process includes:

- creating reports (ad-hoc - design)
- creating report templates
- testing, generating and deleting ad-hoc reports (via ad-hoc process)
- validating reports (auditing a reports content both new and standard)
- migrating ad-hoc reports to standard reports (operational/ finance reports are standard reports)
- tweaking standard reports (grace period)
- securing reports from modification
- scheduling of reports
- end of life reports (elimination of standard reports)
- archiving
- retrieval
- tracking

The reporting system will in essence provide a means of document control for all reports.

REQ-BIN-21	Report management system information	Approved	F

Provide a history of a report, when it was generated, and the author for auditing and Quality Assurance purposes. The information in the report management system may be viewed, copied and printed at any time.

REQ-BIN-22	Report repository	Approved	F

Provide standard and ad-hoc reports as well as enable the creation and storage of templates for reporting purposes.

REQ-BIN-22.1	Report repository-2	Approved	F

Maintain report data, including the source data from which a report was generated, for seven years. Each report in the repository shall include:

REQ-BIN-22.2	Report repository-3	Approved	F

- creation date

REQ-BIN-22.3	Report repository-4	Approved	F

- description

REQ-BIN-22.4	Report repository-5	Approved	F

- author (first and last name)

REQ-BIN-22.5	Report repository-6	Approved	F

- validation / verifications status

REQ-BIN-22.6	Report repository-7	Approved	F

- approval date

REQ-BIN-22.7	Report repository-8	Approved	F

- modification date

| REQ-BIN-22.8 | Report repository-9 | Approved | F |

- status (active, in-active, EOL, test)

| REQ-BIN-22.9 | Report repository-10 | Approved | F |

- version number

| REQ-BIN-22.10 | Report repository-11 | Approved | F |

- notes

| REQ-BIN-23 | Report versions | Approved | F |

Support the ability to create multiple versions of reports with proper versioning and document control.

| REQ-BIN-24 | Report archiving | Approved | F |

Support the ability to archive previously generated standard/ad-hoc and interactive reports and their associated data. These reports will be catalogued and archived along with their datasets so that they may be re-created at any time in the future.

| REQ-BIN-24.1 | Report archiving-2 | Approved | F |

Enable the archiving feature to be dynamically configurable, allowing the flexibility to determine which reports are to be archived and when they are to be archived. Archiving shall support the ability to archive all reports after a specified date.

| REQ-BIN-24.2 | Report archiving-3 | Approved | F |

Provide a means for retrieving archived reports (and associated data) in a cost-effective manner with a maximum 24 hour turnaround time.

| REQ-BIN-25 | Use of logical data view | Approved | F |

Provide functionality in the reporting system to allow TTC to view data using logical data views allowing TTC business names to be used for all data fields. These views shall be configurable and controlled by TTC.

| REQ-BIN-26 | Report classifications and organization | Approved | F |

Provide a report repository supporting classification (hierarchal, flat, tree and free form) and organization of reports as determined by TTC.

| REQ-BIN-27 | Report generation logging | Approved | F |

Provide a log file of all generated, standard or ad hoc reports that includes:

- when the report was generated
- when the report was submitted (either standard or ad-hoc)
- when the report was sent to the TTC
- report name
- title
- version
- status

| REQ-BIN-27.1 | Report generation logging-2 | Approved | F |

Ensure log files are sent daily to the TTC. All log files will also be kept in the reporting service repository.

REQ-BIN-27.2	Report generation logging-3	Approved	F

Ensure log files can be opened (not edited), viewed and printed from the report repository interface.

REQ-BIN-28	Report tracking	Approved	F

Track all reports generated by the reporting services.   A time history log showing:

 - when the report was requested
 - when the report was generated
 - any notifications that were sent with the report
 - where the report was delivered
 - who requested it
 - personnel/departments the report was delivered to

The information will be recorded and saved automatically by the report management system.

REQ-BIN-29	Report unique identifiers	Approved	F

Ensure each report has a unique identifier number associated with it that is automatically generated. In addition, the reports may be identified by name and classified by logical business views.

REQ-BIN-30	Time, date, unique ID stamping	Approved	F

Ensure all reports are time, date and ID stamped as to when they were generated/printed.   The report management system will continue to contain all the other relevant information as to when the report/template was created changed etc; however for the final generated report having the date/time/ID stamped on it will enable the report to be verified against its content (data).

Additionally, a report generation unique ID may be generated, each and every time a report is generated. This would number would uniquely identify, where, when and what report was generated.

This will be part of the Quality Assurance controls for report generation.

REQ-BIN-31	Report reference by name	Approved	F

All reports, standard and ad-hoc, may be referenced by name. This name may be any combination of letters, numbers and spaces that uniquely identify that report.

All report management and manipulation (create, delete, print save, scheduled etc) may use this report name.Report names may be changed and modified as needed by authorized TTC personnel.

REQ-BIN-32	Report delivery	Approved	F

Support the following delivery channels for all PRESTO reports:

REQ-BIN-32.1	Report delivery-2	Approved	F

 - email attachment

REQ-BIN-32.2	Report delivery-3	Approved	F

 - link to a web site

REQ-BIN-32.3	Report delivery-4	Approved	F

 - embedded graphic

REQ-BIN-32.4	Report delivery-5	Approved	F

 - directly back to the report user via the report services interface

REQ-BIN-32.5	Report delivery-6	Approved	F

 - web-based repository where the reports may be viewed in a web-based format (or in the standard export formats)

REQ-BIN-33	Report delivery on-demand	Approved	F

Support on-demand report delivery.

This 'pull' report delivery capability will allow report users to quickly see the results for their report, as it is generated and presented to the report user.   Report delivery on-demand may use any or all of the report delivery channels.Both standard and ad-hoc reports may use report delivery on-demand.

REQ-BIN-33.1	Report delivery on-demand-2	Approved	F

 - report delivery on-demand may use any or all of the report delivery channels

REQ-BIN-33.2	Report delivery on-demand-3	Approved	F

 - both standard and ad-hoc reports may use report delivery on-demand

REQ-BIN-34	Report delivery on event	Approved	F

Support on-event report delivery:

 - scheduled by date, time, frequency
 - generated on some other PRESTO System event such as end of shift indicator (for surface vehicles)

REQ-BIN-34.1	Report delivery on event-2	Approved	F

Ensure reports are triggered automatically on such things as:

 - fraud detection parameters
 - end of shift indicators
 - inventory levels
 - Preventative Maintenance indicators

Report delivery on-demand may use any or all of the report delivery channels.

Both standard and ad-hoc reports may use report delivery on-demand.

REQ-BIN-35	Report generation notifications	Approved	F

Provide a report notification (message to be configurable). The notification includes:

 - name of report generated
 - where the report generated is located
 - status of the generated report (i.e. completed successfully, failed, errors)

REQ-BIN-35.1	Report generation notifications-2	Approved	F

Ensure ad-hoc reports are able to estimated report completion time.

Note that for ad hoc reports, an additional notification specifying the estimated report completion time may be generated.   This option may be stipulated by TTC personnel when the ad hoc report is

submitted for generation.

The choice and content of a report notification message will be made by TTC personnel.

REQ-BIN-36	Report notification channels	Approved	F

Provide notifications for reports using:

REQ-BIN-36.1	Report notification channels-2	Approved	F

 - Email

REQ-BIN-36.2	Report notification channels-3	Approved	F

 - SMS

REQ-BIN-36.3	Report notification channels-4	Approved	F

 - web page notification

REQ-BIN-36.4	Report notification channels-5	Approved	F

 - phone message

REQ-BIN-37	Report delivery and notification management	Approved	F

Support a delivery and notification management tool.

This will allow TTC personnel to,

  - manage group deliveries of reports,
  - manage individual delivery of reports,
  - choose the notification channel to be used for delivery,
  - change times of delivery and frequency for standard reports,
  - stipulate ad hoc report initiation times (note that this does not stipulate when ad hoc reports are to be completed)

REQ-BIN-38	Report generation live schedule	Approved	F

Provide a report generation 'live schedule' with the following:

 - all standard reports scheduled with status (i.e. pending, generating, complete)
 - all ad-hoc reports scheduled (i.e. queued, generating, completed)

REQ-BIN-38.1	Report generation live schedule-2	Approved	F

Provide the ability to delete queued reports.

REQ-BIN-39	Reporting across business functions	Approved	F

Provide the ability to generate reports based on data collected from different business sources.   Data collected from field devices, will need to be related to data collected from financial services.

REQ-BIN-40	Report generation and system performance	Approved	F

Provide ad-hoc report services to estimate ad-hoc report completion times.

The generation of any type of report (scheduled or unscheduled) should in no way effect or impact the PRESTO System performance.

REQ-BIN-41	Standard reports	Approved	F

Provide standard reports that capture all TTC business activity on a predefined schedule through the service provider web site.

Standard reports are reports that have been defined by the TTC as reports that are essential and necessary for operations and functionality of the business.   For the most part, they are static format reports based on collected, raw and processed data from the PRESTO System.   The data of the report may change; however the basic format will not (apart from tweaking).

TTC standard reports would be generated by the central service operator and delivered to the TTC according to predefined schedules and delivery channels.

Standard reports may be interactive reports with relatively large datasets associated with them.

REQ-BIN-42	Creation of Standard Reports on a Daily Basis	Approved	F

Provide TTC the ability to generate standard reports as required on an intra-day basis as of a given start and end date.

REQ-BIN-43	Automatic generation of standard reports	Approved	F

Provide a tool to automatically generate and deliver standard reportsto the TTC.

REQ-BIN-44	Manual generation of standard reports	Approved	F

Ensure ability to generate (manually) standard reports at any period of time.

REQ-BIN-45	Standard reports modification grace period	Approved	F

Provide the ability to modify standard reports for a period of up to two years from the initial standard report design.

The expressed intent of this grace period shall allow the TTC to make adjustments to standard reports as it deems necessary in order to capture, process and convey the correct information about its business to its business units.

REQ-BIN-46	Frequency and bounded delivery times of standard reports	Approved	F

Ensure standard reports will have a generated frequency and a bounded delivery time.

For example, ridership reports for the subway, by fare type, over a transit day, in fifteen (15) minute intervals may be specified as a standard report that needs to be delivered before 12:00 noon of the next 'transit' day.

Frequency of reports and bounded delivery times will be mutually agreed upon by PRESTO and TTC.

REQ-BIN-47	Time of generation of standard reports	Approved	F

Standard reports can be generated any time after the data the standard report is based on, has been gathered, processed and stored.

REQ-BIN-48	EOL for reports	Approved	F

Support an end-of-life mechanism for standard and ad-hoc reports.

The EOL mechanism will remove the standard report from the automatic report generation cycle.   The EOL report will be marked as such in the repository.   It will remain in the repository (not deleted).

Note that ad hoc reports may also be EOLed.

REQ-BIN-49	Number of standard reports	Approved	F

Provide the ability to develop and place into regular production standardized reports using pre-defined data sets populated by the central processor and available through the Data Mart.

REQ-BIN-50	Ad hoc reports	Approved	F

Support the creation and generation of ad-hoc reports.

Ad hoc reports are reports that have been defined by the TTC on an as needed basis. These reports may not be needed on a periodic basis and hence are requested manually by TTC personnel as required; however, there is nothing preventing ad hoc reports from being delivered on a periodic basis. For example, a TTC designed ad hoc report may go through a trial period before it is migrated to a standard report.

Ad hoc reports will allow TTC personnel to create specific, customized queries across all PRESTO System data collected. Both the format and the content of the reports are customizable. Ad hoc reports that include interactive data will be a key component in investigating and understanding the PRESTO System as it pertains to the TTC.

REQ-BIN-51	Support for Queries and Extracts of Data	Approved	F

Ensure the Data Mart will support queries and extracts of data through a series of web-based menus and screens.

REQ-BIN-51.1	Support for Queries and Extracts of Data-2	Approved	F

Ensure the Data Mart is scalable to support transaction volumes defined in the service levels that enable multiple end users to construct ad-hoc reports.

REQ-BIN-51.2	Support for Queries and Extracts of Data-2	Approved	F

Ensure queries are available both as screen displays and as outputs for printing by each authorized user.

REQ-BIN-51.3	Support for Queries and Extracts of Data-3	Approved	F

Ensure the Data Mart is capable of storing queries for future use or for use as the basis of a standard report.

REQ-BIN-52	Minimum Number of Simultaneous Ad Hoc Users	Approved	F

Ensure the Data Mart is able to handle at least 20 simultaneous TTC end-users accessing for ad-hoc queries and reports without any degradation to the performance.

REQ-BIN-53	Support for Additional Simultaneous Users	Approved	F

Ensure the Data Mart is able to handle large volumes of users simultaneously.

PRESTO will ensure that the Data Mart is architected in such a manner as to permit an increase in the number of simultaneous users during the initial Operating Phase of the PRESTO System when TTC personnel are qualifying and quantifying the reports required.

The PRESTO System architecture must be capable of adding future users.

REQ-BIN-54	Timing of ad hoc reports	Approved	F

Provide the ability for ad-hoc reports (current and archived) to be:

REQ-BIN-54.1	Timing of ad hoc reports-2	Approved	F

 - generated during the active transit day

REQ-BIN-54.2	Timing of ad hoc reports-3	Approved	F

 - generated at the end of a particular transit day

REQ-BIN-54.3	Timing of ad hoc reports-4	Approved	F

 - generated using data from any other time in the past when the data was collected

REQ-BIN-54.4	Timing of ad hoc reports-5	Approved	F

 - periodically (scheduled) like standard reports

Note that the generation of ad hoc reports does not exclude the use of any and all archived data. There will be a process for retrieving archived data.

REQ-BIN-55	Ad hoc timing and data constraints	Approved	F

The reporting system will endeavor to provide TTC personnel with any time, data or other constraints that may affect the generation of an ad hoc report.

Ad hoc reports by their very definition may span any time frame and any dataset.   When an ad hoc report is generated it will be checked and validated by TTC personnel before it is sent to the central system for processing.   This validation by the TTC can only check to see if the report requested is in fact the one that is actually desired.   Through education and experience, ad hoc reports that require days of computation to generate may not be requested however, it is the responsibility of the reporting system to estimate any timing and data constraints that may be placed on the requested report.

This may either be done as the report is being created, or once the report has been sent to the reporting service.

Note that this does not preclude the TTC from generating ad hoc reports that may take significant time to compute.

The data for these special database sources will be imported from the reporting databases. The reporting services must support multiple database sources for all report generation.

REQ-BIN-56	Report datasets and databases.	Approved	F

Ensure ad-hoc reports use all transit data collected by the central service.

REQ-BIN-57	Estimation of ad hoc report generation	Approved	F

Ensure the reporting system will provide an indication of how much time it will take to generate or when to expect the completed ad-hoc report.

REQ-BIN-58	Multiple submissions of ad hoc reports	Approved	F

Support multiple requests (at the same time) for ad-hoc reports.

There is no technical limit to the number of ad hoc reports that can be submitted.

REQ-BIN-59	Cancellation of submitted ad hoc reports	Approved	F

Provide a means for TTC to cancel ad-hoc reports.

REQ-BIN-60	Isolation of ad hoc report generation effects	Approved	F

Ensure the generation of ad-hoc reports in no way effects standard report generation and scheduling. Ad-hoc reporting should not affect any other services of the PRESTO System, especially those services that deal directly with the operations of the PRESTO System.

REQ-BIN-61	Ad hoc to standard report migration	Approved	F

Provide the ability to migrate ad-hoc reports to standard reports.

REQ-BIN-62	Number of ad hoc reports	Approved	F

Ensure there is no technical limitation to the number of ad-hoc reports that can be generated by the reporting services.

REQ-BIN-63	Interactive reports	Approved	F

Support interactive reports featuring such things as on-report data sorting, data filtering and report formatting.

REQ-BIN-64	Interactive data exploration	Approved	F

Support interactive drill down including the automatic generation of new reports based on this localized data.

REQ-BIN-65	Dynamic end-user data manipulation	Approved	F

Ensure reporting services are capable of manipulating data dynamically at a users workstation.

Interactive reports will most likely have multiple data variables associated with them.

REQ-BIN-66	Report users	Approved	F

Ensure report user roles are able to:

REQ-BIN-66.1	Report users-2	Approved	F

- execute standard reports

REQ-BIN-66.2	Report users-3	Approved	F

- re-execute standard reports

REQ-BIN-66.3	Report users-4	Approved	F

- execute ad-hoc reports (that have already been designed)

REQ-BIN-66.4	Report users-5	Approved	F

- annotate reports

REQ-BIN-66.5	Report users-6	Approved	F

- prepare reports for publishing

REQ-BIN-67	Report designers	Approved	F

Ensure the report designer roles are able to:

REQ-BIN-67.1	Report designers-2	Approved	F

- design/create reports

REQ-BIN-67.2	Report designers-3	Approved	F

- modify existing reports

REQ-BIN-67.3	Report designers-4	Approved	F

- test reports

REQ-BIN-67.4	Report designers-5	Approved	F

- delete designed reports

REQ-BIN-67.5	Report designers-6	Approved	F

- submit designed reports for review

REQ-BIN-68	Report design input	Approved	F

Ensure the report designer will receive input requirements as to:

- the report content
- the report format
- the report presentation
- the report scheduling

The source of these reports will be from a variety of departments and business units as dictated by the needs of the TTC.

REQ-BIN-69	Report authoring	Approved	F

Ensure reporting services are capable of creating and designing interactive, ad-hoc and standard reports.

Report authoring tools (such as the following) will include:

- selection of a foundation template upon which to base the report,
- adding data fields to a report,
- browsing data within a particular data field,
- selecting, moving, and resizing fields
- alignment of fields and objects in the report,
- creating text objects,
- selecting fonts, type etc.
- drawing graphic objects (lines, boxes, circles, etc.)
- inserting pictures, images,

REQ-BIN-70	Report calculations	Approved	F

Ensure reports are capable of using formulas for directly or indirectly transforming data.

This will include:

- statistical calculations,
- time calculations,

- sums,
- financial calculations
- text manipulations
- logical calculations
- database calculations/commands (direct commands to the database if required)
- lookup and reference calculations
- math /trig calculations
- information/data calculations (i.e. missing numbers, out of range)
- advanced formula creation (programming)
- error handling.

Additional functionality may be added via integrated third party tools.

REQ-BIN-71	Data manipulations	Approved	F

Ensure reporting services allows at a minimum:

REQ-BIN-71.1	Data manipulations-2	Approved	F

- sorting

REQ-BIN-71.2	Data manipulations-3	Approved	F

- aliasing

REQ-BIN-71.3	Data manipulations-4	Approved	F

- joining

REQ-BIN-71.4	Data manipulations-5	Approved	F

- verifying

REQ-BIN-71.5	Data manipulations-6	Approved	F

- mapping of database fields and tables

REQ-BIN-71.6	Data manipulations-7	Approved	F

Ensure that both data and tables can be manipulated.

REQ-BIN-72	General report types	Approved	F

Provide the following range of report types:

REQ-BIN-72.1	General report types-2	Approved	F

- summary reports

REQ-BIN-72.2	General report types-3	Approved	F

- series

REQ-BIN-72.3	General report types-4	Approved	F

- multiple series

REQ-BIN-72.4	General report types-5	Approved	F

- 2D

REQ-BIN-72.5	General report types-6	Approved	F

- 3D

REQ-BIN-72.6	General report types-7	Approved	F

- pie

REQ-BIN-72.7	General report types-8	Approved	F

- scatter

REQ-BIN-72.8	General report types-9	Approved	F

- relief

REQ-BIN-72.9	General report types-10	Approved	F

- mesh

REQ-BIN-72.10	General report types-11	Approved	F

- win/loss

REQ-BIN-72.11	General report types-12	Approved	F

- crosstabs

REQ-BIN-72.12	General report types-13	Approved	F

- bar/2D bar/3D bar

REQ-BIN-72.13	General report types-14	Approved	F

- pie/ doughnut

REQ-BIN-72.14	General report types-15	Approved	F

- gauge

REQ-BIN-72.15	General report types-16	Approved	F

- funnel

REQ-BIN-72.16	General report types-17	Approved	F

- scatter

REQ-BIN-72.17	General report types-18	Approved	F

- dot density

REQ-BIN-72.18	General report types-19	Approved	F

- waterfall

REQ-BIN-73	Preview reports	Approved	F

Provide the ability to pre-view authored reports with or without data in order to determine correct formatting and contents.

REQ-BIN-74	Printing reports	Approved	F

Support report printing in colour or black and white. Reports must be able to printed to:

REQ-BIN-74.1	Printing reports-2	Approved	F

 - PDF

REQ-BIN-74.2	Printing reports-3	Approved	F

 - Word

REQ-BIN-74.3	Printing reports-4	Approved	F

 - Excel

REQ-BIN-74.4	Printing reports-5	Approved	F

 - HTML

REQ-BIN-74.5	Printing reports-6	Approved	F

 - XML

REQ-BIN-74.6	Printing reports-7	Approved	F

 - TIF

REQ-BIN-74.7	Printing reports-8	Approved	F

 - JPG

REQ-BIN-75	Report presentation quality	Approved	F

Support printing draft and finished presentation quality reports.

REQ-BIN-76	Saving a report	Approved	F

All authored reports may be saved. The content, format and presentation of the report will be saved.

REQ-BIN-77	Refreshing report data	Approved	F

Ensure refreshing of report data will be supported for all report types.

The format and structure of the report is independent from the data of the report.   This data can be refreshed at any time with data from the database source.   Refreshing a report is equivalent to re-generation of report and all requirements that apply to generation of report apply.

REQ-BIN-78	Report import capability	Approved	F

At a minimum, support the ability for reports to import data from the following formats:

REQ-BIN-78.1	Report import capability-2	Approved	F

 - text

REQ-BIN-78.2	Report import capability-3	Approved	F

 - CSV

REQ-BIN-78.3	Report import capability-4	Approved	F

- Excel

REQ-BIN-78.4	Report import capability-5	Approved	F

- XML

REQ-BIN-78.5	Report import capability-6	Approved	F

- Oracle

REQ-BIN-78.6	Report import capability-7	Approved	F

- SQL

REQ-BIN-78.7	Report import capability-8	Approved	F

- PostgreSQL

REQ-BIN-79	Report export capability	Approved	F

Support the ability for reports to be exported(without the need for extraordinary steps or procedures) to the following formats:

REQ-BIN-79.1	Report export capability-2	Approved	F

- CSV

REQ-BIN-79.2	Report export capability-3	Approved	F

- text

REQ-BIN-79.3	Report export capability-4	Approved	F

- Excel

REQ-BIN-79.4	Report export capability-5	Approved	F

- Word

REQ-BIN-79.5	Report export capability-6	Approved	F

- XML

REQ-BIN-79.6	Report export capability-7	Approved	F

- HTML

REQ-BIN-79.7	Report export capability-8	Approved	F

- PDF

REQ-BIN-79.8	Report export capability-9	Approved	F

- Oracle

REQ-BIN-79.9	Report export capability-10	Approved	F

- SQL

REQ-BIN-79.10	Report export capability-11	Approved	F

- PostgreSQL

REQ-BIN-80	Report validation and verification	Approved	F

Support a validation and verification process as part of the report management life cycle.

The appropriate TTC personnel will validate the report style, format, content, layout etc. Furthermore, the contents of the report will be verified by various methods including audits.

Once the report is verified and validated it may be accepted as a valid TTC report. Note that the report still may be an ad hoc or standard report.

REQ-BIN-81	Error handling	Approved	F

The report services must be capable of handling any errors that occur.   This will include but not be limited to errors from,

REQ-BIN-81.1	Error handling-2	Approved	F

- out of range data

REQ-BIN-81.2	Error handling-3	Approved	F

- missing data

REQ-BIN-81.3	Error handling-4	Approved	F

- improperly formatted data

REQ-BIN-81.4	Error handling-5	Approved	F

- NaNs, (not a number)

REQ-BIN-81.5	Error handling-6	Approved	F

- report application errors

REQ-BIN-81.6	Error handling-7	Approved	F

- report generation crashes

The handling of these errors may be done in a variety of ways depending on the nature of the error. For example, where data is non-existent (due to loss in the system) the TTC will determine how this will be handled.   Furthermore, where there is data that results in overflows or divide by zero, the system will alert TTC personnel about this prior to analysis and/or report generation

REQ-BIN-82	Support for data exchanges	Approved	F

Ensure reports are compatible with data exchanges with other applications.

For example, a user should be able to "cut and paste" results from the report, into a word or excel document.

4.2.2   Report Types

REQ-BIN-83	Overview	Approved	F

This section defines some of the report types required by the TTC.   This list is not extensive nor is it

by any means complete.   A thorough list and explanation of all report types and data required by the TTC will be carried out before the PRESTO System is designed.

Common reports will include but not be limited to:

REQ-BIN-83.1	Overview-2	Approved	F

 - finance/accounting reports

REQ-BIN-83.2	Overview-3	Approved	F

 - revenue reports

REQ-BIN-83.3	Overview-4	Approved	F

 - ridership reports

REQ-BIN-83.4	Overview-5	Approved	F

 - fraud reports

REQ-BIN-83.5	Overview-6	Approved	F

 - Device Maintenance reports

REQ-BIN-83.6	Overview-7	Approved	F

 - system status

REQ-BIN-83.7	Overview-8	Approved	F

 - sales and reload

REQ-BIN-83.8	Overview-9	Approved	F

 - auditing reports

REQ-BIN-83.9	Overview-10	Approved	F

 - inventory reports

Note that many of these reports will be similar, if not the same to reports currently used by the TTC. However, due to the timeliness and amount of new data generated by the PRESTO System, many new reports will be identified, defined and used.   Furthermore, these reports will be modified and adapted as needed.

REQ-BIN-84	Finalization of Standard Reports during Design Review	Approved	F

The content and format of standard reports will be finalized by PRESTO and the TTC.

4.2.2.1   Ridership Reports

REQ-BIN-85	Ridership verses revenue reports	Approved	F

The PRESTO System Reader Assemblies across the TTC system will collect and transmit transaction records to the Central System's ridership database. Reporting services will be capable of generating regular ridership reports as required. These reports may be run at the close of each day and sent via specified reporting channels (e.g. email) to the designated employees.

Ridership includes both paid trips(revenue trips) and transfers(non-revenue trips). All trips are referred to as Boardings. All Boardings are recorded and tracked by the PRESTO System. Note that LUMs are included in all Boardings.

REQ-BIN-86	Ridership vs revenue by fare product reports	Approved	F

Provide access and report on ridership and financial information separately for its varying fare products(e.g. TTC will need to know ridership for weekly passes separate from the ridership for Metropasses separate from the ridership for Day Pass).

REQ-BIN-87	Revenue trips verses Boardings	Approved	F

Track and report separately (for all PRESTO Media) the following:

 - revenue trips vs. Boardings
 - revenue trips vs. non-revenue trips
 - non-revenue trips vs. non-revenue Boarding

REQ-BIN-88	Surface vehicle ridership reports	Approved	F

Provide surface vehicle ridership reports with at least the following:

 - route
 - time of day
 - hour
 - by hour or partial hour
 - by stop

REQ-BIN-89	Subway ridership reports	Approved	F

Provide subway ridership reports with at least the following:

 - turnstile (entries)
 - station
 - line (route)
 - by time of day
 - by hour or partial hour

REQ-BIN-90	Ridership verses transfers reports	Approved	F

Ensure transfers will be recorded, tracked and reported on by fare product (i.e. what fare product the Customer used for the transfer).

REQ-BIN-91	Ridership summary reports	Approved	F

At a minimum provide summary reports on ridership which will include:

 - route
 - day
 - TTC defined week
 - calendar month
 - 4/4/5 reporting period
 - Year To Date
 - previous year
 - between any two dates in the past two years
 - allow comparisons between selected time periods (i.e. month to previous month, between months of the last 5 years, year to year)

4.2.2.2   Customer Reports

REQ-BIN-92	Overview	Approved	F

There are several reports required by Customers that need to be generated by reporting services.

REQ-BIN-93	Transit Usage to Support Tax Receipts	Approved	F

Provide tax receipt reports on a per Customer basis over the course of a year in accordance with relevant tax regulations and policies.

REQ-BIN-94	Customer requested transaction detail report	Approved	F

Provide a Customer requested transaction detail report from a previous period in the past. This report will include a detailed listing of PRESTO transactions over the course of the time period specified.

REQ-BIN-95	Loyalty reports	Approved	F

Provide a Customer requested loyalty report detailing the number of times they received either free trips or other loyalty benefits over the past year.

4.2.2.3   Financial Reports

REQ-BIN-96	Scope	Approved	F

Provide the TTC's finance/accounting division with user screens and reporting tools necessary to allow it to monitor, reconcile and report fare sales, liability and revenue from a detail to a summary level.

REQ-BIN-97	Surface vehicle financial reports	Approved	F

Maintain a record of all transactions that occur at the Reader Assembly.

REQ-BIN-97.1	Surface vehicle financial reports-2	Approved	F

Provide surface vehicle financial reports which at least include:

 - vehicle number
 - PRESTO Card number
 - transaction type (as outlined in previous section)
 - Route #
 - run #
 - time of day
 - location (GPS equipped vehicles)
 - data collection point (i.e. depot, route stop)

REQ-BIN-97.2	Surface vehicle financial reports-3	Approved	F

Collect and report on the following:

 - # of e-Purse value transactions/amount deducted
 - # of pass transactions
 - # electronic transfers used
 - # of LUM transfers used
 - # and amount of automatic or directed reloads of e-Purse value or pass products
 - # of negative protection transactions and the amount of fare given to qualifying Customers if they do not have adequate value
 - # of rejected transactions

REQ-BIN-98	Subway financial reports from the FMVD	Approved	F

Provide financial reports for the FMVD which shall at least include:

- cash (coin/currency) collected
- cash dispensed
- credit/debit transactions
- PRESTO Cards and/or LUMs dispensed
- serial number of PRESTO Card dispensed
- e-Purse value / pass product applied to a PRESTO Card
- automatic or directed reload transactions (if Customer taps the Reader Assembly at the FMVD before any other device)
- negative protection: # and amount of revenue recovered at time Customers reload their card

REQ-BIN-99	Subway financial reports from the AVM	Approved	F

Provide financial AVM reports which at least include:

- credit /debit transactions
- e-Purse value/pass product applied to a PRESTO Card
- automatic or directed reload transactions/amount
- negative protection (amount of revenue recovered at time Customers reloads their card)

REQ-BIN-100	Subway financial reports from the Turnstile Reader Assembly	Approved	F

Provide financial reports for the Turnstile Reader Assembly which at least include:

- e-Purse transactions/value deducted at the turnstile
- pass product transactions at the turnstile
- electronic transfers used
- PRESTO Card/LUM use transactions
- automatic or directed reload transactions/amount
- negative protection (number and amount of fare the TTC gives qualifying Customers, if they do not have adequate value)

REQ-BIN-101	Parking reports	Approved	F

Provide parking reports for individual commuter lots as well as the entire system which specifies at least the:

- number of e-Purse value transactions/amount deducted
- number of pass product transactions
- number and amount of automatic or directed reloads of e-Purse value or pass products

REQ-BIN-102	Call centre reports	Approved	F

Provide call centre reports which at least include:

- number and type of Customer transactions
- number and amount of credit/debit sale
- number and amount of negative protection

REQ-BIN-103	Customer Centre reports	Approved	F

Provide Customer centre reports which at least specifies:

- number and type of Customer transaction by payment method
- number of PRESTO Cards sold
- serial number of PRESTO Cards sold
- number and amount of e-Purse value/pass product applied
- number and amount of automatic or directed reload transactions/amount
- number and amount of negative protection: revenue recovered by the TTC at time Customer reloads their card

REQ-BIN-104	Web service reports	Approved	F

Provide web services reports which at least specifies:

 - number and type of Customer transactions
 - number and amount of credit/debit sale
 - card fulfillment status
 - number and amount of negative protection

REQ-BIN-105	e-Mail reports	Approved	F

Provide mail reports which at least specifies:

 - number and type of Customer transactions
 - number and amount of credit/debit sale

REQ-BIN-106	HHPOS	Approved	F

Provide a hand held card reader report that specifies at least the number of e-Purse value transactions/amount deducted

REQ-BIN-106.1	HHPOS-2	Approved	F

Provide a special constable remittance report for end of shift processing.

REQ-BIN-107	Audits and reconciliation reports	Approved	F

At a minimum, provide auditing and reconciliation reports:

 - revenue/sales - cash, credit/debit
 - by device
 - by location
 - by employee
 - by date, time
 - by serial number
 - by PRESTO Card /LUM
 - reports on PRESTO Card/LUM usage
 - by mode
 - by device
 - by date, time
 - by fare type
 - by serial number
 - by route
 - by station

REQ-BIN-108	Exception reports	Approved	F

Provide a report on the number of exceptions processed by the CBO.

REQ-BIN-109	Distribution sales reports	Approved	F

Provide a report on the number of sales done through the TTC's in-school program to distribute cards.

4.2.2.4   Fare Transaction Data Reports

REQ-BIN-110	Overview	Approved	F

Gather and process fare transaction data from any or all of the following sources:

REQ-BIN-110.1	Overview-2	Approved	F

- FMVD

REQ-BIN-110.2	Overview-3	Approved	F

- AVM

REQ-BIN-110.3	Overview-12	Approved	F

- SRVM

REQ-BIN-110.4	Overview-4	Approved	F

- Customer web site

REQ-BIN-110.5	Overview-5	Approved	F

- cash transactions at FMVD, Customer centre, third party ticket agent

REQ-BIN-110.6	Overview-6	Approved	F

- Autoloads at the central system

REQ-BIN-110.7	Overview-7	Approved	F

- IVR

REQ-BIN-110.8	Overview-8	Approved	F

- turnstile

REQ-BIN-110.9	Overview-9	Approved	F

- bus/streetcar/LRV Reader Assembly

REQ-BIN-110.10	Overview-10	Approved	F

- pay and display parking meter

REQ-BIN-110.11	Overview-11	Approved	F

- parking gate

REQ-BIN-111	Cash transactions by purchase item reports	Approved	F

Provide a report of cash transactions by item of purchase which specifies:

- Smart Card purchases (without pass product or e-Purse)
- e-Purse value purchases
- pass product purchases (by type)

REQ-BIN-112	Cash transactions by sales channel reports	Approved	F

Provide a report of cash transactions by sales channel which specifies at least:

- FMVD
- Customer service centre
- third party ticket agent

REQ-BIN-113	Cash disbursed reports	Approved	F

At a minimum provide a report of cash disbursed (change given) at the FMVD and Customer service centres.

REQ-BIN-114	Credit/Debit transactions by type reports	Approved	F

Provide report(s)of credit and debit transaction by type for at least the following channels:

 - FMVD
 - AVM
 - SRVM
 - web service
 - Customer call centre
 - Customer service centre
 - third party network
 - central service (auto loads)

REQ-BIN-115	ePurse value sales by sales channel	Approved	F

Provide report(s) of e-Purse value sales at:

 - FMVD (including LUM)
 - Customer service centre
 - AVM
 - SRVM
 - third party ticket agent
 - IVR
 - web service

REQ-BIN-116	ePass value sales by sales channel reports	Approved	F

Provide report(s) of pass product value sales by product type at:

 - FMVD
 - Customer service centre
 - AVM
 - SRVM
 - third party ticket agent
 - IVR
 - web service

The TTC will need to be able to break out sales by product type (e.g. monthly sales vs. weekly sales vs. day pass sales etc).

REQ-BIN-117	ePurse usage at devices reports	Approved	F

Provide report(s) on e-Purse usage (amount deducted) at:

 - Turnstile Reader Assembly
 - surface vehicle Reader Assembly
 - parking (pay and display and or gated)
 - handheld device for special events
 - FMVD
 - AVM
 - SRVM

REQ-BIN-118	ePass usage at devices reports	Approved	F

Ensure reporting services supports reporting on pass product usage (amount deducted) at:

- Turnstile Reader Assembly
- surface vehicle Reader Assembly
- parking (pay and display; gated)
- handheld device for special events
- FMVD
- AVM
- SRVM

REQ-BIN-119	Zero value PRESTO Card sales reports	Approved	F

Provide report(s) of PRESTO Card only sales, or zero value sales (PRESTO Media without any fare product) from all sales channels, including:

- FMVD
- Customer service centre
- call centre
- third party ticket agent
- web service
- bulk purchases (contractors)
- MDP

REQ-BIN-120	ePurse value reloads by sales channel reports	Approved	F

Provide report(s) of e-Purse value re-loads by the following sales channels:

- FMVD
- Customer service centre
- AVM
- SRVM
- third party ticket agent
- IVR
- web service

REQ-BIN-121	ePass value reloads by sales channel reports	Approved	F

Provide report(s) of pass product value re-loads by type by the following sales channels:

- FMVD
- Customer service centre
- AVM & SRVM
- third party ticket agent
- IVR
- web service

Furthermore, the type of pass product being loaded at each of these sales channels will need to be reported on also.

REQ-BIN-122	ePurse value automatic reloads reports	Approved	F

Provide report(s)of e-Purse value automatic reloads from the following sales channels:

- FMVD
- Customer service centre
- AVM & SRVM
- third party ticket agent
- IVR
- web service

REQ-BIN-123	ePass value automatic reloads reports	Approved	F

Provide report(s)of pass product value automatic reloads (by type) from the following sales channels:

- FMVD
- Customer service centre
- AVM & SRVM
- third party ticket agent
- IVR
- web service

REQ-BIN-124	ePurse value directed reloads reports	Approved	F

Provide report(s)of e-Purse value directed reloads from the following channels:

- FMVD
- Customer service centre
- AVM & SRVM
- third party ticket agent
- IVR
- web service

A directed Autoload is a simple direction to the field devices to load e-Purse value or pass product to a Smartcard. For example, this direction will be delivered by the Central System and sent down to devices if a Customer calls the IVR to reload a card or submits a reload via the web. The next time the Customer taps their card at a field device, the system will load their card.

REQ-BIN-125	ePass value directed reloads reports	Approved	F

Provide report(s) of pass product value (by type) directed reloads from the following channels:

- FMVD
- Customer service centre
- AVM & SRVM
- third party ticket agent
- IVR
- web service

Furthermore, the type of pass product being loaded at each of these sales channels will need to be reported on also.

REQ-BIN-126	Transfer reports	Approved	F

Provide report(s)of transfers onto a PRESTO Card or a LUM at turnstiles (subway) and surface vehicle Reader Assemblies.

REQ-BIN-126.1	Transfer reports-2	Approved	F

Provide report(s)on sales of LUM versus the number of LUM issued as transfers.

4.2.2.5   Operations Performance

REQ-BIN-127	Performance Monitoring and Reporting	Approved	F

Provide performance monitoring to ensure compliance with card association procedures, sustain operational viability and track progress towards business goals.

REQ-BIN-127.1	Performance Monitoring and Reporting-2	Approved	F

Ensure the back-office accesses information in real-time, as well as produce standard and ad-hoc reports, in order to support performance reporting for the PRESTO System.

REQ-BIN-128	Sales Availability	Approved	F

As part of the operations performance functionality, the PRESTO System will be designed by PRESTO to provide a universal metric of system readiness to accept fare payments. This metric, hereafter referred to as Sales Availability (as defined in Schedule A), reflects a Customer-centric perspective in the required readiness and full functionality of the end-to-end PRESTO System to perform sales transactions, and/or accept fare payments at system points-of-entry. It is also intended to reflect the requirement of timely processing of funds transfers consistent with the PRESTO-TTC agreement.

REQ-BIN-129	Minimum performance criteria	Approved	F

At a minimum, provide performance criteria reporting; that includes:

 - Sales Availability
 - real-time versus store-and-forward processing ratio
 - fare transaction success rates
 - wireless Network Availability for buses
 - Tap Transaction Speeds
 - fraud loss rates
 - size, accuracy, and refresh performance of hot lists
 - data accuracy and capture rate

REQ-BIN-130	Performance Data Incorporated in Sales Availability	Approved	F

Provide calculation of Sales Availability incorporating the performance data in terms of hours of full functionality from at least the following:

 - telecommunications network
 - central processor internal operations
 - external processing operations and systems (i.e. Merchant Acquirers and Issuer processing systems)
 - Field Maintenance and Revenue Collection / Servicing operations

REQ-BIN-131	Daily Sales Availability Reports	Approved	F

Provide a daily report on the Sales Availability of all PRESTO Hardware, Software, firmware and related support systems that are in operation for TTC. PRESTO will also enable the generation of ad hoc, on-demand updates on Sales Availability for the PRESTO System operating for TTC.

REQ-BIN-132	Automatic Generation of Sales Availability	Approved	F

Reports will automatically be generated by the PRESTO System and be in either PDF format, Excel, web page, or similarly common, accepted and available format.

REQ-BIN-133	Performance of FMVD Reports	Approved	F

Standard reports will track performance of the FMVD and interactions with the web site.

4.2.3   Report Data

REQ-BIN-134	General types	Approved	F

Provide standard and/or ad-hoc interactive reports.

REQ-BIN-135	Reports based on detailed data	Approved	F

Ensure the reporting services support reports based on detailed data.   Detailed data is any PRESTO System data that is not aggregated.

REQ-BIN-136	Reports based on non-aggregated summary data	Approved	F

Provide summarized reports.   The summary interval will be by the finest resolution at which PRESTO System data is collected, and the total length of time the PRESTO System data has been collected for.

The reporting services will support reports based on detailed data that has been summarized at the time the report is generated.

For example, the number of limited use cards purchased at a particular subway station can be tabulated on a per minute, ten (10) minute, hour and daily basis.

REQ-BIN-137	Reports based on aggregate data	Approved	F

Ensure reporting services will support reports based on aggregated data.   Aggregated data, is data based on detailed data that has already been aggregated according to TTC requirements.

REQ-BIN-138	Reports based on aggregated summary data	Approved	F

The reporting services will support reports based on aggregated data that has been summarized at the time the report is generated.

For example, the number of limited use cards purchased at a particular subway station can be tabulated on a , ten (10) minute, hour, daily, etc ... ,
basis.   The summary interval will only be limited by:

  - the finest resolution at which PRESTO System data is aggregated on; and
  - the total length of time the PRESTO System data has been collected for..

REQ-BIN-139	Automatic data processing	Approved	F

Provide the functionality and the flexibility of automatically processing data for the reports defined by the TTC.   If data needs to be summed, statistics calculated, or any other data processing required, then this will be done automatically by the reporting service when the report is generated.

REQ-BIN-140	Flexible reporting periods	Approved	F

At a minimum, support flexible reporting periods including:

 - instantaneous (as an event happens)
 - hourly
 - daily
 - TTC service day
 - weekly
 - monthly
 - yearly
 - since the start of the PRESTO System

REQ-BIN-141	Reporting periods as part of report design	Approved	F

The reporting periods required by the TTC should be part of the report design.

Essentially, this means that the TTC report designer will be able to choose the reporting period(s) required for a particular report.

REQ-BIN-142	Support for calendar day	Approved	F

Support reporting based on the calendar day.

REQ-BIN-143	Support for calendar month	Approved	F

Support reporting based on the calendar month.

REQ-BIN-144	Support for 4/4/5 cycle	Approved	F

Support report generation based on the current TTC 4/4/5 cycle. Note that the 4/4/5 calendar divides a year into 4 quarters with each quarter having 13 weeks grouped in 4 week months and one 5 week month.

REQ-BIN-145	Support for flexible start of 'transit' day	Approved	F

Support a flexible start for the transit day.

REQ-BIN-146	Support for flexible end of 'transit' day	Approved	F

Support a flexible end time for the transit day.

REQ-BIN-147	Support for flexible start of week day	Approved	F

Support a flexible start of the week day.   For example, the week could run Monday to Sunday, as opposed to Sunday to Saturday.

REQ-BIN-148	Support for multiple data source reports	Approved	F

Support multiple data sources across the organization. For example, reports may be integrated between fare transaction and maintenance.

REQ-BIN-149	Support for Concessions	Approved	F

Provide a report by Concession type.   Any report base on fare product may also be broken down by reports on Concession type. For example, all sales, usage, load/reload data will be further broken down by smartcard and paper limited use smartcard and by Customer class such as adult, Senior, Student or other classification.

REQ-BIN-150	Integration with existing reporting Software	Approved	F

Provide a means of integrating with the current TTC's legacy financial system (i.e. General Ledger).

REQ-BIN-151	Integration with new systems	Approved	F

The system will also need to integrate with "new" Software and systems that the TTC will likely need to put into place to support the PRESTO System. This will include but not be limited to auditing, inventory, operations, etc.... systems.

REQ-BIN-152	Reporting across all pass types-2	Approved	F

Provide reports for sales and ridership by pass product for revenue and non-revenue products.

REQ-BIN-153	Tracking and reporting on revenue and non-revenue passengers	Approved	F

Provide a ridership report for revenue and non-revenue usage.

The system will need to be able to distinguish and process both revenue passengers and non-revenue passengers. Examples of non-revenue passengers would be people gaining access to the transit system using the following types of cards: employee; councillor; ACAT; etc. The data for these different groups of riders will need to be separated in the database and the eventual reporting of ridership.

REQ-BIN-154	Tracking of passenger Boardings at all stops	Approved	F

Ensure that the passenger Boardings are required and reported for each surface stop in the system.

REQ-BIN-155	Ability to distinguish and report on both revenue trips and Boardings	Approved	F

Ensure all revenue and non-revenue trips are tracked.

The TTC will need to be able to distinguish "revenue trips" from "Boardings" for pass users. This is necessary for ridership reporting to be CUTA and to the Ontario Government. This means that when a Customer might use multiple vehicles to complete a trip, the system needs to record this as one revenue trip. This information will be used for financial and overall ridership reporting. At the same time, the system will need to be able to keep track of "Boardings" (i.e. every time an individual gets on a vehicle or goes through a turnstile); this information is used for planning purposes.

4.3   Dashboards

4.3.1   Dashboard Functionality

REQ-BIN-156	Types of dashboards supported	Approved	F

Provide at least the following types of dashboards (standard or ad-hoc): - operation dashboards - tactical dashboards - strategic dashboards/ scorecards

Any of the above dashboards may be standard or ad hoc. A standard dashboard is defined as a dashboard that has a fixed format (i.e. does not really change). Ad hoc dashboards are dashboards defined, designed and deployed as needed by the TTC.   Ad hoc dashboards may be used for auditing and anomaly detection.

REQ-BIN-157	Operation dashboards	Approved	F

Ensure operational dashboards will allow the TTC to:

 - monitor operational processes as they happen
 - get immediate visibility into Key Performance Indicators (KPIs) for corrective action and rapid decision-making
 - enable exception-based decisions with alerts
 - provide links to associated reports

Operational dashboards are for all intents and purposes, real time, with a flexible real time period window (e.g. the real time period can be over seconds, minutes, hours, days, weeks, etc...).   Some examples of operational dashboards for the TTC may include,

  - current throughput rates at subway turnstiles,
  - current Boardings by location
  - current PRESTO Media transaction times per device (i.e. how long it takes a transaction to complete at a particular gate)
  - current PRESTO Media transaction failure rates (i.e. failure at the card Reader Assembly for various reasons, including insufficient funds, card failure and pass-backs).

REQ-BIN-158	Tactical dashboards	Approved	F

Provide tactical dashboards that run against stored data (not real-time) in order to track processes and projects.

Tactical dashboards will allow the TTC to:

- monitor performance on a daily, weekly, or monthly basis
- get visibility into performance of departmental activities, processes, and projects
- drill-down or drill-through to reports and analysis for additional information or context
- integrate data from different core areas such as sales, marketing, finance and HR

REQ-BIN-159	Strategic dashboards/scorecards	Approved	F

Provide Strategic dashboards/scorecards. Strategic dashboards will allow the TTC to:

- track progress against strategic corporate goals allowing the TTC to uncover performance issues

- map key connections among departments and cause-and-effect relationships between or across departments

- support management methodologies including Balanced Scorecard, TQM, Six Sigma

- drill-down to reports and analysis for additional information or context

Some strategic dashboards for the TTC may include:

   - a strategic dashboard that shows ridership over set time periods along new transit routes, subway lines etc.

   - a strategic dashboard that shows the percentage of pass product users over a set time period that use TTC transit.

Strategic dashboards/ scorecards are in essence, visual indicators of whether or not a defined TTC goal has been achieved.
To this end, TTC personnel will require the ability to:

- set the metric or Key Performance Indicator target for a particular dashboard.
- set the time span and time interval over which the metric is measured
- set target dates,
- automatically calculate actual, target, variance etc
- automatically indicate trends
- set alerts/status

REQ-BIN-160	Flexible rule based alerts and status indicators	Approved	F

Provide a flexible rule based dashboard system that will generate alerts and status.   The following parameters must be configurable by TTC personnel:

- the rule that generated an alert or status notification
- the notification channel (Email, SMS, web, colour indicator on dashboard, flashing graphic)
- the personnel (if applicable) to be notified

Rules may vary according to the process parameter being measured.   For example, when current throughput rates at subway turnstiles exceed 60 people/minutes for more than 20 minutes a status notification may be sent to appropriate PRESTO and TTC personnel.

REQ-BIN-161	Flexible refresh schedules	Approved	F

Provide a dashboard data refresh rate to be flexible and support a wide range of values.

REQ-BIN-162	Drill down capability	Approved	F

Ensure dashboards have the ability to drill down to finer detail capability.

Selecting a particular dashboard on a screen may allow TTC personnel to 'zoom' in on data or target

additional dashboard data if available.

REQ-BIN-163	Dashboard display /delivery	Approved	F

Provide dashboards that can be viewed via:

 - web page
 - embedded web link
 - dedicated portals

It is important to note that dashboards are being continuously updated by the dashboard services.   If desired these dashboards may,

 - not be viewed live unless requested by TTC personnel,
 - may generate alerts, emails, sms etc. even when they are not viewed live.

REQ-BIN-164	Dashboard display on event	Approved	F

Ensure the dashboard services will support on-event display.

Dashboards may be generated on other events as specified by the TTC.

For example, dashboards may be triggered automatically on,

 - some fraud detection parameters
 - end of shift indicators (when a bus actually arrives at a depot at the end of a shift)
 - inventory levels (consumables or field device spares etc.)
 - Preventative Maintenance indicators,

REQ-BIN-165	Interactive data exploration	Approved	F

Dashboard users will be able to interactively drill down and explore data contained within the content of the interactive dashboard. This includes the automatic generation of new reports based on this localized data.

REQ-BIN-166	General dashboard types	Approved	F

Ensure the dashboard services provide a plethora of report types including:

REQ-BIN-166.1	General dashboard types-2	Approved	F

 - time series

REQ-BIN-166.2	General dashboard types-3	Approved	F

 - multiple series

REQ-BIN-166.3	General dashboard types-4	Approved	F

 - ranking

REQ-BIN-166.4	General dashboard types-5	Approved	F

 - 2D

REQ-BIN-166.5	General dashboard types-6	Approved	F

 - 3D

REQ-BIN-166.6	General dashboard types-7	Approved	F

- pie

REQ-BIN-166.7	General dashboard types-8	Approved	F

- scatter

REQ-BIN-166.8	General dashboard types-9	Approved	F

- deviation

REQ-BIN-166.9	General dashboard types-10	Approved	F

- distribution

REQ-BIN-166.10	General dashboard types-11	Approved	F

- correlation

REQ-BIN-166.11	General dashboard types-12	Approved	F

- bar/2D bar/3D bar

REQ-BIN-166.12	General dashboard types-13	Approved	F

- pie/ doughnut

REQ-BIN-166.13	General dashboard types-14	Approved	F

- gauge

REQ-BIN-166.14	General dashboard types-15	Approved	F

- funnel

REQ-BIN-166.15	General dashboard types-16	Approved	F

- dot density

The dashboard services will support all the types of reports required by the TTC.

4.3.2   Dashboard Types

REQ-BIN-167	Overview	Approved	F

Fare transaction data is essentially all the data collected by the PRESTO System that involves transit fares or transfers and how these transactions are related to the system itself (i.e. devices, sales channel, PRESTO Media etc.) and the transit Customers (Boardings, monetary payment, Concessions, etc.). Fare transaction data is the foundation of information upon which the PRESTO System's financial management Software operates. This financial system Software will gather and process the transactions necessary to report liability and sales and will record the transactions.

| REQ-BIN-167.1 | Overview-2 | Approved | F |

Fare transaction data can be generated from any (or all) of the following sources:

| REQ-BIN-167.2 | Overview-3 | Approved | F |

- FMVD

| REQ-BIN-167.3 | Overview-4 | Approved | F |

- AVM and SRVM

| REQ-BIN-167.4 | Overview-5 | Approved | F |

- Customer web site

| REQ-BIN-167.5 | Overview-6 | Approved | F |

- cash transactions at FMVD, Customer centre, third party ticket agent

| REQ-BIN-167.6 | Overview-7 | Approved | F |

- Autoloads at the central system

| REQ-BIN-167.7 | Overview-8 | Approved | F |

- IVR

| REQ-BIN-167.8 | Overview-9 | Approved | F |

- turnstile

| REQ-BIN-167.9 | Overview-10 | Approved | F |

- bus/streetcar/LRV Reader Assembly

| REQ-BIN-167.10 | Overview-12 | Approved | F |

- pay and display parking meter

| REQ-BIN-167.11 | Overview-13 | Approved | F |

- parking gate

| REQ-BIN-167.12 | Overview-14 | Approved | F |

- e-Pass sales by type (adult, child, senior, student)

| REQ-BIN-168 | Current ePurse usage at devices dashboards | Approved | F |

The dashboard services will support a dashboard on e-Purse usage (by type) at

- turnstile
- surface vehicle Reader Assembly
- parking (Pay and Display and or Gated)
- FMVD,
- AVM & SRVM,

- etc ....

on a minute by minute bases (or hourly, daily etc.).   The actual time interval for this dashboard data will be determined during the detailed system requirements phase of the project.

Furthermore, this time interval (min by min; hourly; daily) will be constrained by the limitations of when data is available on the PRESTO System.   For example, fare data from surface vehicles may not be available for 90 minutes.

REQ-BIN-169	Current ePass usage at devices dashboards	Approved	F

The dashboard services will support reporting on ePass usage (amount deducted) at all relevant locations, including:

  - turnstile
  - surface vehicle Reader Assembly
  - parking (Pay and Display and or Gated)
  - Handheld device for special events,
  - FMVD,
  - AVM,
  - SRVM

on a minute by minute (hourly etc.) basis. The actual time interval for this dashboard data will be determined during the detailed system requirements phase of the project.

Furthermore, this time interval (min by min; hourly; daily) will be constrained by the limitations of when data is available on the PRESTO System.   For example, fare data from surface vehicles may not be available for 90 minutes.

REQ-BIN-170	Hourly Credit/Debit transactions by type dashboards	Approved	F

The Dashboard services will support reporting of credit and debit transaction by type for at least the following channels,

 - FMVD
 - AVM
 - SRVM
 - web service
 - Customer call centre
 - Customer service centre
 - third party
 - central service (auto loads)

on an hourly basis.   Note that some of these channels may be controlled by various third parties including the CBO, TTC, third party etc.

REQ-BIN-171	Hourly ePurse value automatic reloads dashboard	Approved	F

Provide a dashboard showing e-Purse value automatic reloads on an hourly basis for at least the following channels:

 - FMVD,
 - AVM & SRVM,
 - Turnstile,
 - Surface vehicle Reader Assembly
 - Parking

REQ-BIN-172	Hourly ePass value automatic reloads dashboards	Approved	F

Provide a dashboard showing hourly pass product value automatic reloads for at least the following

channels:

 - FMVD,
 - AVM & SRVM,
 - Turnstile,
 - Surface vehicle Reader Assembly
 - Parking.

REQ-BIN-173	Daily exception dashboard	Approved	F

Provide a dashboard showing the daily exceptions (broken down by type).

REQ-BIN-174	Real-time Customer web site status	Approved	F

Provide a real-time dashboard showing the minute by minute status of the Customer web site.

This may show any number of things such as,

 - number of TTC- specific PRESTO holder updates
 - number of TTC-specific adult PRESTO Card purchases,
 - pages visited,   - languages selected,

REQ-BIN-175	Real-time device monitoring dashboards	Approved	F

Provide real-time device monitoring dashboards defined, designed and deployed by the TTC.

REQ-BIN-176	Ridership throughput at subway turnstiles	Approved	F

Provide a dashboard that shows ridership numbers (totals and averages) at each turnstile in the subway system.

The actual time interval for this dashboard data will be determined by TTC and PRESTO prior to Final Design..

REQ-BIN-177	Financial Payment Dashboard	Approved	F

Provide a dashboard showing:

 - All cleared transactions;
 - All pending transactions; and
 - All exceptions;

This dashboard will be updated continuously as transactions are processed.

5 Data Management

5.1 Data Mart

REQ-DMG-1	Data Mart Scope	Approved	F

Support data warehousing for all TTC data collected, aggregated and assimilated throughout the operation of the PRESTO System.

The Data Warehouse shall be designed to facilitate reporting, analysis and auditing for all data collected over the lifetime of the PRESTO System.

REQ-DMG-2	Provision of a Data Mart	Approved	F

PRESTO will develop, operate, maintain and update a Data Mart for TTC.

REQ-DMG-3	Storage scope	Approved	F

Data Mart will be a repository of all TTC relevant data collected, integrated and derived from the PRESTO System.

Provide a Data Mart or multiple Data Marts that are decoupled from the operation database and include:

- ridership
- deployment
- operation
- maintenance
- finance

REQ-DMG-4	Accessibility of Data Mart Data	Approved	F

Provide the TTC with access to all data through the Data Mart.

REQ-DMG-5	Location of Data Mart	Approved	F

Ensure the Data Mart will be hosted at a Canadian site.

REQ-DMG-6	Data Mart functionality	Approved	F

At a minimum, provide the following functionality that is in addition to the primary focus of data storage:

REQ-DMG-6.1	Data Mart functionality-2	Approved	F

- data retrieval

REQ-DMG-6.2	Data Mart functionality-3	Approved	F

- data extraction

REQ-DMG-6.3	Data Mart functionality-4	Approved	F

- data analysis

| REQ-DMG-6.4 | Data Mart functionality-5 | Approved | F |

- data transformation

| REQ-DMG-6.5 | Data Mart functionality-6 | Approved | F |

- loading data into the Data Warehouse

| REQ-DMG-6.6 | Data Mart functionality-7 | Approved | F |

- data filtering

| REQ-DMG-6.7 | Data Mart functionality-8 | Approved | F |

- data normalization

| REQ-DMG-6.8 | Data Mart functionality-9 | Approved | F |

- data cleanup

| REQ-DMG-6.9 | Data Mart functionality-10 | Approved | F |

- data dictionary management

| REQ-DMG-7 | State of the Art | Approved | F |

Provide principles of relational database design and management for the Data Mart; including:

| REQ-DMG-7.1 | State of the Art-2 | Approved | F |

- being ODBC compliant

| REQ-DMG-7.2 | State of the Art-3 | Approved | F |

- supporting SQL commands and queries

| REQ-DMG-7.3 | State of the Art-4 | Approved | F |

- containing only standard, non-proprietary instructions, procedures, and commands

| REQ-DMG-8 | Data Mart designed for Business End User | Approved | F |

Support Data Mart access for end users, should the TTC choose to grant them access.

The Data Mart will be outfitted in a manner that supports easy access and use by end users, without the need for special, professional competencies in computer programming and computer science. TTC's business end users will be expected to have competency in common, commercially available office programs, such as the Microsoft suite of office products in order to understand and utilize Data Mart tools and functionalities.

| REQ-DMG-9 | User Friendly Design | Approved | F |

Provide a full range of 'user friendly' Business Intelligence tools that permit the TTC access to:

| REQ-DMG-9.1 | User Friendly Design-2 | Approved | F |

- generate reports

| REQ-DMG-9.2 | User Friendly Design-3 | Approved | F |

- configure and query all database tables and relationships

REQ-DMG-9.3	User Friendly Design-4	Approved	F

- customize and edit queries and reports

REQ-DMG-9.4	User Friendly Design-5	Approved	F

- download data either on an ad-hoc or regular, pre-determined basis without impacting the processing capabilities of the central processor

REQ-DMG-9.5	User Friendly Design-6	Approved	F

- create new datasets, tables, and other Business Intelligence functionalities and tools as required

REQ-DMG-9.6	User Friendly Design-7	Approved	F

- allow data integration and fusion with other data and services in order to provide a comprehensive operations overview

REQ-DMG-10	Automatic capture and storage of all PRESTO System Data	Approved	F

Ensure the Data Mart will automatically capture and retain all data and information related to the operation of the PRESTO System.

At a minimum, data sets described in this Schedule will be generated by the Central Processor and captured by the Data Mart. A final, comprehensive listing of data sets and a definition of the Data Universe will be developed during Design Review.

REQ-DMG-11	Decoupled from operations	Approved	F

Ensure the use of the Data Mart (e.g. data extraction, filtering, formatting, insertion of data, etc.) does not affect the live operation of the PRESTO System operations in any manner.

REQ-DMG-12	Interfacing with TTC's Existing Network	Approved	F

Ensure the Data Mart will interface, using Open Standards, with the TTC's existing networks.

REQ-DMG-13	Data warehouse management	Approved	F

Provide a data management process that will include at a minimum:

- initiating
- operating
- extracting fare system data from 'live' sources
- transforming this data to the Data Warehouse format
- loading the data into the Data Warehouse
- executing reports on this data
- monitoring, (and specifically data quality monitoring)
- maintaining (i.e. ensure the Data Warehouse is current)
- archiving

REQ-DMG-14	Support for standard and ad hoc reporting	Approved	F

Support all the standard and ad-hoc reporting requirements as specified in the reporting requirements.   The Data Warehouse should provide the same functionality and flexibility as the live PRESTO System including: - report functionality - report data and type - report data sources and databases

REQ-DMG-15	Scalability	Approved	F

As per report data sources and databases BIN-12.

REQ-DMG-16	Availability	Approved	F

As per report data sources and databases BIN-13.

REQ-DMG-17	Database validation	Approved	F

All databases will support database validation where the results of the validation will be written to a log file. Databases may be validated at regular intervals depending on the volume of data they are storing as a background processes. The log file will be examined for any errors regarding physical file size and database index terms.

REQ-DMG-18	Data integrity	Approved	F

Provide controls to continually check the integrity and quality of the data. These controls and checks will include:

REQ-DMG-18.1	Data integrity-2	Approved	F

- checking the correctness of data being stored (data range, missing data)

REQ-DMG-18.2	Data integrity-3	Approved	F

- checking the correctness of aggregate data

REQ-DMG-18.3	Data integrity-4	Approved	F

- checking data classifications (or logical assignments) are correct

REQ-DMG-18.4	Data integrity-5	Approved	F

- report verification/validation of pre-warehouse data with post warehouse data

REQ-DMG-18.5	Data integrity-6	Approved	F

- verifying all extraction, transforming and loading procedures

REQ-DMG-18.6	Data integrity-7	Approved	F

- audit controls / trail linking the data in the warehouse to the data sources.

REQ-DMG-19	Security	Approved	F

Provide security Software that allows secure, two-factor Authentication access for use of the Data Mart. Security Software must comply with PCI-DSS, as well as all other applicable security standards.

REQ-DMG-20	Compliance to all applicable Laws	Approved	F

Ensure all applicable laws regarding the storage, access and use of private data are followed.

REQ-DMG-21	Logical data view	Approved	F

As per report data sources and databases BIN-25.

REQ-DMG-22	Multiple logical views	Approved	F

The report database may support multiple logical views allowing TTC personnel to view the data in a more business-related way based on their business unit or type of operation.

REQ-DMG-23	Data dictionary	Approved	F

A 'data dictionary' of all available data for reports (or any other fare card service) will be present.

The data dictionary is a centralized repository of information about the data and will include but not be limited to,

  - data variable name,
  - data variable alias, (what name the TTC has labelled the data),
  - data meaning,
  - data origin,
  - data source,
  - database it is stored in,
  - data usage,
  - data format,
  - data limits (upper and lower bound on the data),
  - relationships to other data parameters,
  - etc...

The data dictionary is a key resource when designing and testing reports.   It is also a key component in understanding the information a report is conveying based on the data components used.

REQ-DMG-24	Dataset complexity	Approved	F

No in-depth technical understanding of the underlying data sources and/or datasets will be required in order to design and execute reports.

REQ-DMG-25	Additional standard reports	Approved	F

The Data Mart may support additional standard reports (either interactive or static) that are not normally derived directly from operational data.

These reports will include at a minimum:

Provide the following operational reports in addition to standard reports (interactive or static):

REQ-DMG-25.1	Additional standard reports-2	Approved	F

 - Customer ridership trip data to support tax receipts

REQ-DMG-25.2	Additional standard reports-3	Approved	F

 - inventory reports

REQ-DMG-26	Automated data handling	Approved	F

Provide the following automated processes that will support data formats as required by the Data Warehouse and outlined in the report data sources and database requirements:

REQ-DMG-26.1	Automated data handling-2	Approved	F

 - data extraction

REQ-DMG-26.2	Automated data handling-3	Approved	F

 - data cleaning

REQ-DMG-26.3	Automated data handling-4	Approved	F

 - data loading

REQ-DMG-27	Rule based data handling	Approved	F

Support business rules and processes as defined by PRESTO and TTC for data extraction, cleansing, interpretation, and loading. These rules will be:

REQ-DMG-27.1	Rule based data handling-2	Approved	F

 - modifiable/flexible as determined by TTC Data Warehouse needs

REQ-DMG-27.2	Rule based data handling-3	Approved	F

 - deterministic/verifiable(e.g. the same data processed through the rules results in the same output)

REQ-DMG-27.3	Rule based data handling-4	Approved	F

 - capable of dealing with all supported data/Metadata formats as specified by the TTC

REQ-DMG-28	Database export/import capability	Approved	F

All databases will support the capability to import/export data.

REQ-DMG-29	Export /Import data formats	Approved	F

The following export formats will be supported,

 - text,
 - csv,
 - excel,
 - xml,
 - dbf,
 - word,
 - other database format such as SQL, Oracle, PostgreSQL ...

REQ-DMG-30	Export/Import data selections	Approved	F

Exporting/Importing data from databases may occur from tables, view or custom queries on the database.   If any BLOB (binary large object) elements exist, they will be exported as (binary) files.

REQ-DMG-31	Export/Import Automation	Approved	F

Database exporting/importing may be automated (as a background task) such that it occurs at a predefined time or on an event.

REQ-DMG-32	Backups	Approved	F

Copies of the databases need to be made regularly in case storage equipment fails. Furthermore, the TTC reserves the right to request and store selected views of the database in addition to normal backups.

REQ-DMG-33	Seven Year Storage	Approved	F

Retain, store and retrieve all data collected by the PRESTO System for no less than seven years.

REQ-DMG-34	Archival Storage	Approved	F

Transfer data that exceeds the seven year retention limit to permanent storage for archival purposes.

REQ-DMG-34.1	Archival Storage-2	Approved	F

Ensure that archived data is easily reloaded to the Data Mart in a timely manner.

REQ-DMG-34.2	Archival Storage-3	Approved	F

PRESTO is responsible for reloading data to the Data Mart within a timeframe that permits TTC and other authorized end users timely support of business operations as defined in the SLAs.

REQ-DMG-35	Aggregated data storage	Approved	F

As per report data requirements BIN-13 , BIN-138 and DMG-36.

REQ-DMG-36	Aggregation time span	Approved	F

Support reports based on aggregating data in the data base. The time span over which data will be aggregated may be flexible as long as it does not impact reporting and data analysis.   Typically, data aggregation may be done over five (5), ten (10) or fifteen (15) minute intervals.

REQ-DMG-37	Data Mart modification process	Approved	F

Develop a process/policy which specifically deals with problems associated with data stored by the Data Warehouse.   This process will include:

REQ-DMG-37.1	Data Mart modification process-2	Approved	F

 - fixing problems in the 'read-only' Data Mart that will arise after launch (i.e. it may be years later)

REQ-DMG-37.2	Data Mart modification process-3	Approved	F

 - addition of data sources not originally captured (or from new fare card system sources) by the Data Warehouse

REQ-DMG-37.3	Data Mart modification process-4	Approved	F

 - removal of data sources no longer required to the warehoused

REQ-DMG-38	Support for validating 'non-validated' data	Approved	F

Support data scrubbing for instances where descriptive data (and/or logical data names) may not be controlled, such as Customer names, device descriptions, operational departments (or any free form field) TTC personnel executing reports on these 'non-validated' data fields may encounter problems.

REQ-DMG-39	Support for automated directory	Approved	F

Support a user accessible automated directory that provides easy access and navigation to stored information.

REQ-DMG-40	Support for error checking	Approved	F

Support checking and mitigating the following errors:

REQ-DMG-40.1	Support for error checking -2	Approved	F

 - incomplete data
 - missing records
  - missing fields
 - non-recorded records or fields

REQ-DMG-40.2	Support for error checking -3	Approved	F

 - incorrect data
        - incorrect data values (out of range, invalid)
        - wrong data calculations
        - incorrect data aggregations
        - duplicate records

- incorrect information entered into the fare card system
  - incorrect pairing of data (i.e.   TTC device to station location)

REQ-DMG-40.3	Support for error checking -4	Approved	F

- incomprehensible data
- multiple fields within one field   - non-standard data formatting   - unknown data values

REQ-DMG-40.4	Support for error checking -5	Approved	F

- inconsistent data
  - inconsistent use of data values (i.e. use of M/F and 0/1 for male/female)
  - inconsistent meaning of data values
  - inconsistent names and addresses

- inconsistent business rules
  - inconsistent aggregation
  - inconsistent timing

- inconsistent dates

REQ-DMG-41	Timely correction of data	Approved	F

Perform data scrubbing in a timely manner.

REQ-DMG-42	Web based access	Approved	F

Support web based access (secure access for reporting and analysis using data from the Data Warehouse).

REQ-DMG-43	Incremental data updates	Approved	F

Support timely, incremental updates of operation data as mutually agreed by TTC and PRESTO.

REQ-DMG-44	Support for Data Mart query speed ups	Approved	F

Support various techniques for speedy querying and reporting of data within the Data Mart service, specifically:

 - partitioning
 - indexing
 - dimensional modeling
 - parallelizing query execution
 - archiving/purging data
 - de-normalizing aggregate table
 - bit mapped indexing
 - de-fragmentation of table and index files
 - query scheduling (after hours)
 - query queuing
 - query accelerators
 - query governors (i.e. stoppage of a query after a specified time or rows have elapsed)
 - query filters (warn when a user has submitted an in-efficient query)
 - storing of executed reports (images), especially if the report is to be run multiple times by various users
 - query preview support
 - table compression
 - use of columnar database
 - use of specialized Data Warehouse appliances
 - ability to scale the Data Warehouse

REQ-DMG-45	Support for Business Intelligence	Approved	F

Support Business Intelligence tools. For example, tools that:

 - check that the fare card system is 'okay' and running smoothly
 - confirm or verify operational data,
 - investigate Customer/operational/ financial patterns
 - compare information about Customers, products, costs, revenues, financial accounts
 - compare the same reports over different time spans
 - check the performance and efficiency of various systems
 - provide reports of record
 - identify trends
 - identify relationships
 - identify exceptions
 - to provide data for a "what if" analysis or forecast

REQ-DMG-46	Support for Data Marts	Approved	F

The Data Mart architecture may support multiple Data Marts.   Specifically, Data Marts are analytical data stores designed to focus on specific business functions for a specific department within the TTC organization.   Either bottom up or top down Data Mart creation may be supported.

REQ-DMG-47	Data Mart training	Approved	F

Provide training on usage of the Data Mart including data fields/data definitions, Metadata and the reporting system that will be used to access the data.

5.1.1   Data Universe and Files

REQ-DMG-48	Definition of Data Elements	Approved	F

Ensure all the TTC-required data elements required to support standard reports, as well as system monitoring and reporting are properly defined

REQ-DMG-49	Finalization of Data Universe during Design Review	Approved	F

PRESTO and TTC will finalize the scope of the Data Universe to be made available at the launch of PRESTO System revenue service. This description will include details of the data base environment, connections, roles, tools, and business process support functionality in support of the Data Mart.

REQ-DMG-50	Final Approval Timing	Approved	F

PRESTO and TTC will mutually agree on the Data Universe prior to PRESTO proceeding with the Final Design of PRESTO System, equipment, and manufacture of system components.

REQ-DMG-51	Refinement of Data Universe	Approved	F

After implementation, PRESTO, and/or TTC, may recommend refinements and changes to the Data Universe that aim to improve PRESTO System business results.

REQ-DMG-52	Scope of Data Elements	Approved	F

In defining the Data Universe, PRESTO will incorporate all data elements necessary to support operation of the PRESTO System approach to fare payment, transaction processing and settlement, risk management, business operations, and Customer service; and support specific requirements of TTC as a member of the PRESTO System.

REQ-DMG-53	Minimal Data Elements	Approved	F

Provide the following data fields in the Data Universe:

REQ-DMG-53.1	Minimal Data Elements-2	Approved	F

- transaction type (e.g. Pre-Funded or PAYG, single ride trip (LUM), non-revenue fare categories and pricing)

REQ-DMG-53.2	Minimal Data Elements-3	Approved	F

- TTC Fare Product

REQ-DMG-53.3	Minimal Data Elements-4	Approved	F

- TTC Fare Product purchase date

REQ-DMG-53.4	Minimal Data Elements-5	Approved	F

- transit agency

REQ-DMG-53.5	Minimal Data Elements-6	Approved	F

- transit service type (e.g. bus, streetcar, LRV, etc.)

REQ-DMG-53.6	Minimal Data Elements-7	Approved	F

- unique device ID

REQ-DMG-53.7	Minimal Data Elements-8	Approved	F

- unique terminal ID

REQ-DMG-53.8	Minimal Data Elements-9	Approved	F

- route number

REQ-DMG-53.9	Minimal Data Elements-10	Approved	F

- stop ID location

REQ-DMG-53.10	Minimal Data Elements-11	Approved	F

- GPS location

REQ-DMG-53.11	Minimal Data Elements-12	Approved	F

- unique fare transaction ID

REQ-DMG-53.12	Minimal Data Elements-13	Approved	F

- denial date

REQ-DMG-53.13	Minimal Data Elements-14	Approved	F

- denial reason code

REQ-DMG-53.14	Minimal Data Elements-15	Approved	F

- denial reason source

REQ-DMG-53.15	Minimal Data Elements-16	Approved	F

- registration date and time

| REQ-DMG-53.16 | Minimal Data Elements-17 | Approved | F |

- registration cancellation date and time

| REQ-DMG-53.17 | Minimal Data Elements-18 | Approved | F |

- source of sale: FMVD, SRVM, AVM web site, TTC Customer Centre, or Customer service call centre

| REQ-DMG-53.18 | Minimal Data Elements-19 | Approved | F |

- Customer service call centre

| REQ-DMG-53.19 | Minimal Data Elements-20 | Approved | F |

- pre-fund account reference number

| REQ-DMG-53.20 | Minimal Data Elements-21 | Approved | F |

- purchase type ID (e.g. the type of Pre-Funded purchase made)

| REQ-DMG-53.21 | Minimal Data Elements-22 | Approved | F |

- Hotlist calendar date

| REQ-DMG-53.22 | Minimal Data Elements-23 | Approved | F |

- Hotlist reason code

| REQ-DMG-53.23 | Minimal Data Elements-24 | Approved | F |

- total count of Hotlist additions

| REQ-DMG-53.24 | Minimal Data Elements-25 | Approved | F |

- total count of Hotlist as of date

| REQ-DMG-53.25 | Minimal Data Elements-26 | Approved | F |

- unique refund ID number

| REQ-DMG-53.26 | Minimal Data Elements-27 | Approved | F |

- refund date and time

| REQ-DMG-53.27 | Minimal Data Elements-28 | Approved | F |

- refund amount

| REQ-DMG-53.28 | Minimal Data Elements-29 | Approved | F |

- refund reason code

| REQ-DMG-53.29 | Minimal Data Elements-30 | Approved | F |

- refund approval code

| REQ-DMG-53.30 | Minimal Data Elements-31 | Approved | F |

- transfer amount

REQ-DMG-53.31	Minimal Data Elements-32	Approved	F

- cost of tap

REQ-DMG-53.32	Minimal Data Elements-33	Approved	F

- loyalty applied

REQ-DMG-53.33	Minimal Data Elements-34	Approved	F

- account balance file: date account balance file is created

REQ-DMG-53.35	Minimal Data Elements-36	Approved	F

- paid balance

REQ-DMG-53.36	Minimal Data Elements-37	Approved	F

- transfer balance

REQ-DMG-53.37	Minimal Data Elements-38	Approved	F

- refund balance

REQ-DMG-53.38	Minimal Data Elements-39	Approved	F

- other balance(s)

REQ-DMG-53.39	Minimal Data Elements-40	Approved	F

- passes start date

REQ-DMG-53.40	Minimal Data Elements-41	Approved	F

- passes end date

REQ-DMG-53.41	Minimal Data Elements-42	Approved	F

- source of test card

REQ-DMG-53.42	Minimal Data Elements-43	Approved	F

- test reason

REQ-DMG-53.43	Minimal Data Elements-44	Approved	F

- ride status code

REQ-DMG-53.44	Minimal Data Elements-45	Approved	F

- tap number

REQ-DMG-53.45	Minimal Data Elements-46	Approved	F

- fare implementation date

REQ-DMG-53.46	Minimal Data Elements-47	Approved	F

- fare expiration date

| REQ-DMG-53.47 | Minimal Data Elements-48 | Approved | F |

 - cost of tap

| REQ-DMG-54 | Additional System and Transit Data | Approved | F |

PRESTO will identify and provide any additional transaction fields required by the PRESTO System.

Other types of data strictly associated with transit (e.g., including but not limited to location and direction or travel of Reader Assemblies deployed on surface vehicles, etc.) will also be specified and finalized during Design Review.

| REQ-DMG-55 | Ability to Generate Files and File sets from Datasets | Approved | F |

As determined by TTC, the PRESTO System must generate specific files compromised of select data sets from the Data Universe. The files are the basis of specific reconciliation and reporting reports that may be required by TTC and that as a minimum have been described as reports (both standard and ad-hoc) in this schedule.

| REQ-DMG-56 | Purpose of Data Universe Files and File sets | Approved | F |

The following list is provided in order to gauge the scope of what is required only and is by no means exhaustive. During Design Review, TTC and PRESTO will finalize the Data Universe.

At a minimum enable the composition and structure of files and file sets to provide:

| REQ-DMG-56.1 | Purpose of Data Universe Files and File sets-2 | Approved | F |

 - provide financial reconciliation through capture of processing and posting details of each transaction performed by the central processor

| REQ-DMG-56.2 | Purpose of Data Universe Files and File sets-3 | Approved | F |

 - provide exception processing through capture of processing, settlement, and posting details of each transaction performed by the central processor

| REQ-DMG-56.3 | Purpose of Data Universe Files and File sets-4 | Approved | F |

 - provide Authorization tracking and control through capture of all requests and responses from the central processor and other systems

| REQ-DMG-56.4 | Purpose of Data Universe Files and File sets-5 | Approved | F |

 - provide clearing and processing reconciliation for banks, Merchant Acquirers, and all other entities engaged in the processing of payment and/or usage transactions

| REQ-DMG-56.5 | Purpose of Data Universe Files and File sets-6 | Approved | F |

 - provide reconciliation of PAYG settlement and clearing details through one-to-one matching of transactions

| REQ-DMG-56.6 | Purpose of Data Universe Files and File sets-7 | Approved | F |

 - provide Pre-Funded account activity tracking and management, including activities by Customers or Customer agents

| REQ-DMG-56.7 | Purpose of Data Universe Files and File sets-8 | Approved | F |

- provide single ride LUM sales tracking and management

REQ-DMG-56.8	Purpose of Data Universe Files and File sets-9	Approved	F

- provide LUM transfer usage tracking and management

REQ-DMG-56.9	Purpose of Data Universe Files and File sets-10	Approved	F

- provide transfer tracking and management of use of LUM as transfer stock

REQ-DMG-56.10	Purpose of Data Universe Files and File sets-11	Approved	F

- provide tracking of Reader Assemblies and other field equipment deployed or installed

REQ-DMG-56.11	Purpose of Data Universe Files and File sets-12	Approved	F

- provide tracking of all non-revenue fare products

REQ-DMG-56.12	Purpose of Data Universe Files and File sets-13	Approved	F

- provide tracking of unpaid transactions

REQ-DMG-56.13	Purpose of Data Universe Files and File sets-14	Approved	F

- provide tracking of all hot listing activity by source of hot list action

REQ-DMG-56.14	Purpose of Data Universe Files and File sets-15	Approved	F

- provide tracking and management of refunds to Customers

REQ-DMG-56.15	Purpose of Data Universe Files and File sets-16	Approved	F

- provide management of communications and other systems failures

REQ-DMG-56.16	Purpose of Data Universe Files and File sets-17	Approved	F

- provide "cradle-to-grave" monitoring and management of Customer claims

REQ-DMG-56.17	Purpose of Data Universe Files and File sets-18	Approved	F

- provide comprehensive tracking of all configuration and activity result messages, including:

  - decline reason codes
  - Reader Assembly acceptance result codes
  - failure codes
  - test card usage
  - Customer service codes for resolution of inquiries
  - authorized approver codes

REQ-DMG-56.18	Purpose of Data Universe Files and File sets-19	Approved	F

- provide tracking of account balances on all transit accounts

REQ-DMG-56.19	Purpose of Data Universe Files and File sets-20	Approved	F

- provide monitoring of current processing categories and fare pricings

REQ-DMG-56.20	Purpose of Data Universe Files and File sets-21	Approved	F

 - provide tracking of positive and negative exception lists for transfers between all modes of transportation by tap sequence, as required by fare policies and procedures

6   Fare Management

REQ-FAM-1	Allowance for New Fare Products	Approved	F

The PRESTO System will be designed to allow TTC to introduce new fare rules and products with minimal, if any, impact and changes to the PRESTO System.

REQ-FAM-2	Process for Changes to Fare Policy and Rules	Approved	F

TTC and PRESTO will mutually agree on a process for implementing, testing and rolling out TTC changes to fare rules and policy. This process will include a:

REQ-FAM-2.1	Process for Changes to Fare Policy and Rules-2	Approved	F

 - PRESTO System impact on implementing new TTC policy, rules and fares conducted by PRESTO

REQ-FAM-2.2	Process for Changes to Fare Policy and Rules-3	Approved	F

 - time, effort and cost of implementing policy changes conducted by PRESTO

REQ-FAM-2.3	Process for Changes to Fare Policy and Rules-4	Approved	F

 - TTC analysis outlining impact of fare policy changes to TTC

REQ-FAM-3	Process for Fare Groups Management	Approved	F

TTC and PRESTO will mutually agree on a process for managing fare groups as outlined in the fare groups section in this Schedule.

6.1   TTC Fare Groups

A Fare Group is a collection of transit devices, stations, routes, stops, areas, directions etc. that share a common, TTC specified, set of parameters.   This common set of parameters, among other things, includes fares, fare rate tables, activation time of fares and de-activation time of fares. Individual transit devices, stations, routes, stops, areas, directions etc., are referred to as Transit Objects.

Once a Fare Group is defined, changing any common parameter for the Fare Group, automatically changes it for all transit objects (devices, routes etc) in that Fare Group.

Fare Groups provide a measured degree of flexibility, adaptability and extensibility to the PRESTO System.   For example, Fare Groups allow the TTC the flexibility to create dynamic transit policies such as special fares for smog days or maintenance work on a subway line.   Furthermore, annual events such as 'a taste of the Danforth', New Years Eve, etc. can be easily handled via Fare Groups.

TTC Fare Groups will be defined by the TTC.

REQ-FAM-4	Overview	Approved	F

The primary shared common transit parameter is the transit fare rate and the time it is schedule to take effect both of which are flexible. Ensure support of the following additional fare groups:

REQ-FAM-4.1	Overview-2	Approved	F

 - support fare group based on a particular physical region (e.g. for the downtown core, or a particular route direction.)

REQ-FAM-4.2	Overview-3	Approved	F

- support fare group based on direction

| REQ-FAM-4.3 | Overview-4 | Approved | F |

- support fare group based on route

| REQ-FAM-4.4 | Overview-5 | Approved | F |

- support fare group based on events

| REQ-FAM-5 | Roles | Approved | F |

The TTC will provide examples of fare groups as part of its fare rules and policy management. PRESTO and the PRESTO System will be responsible for incorporating these fare groups into the PRESTO System, testing, managing them and executing them for TTC upon TTC's acceptance.

| REQ-FAM-6 | PRESTO System Flexibility | Approved | F |

The specifications in this Section require the PRESTO System to be designed so that fare groups defined by TTC may be easily implemented by PRESTO, without system, Software, Hardware and process changes.

| REQ-FAM-7 | The number of Fare Groups that can be defined | Approved | F |

Support an unlimited number of fare groups.

Single transit objects may belong to multiple fare groups.

| REQ-FAM-8 | Ad hoc definition of Fare Groups | Approved | F |

Provide the ability to define fare groups on an ad-hoc basis.

| REQ-FAM-8.1 | Ad hoc definition of Fare Groups-2 | Approved | F |

Fare groups within the TTC region may be defined on an ad hoc basis. Fare groups may be created, modified, deleted etc. as various events, strategies and business analysis dictate.

| REQ-FAM-9 | Fare group members | Approved | F |

Ensure that fare groups may consist of any number of individual devices, routes, stops, stations, areas, and directions.

| REQ-FAM-10 | Primary common Fare Group parameters | Approved | F |

The primary or common parameters a group may share include:

| REQ-FAM-10.1 | Primary common Fare Group parameters-2 | Approved | F |

- fare rate/tables

| REQ-FAM-10.2 | Primary common Fare Group parameters-3 | Approved | F |

- activation time for fare group (in minutes)

| REQ-FAM-10.3 | Primary common Fare Group parameters-4 | Approved | F |

- de-activation time for fare group (in minutes)

| REQ-FAM-10.4 | Primary common Fare Group parameters-5 | Approved | F |

- loyalty rate for fare group

REQ-FAM-10.5	Primary common Fare Group parameters-6	Approved	F

- fare group name

REQ-FAM-11	Extensible common Fare Group parameters	Approved	F

Enable common fare group parameters to be added.This list is extensible and flexible.

REQ-FAM-12	Group membership of transit devices/members	Approved	F

There is no limit to the number of groups that may be defined or that a particular member may belong to. A member (device, location, stops) may belong to any number of different groups.

REQ-FAM-13	Minimum Fare Group membership	Approved	F

Ensure the minimum number of members in a group is one. For example any of the following may be considered to a group: a single bus, a single bus stop, a streetcar, a single subway station.

REQ-FAM-14	Composition of Fare Group members	Approved	F

Ensure that single members may be comprised of more than one fare device. For instance a single fare member such as a subway station may contain many Turnstile Reader Assemblies.

REQ-FAM-15	Surface and subway Fare Groups	Approved	F

Ensure that surface and subway transit objects may belong to the same fare group.

REQ-FAM-16	Subway station Turnstile Reader Assemblies as Transit Objects	Approved	F

The aggregate of all the Turnstile Reader Assemblies in a single subway station is considered to be a single transit object.   That is, all the Turnstile Reader Assemblies located in that station have the same common parameters and may be treated as a single transit object.

For example, all the Turnstile Reader Assemblies at Davisville can be referred and referenced to as the Davisville subway station transit object.

REQ-FAM-17	Surface vehicle Reader Assemblies as Transit Objects	Approved	F

The aggregate of all the reader Assemblies in a single surface vehicle is considered to be a single transit object.   That is, all the reader Assemblies located in that surface vehicle have the same common parameters and may be treated as a single transit object.

 For example, all the reader Assemblies in a streetcar can be referred and referenced to as a single transit object.

REQ-FAM-18	Non-device Transit Objects	Approved	F

Ensure that each transit object has its own or shared common parameters. Transit objects may be surface vehicle stops, routes, transit lines, geographical areas, particular locations or directions

REQ-FAM-19	Maximum number of Transit Objects in a Fare Group	Approved	F

The maximum number of transit objects in a fare group is all of the TTC transit objects.

REQ-FAM-20	Fare group profiles	Approved	F

Enable every fare group to have at least two profiles.   The default profile contains all the defaults for the common parameters.   The defined profile contains the TTC determined values of the common parameters.

| REQ-FAM-21 | Default Fare Group | Approved | F |

Ensure that transit objects that do not belong to any TTC defined fare group automatically belong to an overall default fare group.

This default fare group will have its own common parameters that are defined by the TTC.   Default parameters for a fare group are always defined as these are the parameters a transit object reverts to when the transit object either does not belong to any other group, or when a defined an active fare group becomes inactive.

| REQ-FAM-22 | Fare groups referenced by name | Approved | F |

Ensure fare groups are referenced uniquely by a TTC defined name.

| REQ-FAM-22.1 | Fare groups referenced by name-2 | Approved | F |

Ensure all operations on, and references to a fare group, will use the TTC defined name.

| REQ-FAM-23 | Operations on Fare Groups | Approved | F |

Enable fare groups to be viewed, defined, edited, printed, copied, activated, de-activated, named, listed and deleted. These operations are performed by PRESTO personnel.

| REQ-FAM-24 | Viewing a Fare Group | Approved | F |

Viewing a fare group will include:

| REQ-FAM-24.1 | Viewing a Fare Group-2 | Approved | F |

 - viewing all transit objects that comprise a fare group

| REQ-FAM-24.2 | Viewing a Fare Group-3 | Approved | F |

 - viewing transit object types for fare group

| REQ-FAM-24.3 | Viewing a Fare Group-4 | Approved | F |

 - viewing all common parameters for a fare group

| REQ-FAM-24.4 | Viewing a Fare Group-5 | Approved | F |

 - viewing the common profile for a fare group

| REQ-FAM-24.5 | Viewing a Fare Group-6 | Approved | F |

 - viewing the default profile for a fare group

| REQ-FAM-24.6 | Viewing a Fare Group-7 | Approved | F |

Ensure selecting any user definable parameter will reveal any finer profile/parametric detail if available.

| REQ-FAM-25 | Defining and editing a Fare Group | Approved | F |

Defining and editing a group will include adding or removing any transit object to a fare group as well as defining common profile/parameters for that fare group.

| REQ-FAM-26 | Automatic parameter setting for Fare Groups | Approved | F |

Ensure that adding a transit object to an existing group automatically sets the global/common profile/parameters for that object to the value set for that fare group.

REQ-FAM-27	Ad hoc Fare Group reports	Approved	F

Ability for TTC to define ad-hoc reports presenting fare group information.

REQ-FAM-27.1	Ad hoc Fare Group reports-2	Approved	F

Ensure ad-hoc reports will include any and all information with regards to fare groups and transit objects within those groups. For example, a fare group report may show all transit objects belonging to a group or it may show all groups a particular transit object may belong to.

REQ-FAM-27.2	Ad hoc Fare Group reports-3	Approved	F

Ensure ad-hoc fare reports are flexible and adaptable.

REQ-FAM-28	Printing of Fare Group reports	Approved	F

Support printing of group reports. These reports will include at a minimum the time the fare group was created and the name of the person who created it.

REQ-FAM-29	Copying of defined Fare Groups	Approved	F

Provide the ability to copy and save previously defined fare group as a new fare group.

REQ-FAM-30	Fare Group activation	Approved	F

Ensure that fare groups may be activated or de-activated.

REQ-FAM-30.1	Fare Group activation-2	Approved	F

Ensure by default, a fare group's common profile is de-activated when the group is first defined.

REQ-FAM-30.2	Fare Group activation-3	Approved	F

Ensure a fare group can be activated by the TTC if the common parameters set in the fare groups profile have been validated by the TTC.

REQ-FAM-31	One Fare Group profile active at a time	Approved	F

Ensure that only one profile associated with a fare group may be active at a time.

REQ-FAM-31.1	One Fare Group profile active at a time-2	Approved	F

Ensure the default global profile becomes active if none of the profiles of all the groups a transit object belongs to is active.

REQ-FAM-32	Validation of Fare Group parameters/profiles via test beds	Approved	F

Ensure group parameters, such as fare and loyalty, will be validated via test beds set up to exactly duplicate transit objects.

REQ-FAM-32.1	Validation of Fare Group parameters/profiles via test beds-2	Approved	F

Ensure testing is done by PRESTO and the test results are reviewed with TTC.

REQ-FAM-33	Validation of Fare Group parameters via simulated fare transactions	Approved	F

Ensure fare group parameters are validated via simulated transactions using actual in-field Hardware.

REQ-FAM-33.1	Validation of Fare Group parameters via simulated fare transactions-2	Approved	F

Ensure the simulated transaction is a complete end-to-end fare transaction that starts within the field device at the card reader / device Software interface. In other words only the actual reading of the physical fare card is simulated.   Everything else in this procedure tests the end-to-end validity of the fare group's common parameters in a live system.

REQ-FAM-34	Displaying Fare Groups	Approved	F

Ensure that all fare groups are displayed as a list. This list will indicate which fare groups are active, de-active, dates of activation, duration of activation. Selection of a fare group on the list will bring up the fare group view.

REQ-FAM-35	Sorting Fare Groups by displayed parameters	Approved	F

Ensure fare group listings may be sorted by any of the common parameters defined for the fare group, including the fare group's name.

REQ-FAM-36	Fare group activation/deactivation time	Approved	F

All transit objects in a fare group must activate/de-activate their profiles at the future specified time stipulated in the fare group parameters by the TTC.

REQ-FAM-37	On-line devices Fare Group activation time	Approved	F

Activate a fare group profile instantaneously if the fare group contains only on-line devices.

REQ-FAM-38	Off-line devices Fare Group activation time	Approved	F

The maximum time between deploying the fare groups profile and the activation time as stipulated by the profile is 90 minutes for fare groups containing off-line devices as stipulated in FRP-9.

Note that this maximum time is for updating Reader Assemblies supporting PRESTO Media only and does not apply to PRESTO Reader Assemblies supporting Open Payments Media where all fare products, rules, groups etc. are located in the Central Back Office. In this latter case, activation of fare groups is for all intents and purposes, instantaneous.

REQ-FAM-38.1	Off-line devices Fare Group activation time-2	Approved	F

Ensure that for PRESTO Reader Assemblies supporting Open Payments Media, activation of fare groups is instantaneous.

REQ-FAM-39	On-line and off-line de-activation	Approved	F

Ensure that de-activation of a fare group's profile containing the common parameters for that group will only occur after a fare group's profile has been activated.

REQ-FAM-39.1	On-line and off-line de-activation-2	Approved	F

Ensure that de-activation of a fare group's profile is immediate for all fare groups regardless of whether or not they contain on-line or off-line devices.

REQ-FAM-39.2	On-line and off-line de-activation-3	Approved	F

Ensure that de-activation of a group profile automatically enables the default profile for that fare group.

7   Revenue Management

REQ-RVM-1	Reconciliation Process	Approved	F

Provide a reconciliation including all exception processing of the amounts payable and received during the immediately preceding month on or prior to the 10th day of each month.

PRESTO and TTC will design a monthly reconciliation process, to validate the daily PRESTO settlement(s) and match to TTC usage and EFT funds received.

REQ-RVM-2	Reconciliation of TTC Usage	Approved	F

Provide an end to end reconciliation of all PRESTO Media fare payments.

REQ-RVM-3	Reconciliation of Cross Boundary Usage	Approved	F

Provide an end to end reconciliation of all PRESTO Media used for cross-boundary travel as defined in the Cross Boundary Specifications (CBD-XX).

REQ-RVM-4	Reconciliation of Transit Expansion Usage	Approved	F

Provide a end to end reconciliation of all PRESTO Media transactions associated with Transit Expansion travel and devices as defined in the Transit Expansion Specifications (TEO-XXX)

REQ-RVM-5	Usage Data Sources	Approved	F

Provide reconciliation (from all sources) of all transit usage and payment activity on a one-by-one usage and fare payment transaction basis.

REQ-RVM-6	Storage of Reconciliation Data	Approved	F

All data used in reconciliation must be collected and stored in the Data Mart. All reconciliation reports generated from the Data Mart data must match those done by the PRESTO System CBO.

REQ-RVM-7	Storage of Exceptions	Approved	F

Ensure all exceptions and exception reports are stored in the Data Mart.

REQ-RVM-8	Specific Reconciliation Fields	Approved	F

Comply with PCI-DSS requirements.

The PRESTO System will include functionality to populate specific data fields that have been created for the reconciliation process.

REQ-RVM-9	Exception processing	Approved	F

Ensure the PRESTO System will be capable of exception processing during the reconciliation process so that corrective actions may be taken.

REQ-RVM-9.1	Exception processing-2	Approved	F

Supply tools for simplifying the exception process that enable:

REQ-RVM-9.2	Exception processing-3	Approved	F

- using Business Intelligence analysis

| REQ-RVM-9.3 | Exception processing-4 | Approved | F |

- pre-filtering all exceptions

| REQ-RVM-9.4 | Exception processing-5 | Approved | F |

- classifying by service provider, device, time

| REQ-RVM-9.5 | Exception processing-6 | Approved | F |

- providing tap usage traceability

| REQ-RVM-10 | Adherence to Accepted Practices | Approved | F |

PRESTO and TTC will mutually agree on accepted practices for exception processing, including automated exception processing procedures which must be followed.

| REQ-RVM-11 | Reduction in manual Re-adjustments | Approved | F |

Reduce the number of manual re-adjustments required during reconciliation.

| REQ-RVM-12 | Performance | Approved | F |

Ensure all SLA performance measures for reconciliation are met.

| REQ-RVM-12.1 | Usage Tap Reconciliation to Fare Product | Approved | F |

Ensure a reconciliation rate of 99.9% or greater (as per SLA-BO-7) be achieved for tap reconciliation to fare product.

| REQ-RVM-12.2 | Daily Financial Reconciliation Performance | Approved | F |

Ensure a reconciliation rate of 99.9% intra-Business Day; 100% next Business Day (as per SLA-BO-1) for daily financial reconciliation performance.

| REQ-RVM-12.3 | Daily Financial Reconciliation Accuracy | Approved | F |

Ensure a reconciliation rate of 99.9% intra-Business Day; 100% next Business Day (as per SLA-BO-2) for daily financial reconciliation accuracy.

| REQ-RVM-12.4 | Usage Tap Reconciliation to Fare Gate Releases | Approved | F |

Ensure a reconciliation rate of 99.9% for Usage Tap to fare gate release is achieved(as per SLA-BO-6).

| REQ-RVM-13 | Use of Electronic Data Interchange for Financial Transactions | Approved | F |

PRESTO and the PRESTO System will use an Electronic Data Interchange process (including all the necessary EDI files) for all financial transactions with the TTC.   This EDI process and files will be part of the daily and monthly electronic funds transfer sent by PRESTO (via PRESTO's bank) to TTC's bank. The EDI process and files will be used by TTC to track/reconcile PRESTO payments received by TTC in an automated fashion.

PRESTO will provide the EDI files in a format that allows for integration with TTC's legacy system. It will be up to TTC to provide the automation of that system.

8   System Management

REQ-SMG-1	System Management Scope	Approved	NF

PRESTO will provide system services for managing the PRESTO System that will include:

 - Performance management;
 - Operations Management;
 - Issue Management;
 - Risk Mitigation;
 - Fraud Detection and Analysis; and
 - Auditing.

8.1   Risk Mitigation

REQ-SMG-2	Minimize Risk of Revenue Loss	Approved	F

Provide and utilize tools within the PRESTO System to minimize the risk of revenue loss through fraud.

REQ-SMG-3	Use of Retail Risk Management Controls	Approved	F

Utilize analysis, techniques and procedures typical of retail Merchants and retails service providers and within accepted financial payments practice, in executing fraud and risk management controls in order to minimize Incidents of fraud and loss of revenue.

REQ-SMG-4	Dynamic Review of Usage Data	Approved	F

Support dynamic review of current and historical usage data to detect suspicious purchase, payment, and usage activity.

This usage data will include all data stored to the Data Mart including:

 - fare payment (tap) transactions (un-aggregated);
 - financial payment transactions at all Customer sales and reload channels;
 - device inventory and tracking; and
 - Device Maintenance and maintenance access (to devices) records.

REQ-SMG-5	Dynamic Review Outcome	Approved	F

Support the ability to hot-list cards and devices.

REQ-SMG-5.1	Dynamic Review Outcome-2	Approved	F

Provide the capability to broadcast information and/or instructions for managing risk to stakeholders, as well as system-wide to all PRESTO System end devices and operating infrastructure

REQ-SMG-6	Best-in-Class Practices	Approved	F

Support timely review of data and the gathering of information on suspicious activity and potential fraud.

Fraud detection and analysis will use best-in-class financial industry practices and procedures, including but not limited to:

 - Batching of inquiries to payment Issuer;

- Conversion of inquiries into Hotlists ready for uploading and broadcasting to end devices;

- Matching TTC Customer inquiries originating from the Web Site, the Customer Service Call Centre, and other sources to Merchant-Hotlisted Contactless Media and Devices;

- Analysis of use and purchase patterns that are considered suspicious (e.g., multiple purchases of high-value fare media in the same day, or over a short period of 2 or 3 days);

- Detection of abnormal, or extraordinary PRESTO Media usage;

- Detection of abnormal LUM usage;

- Detection of abnormal Concession usage (e.g. a sudden spike in Concession usage);

- Detection of a sudden increase in LUM transfer usage;

- Device status, functionality, history, including capture of data regarding tampering;

- Pre-Funded purchase amount by account;

- Pre-Funded fare product purchase by type; and

- Frequency of Pre-Funded intra-Business Day purchases, set by time interval and location of usage.

Additional parameters, procedures, and techniques for fraud detection and analysis will be detailed during Design Review.

REQ-SMG-7	Tracking and Reporting	Approved	F

Track and report results from all risk management and fraud detection activities to stakeholders and partners in the PRESTO System and business network.

REQ-SMG-8	Secure Usage Data Access	Approved	F

Parameter settings and data with regards to usage data will be controlled and accessed through the PRESTO System CBO.

Control usage data and related parameter settings via the PRESTO System CBO.

REQ-SMG-8.1	Secure Usage Data Access-2	Approved	F

Make access available to authorized PRESTO and TTC personnel in a secure manner in compliance with applicable security standards.

REQ-SMG-9	Use of TTC Expertise	Approved	NF

Transit expertise from TTC will be used by PRESTO to further enhance PRESTO's risk management efforts when specifically dealing with suspect transit activities.

REQ-SMG-10	Automatic Fraud Alerts	Approved	F

The fraud detection and analysis system will be capable of providing fraud alerts, state and status reports automatically and will not solely rely on manual investigations.

REQ-SMG-11	Use of On-Line Authorization Only	Approved	F

Use real-time Authorization with financial institutions for product purchases. Do not allow batch processing.

PRESTO will ensure that the PRESTO System will be capable of real-time access to all required Pre-Authorization, Authorization, and Authentication capabilities of the financial services industry and other entities issuing devices for acceptance at TTC.

8.2   Fraud Detection and Analysis - Details

This section covers the fraud detection and data analysis service requirements for the PRESTO System.

REQ-SMG-12	Fraud detection and data analysis scope	Approved	F

Ensure the fraud detection and data analysis systems are capable of detecting revenue and non-revenue PRESTO Card transaction fraud.

REQ-SMG-12.1	Fraud detection and data analysis scope-2	Approved	F

Ensure the fraud detection and data analysis systems are capable of detecting financial transaction fraud (credit, debit, and cash).

REQ-SMG-13	Functionality with respect to Fare Payment	Approved	F

Provide fraud detection and analysis capabilities, that at a minimum:

REQ-SMG-13.1	Functionality with respect to Fare Payment-2	Approved	F

 - analysis of fare card usage patterns

REQ-SMG-13.2	Functionality with respect to Fare Payment-3	Approved	F

 - monitoring of LUMs (sold, in-use, active)

REQ-SMG-13.3	Functionality with respect to Fare Payment-4	Approved	F

 - analysis of fare device usage patterns including but not limited to AVM, FMVD, and Reader Assemblies

REQ-SMG-13.4	Functionality with respect to Fare Payment-5	Approved	F

 - analysis of HHPOS usage and enforcement

REQ-SMG-13.5	Functionality with respect to Fare Payment-6	Approved	F

 - dispensed fare media patterns from AVM/FMVD machines

REQ-SMG-13.6	Functionality with respect to Fare Payment-7	Approved	F

 - analysis of fare purchase / load patterns

REQ-SMG-14	Fraud Detection in Other Areas	Approved	F

Provide fraud detection and analysis capabilities in non-financial areas ,including but not limited to:

REQ-SMG-14.1	Fraud Detection in Other Areas-2	Approved	F

 - operator cards/tracking

REQ-SMG-14.2	Fraud Detection in Other Areas-3	Approved	F

 - employee card management/tracking

REQ-SMG-14.3	Fraud Detection in Other Areas-4	Approved	F

- device management

REQ-SMG-14.4	Fraud Detection in Other Areas-5	Approved	F

- card procurement

REQ-SMG-15	Guidance in Fraud Detection and Data Analysis	Approved	F

Ensure the fraud detection and data analysis is capable of detecting Incidents/events that may result in loss of revenue, disruption of service, denial of service and loss of good will.

REQ-SMG-16	General Characteristics	Approved	F

Ensure the fraud detection and analysis service is flexible with user defined fraud analysis rules and pattern matching.

REQ-SMG-16.1	General Characteristics-2	Approved	F

Ensure the fraud detection and analysis service has the ability to learn and detect changes in pattern usage.

REQ-SMG-16.2	General Characteristics-3	Approved	F

Ensure the fraud detection and analysis service provides automatic reporting of fraud events.

REQ-SMG-16.3	General Characteristics-4	Approved	F

Ensure the fraud detection and analysis service provides automatic reporting for fraud Incidents.

REQ-SMG-16.4	General Characteristics-5	Approved	F

Ensure the fraud detection and analysis service provides assignment of likelihood levels to all Incidents and reports.

REQ-SMG-17	Use of Past History	Approved	F

Fraud detection and data analysis is not an exact science.   Through experience, PRESTO and the PRESTO System will use observed trends and past patterns to enhance their fraud detection techniques and processes.

REQ-SMG-18	Scalability	Approved	F

Ensure the fraud detection and data analysis capabilities are scalable, modular and can support a high volume of transactions associated with TTC.

This service needs to grow with the roll out of the PRESTO System at TTC.

REQ-SMG-19	Fraud detection and data analysis policy	Approved	F

Provide a PRESTO System fraud detection and analysis policy that includes at a minimum methods and procedures used for investigative data analysis; identification procedures for determining types of Incidents; escalation methods for handling fraud; training; and legal consultation.

These policies must ensure,

- repeatability,
- accuracy,
- completeness,

- verifiability

of any Incident detected.

| REQ-SMG-20 | Availability | Approved | F |

Provide fraud detection and data analysis services 24 x 7 x 365 days of the year.

| REQ-SMG-21 | Support for forensic analysis | Approved | F |

Ensure the fraud detection and data analysis services are capable of supporting forensic analysis for all Incidents recorded.

| REQ-SMG-22 | Use in detection of non-fraud Incidents | Approved | F |

Ensure fraud detection and data analysis services are flexible and adaptable enough to be used for not only detecting fraud, but also systematic errors such as failure of fare cards.

These errors would include:

- failure of fare cards;
- failure of Reader Assemblies;
- detecting security holes in the fare card system;
- detecting system or process anomalies that may result in the loss of revenue or functionality;
- network / operations log;
- maintenance history analysis;
- inventory analysis; and
- consumables (money, paper, etc.) analysis

| REQ-SMG-23 | Leverage existing solutions | Approved | F |

Although fraud detection and data analysis in the fare card industry tend to be based on simple reporting techniques, the service envisioned for the PRESTO System may be based on current techniques employed in other industries (such as banking, Credit Card usage patterns).

| REQ-SMG-24 | Support for multiple databases | Approved | F |

Ensure the fraud detection and data analysis services are flexible and adaptable in order to execute against multiple, independent databases.

For example, the services will need to check fare card transaction patterns at the same time it is checking operator card transaction patterns.   Another example would be the detection of any anomalies while examining ridership verses revenue data.

| REQ-SMG-25 | Support for multiple simultaneous fraud detection data analysis | Approved | F |

Ensure the fraud detection and data analysis services are capable of executing multiple, simultaneous fraud detection and data analysis at the same time.

| REQ-SMG-26 | No fare card system impact | Approved | F |

Ensure the fraud detection and data analysis services do not impact the operation of any other part of the PRESTO System.

| REQ-SMG-27 | Background operation | Approved | F |

Provide continuous fraud analysis and detection.

PRESTO personnel will determine which and what type of data analysis and fraud detection rules that

will be executed at various times of the day.   For example, data analysis rules that may make use of long term patterns and trends may be run at night in order to offset the computational load during the peak fare transactions that occur during 'rush hour' times.

REQ-SMG-28	Rule based analysis	Approved	F

Ensure the fraud detection and data analysis services support flexible rule based analysis.
Rule base analysis will allow PRESTO personnel to:

- specifically target both types and patterns of known, expected or hypothesized fraud; and
- look for trends / patterns that may indicate fraud (unknown but suspected).

The nomenclature and basic rules for fraud detection may be worked out during design of the PRESTO System.

REQ-SMG-29	Rule execution and timing	Approved	F

Rule execution shall be done on:

REQ-SMG-29.1	Rule execution and timing-2	Approved	F

 - a continuous basis (e.g. when a rule has finished executing, it starts again on either new data or a different resolution and range of data);

REQ-SMG-29.2	Rule execution and timing-3	Approved	F

 - a period basis (e.g. at the end of a Business Day).

Note that continuous rule execution may be referred to as real time rules.

REQ-SMG-30	Definition and generation of alerts/alarms/Incidents/status	Approved	F

There are a wide range of Incidents, known and unknown that may have their root cause in fraudulent or systematic failure activity. The fraud detection and analysis system must allow PRESTO personnel to define (by name and type) all alarms, Incidents, statuses etc. that may occur in the PRESTO System.

Support the capability to execute rules for fraud detection and data analysis on a continuous or periodic basis.   Rules are defined by PRESTO.

Execution of the rules defined for fraud detection and data analysis rules may generate:

 - alerts,
 - alarms,
 - Incidents,
 - status,
 - etc...

REQ-SMG-31	Standard rules	Approved	F

Support the capability to execute standard rules at any time for fraud detection and data analysis.
Standard rules will be executed by the fraud detection and data analysis service on a continuous or periodic basis.

These standard rules are defined by PRESTO.

These rules may be defined, and added to the set of rules for a particular database at any time.

REQ-SMG-32	Support for ad hoc rules	Approved	F

Enable ad hoc rules (i.e. rules that are defined and executed at any time) to be executed on a continuous or periodic basis at any time

REQ-SMG-33	Migration of ad hoc rules to standard rules	Approved	F

In some cases, the result of an ad hoc rule may warrant further investigation.   Ad hoc rules may be migrated to standard rules, with either periodic or continuous execution by the appropriate PRESTO personnel.

REQ-SMG-34	Rule and pattern definition editor	Approved	F

Ensure the fraud detection and data analysis services support an interactive rule and pattern definition service.

REQ-SMG-35	Advanced rule generation and pattern analysis	Approved	F

Ensure the fraud detection and data analysis services support advance data analysis techniques such as:

 - advanced statistical analysis techniques, (statistical pattern analysis, variance,); - pattern matching techniques such as clustering, classification, non-linear pattern analysis; - sampling methods (i.e. Monte Carlo techniques); - time/template matching algorithms; - advance Boolean expressions; - sampling methods; - data filtering; and - TTC defined heuristics based on PRESTO personnel and operations experience..

REQ-SMG-36	Support for data filtering and sampling	Approved	F

Ensure fraud detection and analysis services supports data filtering such as:

REQ-SMG-36.1	Support for data filtering and sampling-2	Approved	F

 - selectively sampling data

REQ-SMG-36.2	Support for data filtering and sampling-3	Approved	F

 - aggregating data

REQ-SMG-36.3	Support for data filtering and sampling-4	Approved	F

 - setting thresholds/triggers for data analysis

REQ-SMG-37	Automatic discovery of fraud and data corruption	Approved	F

Ensure fraud detection and analysis services can automatically detect some fraudulent behavior.

For example, the service should be able to detect increases in Concession card use at certain fare card reader locations, or multiple use of the same fare card within the pass back timeout period.

REQ-SMG-38	Automatic learning	Approved	F

Ensure the fraud detection and data analysis services are capable of learning, with manual interaction, how to distinguish between false positives and false negatives to improve future fraud detection.

REQ-SMG-39	Assigning of likelihood estimates	Approved	F

Ensure the fraud detection and data analysis services are able to detect and report on:

REQ-SMG-39.1	Assigning of likelihood estimates-2	Approved	F

 - likelihood that an event is fraudulent

REQ-SMG-39.2	Assigning of likelihood estimates-3	Approved	F

- likelihood that an event is a systematic problem

REQ-SMG-39.3	Assigning of likelihood estimates-4	Approved	F

- time(s), location and frequency of an event

REQ-SMG-39.4	Assigning of likelihood estimates-5	Approved	F

- revenue loss, or estimated revenue loss

REQ-SMG-39.5	Assigning of likelihood estimates-6	Approved	F

- probability that an event will occur again

REQ-SMG-39.6	Assigning of likelihood estimates-7	Approved	F

- estimation of when an event will occur

REQ-SMG-40	Report generation	Approved	F

Ensure the fraud detection and data analysis services shall generate reports on:

REQ-SMG-40.1	Report generation-2	Approved	F

- the completion of a fraud rule

REQ-SMG-40.2	Report generation-3	Approved	F

- the completion of a set of fraud rules

REQ-SMG-40.3	Report generation-4	Approved	F

- the end of the service day

REQ-SMG-40.4	Report generation-5	Approved	F

- the completion of an ad hoc rule execution on demand

REQ-SMG-40.5	Report generation-6	Approved	F

- detection of a fraud alert/Incident (positive or negative)

REQ-SMG-40.6	Report generation-7	Approved	F

- user-defined period summary reports (e.g. day, week, month, year)

REQ-SMG-41	Fraud report definition and design	Approved	F

Provide fraud reports. These reports will include at a minimum:

- rule(s) the report is based on
- time period the report is over
- date/time the report is generated
- unique identification of the report
- type of report (chart, series)
- all relevant data analysis details (i.e. statistics, alarms, events)

Generally, the fraud report definition and design will be similar to all other Report Functionality

requirements.   Details of these requirements will be mutually agreed upon before Final Design.

REQ-SMG-42	Minimum relevant report content	Approved	F

Provide a fraud detection and analysis report. The report will include:

 - description of the event that has occurred (i.e. via the rules/patterns detected)
 - likelihood estimates that fraud has occurred
 - location of event (device, area)
 - time and date of the event
 - number of occurrences
 - suggested priority level for investigation

REQ-SMG-43	Fraud/data analysis report channels	Approved	F

Use the following channels to automatically send Fraud and data analysis :

REQ-SMG-43.1	Fraud/data analysis report channels-2	Approved	F

 - Email

REQ-SMG-43.2	Fraud/data analysis report channels-3	Approved	F

 - hosted web page

REQ-SMG-43.3	Fraud/data analysis report channels-4	Approved	F

 - text message

REQ-SMG-44	Notification channels	Approved	F

Ensure the following notification channels are used for fraud detection and data analysis:

REQ-SMG-44.1	Notification channels-2	Approved	F

 - email

REQ-SMG-44.2	Notification channels-3	Approved	F

 - SMS

REQ-SMG-44.3	Notification channels-4	Approved	F

 - web portal

REQ-SMG-45	Notification channel usage	Approved	F

Use notification channels for:

REQ-SMG-45.1	Notification channel usage-2	Approved	F

 - completion of a rule or rule(s)

REQ-SMG-45.2	Notification channel usage-3	Approved	F

 - the immediate positive detection of a fraud Incident

REQ-SMG-45.3	Notification channel usage-4	Approved	F

 - completion of fraud analysis cycle

| REQ-SMG-46 | Time span and resolution | Approved | F |

Ensure the fraud detection and data analysis service encompasses the same time spans and resolution as the data upon which the analysis is applied.

| REQ-SMG-47 | Storage | Approved | F |

Fraud detection and analysis reports will need to be saved, stored and archived.

| REQ-SMG-48 | Dashboards | Approved | F |

Support the use dashboards to convey real time events and Incidents. Dashboards must be able to interactively drill down to the root cause of the Incident and reproduce it if necessary.

| REQ-SMG-49 | Ability to handle non-compliant data | Approved | F |

Ensure the fraud detection and data analysis services automatically recognize:

| REQ-SMG-49.1 | Ability to handle non-compliant data-2 | Approved | F |

 - missing data

| REQ-SMG-49.2 | Ability to handle non-compliant data-3 | Approved | F |

 - data out of range

| REQ-SMG-49.3 | Ability to handle non-compliant data-4 | Approved | F |

 - corrupted data

| REQ-SMG-50 | Interactive/ manual modes and reproducibility | Approved | F |

Support manual/interactive modes for fraud investigation. Typically, once an event has been detected and reported on, PRESTO personnel should be able to interactively investigate and reproduce the automatically generated report.   Reproducibility is a key requirement for the fraud detection and data analysis service.

| REQ-SMG-51 | Fraud detection and data analysis tracking | Approved | F |

Ensure the fraud detection and data analysis services shall at a minimum have the capability of:

| REQ-SMG-51.1 | Fraud detection and data analysis tracking-2 | Approved | F |

 - recording and storing all Incidents

| REQ-SMG-51.2 | Fraud detection and data analysis tracking-3 | Approved | F |

 - generating reports based on Incidents (either individual Incidents, groups or overall)

| REQ-SMG-51.3 | Fraud detection and data analysis tracking-4 | Approved | F |

 - tracking and history of all Incidents

| REQ-SMG-51.4 | Fraud detection and data analysis tracking-5 | Approved | F |

 - storing Incident resolutions

| REQ-SMG-51.5 | Fraud detection and data analysis tracking-6 | Approved | F |

 - providing a complete Incident management service for storing, cataloguing, and archiving reports

REQ-SMG-52	Continually monitor external fraud events and literature	Approved	F

Monitor, access and adopt preventative measures for both known and potential fraudulent behavior as it becomes available via:

- other transit agencies
- published literature (including the internet)
- external agencies
- research institutions
- third party agencies
- card manufactures (e.g. MIFARE crypto1 weakness)

REQ-SMG-53	Brainstorming	Approved	F

Provide expert consultation for determining where fraud or systematic errors may occur in the PRESTO System.   Furthermore, experts throughout the PRESTO System will need to be consulted in interpreting 'discovered' data patterns in order to determine the root cause.

8.3   Audit

REQ-SMG-54	TTC Audit Rights	Approved	NF

TTC and/or any internal or external TTC Audit Representatives will have the right, and PRESTO will provide access for the TTC Audit Representatives, upon 72 hours notice in writing to PRESTO, to audit and inspect the PRESTO System.

REQ-SMG-54.1	Facility Audits	Approved	NF

TTC Audit Representatives will have the right to audit all relevant facility or part of a facility at which PRESTO or its subcontractor(s) is providing Managed Services.

REQ-SMG-54.2	Data Audits and Scope of Data Audits	Approved	NF

TTC Audit Representatives (through the Executive Client Committee) will have the right to audit data, records, documents and other information of either PRESTO or its subcontractor (s) relating to the Managed Services being provided to TTC in order to verify:

- the performance of PRESTO or it's subcontractor of its obligations under this agreement;
- the internal control environment of PRESTO or its subcontractor as it relates to the Managed Services;
- the security and integrity of TTC Confidential Information;
- amounts paid by TTC under the PRESTO agreement;
- the security of TTC and the Provincial PRESTO System; and
- compliance with applicable Laws, including privacy Laws to the extent required by the provisions of this Agreement.

REQ-SMG-55	PRESTO Audits	Approved	NF

PRESTO will conduct audits of or pertaining to the Services provided to TTC in such manner and at such times as is consistent with the audit practices of well-managed operations performing services substantially similar to PRESTO's obligations set forth in this Agreement at least once per contract year.

REQ-SMG-56	PRESTO Audit Obligation to TTC	Approved	NF

Each contract year, Metrolinx will complete a CSAE 3416 Type 2 report (or its then-current equivalent) at its cost.   The CSAE 3416 type 2 (or its then-current equivalent) report must address all key controls necessary to ensure that customers are properly charged and that revenue allocated to TTC, and unearned revenue is properly calculated, complete (i.e. including any "exception" transactions),

and remitted to TTC within the settlement time frame outlined in the Agreement. The CSAE 3416 Type 2 (or its then-current equivalent) report should be made available to the PRESTO Audit Committee (PAC), and subsequently to Executive Client Committee (ECC) for approval, by February 28th each year or date mutually agreed to by the ECC.

REQ-SMG-57	Emergency Audits	Approved	NF

TTC Audit Representatives may at any time conduct Emergency Audits, without prior written notice, to address material operation problems and issues that pose a significant threat to TTC's interests.

REQ-SMG-58	Audit Costs	Approved	NF

TTC's costs of any PRESTO audit(s) conducted to be addressed in the overall Master Agreement.

9   Order and Distribution Management

9.1   General

REQ-ODM-1	Media Distribution to Fare Equipment	Approved	F

Ensure distribution of all PRESTO Media to all PRESTO equipment that dispenses PRESTO Media.

REQ-ODM-2	Media Distribution to Third Party	Approved	F

Ensure distribution of all PRESTO Media to all third party agencies.

REQ-ODM-3	Media Distribution to TTC Customer Centres	Approved	F

Ensure distribution of all PRESTO Media to all Customer service centres.

REQ-ODM-4	Media Distribution to Concession Groups	Approved	F

The PRESTO System will have the necessary mechanisms, equipment and processes in place in order to perform targeted distribution of PRESTO Media to Concession groups at locations such as: schools; old age centres; and community centres. The necessary distribution mechanisms may include: using a third party for distribution and registration; PRESTO Media encoding equipment; card printing and lamination device; portable Reader Assembly; and point of sale device.

REQ-ODM-15	Media Distribution and Collection for MDP and VIP	Approved	F

Provide management and support for the distribution and collection of PRESTO Media and equipment for the TTC MDP and VIP programs. The necessary distribution and collection mechanisms may include: - using a third party for distribution and registration; - PRESTO Media encoding equipment; - card printing and lamination device; - portable Reader Assembly; and - Point of Sale device.

REQ-ODM-5	TTC Private Fare Cards Ordering	Approved	F

Enable TTC to order TTC private fare cards via the PRESTO System.

REQ-ODM-6	Ordering System for TTC Private Fare Cards	Approved	F

Enable TTC to modify, track, accept and verify TTC private fare card orders via the PRESTO System.

REQ-ODM-6.1	Ordering System for TTC Private Fare Cards-2	Approved	F

 Provide TTC with notification requests and verifications regarding the status of an order.

REQ-ODM-7	TTC Private Fare Card Distribution	Approved	F

The TTC will be responsible for distributing all TTC private fare cards.

REQ-ODM-8	Equipment for TTC Private Fare Card Distribution	Approved	F

PRESTO shall provide any necessary equipment for distribution of TTC Private Fare Cards by the TTC as outlined in the Distribution Equipment Section of Schedule B. This includes any equipment required for registering TTC Private Fare Cards either at central locations or portable equipment for in-field distribution and registration.

REQ-ODM-9	Tracking and Reporting of TTC Private Fare Cards	Approved	F

Ensure all TTC private fare cards are tracked, recorded, reported on and may be hot listed no differently to revenue cards. The PRESTO System will not require a separate system to do this. Registering the TTC private fare card will initiate this process.

REQ-ODM-10	Ordering and Distribution of Consumables	Approved	NF

The ordering, distribution and installation of all field equipment consumables is the responsibility of PRESTO. TTC fare policy will determine the allowable "expiry" status of PRESTO Media inventory in the field. For example, PRESTO vending machines will not dispense PRESTO cards that are "about to expire". PRESTO must keep field inventory "fresh" in accordance with TTC fare policy. PRESTO will use the Ordering, Inventory and MMS systems to ensure that all performance and availability specifications are met.

9.2 LUM Distribution to Surface Vehicle Garages

REQ-ODM-11	Provision of LUMs and LUM on Bus Dispensers	Approved	F

PRESTO will provide a sufficient number of LUMs and LUM On Bus Dispensers to equip and ensure LUM Availability for scheduled, in-service bus and legacy streetcar operations so as to: - Not to impede or in any way restrict the ability of TTC Operators to issue LUMs when TTC vehicles are in service; and - Not hinder or in any way prevent scheduled pull-out of vehicles for in-service operations due to unavailability of LUMs or LUM on Bus Dispensers.

REQ-ODM-12	Tracking of LUM on Bus Distribution	Approved	F

Process, track, and report on distribution of LUM by PRESTO to TTC bus garages, streetcar car houses and Wheel-Trans vehicles.

REQ-ODM-12.1	Tracking of LUM on Bus Distribution-2	Approved	F

Process, track, and report on the use of LUM by Customers as transfer media.

REQ-ODM-13	Distribution Capabilities	Approved	F

At a minimum, Process, track, and report on the following:

REQ-ODM-13.1	Distribution Capabilities-2	Approved	F

 - assignment of batches of LUM to a garage or streetcar car house

REQ-ODM-13.2	Distribution Capabilities-3	Approved	F

 - tracking of activation of LUM for use as a transfer to the point of activation by route, vehicle, and Reader Assembly

REQ-ODM-13.3	Distribution Capabilities-4	Approved	F

 - automation of management and control of LUM inventory so as to maximize operating efficiencies while reducing the possibility of LUM fraud

REQ-ODM-14	Sufficient Supply of LUMs	Approved	F

Provide, distribute and deliver a sufficient supply of LUM to all TTC facility locations (bus garages, streetcar houses and TTC owned Wheel-Trans vehicles) as specified in SLA EQ-5 of Schedule A.

10 Training

REQ-TRN-1	Training Scope	Approved	NF

PRESTO will provide training on all aspects of the PRESTO system including but not limited to:

- Operation of all field devices;
- Maintenance of all field devices, as necessary;
- Customer use of all field devices; and
- PRESTO System services such as, Financial Reconciliation and Settlement, Customer Web Site, Card Ordering, Device Management/Monitoring, Reporting, BI, Work Order system, IVR, Help Desk, Operations Web Site, and Data Mart.

REQ-TRN-2	Provision of PRESTO Training Material	Approved	NF

PRESTO will provide TTC with training material on all aspects of the PRESTO System. Training material will include but not be limited to,

- Instructions,
- manuals,
- drawings,
- notes, charts and other information used in connection with the instruction and training of individuals in the use,
- EOD configuration,
- operation,
- updating, and
- maintenance or support of the PRESTO System or any part thereof.

REQ-TRN-3	Training Plan	Approved	NF

PRESTO will provide a mutually agreed upon comprehensive and complete training plan for TTC personnel.   This training plan will include multiple training plans to coincide with the Project Plan.

REQ-TRN-4	Timing of Training	Approved	NF

PRESTO will train TTC personnel as outlined in the Project Plan.

REQ-TRN-6	Ongoing Training Services	Approved	NF

If PRESTO has undertaken a modification/updating to the PRESTO System, PRESTO will conduct training due to the modification/update for all affected TTC personnel (up to 5% of TTC employees).

REQ-TRN-8	Train the Trainer Program	Approved	NF

At TTC's request, PRESTO will conduct training for TTC staff on a train the trainer basis which will count toward the 5% commitment.

REQ-TRN-9	Training Equipment	Approved	NF

PRESTO will be responsible for all documentation and PRESTO System /Equipment required with its training activities.

REQ-TRN-10	Equipment Used for Training	Approved	F

Ensure fully operational equipment will be used for training.

REQ-TRN-11	Training Environment	Approved	NF

PRESTO will establish, operate, support and maintain a non-production training environment on a site,

agreed to by TTC and PRESTO, that mirrors the then-current production environment for PRESTO and that meets the requirements set forth in this document. In those circumstances when TTC is training TTC personnel regarding the PRESTO system, PRESTO, acting reasonably, will provide access to the PRESTO training environment. The location must be conveniently located for reasonable access for TTC personnel.

REQ-TRN-12	Recording of Training Sessions	Approved	NF

TTC may record any Training Sessions conducted by PRESTO. In addition, PRESTO and TTC will mutually agree on when to record any Training Services sessions conducted by PRESTO for TTC. TTC may, for internal purposes only, use, reproduce, edit, and rebroadcast all or any part of the recordings made by TTC, or by PRESTO.

REQ-TRN-13	Extent of Training	Approved	NF

PRESTO will train up to 5% of TTC employees.   All training of TTC and operations support staff required for the PRESTO System will be completed in accordance to the Project Plan.

11 **Marketing**

Marketing will be dealt with in the Master Agreement between PRESTO and TTC.

Cross Reference Table

This cross reference table matches PRESTO information to TTC Business Requirements. This table is in document order as defined in this document.

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-RAR-1	RAR	REQ-RAR-1/1	Other - Roles & Responsibilities	NF	*Approved*	R?.?
REQ-RAR-11	RAR	REQ-RAR-11/1	Other - Roles & Responsibilities	F	*Approved*	R?.?
REQ-RAR-6	RAR	REQ-RAR-6/1	Other - Roles & Responsibilities	NF	*Approved*	R?.?
REQ-RAR-7	RAR	REQ-RAR-7/1	Other - Roles & Responsibilities	NF	*Approved*	R?.?
REQ-CMG-1	CMG	REQ-CMG-1/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-1.1	CMG	REQ-CMG-1/2	Customer Management	F	*Approved*	R?.?
REQ-CMG-1.2	CMG	REQ-CMG-1/3	Customer Management	F	*Approved*	R?.?
REQ-CMG-2	CMG	REQ-CMG-2/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-3	CMG	REQ-CMG-3/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-4	CMG	REQ-CMG-4/1	Fare Management	F	*Approved*	R?.?
REQ-CMG-5	CMG	REQ-CMG-5/1	Asset Management	F	*Approved*	R?.?
REQ-CMG-6	CMG	REQ-CMG-6/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-6.1	CMG	REQ-CMG-6/2	Customer Management	F	*Approved*	R?.?
REQ-CMG-7	CMG	REQ-CMG-7/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-8	CMG	REQ-CMG-8/1	Fare Management	F	*Approved*	R?.?
REQ-CMG-8.1	CMG	REQ-CMG-8.1/1	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-8.1.1	CMG	REQ-CMG-8.1/2	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-8.1.2	CMG	REQ-CMG-8.1/3	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-8.1.3	CMG	REQ-CMG-8.1/4	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-8.2	CMG	REQ-CMG-8.2/1	Fare Management	F	*Approved*	R?.?
REQ-CMG-8.3	CMG	REQ-CMG-8.3/1	Fare Management	F	*Approved*	R?.?
REQ-CMG-8.3.1	CMG	REQ-CMG-8.3/2	Fare Management	F	*Approved*	R?.?
REQ-CMG-8.4	CMG	REQ-CMG-8.4/1	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-9	CMG	REQ-CMG-9/1	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-9.1	CMG	REQ-CMG-9/2	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-9.2	CMG	REQ-CMG-9/3	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-9.3	CMG	REQ-CMG-9/4	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-10	CMG	REQ-CMG-10/1	Card/Media	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
			Management			
REQ-CMG-11	CMG	REQ-CMG-11/1	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-11.1	CMG	REQ-CMG-11/2	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-11.2	CMG	REQ-CMG-11/3	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-12	CMG	REQ-CMG-12/2	Asset Management	F	*Approved*	R?.?
REQ-CMG-12.3	CMG	REQ-CMG-12 /1	Asset Management	F	*Approved*	R?.?
REQ-CMG-12.1	CMG	REQ-CMG-12/3	Asset Management	F	*Approved*	R?.?
REQ-CMG-12.2	CMG	REQ-CMG-12/4	Asset Management	F	*Approved*	R?.?
REQ-CMG-13	CMG	REQ-CMG-13/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-14	CMG	REQ-CMG-14/1	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-15	CMG	REQ-CMG-15/1	Fare Management	F	*Approved*	R?.?
REQ-CMG-16	CMG	REQ-CMG-16/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-17	CMG	REQ-CMG-17/1	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-18	CMG	REQ-CMG-18/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-19	CMG	REQ-CMG-19/1	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-20	CMG	REQ-CMG-20/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-20.1	CMG	REQ-CMG-20.1/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-20.2	CMG	REQ-CMG-20.2/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-20.3	CMG	REQ-CMG-20.3/1	Card/Media Management	F	*Approved*	R?.?
REQ-CMG-20.4	CMG	REQ-CMG-20.4/1	Financial Management	F	*Approved*	R?.?
REQ-CMG-21	CMG	REQ-CMG-21/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-22	CMG	REQ-CMG-22/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-23	CMG	REQ-CMG-23/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-23.1	CMG	REQ-CMG-23/2	Customer Management	F	*Approved*	R?.?
REQ-CMG-23.2	CMG	REQ-CMG-23/3	Customer Management	F	*Approved*	R?.?
REQ-CMG-23.3	CMG	REQ-CMG-23/4	Customer Management	F	*Approved*	R?.?
REQ-CMG-23.4	CMG	REQ-CMG-23/5	Customer Management	F	*Approved*	R?.?
REQ-CMG-23.5	CMG	REQ-CMG-23/6	Customer Management	F	*Approved*	R?.?
REQ-CMG-24	CMG	REQ-CMG-24/1	Data Management	F	*Approved*	R?.?
REQ-CMG-24.1	CMG	REQ-CMG-24/2	Data Management	F	*Approved*	R?.?
REQ-CMG-25	CMG	REQ-CMG-25/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-26	CMG	REQ-CMG-26/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-27	CMG	REQ-CMG-27/1	Reporting	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-CMG-28	CMG	REQ-CMG-28/1	Channels	F	*Approved*	R?.?
REQ-CMG-28.1	CMG	REQ-CMG-28/2	Channels	F	*Approved*	R?.?
REQ-CMG-28.2	CMG	REQ-CMG-28/3	Channels	F	*Approved*	R?.?
REQ-CMG-28.3	CMG	REQ-CMG-28/4	Channels	F	*Approved*	R?.?
REQ-CMG-28.4	CMG	REQ-CMG-28/5	Channels	F	*Approved*	R?.?
REQ-CMG-28.5	CMG	REQ-CMG-28/6	Channels	F	*Approved*	R?.?
REQ-CMG-28.6	CMG	REQ-CMG-28/7	Channels	F	*Approved*	R?.?
REQ-CMG-28.7	CMG	REQ-CMG-28/8	Channels	F	*Approved*	R?.?
REQ-CMG-28.8	CMG	REQ-CMG-28/9	Channels	F	*Approved*	R?.?
REQ-CMG-29	CMG	REQ-CMG-29/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-30	CMG	REQ-CMG-30/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-31	CMG	REQ-CMG-31/1	Order Management	F	*Approved*	R?.?
REQ-CMG-32	CMG	REQ-CMG-32/1	Other - Operations	F	*Approved*	R?.?
REQ-CMG-32.1	CMG	REQ-CMG-32/2	Other - Operations	F	*Approved*	R?.?
REQ-CMG-32.2	CMG	REQ-CMG-32/3	Other - Operations	F	*Approved*	R?.?
REQ-CMG-33	CMG	REQ-CMG-33/1	Other - Training	F	*Approved*	R?.?
REQ-CMG-34	CMG	REQ-CMG-34/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-35	CMG	REQ-CMG-35/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-36	CMG	REQ-CMG-36/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-37	CMG	REQ-CMG-37/1	Channels	F	*Approved*	R?.?
REQ-CMG-37.1	CMG	REQ-CMG-37/2	Channels	F	*Approved*	R?.?
REQ-CMG-38	CMG	REQ-CMG-38/1	Channels	F	*Approved*	R?.?
REQ-CMG-38.1	CMG	REQ-CMG-38.1/1	Channels	F	*Approved*	R?.?
REQ-CMG-38.2	CMG	REQ-CMG-38.2/1	Channels	F	*Approved*	R?.?
REQ-CMG-38.3	CMG	REQ-CMG-38.3/1	Channels	F	*Approved*	R?.?
REQ-CMG-38.4	CMG	REQ-CMG-38.4/1	Channels	F	*Approved*	R?.?
REQ-CMG-38.5	CMG	REQ-CMG-38.5/1	Channels	F	*Approved*	R?.?
REQ-CMG-38.6	CMG	REQ-CMG -38.6/1	Channels	F	*Approved*	R?.?
REQ-CMG-39	CMG	REQ-CMG-39/1	Channels	F	*Approved*	R?.?
REQ-CMG-39.1	CMG	REQ-CMG-39/2	Channels	F	*Approved*	R?.?
REQ-CMG-40	CMG	REQ-CMG-40/1	Channels	F	*Approved*	R?.?
REQ-CMG-40.1	CMG	REQ-CMG-40.1/1	Channels	F	*Approved*	R?.?
REQ-CMG-40.2	CMG	REQ-CMG-40.2/1	Channels	F	*Approved*	R?.?
REQ-CMG-40.3	CMG	REQ-CMG-40.3/1	Channels	F	*Approved*	R?.?
REQ-CMG-40.4	CMG	REQ-CMG-40.4/1	Channels	F	*Approved*	R?.?
REQ-CMG-40.5	CMG	REQ-CMG-40.5/ 1	Channels	F	*Approved*	R?.?
REQ-CMG-40.6	CMG	REQ-CMG-40.6/1	Channels	F	*Approved*	R?.?
REQ-CMG-40.7	CMG	REQ-CMG-40.7/1	Channels	F	*Approved*	R?.?
REQ-CMG-40.8	CMG	REQ-CMG-40.8/1	Channels	F	*Approved*	R?.?
REQ-CMG-41	CMG	REQ-CMG-41/1	Channels	F	*Approved*	R?.?
REQ-CMG-42	CMG	REQ-CMG-42/1	Channels	F	*Approved*	R?.?
REQ-CMG-43	CMG	REQ-CMG-43/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-44	CMG	REQ-CMG-44/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-44.1	CMG	REQ-CMG-44/2	Customer Management	F	*Approved*	R?.?
REQ-CMG-45	CMG	REQ-CMG-45/1	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1	CMG	REQ-CMG-45.1/2	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.1	CMG	REQ-CMG-45.1.1/3	Other - Training	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-CMG-45.1.2	CMG	REQ-CMG-45.1.2/4	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.3	CMG	REQ-CMG-45.1.3/5	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.4	CMG	REQ-CMG-45.1.4/6	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.5	CMG	REQ-CMG-45.1.5/7	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.6	CMG	REQ-CMG-45.1.6/8	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.7	CMG	REQ-CMG-45.1.7/9	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.8	CMG	REQ-CMG-45.1.8/10	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.9	CMG	REQ-CMG-45.1.9/11	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.10	CMG	REQ-CMG-45.1.10/12	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.11	CMG	REQ-CMG-45.1.11/13	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.12	CMG	REQ-CMG-45.1.12/14	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.13	CMG	REQ-CMG-45.1.13/15	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.14	CMG	REQ-CMG-45.1.14/16	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.15	CMG	REQ-CMG-45.1.15/17	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.1.16	CMG	REQ-CMG-45.1.16/18	Other - Training	F	*Approved*	R?.?
REQ-CMG-45.2	CMG	REQ-CMG-45.2/1	Other - Training	F	*Approved*	R?.?
REQ-CMG-46	CMG	REQ-CMG-46/1	Other - Training	F	*Approved*	R?.?
REQ-CMG-46.1	CMG	REQ-CMG-46.1/1	Other - Training	F	*Approved*	R?.?
REQ-CMG-46.2	CMG	REQ-CMG-46.2/1	Other - Operations	F	*Approved*	R?.?
REQ-CMG-47	CMG	REQ-CMG-47/1	Channels	F	*Approved*	R?.?
REQ-CMG-48	CMG	REQ-CMG-48/1	Reporting	F	*Approved*	R?.?
REQ-CMG-49.1	CMG	REQ-CMG-49.1/1	Channels	F	*Approved*	R?.?
REQ-CMG-49.2	CMG	REQ-CMG-49.2/1	Channels	F	*Approved*	R?.?
REQ-CMG-49.3	CMG	REQ-CMG-49.3/1	Channels	F	*Approved*	R?.?
REQ-CMG-50	CMG	REQ-CMG-50/1	Channels	F	*Approved*	R?.?
REQ-CMG-51	CMG	REQ-CMG-51/1	Channels	F	*Approved*	R?.?
REQ-CMG-52	CMG	REQ-CMG-52/1	Channels	F	*Approved*	R?.?
REQ-CMG-53	CMG	REQ-CMG-53/ 1	Channels	F	*Approved*	R?.?
REQ-CMG-54	CMG	REQ-CMG-54/1	Channels	F	*Approved*	R?.?
REQ-CMG-55	CMG	REQ-CMG-55/1	Channels	F	*Approved*	R?.?
REQ-CMG-56	CMG	REQ-CMG-56/1	Channels	F	*Approved*	R?.?
REQ-CMG-57	CMG	REQ-CMG-57/1	Channels	F	*Approved*	R?.?
REQ-CMG-58	CMG	REQ-CMG-58/1	Channels	F	*Approved*	R?.?
REQ-CMG-59	CMG	REQ-CMG-59/1	Channels	F	*Approved*	R?.?
REQ-CMG-60	CMG	REQ-CMG-60/1	Channels	F	*Approved*	R?.?
REQ-CMG-61	CMG	REQ-CMG-61/1	Channels	F	*Approved*	R?.?
REQ-CMG-62	CMG	REQ-CMG-62/1	Channels	F	*Approved*	R?.?
REQ-CMG-63	CMG	REQ-CMG-63/1	Channels	F	*Approved*	R?.?
REQ-CMG-64	CMG	REQ-CMG-64/1	Channels	F	*Approved*	R?.?
REQ-CMG-65	CMG	REQ-CMG-65/1	Channels	F	*Approved*	R?.?
REQ-CMG-66	CMG	REQ-CMG-66/1	Channels	F	*Approved*	R?.?
REQ-CMG-67	CMG	REQ-CMG-67/1	Channels	F	*Approved*	R?.?
REQ-CMG-68	CMG	REQ-CMG-68/1	Channels	F	*Approved*	R?.?
REQ-CMG-68.1	CMG	REQ-CMG-68.1/1	Channels	F	*Approved*	R?.?
REQ-CMG-68.1.1	CMG	REQ-CMG-68.1/2	Channels	F	*Approved*	R?.?
REQ-CMG-68.1.2	CMG	REQ-CMG-68.1/3	Channels	F	*Approved*	R?.?
REQ-CMG-68.2	CMG	REQ-CMG-68.2/1	Channels	F	*Approved*	R?.?
REQ-CMG-68.3	CMG	REQ-CMG-68.3/1	Channels	F	*Approved*	R?.?
REQ-CMG-68.4	CMG	REQ-CMG-68.4/1	Channels	F	*Approved*	R?.?
REQ-CMG-68.5	CMG	REQ-CMG-68.5/1	Channels	F	*Approved*	R?.?
REQ-CMG-68.6	CMG	REQ-CMG-68.6/1	Channels	F	*Approved*	R?.?
REQ-CMG-68.7	CMG	REQ-CMG-68.7/1	Channels	F	*Approved*	R?.?
REQ-CMG-68.8	CMG	REQ-CMG-68.8/1	Channels	F	*Approved*	R?.?
REQ-CMG-69	CMG	REQ-CMG-69/1	Channels	F	*Approved*	R?.?
REQ-CMG-69.1	CMG	REQ-CMG-69.1/1	Channels	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-CMG-70	CMG	REQ-CMG-70/1	Channels	F	*Approved*	R?.?
REQ-CMG-70.1	CMG	REQ-CMG-70/2	Channels	F	*Approved*	R?.?
REQ-CMG-70.2	CMG	REQ-CMG-70/3	Channels	F	*Approved*	R?.?
REQ-CMG-71	CMG	REQ-CMG-71/1	Channels	F	*Approved*	R?.?
REQ-CMG-71.1	CMG	REQ-CMG-71/2	Channels	F	*Approved*	R?.?
REQ-CMG-72	CMG	REQ-CMG-72/1	Channels	F	*Approved*	R?.?
REQ-CMG-73	CMG	REQ-CMG-73/1	Channels	F	*Approved*	R?.?
REQ-CMG-74	CMG	REQ-CMG-74/1	Channels	F	*Approved*	R?.?
REQ-CMG-74.1	CMG	REQ-CMG-74/2	Channels	F	*Approved*	R?.?
REQ-CMG-74.2	CMG	REQ-CMG-74/3	Channels	F	*Approved*	R?.?
REQ-CMG-74.3	CMG	REQ-CMG-74/4	Channels	F	*Approved*	R?.?
REQ-CMG-74.4	CMG	REQ-CMG-74/5	Channels	F	*Approved*	R?.?
REQ-CMG-74.5	CMG	REQ-CMG-74/6	Channels	F	*Approved*	R?.?
REQ-CMG-74.6	CMG	REQ-CMG-74/7	Channels	F	*Approved*	R?.?
REQ-CMG-74.7	CMG	REQ-CMG-74/8	Channels	F	*Approved*	R?.?
REQ-CMG-74.8	CMG	REQ-CMG-74/9	Channels	F	*Approved*	R?.?
REQ-CMG-74.9	CMG	REQ-CMG-74/10	Channels	F	*Approved*	R?.?
REQ-CMG-74.10	CMG	REQ-CMG-74/11	Channels	F	*Approved*	R?.?
REQ-CMG-74.11	CMG	REQ-CMG-74/12	Channels	F	*Approved*	R?.?
REQ-CMG-74.12	CMG	REQ-CMG-74/13	Channels	F	*Approved*	R?.?
REQ-CMG-74.13	CMG	REQ-CMG-74/14	Channels	F	*Approved*	R?.?
REQ-CMG-75	CMG	REQ-CMG-75/1	Channels	F	*Approved*	R?.?
REQ-CMG-76	CMG	REQ-CMG-76/1	Channels	F	*Approved*	R?.?
REQ-CMG-77	CMG	REQ-CMG-77/1	Channels	F	*Approved*	R?.?
REQ-CMG-77.1	CMG	REQ-CMG-77/2	Channels	F	*Approved*	R?.?
REQ-CMG-77.2	CMG	REQ-CMG-77/3	Channels	F	*Approved*	R?.?
REQ-CMG-77.3	CMG	REQ-CMG-77/4	Channels	F	*Approved*	R?.?
REQ-CMG-77.4	CMG	REQ-CMG-77/5	Channels	F	*Approved*	R?.?
REQ-CMG-77.5	CMG	REQ-CMG-77/6	Channels	F	*Approved*	R?.?
REQ-CMG-77.6	CMG	REQ-CMG-77/7	Channels	F	*Approved*	R?.?
REQ-CMG-77.7	CMG	REQ-CMG-77/8	Channels	F	*Approved*	R?.?
REQ-CMG-77.8	CMG	REQ-CMG-77/9	Channels	F	*Approved*	R?.?
REQ-CMG-77.9	CMG	REQ-CMG-77/10	Channels	F	*Approved*	R?.?
REQ-CMG-77.10	CMG	REQ-CMG-77/11	Channels	F	*Approved*	R?.?
REQ-CMG-77.11	CMG	REQ-CMG-77/12	Channels	F	*Approved*	R?.?
REQ-CMG-77.12	CMG	REQ-CMG-77/13	Channels	F	*Approved*	R?.?
REQ-CMG-77.13	CMG	REQ-CMG-77/14	Channels	F	*Approved*	R?.?
REQ-CMG-77.14	CMG	REQ-CMG-77/15	Channels	F	*Approved*	R?.?
REQ-CMG-77.15	CMG	REQ-CMG-77/16	Channels	F	*Approved*	R?.?
REQ-CMG-77.16	CMG	REQ-CMG-77/17	Channels	F	*Approved*	R?.?
REQ-CMG-77.17	CMG	REQ-CMG-77/18	Channels	F	*Approved*	R?.?
REQ-CMG-77.18	CMG	REQ-CMG-77/19	Channels	F	*Approved*	R?.?
REQ-CMG-77.19	CMG	REQ-CMG-77/20	Channels	F	*Approved*	R?.?
REQ-CMG-77.20	CMG	REQ-CMG-77/21	Channels	F	*Approved*	R?.?
REQ-CMG-77.21	CMG	REQ-CMG-77/22	Channels	F	*Approved*	R?.?
REQ-CMG-77.22	CMG	REQ-CMG-77/23	Channels	F	*Approved*	R?.?
REQ-CMG-78	CMG	REQ-CMG-78/1	Channels	F	*Approved*	R?.?
REQ-CMG-78.1	CMG	REQ-CMG-78.1/1	Channels	F	*Approved*	R?.?
REQ-CMG-78.1.1	CMG	REQ-CMG-78.1/2	Channels	F	*Approved*	R?.?
REQ-CMG-78.1.2	CMG	REQ-CMG-78.1/3	Channels	F	*Approved*	R?.?
REQ-CMG-78.1.3	CMG	REQ-CMG-78.1/4	Channels	F	*Approved*	R?.?
REQ-CMG-78.1.4	CMG	REQ-CMG-78.1/5	Channels	F	*Approved*	R?.?
REQ-CMG-78.1.5	CMG	REQ-CMG-78.1/6	Channels	F	*Approved*	R?.?
REQ-CMG-78.2	CMG	REQ-CMG-78.2/1	Channels	F	*Approved*	R?.?
REQ-CMG-79	CMG	REQ-CMG-79/1	Channels	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-CMG-80	CMG	REQ-CMG-80/1	Other - Operations	F	*Approved*	R?.?
REQ-CMG-81	CMG	REQ-CMG-81/1	Channels	F	*Approved*	R?.?
REQ-CMG-81.1	CMG	REQ-CMG-81.1/1	Data Management	F	*Approved*	R?.?
REQ-CMG-81.2	CMG	REQ-CMG-81.2/1	Data Management	F	*Approved*	R?.?
REQ-CMG-81.2.1	CMG	REQ-CMG-81.2/2	Data Management	F	*Approved*	R?.?
REQ-CMG-81.3	CMG	REQ-CMG-81.3/1	Channels	F	*Approved*	R?.?
REQ-CMG-81.3.1	CMG	REQ-CMG-81.3/2	Channels	F	*Approved*	R?.?
REQ-CMG-81.4	CMG	REQ-CMG-82.1/1	Channels	F	*Approved*	R?.?
REQ-CMG-81.4.1	CMG	REQ-CMG-82.1/2	Channels	F	*Approved*	R?.?
REQ-CMG-81.5	CMG	REQ-CMG-82.2/1	Channels	F	*Approved*	R?.?
REQ-CMG-81.5.1	CMG	REQ-CMG-82.2/2	Channels	F	*Approved*	R?.?
REQ-CMG-81.6	CMG	REQ-CMG-82.3/1	Channels	F	*Approved*	R?.?
REQ-CMG-81.6.1	CMG	REQ-CMG-82.3/2	Channels	F	*Approved*	R?.?
REQ-CMG-81.6.2	CMG	REQ-CMG-82.3/3	Channels	F	*Approved*	R?.?
REQ-CMG-81.6.3	CMG	REQ-CMG-82.3/4	Channels	F	*Approved*	R?.?
REQ-CMG-81.6.4	CMG	REQ-CMG-82.3/5	Channels	F	*Approved*	R?.?
REQ-CMG-81.6.5	CMG	REQ-CMG-82.3/6	Channels	F	*Approved*	R?.?
REQ-CMG-81.6.6	CMG	REQ-CMG-82.3/7	Channels	F	*Approved*	R?.?
REQ-CMG-81.6.7	CMG	REQ-CMG-82.3/8	Channels	F	*Approved*	R?.?
REQ-CMG-81.6.8	CMG	REQ-CMG-82.3/9	Channels	F	*Approved*	R?.?
REQ-CMG-82	CMG	REQ-CMG-82/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-82.2	CMG	REQ-CMG-82/2	Customer Management	F	*Approved*	R?.?
REQ-CMG-82.3	CMG	REQ-CMG-82/3	Customer Management	F	*Approved*	R?.?
REQ-CMG-83	CMG	REQ-CMG-83/1	Channels	F	*Approved*	R?.?
REQ-CMG-83.1	CMG	REQ-CMG-83.1/1	Channels	F	*Approved*	R?.?
REQ-CMG-83.2	CMG	REQ-CMG-83.2/1	Channels	F	*Approved*	R?.?
REQ-CMG-83.2.1	CMG	REQ-CMG-83.2/2	Channels	F	*Approved*	R?.?
REQ-CMG-83.3	CMG	REQ-CMG-83.3/1	Channels	F	*Approved*	R?.?
REQ-CMG-83.4	CMG	REQ-CMG-83.4/1	Channels	F	*Approved*	R?.?
REQ-CMG-83.5	CMG	REQ-CMG-83.5/1	Channels	F	*Approved*	R?.?
REQ-CMG-83.6	CMG	REQ-CMG-83.6/1	Channels	F	*Approved*	R?.?
REQ-CMG-84	CMG	REQ-CMG-84/1	Channels	F	*Approved*	R?.?
REQ-CMG-85	CMG	REQ-CMG-85/1	Channels	F	*Approved*	R?.?
REQ-CMG-85.1	CMG	REQ-CMG-85/2	Channels	F	*Approved*	R?.?
REQ-CMG-86	CMG	REQ-CMG-86/1	Channels	F	*Approved*	R?.?
REQ-CMG-87	CMG	REQ-CMG-87/1	TBD	NF	*Approved*	R?.?
REQ-CMG-88	CMG	REQ-CMG-88/1	Channels	F	*Approved*	R?.?
REQ-CMG-89	CMG	REQ-CMG-89/1	Data Management	F	*Approved*	R?.?
REQ-CMG-89.1	CMG	REQ-CMG-89/2	Data Management	F	*Approved*	R?.?
REQ-CMG-90	CMG	REQ-CMG-90/1	Channels	F	*Approved*	R?.?
REQ-CMG-91	CMG	REQ-CMG-91/1	Channels	F	*Approved*	R?.?
REQ-CMG-92	CMG	REQ-CMG-92/1	Channels	F	*Approved*	R?.?
REQ-CMG-93	CMG	REQ-CMG-93/1	TBD	NF	*Approved*	R?.?
REQ-CMG-94	CMG	REQ-CMG-94/1	TBD	NF	*Approved*	R?.?
REQ-CMG-95	CMG	REQ-CMG-95/1	Other - Operations	NF	*Approved*	R?.?
REQ-CMG-96	CMG	REQ-CMG-96/1	Channels	F	*Approved*	R?.?
REQ-CMG-97	CMG	REQ-CMG-97/1	TBD	F	*Approved*	R?.?
REQ-CMG-98	CMG	REQ-CMG-98/1	Channels	F	*Approved*	R?.?
REQ-CMG-99	CMG	REQ-CMG-99/1	Channels	F	*Approved*	R?.?
REQ-CMG-100	CMG	REQ-CMG-100/1	Channels	F	*Approved*	R?.?
REQ-CMG-101	CMG	REQ-CMG-101/1	Channels	F	*Approved*	R?.?
REQ-CMG-101.1	CMG	REQ-CMG-101/2	Channels	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-CMG-101.2	CMG	REQ-CMG-101/3	Channels	F	*Approved*	R?.?
REQ-CMG-101.3	CMG	REQ-CMG-101/4	Channels	F	*Approved*	R?.?
REQ-CMG-101.4	CMG	REQ-CMG-101/5	Channels	F	*Approved*	R?.?
REQ-CMG-101.5	CMG	REQ-CMG-101/6	Channels	F	*Approved*	R?.?
REQ-CMG-101.6	CMG	REQ-CMG-101/7	Channels	F	*Approved*	R?.?
REQ-CMG-102	CMG	REQ-CMG-102/1	Channels	F	*Approved*	R?.?
REQ-CMG-103	CMG	REQ-CMG-103/1	Channels	F	*Approved*	R?.?
REQ-CMG-104	CMG	REQ-CMG-104/1	Channels	F	*Approved*	R?.?
REQ-CMG-105	CMG	REQ-CMG-105/1	Channels	F	*Approved*	R?.?
REQ-CMG-105.1	CMG	REQ-CMG-105/2	Channels	F	*Approved*	R?.?
REQ-CMG-106	CMG	REQ-CMG-106/1	TBD	F	*Approved*	R?.?
REQ-CMG-107	CMG	REQ-CMG-107/1	Channels	F	*Approved*	R?.?
REQ-CMG-108	CMG	REQ-CMG-108/1	TBD	F	*Approved*	R?.?
REQ-CMG-109	CMG	REQ-CMG-109/1	Asset Management	F	*Approved*	R?.?
REQ-CMG-109.1	CMG	REQ-CMG-109/2	Asset Management	F	*Approved*	R?.?
REQ-CMG-109.2	CMG	REQ-CMG-109/3	Asset Management	F	*Approved*	R?.?
REQ-CMG-109.3	CMG	REQ-CMG-109/4	Asset Management	F	*Approved*	R?.?
REQ-CMG-110	CMG	REQ-CMG-110/1	Channels	F	*Approved*	R?.?
REQ-CMG-111	CMG	REQ-CMG-111/1	Channels	F	*Approved*	R?.?
REQ-CMG-111.1	CMG	REQ-CMG-111/2	Channels	F	*Approved*	R?.?
REQ-CMG-111.2	CMG	REQ-CMG-111/3	Channels	F	*Approved*	R?.?
REQ-CMG-112	CMG	REQ-CMG-112/1	Channels	F	*Approved*	R?.?
REQ-CMG-113	CMG	REQ-CMG-113/1	Channels	F	*Approved*	R?.?
REQ-CMG-114	CMG	REQ-CMG-114/1	Other - Deployment	F	*Approved*	R?.?
REQ-CMG-115	CMG	REQ-CMG-115/1	Customer Management	F	Approved	R?.?
REQ-CMG-116	CMG	REQ-CMG-116/1	Channels	F	*Approved*	R?.?
REQ-CMG-116.1	CMG	REQ-CMG-116/2	Channels	F	*Approved*	R?.?
REQ-CMG-116.2	CMG	REQ-CMG-116/3	Channels	F	*Approved*	R?.?
REQ-CMG-117	CMG	REQ-CMG-117/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-118	CMG	REQ-CMG-118/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-119	CMG	REQ-CMG-119/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-120	CMG	REQ-CMG-120/12	Reporting	F	*Approved*	R?.?
REQ-CMG-121	CMG	REQ-CMG-121/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-122	CMG	REQ-CMG-122/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-122.1	CMG	REQ-CMG-122/2	Customer Management	F	*Approved*	R?.?
REQ-CMG-123	CMG	REQ-CMG-123/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-124	CMG	REQ-CMG-124/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-125	CMG	REQ-CMG-125/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-126	CMG	REQ-CMG-126/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-127	CMG	REQ-CMG-127/1	Customer Management	F	*Approved*	R?.?
REQ-CMG-127.1	CMG	REQ-CMG-127/2	Customer Management	F	*Approved*	R?.?
REQ-CMG-127.2	CMG	REQ-CMG-127/3	Customer Management	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-CMG-127.3	CMG	REQ-CMG-127/4	Customer Management	F	*Approved*	R?.?
REQ-CMG-128	CMG	REQ-CMG-128/1	Reporting	F	*Approved*	R?.?
REQ-CMG-128.1	CMG	REQ-CMG-128/2	Reporting	F	*Approved*	R?.?
REQ-CMG-129	CMG	REQ-CMG-129/1	Reporting	F	*Approved*	R?.?
REQ-CMG-129.1	CMG	REQ-CMG-129/2	Reporting	F	*Approved*	R?.?
REQ-FSM-1	FSM	REQ-FSM-1/1	Asset Management	F	Approved	R?.?
REQ-FSM-1.3	FSM	REQ-FSM-1.1/1	Asset Management	F	Approved	R?.?
REQ-FSM-1.2	FSM	REQ-FSM-1/2	Asset Management	F	Approved	R?.?
REQ-FSM-1.4	FSM	REQ-FSM-1.2/1	Asset Management	F	Approved	R?.?
REQ-FSM-1.4.1	FSM	REQ-FSM-1.2/2	Asset Management	F	Approved	R?.?
REQ-FSM-1.4.2	FSM	REQ-FSM-1.2/3	Asset Management	F	Approved	R?.?
REQ-FSM-1.4.3	FSM	REQ-FSM-1.2/4	Asset Management	F	Approved	R?.?
REQ-FSM-1.5	FSM	REQ-FSM-1.3/1	Asset Management	F	Approved	R?.?
REQ-FSM-1.6	FSM	REQ-FSM-1.4/1	Asset Management	F	Approved	R?.?
REQ-FSM-1.6.1	FSM	REQ-FSM-1.4/2	Asset Management	F	Approved	R?.?
REQ-FSM-1.6.2	FSM	REQ-FSM-1.4/3	Asset Management	F	Approved	R?.?
REQ-FSM-1.6.3	FSM	REQ-FSM-1.4/4	Asset Management	F	Approved	R?.?
REQ-FSM-1.6.4	FSM	REQ-FSM-1.4/5	Asset Management	F	Approved	R?.?
REQ-FSM-1.6.5	FSM	REQ-FSM-1.4/6	Asset Management	F	Approved	R?.?
REQ-FSM-1.6.6	FSM	REQ-FSM-1.4/7	Asset Management	F	Approved	R?.?
REQ-FSM-1.7	FSM	REQ-FSM-1.5/1	Reporting	F	Approved	R?.?
REQ-FSM-1.8	FSM	REQ-FSM-1.6/1	Reporting	F	Approved	R?.?
REQ-FSM-1.9	FSM	REQ-FSM-1.7/1	Reporting	F	Approved	R?.?
REQ-FSM-1.9.1	FSM	REQ-FSM-1.7.1/1	Reporting	F	Approved	R?.?
REQ-FSM-1.9.2	FSM	REQ-FSM-1.7.2/1	Reporting	F	Approved	R?.?
REQ-FSM-1.10	FSM	REQ-FSM-1.8/1	Asset Management	F	Approved	R?.?
REQ-FSM-1.10.1	FSM	REQ-FSM-1.8/2	Asset Management	F	Approved	R?.?
REQ-FSM-1.10.2	FSM	REQ-FSM-1.8/3	Asset Management	F	Approved	R?.?
REQ-FSM-1.10.3	FSM	REQ-FSM-1.8/4	Asset Management	F	Approved	R?.?
REQ-FSM-2	FSM	REQ-FSM-2/1	Asset Management	F	Approved	R?.?
REQ-FSM-2.1	FSM	REQ-FSM-2/2	Asset Management	F	Approved	R?.?
REQ-FSM-2.2	FSM	REQ-FSM-2/3	Asset Management	F	Approved	R?.?
REQ-FSM-2.3	FSM	REQ-FSM-2/4	Asset Management	F	Approved	R?.?
REQ-FSM-2.4	FSM	REQ-FSM-2/5	Asset Management	F	Approved	R?.?
REQ-FSM-2.5	FSM	REQ-FSM-2/6	Asset Management	F	Approved	R?.?
REQ-FSM-2.6	FSM	REQ-FSM-2/7	Asset Management	F	Approved	R?.?
REQ-FSM-2.7	FSM	REQ-FSM-2/8	Asset Management	F	Approved	R?.?
REQ-FSM-3	FSM	REQ-FSM-3/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.1	FSM	REQ-FSM-3.1/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.1.1	FSM	REQ-FSM-3.1/2	Asset Management	F	Approved	R?.?
REQ-FSM-3.1.2	FSM	REQ-FSM-3.1/3	Asset Management	F	Approved	R?.?
REQ-FSM-3.1.3	FSM	REQ-FSM-3.1/4	Asset Management	F	Approved	R?.?
REQ-FSM-3.2	FSM	REQ-FSM-3.2/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.2.1	FSM	REQ-FSM-3.2/2	Asset Management	F	Approved	R?.?
REQ-FSM-3.2.2	FSM	REQ-FSM-3.2/3	Asset Management	F	Approved	R?.?
REQ-FSM-3.2.3	FSM	REQ-FSM-3.2/4	Asset Management	F	Approved	R?.?
REQ-FSM-3.3	FSM	REQ-FSM-3.3/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.4	FSM	REQ-FSM-3.4/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.5	FSM	REQ-FSM-3.5/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.6	FSM	REQ-FSM-3.6/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.6.1	FSM	REQ-FSM-3.6/2	Asset Management	F	Approved	R?.?
REQ-FSM-3.6.2	FSM	REQ-FSM-3.6/3	Asset Management	F	Approved	R?.?
REQ-FSM-3.7	FSM	REQ-FSM-3.7/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.8	FSM	REQ-FSM-3.8/1	Asset Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FSM-3.9	FSM	REQ-FSM-3.9/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.10	FSM	REQ-FSM-3.10/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.11	FSM	REQ-FSM-3.11/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.12	FSM	REQ-FSM-3.12/1	Asset Management	F	Approved	R?.?
REQ-FSM-3.13	FSM	REQ-FSM-3.13/1	Asset Management	F	Approved	R?.?
REQ-FSM-4	FSM	REQ-FSM-4/1	Asset Management	F	Approved	R?.?
REQ-FSM-4.1	FSM	REQ-FSM-4.1/1	Asset Management	F	Approved	R?.?
REQ-FSM-4.2	FSM	REQ-FSM-4.2/1	Asset Management	F	Approved	R?.?
REQ-FSM-4.2.1	FSM	REQ-FSM-4.2/2	Asset Management	F	Approved	R?.?
REQ-FSM-4.2.2	FSM	REQ-FSM-4.2/3	Asset Management	F	Approved	R?.?
REQ-FSM-4.2.3	FSM	REQ-FSM-4.2/4	Asset Management	F	Approved	R?.?
REQ-FSM-4.3	FSM	REQ-FSM-4.3/1	Asset Management	F	Approved	R?.?
REQ-FSM-5	FSM	REQ-FSM-5/1	Asset Management	F	Approved	R?.?
REQ-FSM-5.1	FSM	REQ-FSM-5.1/1	Asset Management	F	Approved	R?.?
REQ-FSM-6	FSM	REQ-FSM-6/1	Asset Management	F	Approved	R?.?
REQ-FSM-6.1	FSM	REQ-FSM-6.1/1	Asset Management	F	Approved	R?.?
REQ-FSM-6.1.1	FSM	REQ-FSM-6.1/2	Asset Management	F	Approved	R?.?
REQ-FSM-7	FSM	REQ-FSM-7/1	Order Management	F	Approved	R?.?
REQ-FSM-7.1	FSM	REQ-FSM-7.1/1	Order Management	F	Approved	R?.?
REQ-FSM-7.1.1	FSM	REQ-FSM-7.1/2	Order Management	F	Approved	R?.?
REQ-FSM-7.1.2	FSM	REQ-FSM-7.1/3	Order Management	F	Approved	R?.?
REQ-FSM-7.1.3	FSM	REQ-FSM-7.1/4	Order Management	F	Approved	R?.?
REQ-FSM-7.1.4	FSM	REQ-FSM-7.1/5	Order Management	F	Approved	R?.?
REQ-FSM-7.1.5	FSM	REQ-FSM-7.1/6	Order Management	F	Approved	R?.?
REQ-FSM-7.1.6	FSM	REQ-FSM-7.1/7	Order Management	F	Approved	R?.?
REQ-FSM-7.2	FSM	REQ-FSM-7.2/1	Order Management	F	Approved	R?.?
REQ-FSM-7.2.1	FSM	REQ-FSM-7.2/2	Order Management	F	Approved	R?.?
REQ-FSM-7.2.2	FSM	REQ-FSM-7.2/3	Order Management	F	Approved	R?.?
REQ-FSM-7.3	FSM	REQ-FSM-7.3/1	Order Management	F	Approved	R?.?
REQ-FSM-8	FSM	REQ-FSM-8/1	Asset Management	F	Approved	R?.?
REQ-FSM-8.1	FSM	REQ-FSM-8.1/1	Other - Operations	NF	Approved	R?.?
REQ-FSM-9	FSM	REQ-FSM-9/1	Asset Management	F	Approved	R?.?
REQ-FSM-9.1	FSM	REQ-FSM-9.1/1	Asset Management	F	Approved	R?.?
REQ-FSM-9.1.1	FSM	REQ-FSM-9.1/2	Asset Management	F	Approved	R?.?
REQ-FSM-9.1.2	FSM	REQ-FSM-9.1/3	Asset Management	F	Approved	R?.?
REQ-FSM-10	FSM	REQ-FSM-10/1	Asset Management	F	Approved	R?.?
REQ-FSM-11	FSM	REQ-FSM-11/1	Asset Management	F	Approved	R?.?
REQ-FSM-12	FSM	REQ-FSM-12/1	Asset Management	F	Approved	R?.?
REQ-FSM-13	FSM	REQ-FSM-13/1	Other - Operations	F	Approved	R?.?
REQ-FSM-14	FSM	REQ-FSM-14/2	Asset Management	F	Approved	R?.?
REQ-FSM-15	FSM	REQ-FSM-15/1	Asset Management	F	Approved	R?.?
REQ-FSM-16	FSM	REQ-FSM-16/1	Asset Management	F	Approved	R?.?
REQ-FSM-16.1	FSM	REQ-FSM-16/2	Asset Management	F	Approved	R?.?
REQ-FSM-17	FSM	REQ-FSM-17/1	Other - Operations	F	Approved	R?.?
REQ-FSM-18	FSM	REQ-FSM-18/1	Other - Operations	F	Approved	R?.?
REQ-FSM-19	FSM	REQ-FSM-19/1	Other - Testing	NF	Approved	R?.?
REQ-FSM-20	FSM	REQ-FSM-20/1	Other - Operations	NF	Approved	R?.?
REQ-FSM-21	FSM	REQ-FSM-21/1	Other - Program Management	NF	Approved	R?.?
REQ-FSM-22	FSM	REQ-FSM-22/1	Asset Management	F	Approved	R?.?
REQ-FSM-23	FSM	REQ-FSM-23/1	Asset Management	F	Approved	R?.?
REQ-FSM-23.1	FSM	REQ-FSM-23.1/1	Other - Operations	F	Approved	R?.?
REQ-FSM-23.1.1	FSM	REQ-FSM-23.1/2	Other - Operations	F	Approved	R?.?
REQ-FSM-23.1.2	FSM	REQ-FSM-23.1/3	Other - Operations	F	Approved	R?.?
REQ-FSM-23.1.3	FSM	REQ-FSM-23.1/4	Other - Operations	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FSM-23.1.4	FSM	REQ-FSM-23.1/5	Other - Operations	F	Approved	R?.?
REQ-FSM-23.2	FSM	REQ-FSM-23.2/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-23.2.1	FSM	REQ-FSM-23.2/2	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-23.3	FSM	REQ-FSM-23.3/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-23.3.1	FSM	REQ-FSM-23.3/2	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-23.4	FSM	REQ-FSM-23.4/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-23.4.1	FSM	REQ-FSM-23.4/2	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-23.4.2	FSM	REQ-FSM-23.4/3	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-23.4.3	FSM	REQ-FSM-23.4/4	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-23.4.4	FSM	REQ-FSM-23.4/5	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-23.4.5	FSM	REQ-FSM-23.4/6	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-24	FSM	REQ-FSM-24/1	Asset Management	F	Approved	R?.?
REQ-FSM-25	FSM	REQ-FSM-25/1	Asset Management	F	Approved	R?.?
REQ-FSM-25.1	FSM	REQ-FSM-25.1/1	Asset Management	F	Approved	R?.?
REQ-FSM-25.2	FSM	REQ-FSM-25.2/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-25.2.1	FSM	REQ-FSM-25.2/2	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-25.3	FSM	REQ-FSM-25.3/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-25.3.1	FSM	REQ-FSM-25.3/2	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-26	FSM	REQ-FSM-26/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-26.1	FSM	REQ-FSM-26.1/1	Asset Management	F	Approved	R?.?
REQ-FSM-26.2	FSM	REQ-FSM-26.2/1	Asset Management	F	Approved	R?.?
REQ-FSM-27	FSM	REQ-FSM-27/1	Asset Management	F	Approved	R?.?
REQ-FSM-27.1	FSM	REQ-FSM-27/2	Asset Management	F	Approved	R?.?
REQ-FSM-27.2	FSM	REQ-FSM-27/3	Asset Management	F	Approved	R?.?
REQ-FSM-27.3	FSM	REQ-FSM-27/4	Asset Management	F	Approved	R?.?
REQ-FSM-27.4	FSM	REQ-FSM-27/5	Asset Management	F	Approved	R?.?
REQ-FSM-27.5	FSM	REQ-FSM-27/6	Asset Management	F	Approved	R?.?
REQ-FSM-27.6	FSM	REQ-FSM-27/7	Asset Management	F	Approved	R?.?
REQ-FSM-28	FSM	REQ-FSM-28/1	Other - Testing	NF	Approved	R?.?
REQ-FSM-29	FSM	REQ-FSM-29/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-29.1	FSM	REQ-FSM-29.1/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-29.1.1	FSM	REQ-FSM-29.1/2	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-29.2	FSM	REQ-FSM-29.2/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-29.3	FSM	REQ-FSM-29.3/1	Asset Management	F	Approved	R?.?
REQ-FSM-29.3.1	FSM	REQ-FSM-29.3/2	Asset Management	F	Approved	R?.?
REQ-FSM-30	FSM	REQ-FSM-30/1	Other - Roles & Responsibilities	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FSM-31	FSM	REQ-FSM-31/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-31.1	FSM	REQ-FSM-31/2	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-31.2	FSM	REQ-FSM-31/3	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-31.3	FSM	REQ-FSM-31/4	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-31.4	FSM	REQ-FSM-31/5	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-32	FSM	REQ-FSM-32/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-32.1	FSM	REQ-FSM-32/2	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-32.2	FSM	REQ-FSM-32/3	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-32.3	FSM	REQ-FSM-32/4	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-32.4	FSM	REQ-FSM-32/5	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-FSM-33	FSM	REQ-FSM-33/1	Other - Roles & Responsibilities	F	Approved	R?.?
REQ-BIN-1	BIN	REQ-BIN-1/1	Reporting	F	Approved	R?.?
REQ-BIN-2	BIN	REQ-BIN-2/1	Reporting	F	Approved	R?.?
REQ-BIN-3	BIN	REQ-BIN-3/1	Reporting	F	Approved	R?.?
REQ-BIN-4	BIN	REQ-BIN-4/1	Reporting	F	Approved	R?.?
REQ-BIN-5	BIN	REQ-BIN-5/1	Data Management	F	Approved	R?.?
REQ-BIN-6	BIN	REQ-BIN-6/1	Data Management	F	Approved	R?.?
REQ-BIN-7	BIN	REQ-BIN-7/1	Reporting	F	Approved	R?.?
REQ-BIN-8	BIN	REQ-BIN-8/1	Reporting	F	Approved	R?.?
REQ-BIN-9	BIN	REQ-BIN-9/1	Reporting	F	Approved	R?.?
REQ-BIN-10	BIN	REQ-BIN-10/1	Reporting	F	Approved	R?.?
REQ-BIN-10.1	BIN	REQ-BIN-10/2	Reporting	F	Approved	R?.?
REQ-BIN-10.2	BIN	REQ-BIN-10/3	Reporting	F	Approved	R?.?
REQ-BIN-11	BIN	REQ-BIN-11/1	Reporting	F	Approved	R?.?
REQ-BIN-12	BIN	REQ-BIN-12/1	Reporting	F	Approved	R?.?
REQ-BIN-13	BIN	REQ-BIN-13/1	Reporting	F	Approved	R?.?
REQ-BIN-14	BIN	REQ-BIN-14/1	Reporting	F	Approved	R?.?
REQ-BIN-15	BIN	REQ-BIN-15/1	Reporting	F	Approved	R?.?
REQ-BIN-16	BIN	REQ-BIN-16/1	Channels	F	Approved	R?.?
REQ-BIN-16.1	BIN	REQ-BIN-16/2	Channels	F	Approved	R?.?
REQ-BIN-16.2	BIN	REQ-BIN-16/3	Channels	F	Approved	R?.?
REQ-BIN-17	BIN	REQ-BIN-17/1	Reporting	F	Approved	R?.?
REQ-BIN-18	BIN	REQ-BIN-18/1	Reporting	F	Approved	R?.?
REQ-BIN-19	BIN	REQ-BIN-19/1	Reporting	F	Approved	R?.?
REQ-BIN-20	BIN	REQ-BIN-20/1	Reporting	F	Approved	R?.?
REQ-BIN-21	BIN	REQ-BIN-21/1	Reporting	F	Approved	R?.?
REQ-BIN-22	BIN	REQ-BIN-22/1	Data Management	F	Approved	R?.?
REQ-BIN-22.1	BIN	REQ-BIN-22/2	Data Management	F	Approved	R?.?
REQ-BIN-22.2	BIN	REQ-BIN-22/3	Data Management	F	Approved	R?.?
REQ-BIN-22.3	BIN	REQ-BIN-22/4	Data Management	F	Approved	R?.?
REQ-BIN-22.4	BIN	REQ-BIN-22/5	Data Management	F	Approved	R?.?
REQ-BIN-22.5	BIN	REQ-BIN-22/6	Data Management	F	Approved	R?.?
REQ-BIN-22.6	BIN	REQ-BIN-22/7	Data Management	F	Approved	R?.?
REQ-BIN-22.7	BIN	REQ-BIN-22/8	Data Management	F	Approved	R?.?
REQ-BIN-22.8	BIN	REQ-BIN-22/9	Data Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-BIN-22.9	BIN	REQ-BIN-22/10	Data Management	F	Approved	R?.?
REQ-BIN-22.10	BIN	REQ-BIN-22/11	Data Management	F	Approved	R?.?
REQ-BIN-23	BIN	REQ-BIN-23/1	Data Management	F	Approved	R?.?
REQ-BIN-24	BIN	REQ-BIN-24/1	Data Management	F	Approved	R?.?
REQ-BIN-24.1	BIN	REQ-BIN-24/2	Data Management	F	Approved	R?.?
REQ-BIN-24.2	BIN	REQ-BIN-24/3	Data Management	F	Approved	R?.?
REQ-BIN-25	BIN	REQ-BIN-25/1	Data Management	F	Approved	R?.?
REQ-BIN-26	BIN	REQ-BIN-26/1	Reporting	F	Approved	R?.?
REQ-BIN-27	BIN	REQ-BIN-27/1	Reporting	F	Approved	R?.?
REQ-BIN-27.1	BIN	REQ-BIN-27/2	Reporting	F	Approved	R?.?
REQ-BIN-27.2	BIN	REQ-BIN-27/3	Reporting	F	Approved	R?.?
REQ-BIN-28	BIN	REQ-BIN-28/1	Reporting	F	Approved	R?.?
REQ-BIN-29	BIN	REQ-BIN-29/1	Reporting	F	Approved	R?.?
REQ-BIN-30	BIN	REQ-BIN-30/1	Reporting	F	Approved	R?.?
REQ-BIN-31	BIN	REQ-BIN-31/1	Reporting	F	Approved	R?.?
REQ-BIN-32	BIN	REQ-BIN-32/1	Channels	F	Approved	R?.?
REQ-BIN-32.1	BIN	REQ-BIN-32/2	Channels	F	Approved	R?.?
REQ-BIN-32.2	BIN	REQ-BIN-32/3	Channels	F	Approved	R?.?
REQ-BIN-32.3	BIN	REQ-BIN-32/4	Channels	F	Approved	R?.?
REQ-BIN-32.4	BIN	REQ-BIN-32/5	Channels	F	Approved	R?.?
REQ-BIN-32.5	BIN	REQ-BIN-32/6	Channels	F	Approved	R?.?
REQ-BIN-33	BIN	REQ-BIN-33/1	Reporting	F	Approved	R?.?
REQ-BIN-33.1	BIN	REQ-BIN-33/2	Reporting	F	Approved	R?.?
REQ-BIN-33.2	BIN	REQ-BIN-33/3	Reporting	F	Approved	R?.?
REQ-BIN-34	BIN	REQ-BIN-34/1	Reporting	F	Approved	R?.?
REQ-BIN-34.1	BIN	REQ-BIN-34/2	Reporting	F	Approved	R?.?
REQ-BIN-35	BIN	REQ-BIN-35/1	Reporting	F	Approved	R?.?
REQ-BIN-35.1	BIN	REQ-BIN-35/2	Reporting	F	Approved	R?.?
REQ-BIN-36	BIN	REQ-BIN-36/1	Channels	F	Approved	R?.?
REQ-BIN-36.1	BIN	REQ-BIN-36/2	Channels	F	Approved	R?.?
REQ-BIN-36.2	BIN	REQ-BIN-36/3	Channels	F	Approved	R?.?
REQ-BIN-36.3	BIN	REQ-BIN-36/4	Channels	F	Approved	R?.?
REQ-BIN-36.4	BIN	REQ-BIN-36/5	Channels	F	Approved	R?.?
REQ-BIN-37	BIN	REQ-BIN-37/1	Reporting	F	Approved	R?.?
REQ-BIN-38	BIN	REQ-BIN-38/1	Reporting	F	Approved	R?.?
REQ-BIN-38.1	BIN	REQ-BIN-38/2	Reporting	F	Approved	R?.?
REQ-BIN-39	BIN	REQ-BIN-39/1	Reporting	F	Approved	R?.?
REQ-BIN-40	BIN	REQ-BIN-40/1	Reporting	F	Approved	R?.?
REQ-BIN-41	BIN	REQ-BIN-41/1	Reporting	F	Approved	R?.?
REQ-BIN-42	BIN	REQ-BIN-42/1	Reporting	F	Approved	R?.?
REQ-BIN-43	BIN	REQ-BIN-43/1	Reporting	F	Approved	R?.?
REQ-BIN-44	BIN	REQ-BIN-44/1	Reporting	F	Approved	R?.?
REQ-BIN-45	BIN	REQ-BIN-45/1	Reporting	F	Approved	R?.?
REQ-BIN-46	BIN	REQ-BIN-46/1	Reporting	F	Approved	R?.?
REQ-BIN-47	BIN	REQ-BIN-47/1	Reporting	F	Approved	R?.?
REQ-BIN-48	BIN	REQ-BIN-48/1	Reporting	F	Approved	R?.?
REQ-BIN-49	BIN	REQ-BIN-49/1	Reporting	F	Approved	R?.?
REQ-BIN-50	BIN	REQ-BIN-50/1	Reporting	F	Approved	R?.?
REQ-BIN-51	BIN	REQ-BIN-51/1	Reporting	F	Approved	R?.?
REQ-BIN-51.1	BIN	REQ-BIN-51/2	Reporting	F	Approved	R?.?
REQ-BIN-51.2	BIN	REQ-BIN-51/3	Reporting	F	Approved	R?.?
REQ-BIN-51.3	BIN	REQ-BIN-51/4	Reporting	F	Approved	R?.?
REQ-BIN-52	BIN	REQ-BIN-52/1	Reporting	F	Approved	R?.?
REQ-BIN-53	BIN	REQ-BIN-53/1	Reporting	F	Approved	R?.?
REQ-BIN-54	BIN	REQ-BIN-54/1	Reporting	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-BIN-54.1	BIN	REQ-BIN-54/2	Reporting	F	Approved	R?.?
REQ-BIN-54.2	BIN	REQ-BIN-54/3	Reporting	F	Approved	R?.?
REQ-BIN-54.3	BIN	REQ-BIN-54/4	Reporting	F	Approved	R?.?
REQ-BIN-54.4	BIN	REQ-BIN-54/5	Reporting	F	Approved	R?.?
REQ-BIN-55	BIN	REQ-BIN-55/1	Reporting	F	Approved	R?.?
REQ-BIN-56	BIN	REQ-BIN-56/1	Reporting	F	Approved	R?.?
REQ-BIN-57	BIN	REQ-BIN-57/1	Reporting	F	Approved	R?.?
REQ-BIN-58	BIN	REQ-BIN-58/1	Reporting	F	Approved	R?.?
REQ-BIN-59	BIN	REQ-BIN-59/1	Reporting	F	Approved	R?.?
REQ-BIN-60	BIN	REQ-BIN-60/1	Reporting	F	Approved	R?.?
REQ-BIN-61	BIN	REQ-BIN-61/1	Reporting	F	Approved	R?.?
REQ-BIN-62	BIN	REQ-BIN-62/1	Reporting	F	Approved	R?.?
REQ-BIN-63	BIN	REQ-BIN-63/1	Reporting	F	Approved	R?.?
REQ-BIN-64	BIN	REQ-BIN-64/1	Reporting	F	Approved	R?.?
REQ-BIN-65	BIN	REQ-BIN-65/1	Reporting	F	Approved	R?.?
REQ-BIN-66	BIN	REQ-BIN-66/1	Reporting	F	Approved	R?.?
REQ-BIN-66.1	BIN	REQ-BIN-66/2	Reporting	F	Approved	R?.?
REQ-BIN-66.2	BIN	REQ-BIN-66/3	Reporting	F	Approved	R?.?
REQ-BIN-66.3	BIN	REQ-BIN-66/4	Reporting	F	Approved	R?.?
REQ-BIN-66.4	BIN	REQ-BIN-66/5	Reporting	F	Approved	R?.?
REQ-BIN-66.5	BIN	REQ-BIN-66/6	Reporting	F	Approved	R?.?
REQ-BIN-67	BIN	REQ-BIN-67/1	Reporting	F	Approved	R?.?
REQ-BIN-67.1	BIN	REQ-BIN-67/2	Reporting	F	Approved	R?.?
REQ-BIN-67.2	BIN	REQ-BIN-67/3	Reporting	F	Approved	R?.?
REQ-BIN-67.3	BIN	REQ-BIN-67/4	Reporting	F	Approved	R?.?
REQ-BIN-67.4	BIN	REQ-BIN-67/5	Reporting	F	Approved	R?.?
REQ-BIN-67.5	BIN	REQ-BIN-67/6	Reporting	F	Approved	R?.?
REQ-BIN-68	BIN	REQ-BIN-68/1	Reporting	F	Approved	R?.?
REQ-BIN-69	BIN	REQ-BIN-69/1	Reporting	F	Approved	R?.?
REQ-BIN-70	BIN	REQ-BIN-70/1	Reporting	F	Approved	R?.?
REQ-BIN-71	BIN	REQ-BIN-71/1	Reporting	F	Approved	R?.?
REQ-BIN-71.1	BIN	REQ-BIN-71/2	Reporting	F	Approved	R?.?
REQ-BIN-71.2	BIN	REQ-BIN-71/3	Reporting	F	Approved	R?.?
REQ-BIN-71.3	BIN	REQ-BIN-71/4	Reporting	F	Approved	R?.?
REQ-BIN-71.4	BIN	REQ-BIN-71/5	Reporting	F	Approved	R?.?
REQ-BIN-71.5	BIN	REQ-BIN-71/6	Reporting	F	Approved	R?.?
REQ-BIN-71.6	BIN	REQ-BIN-71/7	Reporting	F	Approved	R?.?
REQ-BIN-72	BIN	REQ-BIN-72/1	Reporting	F	Approved	R?.?
REQ-BIN-72.1	BIN	REQ-BIN-72/2	Reporting	F	Approved	R?.?
REQ-BIN-72.2	BIN	REQ-BIN-72/3	Reporting	F	Approved	R?.?
REQ-BIN-72.3	BIN	REQ-BIN-72/4	Reporting	F	Approved	R?.?
REQ-BIN-72.4	BIN	REQ-BIN-72/5	Reporting	F	Approved	R?.?
REQ-BIN-72.5	BIN	REQ-BIN-72/6	Reporting	F	Approved	R?.?
REQ-BIN-72.6	BIN	REQ-BIN-72/7	Reporting	F	Approved	R?.?
REQ-BIN-72.7	BIN	REQ-BIN-72/8	Reporting	F	Approved	R?.?
REQ-BIN-72.8	BIN	REQ-BIN-72/9	Reporting	F	Approved	R?.?
REQ-BIN-72.9	BIN	REQ-BIN-72/10	Reporting	F	Approved	R?.?
REQ-BIN-72.10	BIN	REQ-BIN-72/11	Reporting	F	Approved	R?.?
REQ-BIN-72.11	BIN	REQ-BIN-72/12	Reporting	F	Approved	R?.?
REQ-BIN-72.12	BIN	REQ-BIN-72/13	Reporting	F	Approved	R?.?
REQ-BIN-72.13	BIN	REQ-BIN-72/14	Reporting	F	Approved	R?.?
REQ-BIN-72.14	BIN	REQ-BIN-72/15	Reporting	F	Approved	R?.?
REQ-BIN-72.15	BIN	REQ-BIN-72/16	Reporting	F	Approved	R?.?
REQ-BIN-72.16	BIN	REQ-BIN-72/17	Reporting	F	Approved	R?.?
REQ-BIN-72.17	BIN	REQ-BIN-72/18	Reporting	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-BIN-72.18	BIN	REQ-BIN-72/19	Reporting	F	Approved	R?.?
REQ-BIN-73	BIN	REQ-BIN-73/1	Reporting	F	Approved	R?.?
REQ-BIN-74	BIN	REQ-BIN-74/1	Reporting	F	Approved	R?.?
REQ-BIN-74.1	BIN	REQ-BIN-74/2	Reporting	F	Approved	R?.?
REQ-BIN-74.2	BIN	REQ-BIN-74/3	Reporting	F	Approved	R?.?
REQ-BIN-74.3	BIN	REQ-BIN-74/4	Reporting	F	Approved	R?.?
REQ-BIN-74.4	BIN	REQ-BIN-74/5	Reporting	F	Approved	R?.?
REQ-BIN-74.5	BIN	REQ-BIN-74/6	Reporting	F	Approved	R?.?
REQ-BIN-74.6	BIN	REQ-BIN-74/7	Reporting	F	Approved	R?.?
REQ-BIN-74.7	BIN	REQ-BIN-74/8	Reporting	F	Approved	R?.?
REQ-BIN-75	BIN	REQ-BIN-75/1	Reporting	F	Approved	R?.?
REQ-BIN-76	BIN	REQ-BIN-76/1	Reporting	F	Approved	R?.?
REQ-BIN-77	BIN	REQ-BIN-77/1	Reporting	F	Approved	R?.?
REQ-BIN-78	BIN	REQ-BIN-78/1	Reporting	F	Approved	R?.?
REQ-BIN-78.1	BIN	REQ-BIN-78/2	Reporting	F	Approved	R?.?
REQ-BIN-78.2	BIN	REQ-BIN-78/3	Reporting	F	Approved	R?.?
REQ-BIN-78.3	BIN	REQ-BIN-78/4	Reporting	F	Approved	R?.?
REQ-BIN-78.4	BIN	REQ-BIN-78/5	Reporting	F	Approved	R?.?
REQ-BIN-78.5	BIN	REQ-BIN-78/6	Reporting	F	Approved	R?.?
REQ-BIN-78.6	BIN	REQ-BIN-78/7	Reporting	F	Approved	R?.?
REQ-BIN-78.7	BIN	REQ-BIN-78/8	Reporting	F	Approved	R?.?
REQ-BIN-79	BIN	REQ-BIN-79/1	Reporting	F	Approved	R?.?
REQ-BIN-79.1	BIN	REQ-BIN-79/2	Reporting	F	Approved	R?.?
REQ-BIN-79.2	BIN	REQ-BIN-79/3	Reporting	F	Approved	R?.?
REQ-BIN-79.3	BIN	REQ-BIN-79/4	Reporting	F	Approved	R?.?
REQ-BIN-79.4	BIN	REQ-BIN-79/5	Reporting	F	Approved	R?.?
REQ-BIN-79.5	BIN	REQ-BIN-79/6	Reporting	F	Approved	R?.?
REQ-BIN-79.6	BIN	REQ-BIN-79/7	Reporting	F	Approved	R?.?
REQ-BIN-79.7	BIN	REQ-BIN-79/8	Reporting	F	Approved	R?.?
REQ-BIN-79.8	BIN	REQ-BIN-79/9	Reporting	F	Approved	R?.?
REQ-BIN-79.9	BIN	REQ-BIN-79/10	Reporting	F	Approved	R?.?
REQ-BIN-79.10	BIN	REQ-BIN-79/11	Reporting	F	Approved	R?.?
REQ-BIN-80	BIN	REQ-BIN-80/1	Reporting	F	Approved	R?.?
REQ-BIN-81	BIN	REQ-BIN-81/1	Reporting	F	Approved	R?.?
REQ-BIN-81.1	BIN	REQ-BIN-81/2	Reporting	F	Approved	R?.?
REQ-BIN-81.2	BIN	REQ-BIN-81/3	Reporting	F	Approved	R?.?
REQ-BIN-81.3	BIN	REQ-BIN-81/4	Reporting	F	Approved	R?.?
REQ-BIN-81.4	BIN	REQ-BIN-81/5	Reporting	F	Approved	R?.?
REQ-BIN-81.5	BIN	REQ-BIN-81/6	Reporting	F	Approved	R?.?
REQ-BIN-81.6	BIN	REQ-BIN-81/7	Reporting	F	Approved	R?.?
REQ-BIN-82	BIN	REQ-BIN-82/1	Reporting	F	Approved	R?.?
REQ-BIN-83	BIN	REQ-BIN-83/1	Reporting	F	Approved	R?.?
REQ-BIN-83.1	BIN	REQ-BIN-83/2	Reporting	F	Approved	R?.?
REQ-BIN-83.2	BIN	REQ-BIN-83/3	Reporting	F	Approved	R?.?
REQ-BIN-83.3	BIN	REQ-BIN-83/4	Reporting	F	Approved	R?.?
REQ-BIN-83.4	BIN	REQ-BIN-83/5	Reporting	F	Approved	R?.?
REQ-BIN-83.5	BIN	REQ-BIN-83/6	Reporting	F	Approved	R?.?
REQ-BIN-83.6	BIN	REQ-BIN-83/7	Reporting	F	Approved	R?.?
REQ-BIN-83.7	BIN	REQ-BIN-83/8	Reporting	F	Approved	R?.?
REQ-BIN-83.8	BIN	REQ-BIN-83/9	Reporting	F	Approved	R?.?
REQ-BIN-83.9	BIN	REQ-BIN-83/10	Reporting	F	Approved	R?.?
REQ-BIN-84	BIN	REQ-BIN-84/1	Reporting	F	Approved	R?.?
REQ-BIN-85	BIN	REQ-BIN-85/1	Reporting	F	Approved	R?.?
REQ-BIN-86	BIN	REQ-BIN-86/1	Reporting	F	Approved	R?.?
REQ-BIN-87	BIN	REQ-BIN-87/1	Reporting	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-BIN-88	BIN	REQ-BIN-88/1	Reporting	F	Approved	R?.?
REQ-BIN-89	BIN	REQ-BIN-89/1	Reporting	F	Approved	R?.?
REQ-BIN-90	BIN	REQ-BIN-90/1	Reporting	F	Approved	R?.?
REQ-BIN-91	BIN	REQ-BIN-91/1	Reporting	F	Approved	R?.?
REQ-BIN-92	BIN	REQ-BIN-92/1	Reporting	F	Approved	R?.?
REQ-BIN-93	BIN	REQ-BIN-93/1	Reporting	F	Approved	R?.?
REQ-BIN-94	BIN	REQ-BIN-94/1	Reporting	F	Approved	R?.?
REQ-BIN-95	BIN	REQ-BIN-95/1	Reporting	F	Approved	R?.?
REQ-BIN-96	BIN	REQ-BIN-96/1	Reporting	F	Approved	R?.?
REQ-BIN-97	BIN	REQ-BIN-97/1	Reporting	F	Approved	R?.?
REQ-BIN-97.1	BIN	REQ-BIN-97/2	Reporting	F	Approved	R?.?
REQ-BIN-97.2	BIN	REQ-BIN-97/3	Reporting	F	Approved	R?.?
REQ-BIN-98	BIN	REQ-BIN-98/1	Reporting	F	Approved	R?.?
REQ-BIN-99	BIN	REQ-BIN-99/1	Reporting	F	Approved	R?.?
REQ-BIN-100	BIN	REQ-BIN-100/1	Reporting	F	Approved	R?.?
REQ-BIN-101	BIN	REQ-BIN-101/1	Reporting	F	Approved	R?.?
REQ-BIN-102	BIN	REQ-BIN-102/1	Reporting	F	Approved	R?.?
REQ-BIN-103	BIN	REQ-BIN-103/1	Reporting	F	Approved	R?.?
REQ-BIN-104	BIN	REQ-BIN-104/1	Reporting	F	Approved	R?.?
REQ-BIN-105	BIN	REQ-BIN-105/1	Reporting	F	Approved	R?.?
REQ-BIN-106	BIN	REQ-BIN-106/1	Reporting	F	Approved	R?.?
REQ-BIN-106.1	BIN	REQ-BIN-106/2	Reporting	F	Approved	R?.?
REQ-BIN-107	BIN	REQ-BIN-107/1	Reporting	F	Approved	R?.?
REQ-BIN-108	BIN	REQ-BIN-108/1	Reporting	F	Approved	R?.?
REQ-BIN-109	BIN	REQ-BIN-109/1	Reporting	F	Approved	R?.?
REQ-BIN-110	BIN	REQ-BIN-110/1	Data Management	F	Approved	R?.?
REQ-BIN-110.1	BIN	REQ-BIN-110/2	Data Management	F	Approved	R?.?
REQ-BIN-110.2	BIN	REQ-BIN-110/3	Data Management	F	Approved	R?.?
REQ-BIN-110.3	BIN	REQ-BIN-110/12	Data Management	F	Approved	R?.?
REQ-BIN-110.4	BIN	REQ-BIN-110/4	Data Management	F	Approved	R?.?
REQ-BIN-110.5	BIN	REQ-BIN-110/5	Data Management	F	Approved	R?.?
REQ-BIN-110.6	BIN	REQ-BIN-110/6	Data Management	F	Approved	R?.?
REQ-BIN-110.7	BIN	REQ-BIN-110/7	Data Management	F	Approved	R?.?
REQ-BIN-110.8	BIN	REQ-BIN-110/8	Data Management	F	Approved	R?.?
REQ-BIN-110.9	BIN	REQ-BIN-110/9	Data Management	F	Approved	R?.?
REQ-BIN-110.10	BIN	REQ-BIN-110/10	Data Management	F	Approved	R?.?
REQ-BIN-110.11	BIN	REQ-BIN-110/11	Data Management	F	Approved	R?.?
REQ-BIN-111	BIN	REQ-BIN-111/1	Reporting	F	Approved	R?.?
REQ-BIN-112	BIN	REQ-BIN-112/1	Reporting	F	Approved	R?.?
REQ-BIN-113	BIN	REQ-BIN-113/1	Reporting	F	Approved	R?.?
REQ-BIN-114	BIN	REQ-BIN-114/1	Reporting	F	Approved	R?.?
REQ-BIN-115	BIN	REQ-BIN-115/1	Reporting	F	Approved	R?.?
REQ-BIN-116	BIN	REQ-BIN-116/1	Reporting	F	Approved	R?.?
REQ-BIN-117	BIN	REQ-BIN-117/1	Reporting	F	Approved	R?.?
REQ-BIN-118	BIN	REQ-BIN-118/1	Reporting	F	Approved	R?.?
REQ-BIN-119	BIN	REQ-BIN-119/1	Reporting	F	Approved	R?.?
REQ-BIN-120	BIN	REQ-BIN-120/1	Reporting	F	Approved	R?.?
REQ-BIN-121	BIN	REQ-BIN-121/1	Reporting	F	Approved	R?.?
REQ-BIN-122	BIN	REQ-BIN-122/1	Reporting	F	Approved	R?.?
REQ-BIN-123	BIN	REQ-BIN-123/1	Reporting	F	Approved	R?.?
REQ-BIN-124	BIN	REQ-BIN-124/1	Reporting	F	Approved	R?.?
REQ-BIN-125	BIN	REQ-BIN-125/1	Reporting	F	Approved	R?.?
REQ-BIN-126	BIN	REQ-BIN-126/1	Reporting	F	Approved	R?.?
REQ-BIN-126.1	BIN	REQ-BIN-126/2	Reporting	F	Approved	R?.?
REQ-BIN-127	BIN	REQ-BIN-127/1	Reporting	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-BIN-127.1	BIN	REQ-BIN-127/2	Reporting	F	Approved	R?.?
REQ-BIN-128	BIN	REQ-BIN-128/1	Customer Management	F	Approved	R?.?
REQ-BIN-129	BIN	REQ-BIN-129/1	Reporting	F	Approved	R?.?
REQ-BIN-130	BIN	REQ-BIN-130/1	Reporting	F	Approved	R?.?
REQ-BIN-131	BIN	REQ-BIN-131/1	Reporting	F	Approved	R?.?
REQ-BIN-132	BIN	REQ-BIN-132/1	Reporting	F	Approved	R?.?
REQ-BIN-133	BIN	REQ-BIN-133/1	Reporting	F	Approved	R?.?
REQ-BIN-134	BIN	REQ-BIN-134/1	Reporting	F	Approved	R?.?
REQ-BIN-135	BIN	REQ-BIN-135/1	Reporting	F	Approved	R?.?
REQ-BIN-136	BIN	REQ-BIN-136/1	Reporting	F	Approved	R?.?
REQ-BIN-137	BIN	REQ-BIN-137/1	Reporting	F	Approved	R?.?
REQ-BIN-138	BIN	REQ-BIN-138/1	Reporting	F	Approved	R?.?
REQ-BIN-139	BIN	REQ-BIN-139/1	Reporting	F	Approved	R?.?
REQ-BIN-140	BIN	REQ-BIN-140/1	Reporting	F	Approved	R?.?
REQ-BIN-141	BIN	REQ-BIN-141/1	Reporting	F	Approved	R?.?
REQ-BIN-142	BIN	REQ-BIN-142/1	Reporting	F	Approved	R?.?
REQ-BIN-143	BIN	REQ-BIN-143/1	Reporting	F	Approved	R?.?
REQ-BIN-144	BIN	REQ-BIN-144/1	Reporting	F	Approved	R?.?
REQ-BIN-145	BIN	REQ-BIN-145/1	Reporting	F	Approved	R?.?
REQ-BIN-146	BIN	REQ-BIN-146/1	Reporting	F	Approved	R?.?
REQ-BIN-147	BIN	REQ-BIN-147/1	Reporting	F	Approved	R?.?
REQ-BIN-148	BIN	REQ-BIN-148/1	Reporting	F	Approved	R?.?
REQ-BIN-149	BIN	REQ-BIN-149/1	Reporting	F	Approved	R?.?
REQ-BIN-150	BIN	REQ-BIN-150/1	Reporting	F	Approved	R?.?
REQ-BIN-151	BIN	REQ-BIN-151/1	TBD	F	Approved	R?.?
REQ-BIN-152	BIN	REQ-BIN-152/2	Reporting	F	Approved	R?.?
REQ-BIN-153	BIN	REQ-BIN-153/1	Reporting	F	Approved	R?.?
REQ-BIN-154	BIN	REQ-BIN-154/1	Fare Management	F	Approved	R?.?
REQ-BIN-155	BIN	REQ-BIN-155/1	Reporting	F	Approved	R?.?
REQ-BIN-156	BIN	REQ-BIN-156/1	Reporting	F	Approved	R?.?
REQ-BIN-157	BIN	REQ-BIN-157/1	Reporting	F	Approved	R?.?
REQ-BIN-158	BIN	REQ-BIN-158/1	Reporting	F	Approved	R?.?
REQ-BIN-159	BIN	REQ-BIN-159/1	Reporting	F	Approved	R?.?
REQ-BIN-160	BIN	REQ-BIN-160/1	Reporting	F	Approved	R?.?
REQ-BIN-161	BIN	REQ-BIN-161/1	Reporting	F	Approved	R?.?
REQ-BIN-162	BIN	REQ-BIN-162/1	Reporting	F	Approved	R?.?
REQ-BIN-163	BIN	REQ-BIN-163/1	Reporting	F	Approved	R?.?
REQ-BIN-164	BIN	REQ-BIN-164/1	Reporting	F	Approved	R?.?
REQ-BIN-165	BIN	REQ-BIN-165/1	Reporting	F	Approved	R?.?
REQ-BIN-166	BIN	REQ-BIN-166/1	Reporting	F	Approved	R?.?
REQ-BIN-166.1	BIN	REQ-BIN-166/2	Reporting	F	Approved	R?.?
REQ-BIN-166.2	BIN	REQ-BIN-166/3	Reporting	F	Approved	R?.?
REQ-BIN-166.3	BIN	REQ-BIN-166/4	Reporting	F	Approved	R?.?
REQ-BIN-166.4	BIN	REQ-BIN-166/5	Reporting	F	Approved	R?.?
REQ-BIN-166.5	BIN	REQ-BIN-166/6	Reporting	F	Approved	R?.?
REQ-BIN-166.6	BIN	REQ-BIN-166/7	Reporting	F	Approved	R?.?
REQ-BIN-166.7	BIN	REQ-BIN-166/8	Reporting	F	Approved	R?.?
REQ-BIN-166.8	BIN	REQ-BIN-166/9	Reporting	F	Approved	R?.?
REQ-BIN-166.9	BIN	REQ-BIN-166/10	Reporting	F	Approved	R?.?
REQ-BIN-166.10	BIN	REQ-BIN-166/11	Reporting	F	Approved	R?.?
REQ-BIN-166.11	BIN	REQ-BIN-166/12	Reporting	F	Approved	R?.?
REQ-BIN-166.12	BIN	REQ-BIN-166/13	Reporting	F	Approved	R?.?
REQ-BIN-166.13	BIN	REQ-BIN-166/14	Reporting	F	Approved	R?.?
REQ-BIN-166.14	BIN	REQ-BIN-166/15	Reporting	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-BIN-166.15	BIN	REQ-BIN-166/16	Reporting	F	Approved	R?.?
REQ-BIN-167	BIN	REQ-BIN-167/1	Fare Management	F	Approved	R?.?
REQ-BIN-167.1	BIN	REQ-BIN-167/2	Fare Management	F	Approved	R?.?
REQ-BIN-167.2	BIN	REQ-BIN-167/3	Fare Management	F	Approved	R?.?
REQ-BIN-167.3	BIN	REQ-BIN-167/4	Fare Management	F	Approved	R?.?
REQ-BIN-167.4	BIN	REQ-BIN-167/5	Fare Management	F	Approved	R?.?
REQ-BIN-167.5	BIN	REQ-BIN-167/6	Fare Management	F	Approved	R?.?
REQ-BIN-167.6	BIN	REQ-BIN-167/7	Fare Management	F	Approved	R?.?
REQ-BIN-167.7	BIN	REQ-BIN-167/8	Fare Management	F	Approved	R?.?
REQ-BIN-167.8	BIN	REQ-BIN-167/9	Fare Management	F	Approved	R?.?
REQ-BIN-167.9	BIN	REQ-BIN-167/10	Fare Management	F	Approved	R?.?
REQ-BIN-167.10	BIN	REQ-BIN-167/12	Fare Management	F	Approved	R?.?
REQ-BIN-167.11	BIN	REQ-BIN-167/13	Fare Management	F	Approved	R?.?
REQ-BIN-167.12	BIN	REQ-BIN-167/14	Fare Management	F	Approved	R?.?
REQ-BIN-168	BIN	REQ-BIN-168/1	Reporting	F	Approved	R?.?
REQ-BIN-169	BIN	REQ-BIN-169/1	Reporting	F	Approved	R?.?
REQ-BIN-170	BIN	REQ-BIN-170/1	Reporting	F	Approved	R?.?
REQ-BIN-171	BIN	REQ-BIN-171/1	Reporting	F	Approved	R?.?
REQ-BIN-172	BIN	REQ-BIN-172/1	Reporting	F	Approved	R?.?
REQ-BIN-173	BIN	REQ-BIN-173/1	Reporting	F	Approved	R?.?
REQ-BIN-174	BIN	REQ-BIN-174/1	Reporting	F	Approved	R?.?
REQ-BIN-175	BIN	REQ-BIN-175/1	Reporting	F	Approved	R?.?
REQ-BIN-176	BIN	REQ-BIN-176/1	Reporting	F	Approved	R?.?
REQ-BIN-177	BIN	REQ-BIN-177/1	Financial Management	F	Approved	R?.?
REQ-DMG-1	DMG	REQ-DMG-1/1	Reporting	F	Approved	R?.?
REQ-DMG-2	DMG	REQ-DMG-2/1	Reporting	F	Approved	R?.?
REQ-DMG-3	DMG	REQ-DMG-3/1	Reporting	F	Approved	R?.?
REQ-DMG-4	DMG	REQ-DMG-4/1	Reporting	F	Approved	R?.?
REQ-DMG-5	DMG	REQ-DMG-5/1	Reporting	F	Approved	R?.?
REQ-DMG-6	DMG	REQ-DMG-6/1	Reporting	F	Approved	R?.?
REQ-DMG-6.1	DMG	REQ-DMG-6/2	Reporting	F	Approved	R?.?
REQ-DMG-6.2	DMG	REQ-DMG-6/3	Reporting	F	Approved	R?.?
REQ-DMG-6.3	DMG	REQ-DMG-6/4	Reporting	F	Approved	R?.?
REQ-DMG-6.4	DMG	REQ-DMG-6/5	Reporting	F	Approved	R?.?
REQ-DMG-6.5	DMG	REQ-DMG-6/6	Reporting	F	Approved	R?.?
REQ-DMG-6.6	DMG	REQ-DMG-6/7	Reporting	F	Approved	R?.?
REQ-DMG-6.7	DMG	REQ-DMG-6/8	Reporting	F	Approved	R?.?
REQ-DMG-6.8	DMG	REQ-DMG-6/9	Reporting	F	Approved	R?.?
REQ-DMG-6.9	DMG	REQ-DMG-6/10	Reporting	F	Approved	R?.?
REQ-DMG-7	DMG	REQ-DMG-7/1	Reporting	F	Approved	R?.?
REQ-DMG-7.1	DMG	REQ-DMG-7/2	Reporting	F	Approved	R?.?
REQ-DMG-7.2	DMG	REQ-DMG-7/3	Reporting	F	Approved	R?.?
REQ-DMG-7.3	DMG	REQ-DMG-7/4	Reporting	F	Approved	R?.?
REQ-DMG-8	DMG	REQ-DMG-8/1	Reporting	F	Approved	R?.?
REQ-DMG-9	DMG	REQ-DMG-9/1	Reporting	F	Approved	R?.?
REQ-DMG-9.1	DMG	REQ-DMG-9/2	Reporting	F	Approved	R?.?
REQ-DMG-9.2	DMG	REQ-DMG-9/3	Reporting	F	Approved	R?.?
REQ-DMG-9.3	DMG	REQ-DMG-9/4	Reporting	F	Approved	R?.?
REQ-DMG-9.4	DMG	REQ-DMG-9/5	Reporting	F	Approved	R?.?
REQ-DMG-9.5	DMG	REQ-DMG-9/6	Reporting	F	Approved	R?.?
REQ-DMG-9.6	DMG	REQ-DMG-9/7	Reporting	F	Approved	R?.?
REQ-DMG-10	DMG	REQ-DMG-10/1	Reporting	F	Approved	R?.?
REQ-DMG-11	DMG	REQ-DMG-11/1	Reporting	F	Approved	R?.?
REQ-DMG-12	DMG	REQ-DMG-12/1	Reporting	F	Approved	R?.?
REQ-DMG-13	DMG	REQ-DMG-13/1	Reporting	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-DMG-14	DMG	REQ-DMG-14/1	Reporting	F	Approved	R?.?
REQ-DMG-15	DMG	REQ-DMG-15/1	Reporting	F	Approved	R?.?
REQ-DMG-16	DMG	REQ-DMG-16/1	Reporting	F	Approved	R?.?
REQ-DMG-17	DMG	REQ-DMG-17/1	Reporting	F	Approved	R?.?
REQ-DMG-18	DMG	REQ-DMG-18/1	Reporting	F	Approved	R?.?
REQ-DMG-18.1	DMG	REQ-DMG-18/2	Reporting	F	Approved	R?.?
REQ-DMG-18.2	DMG	REQ-DMG-18/3	Reporting	F	Approved	R?.?
REQ-DMG-18.3	DMG	REQ-DMG-18/4	Reporting	F	Approved	R?.?
REQ-DMG-18.4	DMG	REQ-DMG-18/5	Reporting	F	Approved	R?.?
REQ-DMG-18.5	DMG	REQ-DMG-18/6	Reporting	F	Approved	R?.?
REQ-DMG-18.6	DMG	REQ-DMG-18/7	Reporting	F	Approved	R?.?
REQ-DMG-19	DMG	REQ-DMG-19/1	Reporting	F	Approved	R?.?
REQ-DMG-20	DMG	REQ-DMG-20/1	Reporting	F	Approved	R?.?
REQ-DMG-21	DMG	REQ-DMG-21/1	Reporting	F	Approved	R?.?
REQ-DMG-22	DMG	REQ-DMG-22/1	Reporting	F	Approved	R?.?
REQ-DMG-23	DMG	REQ-DMG-23/1	Reporting	F	Approved	R?.?
REQ-DMG-24	DMG	REQ-DMG-24/1	Reporting	F	Approved	R?.?
REQ-DMG-25	DMG	REQ-DMG-25/1	Reporting	F	Approved	R?.?
REQ-DMG-25.1	DMG	REQ-DMG-25/2	Reporting	F	Approved	R?.?
REQ-DMG-25.2	DMG	REQ-DMG-25/3	Reporting	F	Approved	R?.?
REQ-DMG-26	DMG	REQ-DMG-26/1	Reporting	F	Approved	R?.?
REQ-DMG-26.1	DMG	REQ-DMG-26/2	Reporting	F	Approved	R?.?
REQ-DMG-26.2	DMG	REQ-DMG-26/3	Reporting	F	Approved	R?.?
REQ-DMG-26.3	DMG	REQ-DMG-26/4	Reporting	F	Approved	R?.?
REQ-DMG-27	DMG	REQ-DMG-27/1	Reporting	F	Approved	R?.?
REQ-DMG-27.1	DMG	REQ-DMG-27/2	Reporting	F	Approved	R?.?
REQ-DMG-27.2	DMG	REQ-DMG-27/3	Reporting	F	Approved	R?.?
REQ-DMG-27.3	DMG	REQ-DMG-27/4	Reporting	F	Approved	R?.?
REQ-DMG-28	DMG	REQ-DMG-28/1	Reporting	F	Approved	R?.?
REQ-DMG-29	DMG	REQ-DMG-29/1	Reporting	F	Approved	R?.?
REQ-DMG-30	DMG	REQ-DMG-30/1	Reporting	F	Approved	R?.?
REQ-DMG-31	DMG	REQ-DMG-31/1	Reporting	F	Approved	R?.?
REQ-DMG-32	DMG	REQ-DMG-32/1	Reporting	F	Approved	R?.?
REQ-DMG-33	DMG	REQ-DMG-33/1	Data Management	F	Approved	R?.?
REQ-DMG-34	DMG	REQ-DMG-34/1	Data Management	F	Approved	R?.?
REQ-DMG-34.1	DMG	REQ-DMG-34/2	Data Management	F	Approved	R?.?
REQ-DMG-34.2	DMG	REQ-DMG-34/3	Data Management	F	Approved	R?.?
REQ-DMG-35	DMG	REQ-DMG-35/1	Reporting	F	Approved	R?.?
REQ-DMG-36	DMG	REQ-DMG-36/1	Reporting	F	Approved	R?.?
REQ-DMG-37	DMG	REQ-DMG-37/1	Reporting	F	Approved	R?.?
REQ-DMG-37.1	DMG	REQ-DMG-37/2	Reporting	F	Approved	R?.?
REQ-DMG-37.2	DMG	REQ-DMG-37/3	Reporting	F	Approved	R?.?
REQ-DMG-37.3	DMG	REQ-DMG-37/4	Reporting	F	Approved	R?.?
REQ-DMG-38	DMG	REQ-DMG-38/1	Reporting	F	Approved	R?.?
REQ-DMG-39	DMG	REQ-DMG-39/1	Reporting	F	Approved	R?.?
REQ-DMG-40	DMG	REQ-DMG-40/1	Reporting	F	Approved	R?.?
REQ-DMG-40.1	DMG	REQ-DMG-40/2	Reporting	F	Approved	R?.?
REQ-DMG-40.2	DMG	REQ-DMG-40/3	Reporting	F	Approved	R?.?
REQ-DMG-40.3	DMG	REQ-DMG-40/4	Reporting	F	Approved	R?.?
REQ-DMG-40.4	DMG	REQ-DMG-40/5	Reporting	F	Approved	R?.?
REQ-DMG-41	DMG	REQ-DMG-41/1	Data Management	F	Approved	R?.?
REQ-DMG-42	DMG	REQ-DMG-42/1	Reporting	F	Approved	R?.?
REQ-DMG-43	DMG	REQ-DMG-43/1	Reporting	F	Approved	R?.?
REQ-DMG-44	DMG	REQ-DMG-44/1	Reporting	F	Approved	R?.?
REQ-DMG-45	DMG	REQ-DMG-45/1	Reporting	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-DMG-46	DMG	REQ-DMG-46/1	Reporting	F	Approved	R?.?
REQ-DMG-47	DMG	REQ-DMG-47/1	Data Management	F	Approved	R?.?
REQ-DMG-48	DMG	REQ-DMG-48/1	Data Management	F	Approved	R?.?
REQ-DMG-49	DMG	REQ-DMG-49/1	Data Management	F	Approved	R?.?
REQ-DMG-50	DMG	REQ-DMG-50/1	Data Management	F	Approved	R?.?
REQ-DMG-51	DMG	REQ-DMG-51/1	Data Management	F	Approved	R?.?
REQ-DMG-52	DMG	REQ-DMG-52/1	Data Management	F	Approved	R?.?
REQ-DMG-53	DMG	REQ-DMG-53/1	Data Management	F	Approved	R?.?
REQ-DMG-53.1	DMG	REQ-DMG-53/2	Data Management	F	Approved	R?.?
REQ-DMG-53.2	DMG	REQ-DMG-53/3	Data Management	F	Approved	R?.?
REQ-DMG-53.3	DMG	REQ-DMG-53/4	Data Management	F	Approved	R?.?
REQ-DMG-53.4	DMG	REQ-DMG-53/5	Data Management	F	Approved	R?.?
REQ-DMG-53.5	DMG	REQ-DMG-53/6	Data Management	F	Approved	R?.?
REQ-DMG-53.6	DMG	REQ-DMG-53/7	Data Management	F	Approved	R?.?
REQ-DMG-53.7	DMG	REQ-DMG-53/8	Data Management	F	Approved	R?.?
REQ-DMG-53.8	DMG	REQ-DMG-53/9	Data Management	F	Approved	R?.?
REQ-DMG-53.9	DMG	REQ-DMG-53/10	Data Management	F	Approved	R?.?
REQ-DMG-53.10	DMG	REQ-DMG-53/11	Data Management	F	Approved	R?.?
REQ-DMG-53.11	DMG	REQ-DMG-53/12	Data Management	F	Approved	R?.?
REQ-DMG-53.12	DMG	REQ-DMG-53/13	Data Management	F	Approved	R?.?
REQ-DMG-53.13	DMG	REQ-DMG-53/14	Data Management	F	Approved	R?.?
REQ-DMG-53.14	DMG	REQ-DMG-53/15	Data Management	F	Approved	R?.?
REQ-DMG-53.15	DMG	REQ-DMG-53/16	Data Management	F	Approved	R?.?
REQ-DMG-53.16	DMG	REQ-DMG-53/17	Data Management	F	Approved	R?.?
REQ-DMG-53.17	DMG	REQ-DMG-53/18	Data Management	F	Approved	R?.?
REQ-DMG-53.18	DMG	REQ-DMG-53/19	Data Management	F	Approved	R?.?
REQ-DMG-53.19	DMG	REQ-DMG-53/20	Data Management	F	Approved	R?.?
REQ-DMG-53.20	DMG	REQ-DMG-53/21	Data Management	F	Approved	R?.?
REQ-DMG-53.21	DMG	REQ-DMG-53/22	Data Management	F	Approved	R?.?
REQ-DMG-53.22	DMG	REQ-DMG-53/23	Data Management	F	Approved	R?.?
REQ-DMG-53.23	DMG	REQ-DMG-53/24	Data Management	F	Approved	R?.?
REQ-DMG-53.24	DMG	REQ-DMG-53/25	Data Management	F	Approved	R?.?
REQ-DMG-53.25	DMG	REQ-DMG-53/26	Data Management	F	Approved	R?.?
REQ-DMG-53.26	DMG	REQ-DMG-53/27	Data Management	F	Approved	R?.?
REQ-DMG-53.27	DMG	REQ-DMG-53/28	Data Management	F	Approved	R?.?
REQ-DMG-53.28	DMG	REQ-DMG-53/29	Data Management	F	Approved	R?.?
REQ-DMG-53.29	DMG	REQ-DMG-53/30	Data Management	F	Approved	R?.?
REQ-DMG-53.30	DMG	REQ-DMG-53/31	Data Management	F	Approved	R?.?
REQ-DMG-53.31	DMG	REQ-DMG-53/32	Data Management	F	Approved	R?.?
REQ-DMG-53.32	DMG	REQ-DMG-53/33	Data Management	F	Approved	R?.?
REQ-DMG-53.33	DMG	REQ-DMG-53/34	Data Management	F	Approved	R?.?
REQ-DMG-53.35	DMG	REQ-DMG-53/36	Data Management	F	Approved	R?.?
REQ-DMG-53.36	DMG	REQ-DMG-53/37	Data Management	F	Approved	R?.?
REQ-DMG-53.37	DMG	REQ-DMG-53/38	Data Management	F	Approved	R?.?
REQ-DMG-53.38	DMG	REQ-DMG-53/39	Data Management	F	Approved	R?.?
REQ-DMG-53.39	DMG	REQ-DMG-53/40	Data Management	F	Approved	R?.?
REQ-DMG-53.40	DMG	REQ-DMG-53/41	Data Management	F	Approved	R?.?
REQ-DMG-53.41	DMG	REQ-DMG-53/42	Data Management	F	Approved	R?.?
REQ-DMG-53.42	DMG	REQ-DMG-53/43	Data Management	F	Approved	R?.?
REQ-DMG-53.43	DMG	REQ-DMG-53/44	Data Management	F	Approved	R?.?
REQ-DMG-53.44	DMG	REQ-DMG-53/45	Data Management	F	Approved	R?.?
REQ-DMG-53.45	DMG	REQ-DMG-53/46	Data Management	F	Approved	R?.?
REQ-DMG-53.46	DMG	REQ-DMG-53/47	Data Management	F	Approved	R?.?
REQ-DMG-53.47	DMG	REQ-DMG-53/48	Data Management	F	Approved	R?.?
REQ-DMG-54	DMG	REQ-DMG-54/1	Data Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-DMG-55	DMG	REQ-DMG-55/1	Reporting	F	Approved	R?.?
REQ-DMG-56	DMG	REQ-DMG-56/1	Reporting	F	Approved	R?.?
REQ-DMG-56.1	DMG	REQ-DMG-56/2	Reporting	F	Approved	R?.?
REQ-DMG-56.2	DMG	REQ-DMG-56/3	Reporting	F	Approved	R?.?
REQ-DMG-56.3	DMG	REQ-DMG-56/4	Reporting	F	Approved	R?.?
REQ-DMG-56.4	DMG	REQ-DMG-56/5	Reporting	F	Approved	R?.?
REQ-DMG-56.5	DMG	REQ-DMG-56/6	Reporting	F	Approved	R?.?
REQ-DMG-56.6	DMG	REQ-DMG-56/7	Reporting	F	Approved	R?.?
REQ-DMG-56.7	DMG	REQ-DMG-56/8	Reporting	F	Approved	R?.?
REQ-DMG-56.8	DMG	REQ-DMG-56/9	Reporting	F	Approved	R?.?
REQ-DMG-56.9	DMG	REQ-DMG-56/10	Reporting	F	Approved	R?.?
REQ-DMG-56.10	DMG	REQ-DMG-56/11	Reporting	F	Approved	R?.?
REQ-DMG-56.11	DMG	REQ-DMG-56/12	Reporting	F	Approved	R?.?
REQ-DMG-56.12	DMG	REQ-DMG-56/13	Reporting	F	Approved	R?.?
REQ-DMG-56.13	DMG	REQ-DMG-56/14	Reporting	F	Approved	R?.?
REQ-DMG-56.14	DMG	REQ-DMG-56/15	Reporting	F	Approved	R?.?
REQ-DMG-56.15	DMG	REQ-DMG-56/16	Reporting	F	Approved	R?.?
REQ-DMG-56.16	DMG	REQ-DMG-56/17	Reporting	F	Approved	R?.?
REQ-DMG-56.17	DMG	REQ-DMG-56/18	Reporting	F	Approved	R?.?
REQ-DMG-56.18	DMG	REQ-DMG-56/19	Reporting	F	Approved	R?.?
REQ-DMG-56.19	DMG	REQ-DMG-56/20	Reporting	F	Approved	R?.?
REQ-DMG-56.20	DMG	REQ-DMG-56/21	Reporting	F	Approved	R?.?
REQ-FAM-1	FAM	REQ-FAM-1/1	Fare Management	F	Approved	R?.?
REQ-FAM-2	FAM	REQ-FAM-2/1	Fare Management	F	Approved	R?.?
REQ-FAM-2.1	FAM	REQ-FAM-2/2	Fare Management	F	Approved	R?.?
REQ-FAM-2.2	FAM	REQ-FAM-2/3	Fare Management	F	Approved	R?.?
REQ-FAM-2.3	FAM	REQ-FAM-2/4	Fare Management	F	Approved	R?.?
REQ-FAM-3	FAM	REQ-FAM-3/1	Fare Management	F	Approved	R?.?
REQ-FAM-4	FAM	REQ-FAM-4/1	Fare Management	F	Approved	R?.?
REQ-FAM-4.1	FAM	REQ-FAM-4/2	Fare Management	F	Approved	R?.?
REQ-FAM-4.2	FAM	REQ-FAM-4/3	Fare Management	F	Approved	R?.?
REQ-FAM-4.3	FAM	REQ-FAM-4/4	Fare Management	F	Approved	R?.?
REQ-FAM-4.4	FAM	REQ-FAM-4/5	Fare Management	F	Approved	R?.?
REQ-FAM-5	FAM	REQ-FAM-5/1	Fare Management	F	Approved	R?.?
REQ-FAM-6	FAM	REQ-FAM-6/1	Fare Management	F	Approved	R?.?
REQ-FAM-7	FAM	REQ-FAM-7/1	Fare Management	F	Approved	R?.?
REQ-FAM-8	FAM	REQ-FAM-8/1	Fare Management	F	Approved	R?.?
REQ-FAM-8.1	FAM	REQ-FAM-8/2	Fare Management	F	Approved	R?.?
REQ-FAM-9	FAM	REQ-FAM-9/1	Fare Management	F	Approved	R?.?
REQ-FAM-10	FAM	REQ-FAM-10/1	Fare Management	F	Approved	R?.?
REQ-FAM-10.1	FAM	REQ-FAM-10/2	Fare Management	F	Approved	R?.?
REQ-FAM-10.2	FAM	REQ-FAM-10/3	Fare Management	F	Approved	R?.?
REQ-FAM-10.3	FAM	REQ-FAM-10/4	Fare Management	F	Approved	R?.?
REQ-FAM-10.4	FAM	REQ-FAM-10/5	Fare Management	F	Approved	R?.?
REQ-FAM-10.5	FAM	REQ-FAM-10/6	Fare Management	F	Approved	R?.?
REQ-FAM-11	FAM	REQ-FAM-11/1	Fare Management	F	Approved	R?.?
REQ-FAM-12	FAM	REQ-FAM-12/1	Fare Management	F	Approved	R?.?
REQ-FAM-13	FAM	REQ-FAM-13/1	Fare Management	F	Approved	R?.?
REQ-FAM-14	FAM	REQ-FAM-14/1	Fare Management	F	Approved	R?.?
REQ-FAM-15	FAM	REQ-FAM-15/1	Fare Management	F	Approved	R?.?
REQ-FAM-16	FAM	REQ-FAM-16/1	Devices	F	Approved	R?.?
REQ-FAM-17	FAM	REQ-FAM-17/1	Devices	F	Approved	R?.?
REQ-FAM-18	FAM	REQ-FAM-18/1	Fare Management	F	Approved	R?.?
REQ-FAM-19	FAM	REQ-FAM-19/1	Fare Management	F	Approved	R?.?
REQ-FAM-20	FAM	REQ-FAM-20/1	Fare Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-FAM-21	FAM	REQ-FAM-21/1	Fare Management	F	Approved	R?.?
REQ-FAM-22	FAM	REQ-FAM-22/1	Fare Management	F	Approved	R?.?
REQ-FAM-22.1	FAM	REQ-FAM-22/2	Fare Management	F	Approved	R?.?
REQ-FAM-23	FAM	REQ-FAM-23/1	Fare Management	F	Approved	R?.?
REQ-FAM-24	FAM	REQ-FAM-24/1	Fare Management	F	Approved	R?.?
REQ-FAM-24.1	FAM	REQ-FAM-24/2	Fare Management	F	Approved	R?.?
REQ-FAM-24.2	FAM	REQ-FAM-24/3	Fare Management	F	Approved	R?.?
REQ-FAM-24.3	FAM	REQ-FAM-24/4	Fare Management	F	Approved	R?.?
REQ-FAM-24.4	FAM	REQ-FAM-24/5	Fare Management	F	Approved	R?.?
REQ-FAM-24.5	FAM	REQ-FAM-24/6	Fare Management	F	Approved	R?.?
REQ-FAM-24.6	FAM	REQ-FAM-24/7	Fare Management	F	Approved	R?.?
REQ-FAM-25	FAM	REQ-FAM-25/1	Fare Management	F	Approved	R?.?
REQ-FAM-26	FAM	REQ-FAM-26/1	Fare Management	F	Approved	R?.?
REQ-FAM-27	FAM	REQ-FAM-27/1	Reporting	F	Approved	R?.?
REQ-FAM-27.1	FAM	REQ-FAM-27/2	Reporting	F	Approved	R?.?
REQ-FAM-27.2	FAM	REQ-FAM-27/3	Reporting	F	Approved	R?.?
REQ-FAM-28	FAM	REQ-FAM-28/1	Reporting	F	Approved	R?.?
REQ-FAM-29	FAM	REQ-FAM-29/1	Fare Management	F	Approved	R?.?
REQ-FAM-30	FAM	REQ-FAM-30/1	Fare Management	F	Approved	R?.?
REQ-FAM-30.1	FAM	REQ-FAM-30/2	Fare Management	F	Approved	R?.?
REQ-FAM-30.2	FAM	REQ-FAM-30/3	Fare Management	F	Approved	R?.?
REQ-FAM-31	FAM	REQ-FAM-31/1	Fare Management	F	Approved	R?.?
REQ-FAM-31.1	FAM	REQ-FAM-31/2	Fare Management	F	Approved	R?.?
REQ-FAM-32	FAM	REQ-FAM-32/1	Other - Testing	F	Approved	R?.?
REQ-FAM-32.1	FAM	REQ-FAM-32/2	Other - Testing	F	Approved	R?.?
REQ-FAM-33	FAM	REQ-FAM-33/1	Other - Testing	F	Approved	R?.?
REQ-FAM-33.1	FAM	REQ-FAM-33/2	Other - Testing	F	Approved	R?.?
REQ-FAM-34	FAM	REQ-FAM-34/1	Fare Management	F	Approved	R?.?
REQ-FAM-35	FAM	REQ-FAM-35/1	Fare Management	F	Approved	R?.?
REQ-FAM-36	FAM	REQ-FAM-36/1	Fare Management	F	Approved	R?.?
REQ-FAM-37	FAM	REQ-FAM-37/1	Fare Management	F	Approved	R?.?
REQ-FAM-38	FAM	REQ-FAM-38/1	Fare Management	F	Approved	R?.?
REQ-FAM-38.1	FAM	REQ-FAM-38/2	Fare Management	F	Approved	R?.?
REQ-FAM-39	FAM	REQ-FAM-39/1	Fare Management	F	Approved	R?.?
REQ-FAM-39.1	FAM	REQ-FAM-39/2	Fare Management	F	Approved	R?.?
REQ-FAM-39.2	FAM	REQ-FAM-39/3	Fare Management	F	Approved	R?.?
REQ-RVM-1	RVM	REQ-RVM-1/1	Financial Management	F	Approved	R?.?
REQ-RVM-2	RVM	REQ-RVM-2/2	Financial Management	F	Approved	R?.?
REQ-RVM-3	RVM	REQ-RVM-3/1	Financial Management	F	Approved	R?.?
REQ-RVM-4	RVM	REQ-RVM-4/1	Financial Management	F	Approved	R?.?
REQ-RVM-5	RVM	REQ-RVM-5/1	Financial Management	F	Approved	R?.?
REQ-RVM-6	RVM	REQ-RVM-6/1	Reporting	F	Approved	R?.?
REQ-RVM-7	RVM	REQ-RVM-7/1	Reporting	F	Approved	R?.?
REQ-RVM-8	RVM	REQ-RVM-8/1	Financial Management	F	Approved	R?.?
REQ-RVM-9	RVM	REQ-RVM-9/1	Financial Management	F	Approved	R?.?
REQ-RVM-9.1	RVM	REQ-RVM-9/2	Financial Management	F	Approved	R?.?
REQ-RVM-9.2	RVM	REQ-RVM-9/3	Financial Management	F	Approved	R?.?
REQ-RVM-9.3	RVM	REQ-RVM-9/4	Financial Management	F	Approved	R?.?
REQ-RVM-9.4	RVM	REQ-RVM-9/5	Financial Management	F	Approved	R?.?
REQ-RVM-9.5	RVM	REQ-RVM-9/6	Financial Management	F	Approved	R?.?
REQ-RVM-10	RVM	REQ-RVM-10/1	Financial Management	F	Approved	R?.?
REQ-RVM-11	RVM	REQ-RVM-11/1	Financial Management	F	Approved	R?.?
REQ-RVM-12	RVM	REQ-RVM-12/1	Financial Management	F	Approved	R?.?
REQ-RVM-12.1	RVM	REQ-RVM-12.1/1	Financial Management	F	Approved	R?.?
REQ-RVM-12.2	RVM	REQ-RVM-12.2/1	Financial Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-RVM-12.3	RVM	REQ-RVM-12.3/1	Financial Management	F	Approved	R?.?
REQ-RVM-12.4	RVM	REQ-RVM-12.4/1	Financial Management	F	Approved	R?.?
REQ-RVM-13	RVM	REQ-RVM-13/1	Financial Management	F	Approved	R?.?
REQ-SMG-1	SMG	REQ-SMG-1/1	Other - Project Plan	NF	Approved	R?.?
REQ-SMG-2	SMG	REQ-SMG-2/1	Financial Management	F	Approved	R?.?
REQ-SMG-3	SMG	REQ-SMG-3/1	Financial Management	F	Approved	R?.?
REQ-SMG-4	SMG	REQ-SMG-4/1	Financial Management	F	Approved	R?.?
REQ-SMG-5	SMG	REQ-SMG-5/1	Financial Management	F	Approved	R?.?
REQ-SMG-5.1	SMG	REQ-SMG-5/2	Financial Management	F	Approved	R?.?
REQ-SMG-6	SMG	REQ-SMG-6/1	Financial Management	F	Approved	R?.?
REQ-SMG-7	SMG	REQ-SMG-7/1	Reporting	F	Approved	R?.?
REQ-SMG-8	SMG	REQ-SMG-8/1	Data Management	F	Approved	R?.?
REQ-SMG-8.1	SMG	REQ-SMG-8/2	Data Management	F	Approved	R?.?
REQ-SMG-9	SMG	REQ-SMG-9/1	Other - Program Management	NF	Approved	R?.?
REQ-SMG-10	SMG	REQ-SMG-10/1	Financial Management	F	Approved	R?.?
REQ-SMG-11	SMG	REQ-SMG-11/1	Financial Management	F	Approved	R?.?
REQ-SMG-12	SMG	REQ-SMG-12/1	Financial Management	F	Approved	R?.?
REQ-SMG-12.1	SMG	REQ-SMG-12/2	Financial Management	F	Approved	R?.?
REQ-SMG-13	SMG	REQ-SMG-13/1	Financial Management	F	Approved	R?.?
REQ-SMG-13.1	SMG	REQ-SMG-13/2	Financial Management	F	Approved	R?.?
REQ-SMG-13.2	SMG	REQ-SMG-13/3	Financial Management	F	Approved	R?.?
REQ-SMG-13.3	SMG	REQ-SMG-13/4	Financial Management	F	Approved	R?.?
REQ-SMG-13.4	SMG	REQ-SMG-13/5	Financial Management	F	Approved	R?.?
REQ-SMG-13.5	SMG	REQ-SMG-13/6	Financial Management	F	Approved	R?.?
REQ-SMG-13.6	SMG	REQ-SMG-13/7	Financial Management	F	Approved	R?.?
REQ-SMG-14	SMG	REQ-SMG-14/1	Financial Management	F	Approved	R?.?
REQ-SMG-14.1	SMG	REQ-SMG-14/2	Financial Management	F	Approved	R?.?
REQ-SMG-14.2	SMG	REQ-SMG-14/3	Financial Management	F	Approved	R?.?
REQ-SMG-14.3	SMG	REQ-SMG-14/4	Financial Management	F	Approved	R?.?
REQ-SMG-14.4	SMG	REQ-SMG-14/5	Financial Management	F	Approved	R?.?
REQ-SMG-15	SMG	REQ-SMG-15/1	Financial Management	F	Approved	R?.?
REQ-SMG-16	SMG	REQ-SMG-16/1	Financial Management	F	Approved	R?.?
REQ-SMG-16.1	SMG	REQ-SMG-16/2	Financial Management	F	Approved	R?.?
REQ-SMG-16.2	SMG	REQ-SMG-16/3	Financial Management	F	Approved	R?.?
REQ-SMG-16.3	SMG	REQ-SMG-16/4	Financial Management	F	Approved	R?.?
REQ-SMG-16.4	SMG	REQ-SMG-16/5	Financial Management	F	Approved	R?.?
REQ-SMG-17	SMG	REQ-SMG-17/1	Financial Management	F	Approved	R?.?
REQ-SMG-18	SMG	REQ-SMG-18/1	Financial Management	F	Approved	R?.?
REQ-SMG-19	SMG	REQ-SMG-19/1	Financial Management	F	Approved	R?.?
REQ-SMG-20	SMG	REQ-SMG-20/1	Financial Management	F	Approved	R?.?
REQ-SMG-21	SMG	REQ-SMG-21/1	Financial Management	F	Approved	R?.?
REQ-SMG-22	SMG	REQ-SMG-22/1	Financial Management	F	Approved	R?.?
REQ-SMG-23	SMG	REQ-SMG-23/1	Financial Management	F	Approved	R?.?
REQ-SMG-24	SMG	REQ-SMG-24/1	Financial Management	F	Approved	R?.?
REQ-SMG-25	SMG	REQ-SMG-25/1	Financial Management	F	Approved	R?.?
REQ-SMG-26	SMG	REQ-SMG-26/1	Financial Management	F	Approved	R?.?
REQ-SMG-27	SMG	REQ-SMG-27/1	Financial Management	F	Approved	R?.?
REQ-SMG-28	SMG	REQ-SMG-28/1	Financial Management	F	Approved	R?.?
REQ-SMG-29	SMG	REQ-SMG-29/1	Fare Management	F	Approved	R?.?
REQ-SMG-29.1	SMG	REQ-SMG-29/2	Fare Management	F	Approved	R?.?
REQ-SMG-29.2	SMG	REQ-SMG-29/3	Fare Management	F	Approved	R?.?
REQ-SMG-30	SMG	REQ-SMG-30/1	Financial Management	F	Approved	R?.?
REQ-SMG-31	SMG	REQ-SMG-31/1	Financial Management	F	Approved	R?.?
REQ-SMG-32	SMG	REQ-SMG-32/1	Financial Management	F	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-SMG-33	SMG	REQ-SMG-33/1	Financial Management	F	Approved	R?.?
REQ-SMG-34	SMG	REQ-SMG-34/1	Financial Management	F	Approved	R?.?
REQ-SMG-35	SMG	REQ-SMG-35/1	Financial Management	F	Approved	R?.?
REQ-SMG-36	SMG	REQ-SMG-36/1	Financial Management	F	Approved	R?.?
REQ-SMG-36.1	SMG	REQ-SMG-36/2	Financial Management	F	Approved	R?.?
REQ-SMG-36.2	SMG	REQ-SMG-36/3	Financial Management	F	Approved	R?.?
REQ-SMG-36.3	SMG	REQ-SMG-36/4	Financial Management	F	Approved	R?.?
REQ-SMG-37	SMG	REQ-SMG-37/1	Financial Management	F	Approved	R?.?
REQ-SMG-38	SMG	REQ-SMG-38/1	Financial Management	F	Approved	R?.?
REQ-SMG-39	SMG	REQ-SMG-39/1	Financial Management	F	Approved	R?.?
REQ-SMG-39.1	SMG	REQ-SMG-39/2	Financial Management	F	Approved	R?.?
REQ-SMG-39.2	SMG	REQ-SMG-39/3	Financial Management	F	Approved	R?.?
REQ-SMG-39.3	SMG	REQ-SMG-39/4	Financial Management	F	Approved	R?.?
REQ-SMG-39.4	SMG	REQ-SMG-39/5	Financial Management	F	Approved	R?.?
REQ-SMG-39.5	SMG	REQ-SMG-39/6	Financial Management	F	Approved	R?.?
REQ-SMG-39.6	SMG	REQ-SMG-39/7	Financial Management	F	Approved	R?.?
REQ-SMG-40	SMG	REQ-SMG-40/1	Financial Management	F	Approved	R?.?
REQ-SMG-40.1	SMG	REQ-SMG-40/2	Financial Management	F	Approved	R?.?
REQ-SMG-40.2	SMG	REQ-SMG-40/3	Financial Management	F	Approved	R?.?
REQ-SMG-40.3	SMG	REQ-SMG-40/4	Financial Management	F	Approved	R?.?
REQ-SMG-40.4	SMG	REQ-SMG-40/5	Financial Management	F	Approved	R?.?
REQ-SMG-40.5	SMG	REQ-SMG-40/6	Financial Management	F	Approved	R?.?
REQ-SMG-40.6	SMG	REQ-SMG-40/7	Financial Management	F	Approved	R?.?
REQ-SMG-41	SMG	REQ-SMG-41/1	Reporting	F	Approved	R?.?
REQ-SMG-42	SMG	REQ-SMG-42/1	Reporting	F	Approved	R?.?
REQ-SMG-43	SMG	REQ-SMG-43/1	Reporting	F	Approved	R?.?
REQ-SMG-43.1	SMG	REQ-SMG-43/2	Reporting	F	Approved	R?.?
REQ-SMG-43.2	SMG	REQ-SMG-43/3	Reporting	F	Approved	R?.?
REQ-SMG-43.3	SMG	REQ-SMG-43/4	Reporting	F	Approved	R?.?
REQ-SMG-44	SMG	REQ-SMG-44/1	Financial Management	F	Approved	R?.?
REQ-SMG-44.1	SMG	REQ-SMG-44/2	Financial Management	F	Approved	R?.?
REQ-SMG-44.2	SMG	REQ-SMG-44/3	Financial Management	F	Approved	R?.?
REQ-SMG-44.3	SMG	REQ-SMG-44/4	Financial Management	F	Approved	R?.?
REQ-SMG-45	SMG	REQ-SMG-45/1	Financial Management	F	Approved	R?.?
REQ-SMG-45.1	SMG	REQ-SMG-45/2	Financial Management	F	Approved	R?.?
REQ-SMG-45.2	SMG	REQ-SMG-45/3	Financial Management	F	Approved	R?.?
REQ-SMG-45.3	SMG	REQ-SMG-45/4	Financial Management	F	Approved	R?.?
REQ-SMG-46	SMG	REQ-SMG-46/1	Financial Management	F	Approved	R?.?
REQ-SMG-47	SMG	REQ-SMG-47/1	Reporting	F	Approved	R?.?
REQ-SMG-48	SMG	REQ-SMG-48/1	Financial Management	F	Approved	R?.?
REQ-SMG-49	SMG	REQ-SMG-49/1	Financial Management	F	Approved	R?.?
REQ-SMG-49.1	SMG	REQ-SMG-49/2	Financial Management	F	Approved	R?.?
REQ-SMG-49.2	SMG	REQ-SMG-49/3	Financial Management	F	Approved	R?.?
REQ-SMG-49.3	SMG	REQ-SMG-49/4	Financial Management	F	Approved	R?.?
REQ-SMG-50	SMG	REQ-SMG-50/1	Reporting	F	Approved	R?.?
REQ-SMG-51	SMG	REQ-SMG-51/1	Financial Management	F	Approved	R?.?
REQ-SMG-51.1	SMG	REQ-SMG-51/2	Financial Management	F	Approved	R?.?
REQ-SMG-51.2	SMG	REQ-SMG-51/3	Financial Management	F	Approved	R?.?
REQ-SMG-51.3	SMG	REQ-SMG-51/4	Financial Management	F	Approved	R?.?
REQ-SMG-51.4	SMG	REQ-SMG-51/5	Financial Management	F	Approved	R?.?
REQ-SMG-51.5	SMG	REQ-SMG-51/6	Financial Management	F	Approved	R?.?
REQ-SMG-52	SMG	REQ-SMG-52/1	Financial Management	F	Approved	R?.?
REQ-SMG-53	SMG	REQ-SMG-53/1	Financial Management	F	Approved	R?.?
REQ-SMG-54	SMG	REQ-SMG-54/1	Other - Audit	NF	Approved	R?.?
REQ-SMG-54.1	SMG	REQ-SMG-54.1/1	Other - Audit	NF	Approved	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-SMG-54.2	SMG	REQ-SMG-54.2/1	Other - Audit	NF	Approved	R?.?
REQ-SMG-55	SMG	REQ-SMG-55/1	Other - Audit	NF	Approved	R?.?
REQ-SMG-56	SMG	REQ-SMG-56/1	Other - Audit	NF	Approved	R?.?
REQ-SMG-57	SMG	REQ-SMG-57/1	Other - Audit	NF	Approved	R?.?
REQ-SMG-58	SMG	REQ-SMG-58/1	Other - Audit	NF	Approved	R?.?
REQ-ODM-1	ODM	REQ-OMD-1/1	Card/Media Management	F	Approved	R?.?
REQ-ODM-2	ODM	REQ-ODM-2/1	Card/Media Management	F	Approved	R?.?
REQ-ODM-3	ODM	REQ-ODM-3/1	Card/Media Management	F	Approved	R?.?
REQ-ODM-4	ODM	REQ-ODM-4/1	Fare Management	F	Approved	R?.?
REQ-ODM-15	ODM	REQ-OMD-15/1	Order Management	F	Approved	R?.?
REQ-ODM-5	ODM	REQ-ODM-5/1	Order Management	F	Approved	R?.?
REQ-ODM-6	ODM	REQ-ODM-6/1	Order Management	F	Approved	R?.?
REQ-ODM-6.1	ODM	REQ-ODM-6/2	Order Management	F	Approved	R?.?
REQ-ODM-7	ODM	REQ-ODM-7/1	Card/Media Management	F	Approved	R?.?
REQ-ODM-8	ODM	REQ-ODM-8/1	Devices	F	Approved	R?.?
REQ-ODM-9	ODM	REQ-ODM-9/1	Card/Media Management	F	Approved	R?.?
REQ-ODM-10	ODM	REQ-ODM-10/1	Other - Implementation	NF	Approved	R?.?
REQ-ODM-11	ODM	REQ-ODM-11/1	TBD	F	Approved	R?.?
REQ-ODM-12	ODM	REQ-ODM-12/1	Reporting	F	Approved	R?.?
REQ-ODM-12.1	ODM	REQ-ODM-12/2	Reporting	F	Approved	R?.?
REQ-ODM-13	ODM	REQ-ODM-13/1	Reporting	F	Approved	R?.?
REQ-ODM-13.1	ODM	REQ-ODM-13/2	Reporting	F	Approved	R?.?
REQ-ODM-13.2	ODM	REQ-ODM-13/3	Reporting	F	Approved	R?.?
REQ-ODM-13.3	ODM	REQ-ODM-13/4	Reporting	F	Approved	R?.?
REQ-ODM-14	ODM	REQ-ODM-14/1	Order Management	F	Approved	R?.?
REQ-TRN-1	TRN	REQ-TRN-1/1	Other - Training	NF	Approved	R?.?
REQ-TRN-2	TRN	REQ-TRN-2/1	Other - Training	NF	Approved	R?.?
REQ-TRN-3	TRN	REQ-TRN-3/1	Other - Training	NF	Approved	R?.?
REQ-TRN-4	TRN	REQ-TRN-4/1	Other - Training	NF	Approved	R?.?
REQ-TRN-6	TRN	REQ-TRN-6/1	Other - Training	NF	Approved	R?.?
REQ-TRN-8	TRN	REQ-TRN-8/1	Other - Training	NF	Approved	R?.?
REQ-TRN-9	TRN	REQ-TRN-9/1	Other - Training	NF	Approved	R?.?
REQ-TRN-10	TRN	REQ-TRN-10/1	Other - Training	F	Approved	R?.?
REQ-TRN-11	TRN	REQ-TRN-11/1	Other - Training	NF	Approved	R?.?
REQ-TRN-12	TRN	REQ-TRN-12/1	Other - Training	NF	Approved	R?.?
REQ-TRN-13	TRN	REQ-TRN-13/1	Other - Training	NF	Approved	R?.?

TTC Fare Card Group

Exhibit D

TTC Business Requirements

Project Plan

Version *Final 8.0*

Date: 121210

This document was automatically generated on 10/12/2012

Document Version History

Page	Ver.	Version Date	Details
NA	Draft 1.0	111024	• This schedule contains Transit Expansion specific specifications that are not are not in common with TTC. These specifications are primarily center around, o Roles and Responsibilities o Power and Communications and o Field Equipment
NA	Draft 2.0	120221	• Intermediate files – TTC/PRESTO requirements process
NA	Draft 3.0	120326	• Incorporated PRESTO/TTC changes from the PRESTO/TTC Business Requirements review process • Changed format of the Requirements as per Format section. • Added Cross Reference table at the end of the document to map TTC IDs to PRESTO IDs.
NA	Draft 4.0	120420	• Clean up
NA	Draft 5.0	120619	• Changed MA to NF / F (non-functional / functional) • Removed the MA Reference – changed it to Cross Reference • Cross Reference table has been changed to include F/NF, whether the requirement is in the Device RFP and if so the Device Spec IDs are listed. • Change the Format of the TTC Specification slightly o NF with the PRESTO reference means it is a nonfunctional specification o If a functional specification is part of the PRESTO Device RFP it is highlighted with a green Y next to the PRESTO NG release number
NA	Draft 6.0		• Deleted requirements PRJ-1,5,6,7,8,10,11,12,12,14,14.1,14.2.2, 14.2.3,15,16,17,18,19,20,20.1,20.3,21,23,24,24.1,25,26,30, 31.1,31.2,32,33,34,35,36,37,39 • PRJ-28,40 to be dealt with in TTC Business Requirements Schedule B - Training • Modified most of the remaining requirements via TTC-PRESTO reviews • Changed the format of the document to remove any reference to RFP • Change Specifications to TTC Business Requirements
NA	FRC 7.0	121201	• Changed name of document to Exhibit – now aligns with the Master Agreement • Changed the version name to Final Release Candidate
NA	Final 8.0	121210	• Changed version to Final and increased the release number.

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Format

Each TTC Business Requirement has the following format:

TTC ID	Name of TTC Business Requirement	Status	Type
Description			

Definitions

TTC ID: Unique TTC Business Requirement Identification Number

Name of Specification: Name of TTC Business Requirement

Status: Review status of the TTC Business Requirement:

Approved: TTC and PRESTO mutually agreed on TTC Business Requirement

Pending: TTC and PRESTO are currently developing a mutually agreeable TTC Business Requirement

Type: **F**: functional; **NF**: Non-Functional

Description: Description of the Requirement including figures, charts, tables etc. if used in defining and describing the TTC Business Requirement.

Additionally, the cross-reference table at the end of the document will include the additional information:

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PLA: PRESTO Logical Area (PLA) the TTC Business Requirement applies to as determined by PRESTO.

PID: PRESTO Identification Number

TYPE[1]: **NF**: nonfunctional Requirement
F: functional Specification

Release[2]: PRESTO NG release number

---

[1] As classified by PRESTO
[2] PRESTO to provide PRESTO NG release information

Document Order of Specifications

Requirements in this document (including the cross reference table at the end of the document) are presented in their TTC logical order. Logical order here means:

- Related requirements are grouped by document sections;
- Sections that deal with overall or general requirements are presented first;
- Within each section, general / overall requirements are presented first with detailed requirements following;
- Requirements are hierarchal (i.e. requirements that are presented later in the document are dependent on earlier presented requirements); and
- Requirements can refer to other requirements or document sections (i.e. named sections and all the requirements contained therein).

Note that TTC ID numbering does not necessarily reflect the document order of how the TTC requirements are presented.

1 Overview

This document outlines the TTC Business Requirements for the Project Plan. These requirements are to be used in conjunction with the processes and RASCI matrices defined in the Master Agreement.

2 Plan

REQ-PRJ-2	Development / Review of Project Plan	Approved	NF

The Project Plan will be based upon industry standard project management procedures.

REQ-PRJ-3	Finalization of Project Plan	Approved	NF

The Project Plan will include:

- Milestones;
- Critical paths;
- Resources;
- Deliverables in accordance with industry standard project management procedures; and
- Identification any tools, software, services, and other requirements that PRESTO will plan to use with regards to facilitating the processes and communications with TTC (e.g., web portals, issue tracking software, project dashboards, use case development and tracking software, and test software).

PRESTO will provide additional deliverables including:

- Organization chart for the PMO, with positions, responsibilities, including the naming of an executive director from PRESTO, a program director or manager from PRESTO, and functional leads (such as Program Manager(s), Test Manager(s), and Design Engineer);
- Procedures/processes for exchanging information, documenting official correspondence, and tracking progress;
- A detailed schedule listing all deliverables, milestones, certifications, tasks, efforts, and responsible parties to the Project Plan;
- A separate document corresponding to the Project Plan that provides detailed descriptions of all tasks and deliverables summarized by the Project Plan;
- A plan for prioritized submission, review, and approval of design documents for all equipment, processes, services, all support functions, including but not limited to PRESTO's marketing and communication plans, and all other PRESTO deliverables identified in the Project Plan;
- A Design Review process that meets all TTC needs;
- A Risk Management Plan that will detail processes to identify, analyze, control, and mitigate risk. The Risk Management Plan will also describe methods for monitoring risk and executing remedial steps in response to breaches and events that could compromise the integrity of the PRESTO solution;
- An Issue Resolution Process that clearly and comprehensively details how all design, development, testing, business, operating, technical, and customer service issues are identified, tracked, and resolved, which will include an issue/project review process;
- A mutually agreeable Operational Change Management Process will be developed by PRESTO and TTC so that the parties can work together to modify operations as necessary;
- A Certification Plan that will include acquisition, validation, maintenance, and delivery of verifiable certifications of compliance with all standards, rules, regulations, laws, procedures, and other guidelines and process necessary for the delivery PRESTO in compliance with all requirements of the Agreement, including but not limited to EMV certification, INTERAC certification, PCI certification, and payment application certifications;
- A Data/System Integration Plan that will include all PRESTO integrations required to TTC systems in order for the PRESTO System to operate according to TTC Specifications, including but not limited to existing stop location indicators, device ID/location specifications, GPS/locations systems, and turnstile integrations;
- A design, installation and testing plan for PRESTO's provisioning telecommunications services for

the PRESTO solution across all TTC transit services a with specific details regarding installations in subways;

- A design, installation and testing plan for all other PRESTO components, devices, services etc.; and

- A comprehensive and complete training plan.

REQ-PRJ-4	Quality Assurance Plan	Approved	NF

As part of the PRESTO Project Plan, PRESTO will develop and provide a Quality Assurance Plan that covers all phases of the project.   The PRESTO Quality Assurance Plan will be IEEE 730 compliant or equivalent. The Quality Assurance Plan will be mutually agreeable to PRESTO and TTC. TTC's ITS-Quality Assurance staff, as well as other relevant TTC departmental representatives will be actively involved with the PRESTO QA team. Under the QA Plan, PRESTO will be responsible for all Affiliates and Approved Subcontractors involved in the delivery of the PRESTO System. All aspects of PRESTO's QA Plan will be reviewed with the TTC during Design Review. Roles and responsibilities of TTC and PRESTO with regards to the QA Plan will be determined during Design Review.

At a minimum, the QA Plan will contain the following:

- An organization chart with QA reporting responsibilities;
- A statement of responsibilities of all QA personnel;
- A description of methods, procedures, forms, and activities used in assurance of compliance with TTC Specifications;
- Specific procedures and processes to address: manufacture, inspection, and testing of equipment; certification and configuration of equipment for deployment in field locations; documentation and testing of remedial actions; software and hardware updates; follow-through on modifications arising from actions required during Weekly Status Meetings; documentation of changes to hardware and software; and oversight of activities by all parties regarding the installation and testing of PRESTO components, whether on-site at TTC or at other locations integral to the system; and
- Procedures for providing TTC and PRESTO with written reports that document all QA activities.

Included in the responsibilities of the QA team are:

- All aspects of fabrication and installation of equipment;
- Inspection of equipment prior to acceptance for installation;
- Inventory and staging of equipment;
- Documentation of events;
- Compliance with TTC Specifications and the Agreement;
- Final inspection of hardware and software; and
- Safety of all PRESTO personnel, TTC Customers and TTC Personnel engaged in the delivery of the PRESTO System.

Furthermore,

- TTC requires reporting of status of activities executed under the QA Plan. Certified QA reports, including but not limited to project QA issues and test plan execution, will be presented at the time of the weekly status meeting;
- TTC reserves the right to conduct an independent assessment of all Hardware, Software, Systems and other equipment that is delivered for Installation and use on TTC property. For the non-financial aspects of the QA Plan, TTC's ITS-Quality Assurance staff will have monitoring and approval responsibility;
- TTC reserves the right, with adequate advance notice to PRESTO, to have access to the facilities of PRESTO for the purpose of QA review. This right includes the authority to perform QA activities for Hardware, Software and Systems during the development manufacturing process, to inspect documentation and records of plans and procedures, and to review other documents pertinent to the delivery of the required Hardware, Software and Systems for the PRESTO System; and

- TTC reserves the right to be involved in testing and QA related to TTC's transit operations, the

PRESTO's solution for TTC, other transit operations being served by the PRESTO solution, fare pricing and policies, customer interactions and communications, and PRESTO piloting.

3   Design

REQ-PRJ-9	Infrastructure Specifications	Approved	F

Infrastructure specifications are all those specifications that are primarily concerned with establishing power, communications and space for the PRESTO System at TTC facilities and on TTC property.

REQ-PRJ-9.1	Infrastructure Specifications-2	Approved	F

Infrastructure Specifications are all those specifications that are primarily concerned with establishing power, communications and space for the PRESTO System at TTC facilities and on TTC property (e.g. in subway stations, bus and streetcar platforms, garages and car houses).
In order to establish Infrastructure Specifications the non-functional specifications of the following equipment must first be established:

- turnstile reader assemblies
- AVMs
- FMVDs
- wireless LANs
- UPS
- routers
- switches
- cabinets
- audit count computer
- turnstile release mechanism

- Concession Indication System

REQ-PRJ-9.2	Infrastructure Specifications-3	Approved	F

The TTC concept of operations for the subway System is used as the basis in establishing what PRESTO Devices are required as well as where they are located and how they interact with Customers, operators, maintenance and revenue serving. From this base, the non-functional specifications are estimated for each device specified. This must be mutually agreed to by PRESTO and TTC prior to Final Design.

REQ-PRJ-14.2	Design Reviews	Approved	NF

As part of a Design Review PRESTO will document PRESTO's plan for fulfilling TTC's business, technical, and operational requirements. The Project Plan will also:

- Identify additional information required by either TTC or PRESTO;
- Review the PRESTO System in sufficient detail to preview potential issues or possible modifications that could materially benefit the outcome of the project;
- Inform both parties of new technical opportunities not anticipated, but which are noteworthy of consideration;
- Address impacts of the conceptual design on operational aspects, including roles and responsibilities, between PRESTO and TTC;
- Relate TTC business, technical, and operational requirements directly to PRESTO's design team;
- Identify any PRESTO project and system risks including but not limited to: system interfacing, key personnel, design failure, schedule overruns, etc;
- Identify all PRESTO inter and intra dependencies;
- Develop interfaces; and
- Ensure full testability of all components, services, functionality etc. of the PRESTO System.

PRESTO will prepare and submit all design documentation for TTC's review in advance of design review meetings.

REQ-PRJ-14.2.1	Design Review Meeting	Approved	NF

The Design Review meeting cannot start until TTC has had sufficient time to comprehensively review all PRESTO design review documentation.

4   Development

REQ-PRJ-20.2	HW FAT	Approved	NF

TTC will require compliance certificates or certified test results from vendors and original equipment manufacturers ("OEMs") for all their equipment. PRESTO will ensure that the vendor will execute test use cases to validate functionality that is not covered by the compliance certificate or certified test results.

5   Build

REQ-PRJ-22	TTC Acceptance of Deployment Plan	Approved	NF

A Deployment Plan" will be developed jointly between the parties to ensure all services, components and phases are identified and results directed to meet TTC Business Requirements. Specific key milestones/steps will be discussed/reviewed in the development of the Plan.

6   Deploy

REQ-PRJ-27	Business Continuity Plan Initiated	Approved	NF

PRESTO will develop a business continuity plan prior to the planned initial commissioning date. PRESTO will complete the development of a mutually agreed disaster recovery, business interruption and business continuity plans and procedures that meet the minimum requirements set forth by the TTC Specifications. PRESTO will maintain, test, review and update this Business Continuity Plan as required.

REQ-PRJ-29	Completion of PRESTO Support Systems	Approved	NF

All support systems and operations, including protocols and procedures for risk management, and field maintenance will be fully operational and functioning as though in revenue operations.

REQ-PRJ-31	Field Trials	Approved	NF

PRESTO will need to work with any and all financial institutions, Acquirers, and other entities to ensure that the Field Trial also qualifies as a financial pilot of the PRESTO system.

7   Closeout

The PRESTO Project Closeout Phase deals with all the activities required to wrap up the PRESTO project after TTC Acceptance.

REQ-PRJ-38	Project Closeout Activities	Approved	NF

At the conclusion of the installation and Acceptance of the PRESTO System at TTC, a project closeout phase will be conducted by PRESTO. The project closeout phase will include at a minimum, a final project review, a lessons learned review, a final security compliance and certification review, a risk assessment report and a final project closeout report. Additionally, any and all further information, processes, procedures, licenses, documentation, and data required for the operation of the PRESTO System, as it effects the TTC and as reasonably requested by TTC, will be prepared by PRESTO at this stage of the project.

Cross Reference Table

This cross reference table matches PRESTO information to TTC Business Requirements. This table is in document order as defined in this document.

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-PRJ-2	PRJ	REQ-PRJ-2/1	Other - Project Plan	NF	*Approved*	NA
REQ-PRJ-3	PRJ	REQ-PRJ-3/1	Other - Project Plan	NF	*Approved*	NA
REQ-PRJ-4	PRJ	REQ-PRJ-4/1	Other - Project Plan	NF	*Approved*	NA
REQ-PRJ-9	PRJ	REQ-PRJ-9/1	Network	F	*Approved*	NA
REQ-PRJ-9.1	PRJ	REQ-PRJ-9/2	Network	F	*Approved*	NA
REQ-PRJ-9.2	PRJ	REQ-PRJ-9/3	Network	F	*Approved*	NA
REQ-PRJ-14.2	PRJ	REQ-PRJ-14.2/1	Other - Project Plan	NF	*Approved*	NA
REQ-PRJ-14.2.1	PRJ	REQ-PRJ-14.2.1/1	Other - Project Plan	NF	*Approved*	NA
REQ-PRJ-20.2	PRJ	REQ-PRJ-20.2/1	Other - Project Plan	NF	*Approved*	NA
REQ-PRJ-22	PRJ	REQ-PRJ-22/1	Other - Project Plan	NF	*Approved*	NA
REQ-PRJ-27	PRJ	REQ-PRJ-27/1	Other - Project Plan	NF	*Approved*	NA
REQ-PRJ-29	PRJ	REQ-PRJ-29/1	Other - Project Plan	NF	*Approved*	NA
REQ-PRJ-31	PRJ	REQ-PRJ-31/1	Other - Project Plan	NF	*Approved*	NA
REQ-PRJ-38	PRJ	REQ-PRJ-38/1	Other - Project Plan	NF	*Approved*	NA

TTC Fare Card Group

Exhibit E

TTC Business Requirements

Testing and Quality Assurance

Version *Final 8.0*

Date: 121210

This document was automatically generated on 10/12/2012

Document Version History

Page	Ver.	Version Date	Details

NA	Draft 1.0	111024	• This schedule contains Transit Expansion specific specifications that are not are not in common with TTC. These specifications are primarily center around,
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			   o Power and Communications and
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NA	Draft 2.0	120221	• Intermediate files – TTC/PRESTO requirements process
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NA	Draft 6.0	121115	• Deleted requirements QAT-4,8,8.1,8.2,8.3,8.4,9,16, 20, 25, 28.1, • Moved QAT-3,10,22 to TTC Business Requirements Schedule B – TTC Test Lab • Modified most of the remaining requirements via TTC-PRESTO reviews • Changed the format of the document to remove any reference to RFP • Changed Specification to TTC Business Requirement
NA	FRC 7.0	121201	• Change name of the document to Exhibit – now aligns with Master Agreement • Changed version name to Final Release Candidate
NA	Final 8.0	121210	• Changed version to final and increased release number

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Description			

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	Pending: TTC and PRESTO are currently developing a mutually agreeable TTC Business Requirement
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Description:	Description of the Requirement including figures, charts, tables etc. if used in defining and describing the TTC Business Requirement.

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TYPE[1]:	**NF**: nonfunctional Requirement **F**: functional Specification
Release[2]:	PRESTO NG release number

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[1] As classified by PRESTO
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Note that TTC ID numbering does not necessarily reflect the document order of how the TTC requirements are presented.

1   Scope

This document outlines the TTC Business Requirements for the Quality Assurance and Testing. These requirements are to be used in conjunction with the processes and RASCI matrices defined in the Master Agreement.

REQ-QAT-1	Scope	Approved	NF

The purpose of these Quality Assurance and Testing Specifications is to ensure that all elements of the PRESTO solution including, but not limited to all hardware, software, supporting systems and services, telecommunications, and other PRESTO System components provided by PRESTO fulfill all requirements in this Agreement.

REQ-QAT-2	Remedial Action	Approved	NF

PRESTO will be responsible to take remedial action and conduct testing as necessary until the entire PRESTO system passes all required tests

2   Test Plan

REQ-QAT-5	Test Plan Scope	Approved	NF

PRESTO will develop a comprehensive Test Plan for the PRESTO system with support from TTC.   This plan will formulate:
All test procedures and protocols;

- Comprehensive test use cases/scripts for all components of the PRESTO System, including but not limited to those related to customer fare payment, customer support, and TTC support operations;
- Provide written procedures that describe all test activities, methodologies, and measurements of success and failure;
- Provide all necessary equipment and personnel resources; and
- Document and report on all test results in written electronic format.

REQ-QAT-6	Industry Standard Approach	Approved	NF

PRESTO will use an industry standard test plan approach and methods that will include tracking of all tests, execution of tests, items tested, features and functionality tested, pass/fail criteria, test deliverables, risks and contingencies, approvals, etc.

REQ-QAT-7	Test Plan Coverage	Approved	NF

This test plan will include:

- A management planning document that will show how the testing will be done, who will do it, what will be tested, how long it will take and what the test coverage will be;
- A test design specification that will detail test conditions and the expected results as well as test pass criteria
- A test case specification, that will specify the test data for use in running the test conditions identified in the test design specification;
- A test procedure specification that will detail how to run each test, including any setup preconditions and steps that need to be followed;
- A test item transmittal report that will report on when tested software and hardware has progressed from one stage of testing to the next;
- A test log that will record which test cases were run, who ran them, in what order and the status of test;
- A test incident report that will detail for any test that failed, the actual versus expected result, and other information intended to throw light on why a test has failed;
- A test summary report that will provide any and all important information uncovered by the tests accomplished including, assessments of the quality of the component under test, statistics derived

from incident reports etc;

- Written test procedures organized in distinct phases and steps that are consistent with the approved overall Project Plan, and that encompass all PRESTO components, services provided across all aspects of the PRESTO solution and all elements of TTC's transportation services, and business and customer service functionalities during all phases of implementation;
- Objectives of the test being performed, with specific references to functionalities, technical specifications, performance criteria, etc. that are being tested;
- A description of test conditions required for a valid test to occur;
- Detailed, step-by-step description of procedures for each part of the test being performed;
- Preventive maintenance actions permitted during the test;
- Criteria for pass/fail; and,
- A test-failure reporting and remediation plan that is integral to PRESTO's quality assurance/quality control plan.

REQ-QAT-8.5	Service and Repair Testing	Approved	NF

Service and Repair Testing (SRT) for the implementation of PRESTO at TTC will be a set of service procedures and repair tests that validate the serviced/repaired PRESTO system component, sub-system, device etc. meet the TTC Specifications and performance measures.

REQ-QAT-11	Validation of TTC Specifications and Needs	Approved	NF

PRESTO will design and structure all tests in the Test Plan so as to document, validate, and definitively demonstrate that all TTC specifications and needs for the implementation of PRESTO system, its subsystems, its service-related functions, and its individual components perform as required both as individual elements and collectively as an automatic fare payment system. In short, the Test Plan will validated that the PRESTO system:

- Meets all functional, business and operating requirements described in the Agreement;
- Is fully operational and ready for revenue service at the time of launch;
- Meets all safety and environmental standards;
- Address any new functional, business, and operational requirements arising out of Design Review;
- Address any relevant industry and accessibility standards for the design, implementation, and maintenance of the PRESTO System; and
- Meets all required standards and certifications.

REQ-QAT-12	Use of TTC Specified QA Tests	Approved	NF

TTC will at its discretion specify QA and test processes (use cases and protocols) as it sees necessary to verify and validate the implementation of the PRESTO System at TTC. PRESTO may choose to use these as part of Test Plan and testing procedure.   However; the TTC QA and Testing processes are not meant to be sufficient and complete (other than the User Acceptance Testing which are specified by TTC) for the validation of the PRESTO System at TTC.   PRESTO will still need to define and execute a full Test Plan.

REQ-QAT-13	Execution of Test Protocol	Approved	NF

PRESTO will execute the test protocol as defined in the approved Test Plan (and test sub-plans) to ensure that all Hardware, Software Systems, equipment, firmware, and other PRESTO business and functional components meet the TTC specifications as well as all required certifications.

PRESTO is responsible for all phases of the test protocol, including the integration of the test protocol with the Project Plan. All test protocols will include provisions for TTC to participate in the testing (including Acceptance Testing) of the PRESTO System at TTC should it wish to do so.

REQ-QAT-14	Test Protocol	Approved	NF

As part of the Test Plan, PRESTO will prepare all procedures, which will specify all activities and their conduct, methods of observation and recording test results, instructions on treatment of failures, and guidelines for assuring accurate and comprehensive testing. The test protocol will include, but not be

limited to the following:

- The nature and sequence of tests to be performed leading up to final acceptance, including Acceptance Testing, Verification Testing and Pilot Testing;
- Location of each test and components to be tested;
- Pre-requisites for each test, including support requirements, coordination, and personnel resources;
- Identification of specific personnel, their numbers, and their requisite qualifications in order to ensure valid, comprehensive observation and testing;
- A test schedule;
- A test report format, including necessary forms or other means for orderly, secure collection of data and comprehensive record keeping;
- A comprehensive list of data to be observed and reported;
- A listing of all equipment, tools, consumables, and other elements and preparatory steps required (e.g., calibration of PRESTO components, availability of test cards, PRESTO system readiness preparations, monitoring and cooperation required by third parties, etc.);
- PRESTO design verification tests that include a Specifications Traceability Matrix ("RTM") with requirements coverage analysis.
- Standards, certifications, technical specifications, and other reference documents; and
- Remedial actions and procedures to be followed in the event of test failures, procedural failures while testing, and any inaccuracies during the testing process.

REQ-QAT-15	Regression Testing Required	Approved	NF

TTC requires that when a given phase of the Test Plan process requires acceptance of previously untested and unimplemented features, functionalities, systems, or other PRESTO System components into already accepted PRESTO System features, functionalities, components, or systems, PRESTO must perform comprehensive testing of those PRESTO System elements.

Comprehensive testing must include regression testing to assess the impact of the untested PRESTO System elements on already accepted PRESTO System features, functionalities, components, and systems.

REQ-QAT-17	Prior Notice for Test Procedure(s)	Approved	NF

PRESTO will provide TTC with reasonable notice prior to the schedule date for the start of a specific test procedure or procedures.

REQ-QAT-18	Use of a Qualified Security Assessor	Approved	NF

PRESTO will engage a Qualified Security Assessor ("QSA") (as proscribed by PCI-DSS) for the purpose of an independent evaluation and validation of security compliance. PRESTO will (at its cost) conduct and will cause all applicable PRESTO contractors, at no cost to the TTC, to ensure security compliance pertaining to the "Managed Services". The nature of the security services to provide the independent evaluation and compliance review however is the responsibility of PRESTO.

2.1   Use Cases

REQ-QAT-19	Comprehensive use of Use Cases	Approved	NF

The Test Plan will make use of a comprehensive series of use cases developed by PRESTO with the support of TTC. The use cases will consist of detailed steps or scripts that will test all possible scenarios, including exceptions and alternatives, for interaction with the PRESTO system by end users.

REQ-QAT-21	Use Case targets	Approved	NF

The use cases will comprehensively describe actual interactions between end users and the PRESTO System that includes but is not limited to:

- Performing all possible fare payment and usage transactions (e.g. Customers who will use the PRESTO system to purchase TTC fares and ride TTC transportation services);
- Use and interaction with the PRESTO Web Site for all possible services and functions available with the PRESTO solution;
- Use and interaction with the Customer Service Call Center;
- TTC and PRESTO employees responsible for operation, management, and oversight of the PRESTO System; and
- Business partners, affiliates and merchant participants in the non-TTC retail sales and reload network.

3   Test Environment

REQ-QAT-23	Use of Final Equipment and Services	Approved	NF

Tests in the Test Plan will include tests performed using the actual equipment, hardware, software, services and components used for the PRESTO System implemented at TTC.

REQ-QAT-24	Use of Production Equipment and Services for User Acceptance Testing	Approved	NF

Production Software, Hardware, Services and Components will be used for all User Acceptance Testing of the PRESTO System at TTC.

REQ-QAT-26	Specific Tests	Approved	NF

The Test Plan will ensure all components and services to address TTC Business Requirements and resultant functionality will be tested.

REQ-QAT-26.1	Network Operations	Approved	NF

PRESTO will conduct the required level of testing across all TTC services and modes of operations where PRESTO equipment is installed to ensure the system design and all of its components meet or exceed the requirements to handle TTC volumes and PRESTO/TTC agreed Service Levels whether that be provided by a wired, wireless or a combination solution.

REQ-QAT-26.2	Field Equipment	Approved	NF

PRESTO tests on all field equipment installed on TTC property will include, but not be limited to:

- Certification as compliant with all financial services, payment industry, and card association standards (e.g., INTERAC, PCI (PED, PA, DSS)), for all devices accepting payment, processing, storing and/or transmitting financial payment data;
- EMV compliance (contact/ contactless, on-line/off-line) for all devices accepting payment from credit/debit cards;
- NFC compliance for all contactless interfaces (i.e. not just payment devices);
- Environmental tests as required by TTC, CSA, and CRTC;
- Maintainability tests across all installation locations and vehicle type installations;
- Performance and stress testing;
- Connectivity testing;
- Remote update/upgrade testing;
- Key management and security tests;
- Interoperability / Cross boundary smart card usage;
- Reliability Testing (MTBF and MTBM metrics); and,
- Usability Testing (including AODA specifications).

REQ-QAT-26.3	System	Approved	NF

PRESTO tests on all PRESTO system components used /installed for TTC property will include, but not be limited to:

- Performance and stress testing (e.g. maximum / peak operating loads, SLA levels);
- Key management and security tests;
- Reliability Testing;
- Connectivity to field equipment tests;
- Ethical hack tests for the Web Site and Customer Service Call Center;
- Configuration testing (e.g. various Internet browsers for web access, credit cards types, hardware replacement, data mart, SQL reporting, etc.);
- Financial reconciliation and management testing;
- Auditing, and monitoring of transactions testing;
- Recovery and Continuity testing (e.g. the PRESTO System's ability to recover and perform self-diagnostics etc.); and
- Data Migration testing for current TTC transit databases (e.g. employee, bus routes, etc.).

REQ-QAT-26.4	Data Mart	Approved	NF

PRESTO tests on the Data Mart will include, but not be limited to:

- Data extract, transfers, and loads;
- Data Reporting;
- Performance and stress testing;
- Business continuity testing;
- Data management and validation; and
- Security and Security monitoring processes.

4   Field Trials

REQ-QAT-27	Scope of Field Trials	Approved	NF

The Field Trial Test will be designed as a live, in-service test of the entire PRESTO system implemented at TTC. All Hardware, Software, components, services, support services etc. of the PRESTO System will be active and approved for full revenue service for the Field Trial. Furthermore, PRESTO will need to work with any and all financial institutions, Acquirers, and other entities as necessary.

REQ-QAT-28	Field Trials - Phase I	Approved	NF

The purpose of Field Trials Phase I will be to fully test the PRESTO system for functionality, reliability, availability, maintainability, accessibility and accuracy, and to evaluate the performance of all maintenance, revenue servicing, and customer support operations.

REQ-QAT-28.2	Duration	Approved	NF

The Field Trial phase I will last a minimum of six (6) weeks, or until satisfactory completion of the testing.

REQ-QAT-28.3	Users	Approved	NF

Participants in Field Trials Phase I will consist of a team of testers comprised of PRESTO and TTC personnel. Consistent with the Project Plan all fare media and TTC fare Products and policies are fully tested in this Field Trial phase.

REQ-QAT-28.4	Daily Reports	Approved	NF

PRESTO will provide TTC with daily and weekly reports on the performance of the PRESTO system during Phase I of Field Trial. TTC requires weekly reviews of reports and evaluation of test results.

REQ-QAT-28.5	Root cause analysis	Approved	NF

All operating malfunctions will be analyzed for root causes. Test results will not be considered complete unless a corresponding root cause analysis has been completed. Results of analysis will be logged in weekly reports. Root cause analysis will include a description of remedial steps and a timeline for testing and completion of remedial actions.
Testing will not be considered complete until the root cause is determined and the correction is fully tested.

REQ-QAT-29	Field Trials Phase II	Approved	NF

The purpose of Field Trials Phase II will be to increase the volume of PRESTO sales, TTC Products and use transactions for the PRESTO installation at TTC. The net effect will be to achieve the minimum levels, to stress test the PRESTO system for reliability, availability, maintainability, and accuracy, and to evaluate and fine tune the performance of all maintenance, revenue servicing, and customer support operations.

REQ-QAT-29.1	Start	Approved	NF

Phase II of Field Trials will begin after the successful completion of Phase I including the fixing and testing of all defects found in Field Trials Phase I. PRESTO will provide Field Trial Phase I defect fix test results to TTC verifying that these defects have been fixed.

REQ-QAT-29.2	Duration	Approved	NF

Field Trials Phase II will last for a minimum of six (6) consecutive weeks or until satisfactory completion of the testing. During this period, with prior consent of TTC, PRESTO will activate the use of the PRESTO system by a larger, but select population of friendly users.

REQ-QAT-29.3	Users	Approved	NF

PRESTO will conduct Field Trial Phase II with a select, limited number of participants. Consistent with the Project Plan all fare media and TTC fare Products and policies are fully tested in this Field Trial phase.

REQ-QAT-29.4	Data and Transaction Volumes	Approved	F

Ensure participating testers perform a combined minimum of 25,000 tap transactions using all types of PRESTO Media on all types of TTC vehicles and at Fare Gates in TTC subway and subway stations.

REQ-QAT-29.4.1	Data and Transaction Volumes-2	Approved	F

Ensure testers perform a minimum of 1,000 payment transactions at each of the sales and reload channels.

REQ-QAT-29.5	Daily Reports	Approved	NF

PRESTO will provide daily and weekly reports on the performance of the PRESTO system during Phase II of Field Trial . TTC requires weekly reviews of reports and evaluation of test results.

REQ-QAT-29.6	Operating malfunctions	Approved	NF

All operating malfunctions will be logged (tracked) and included in weekly reports. TTC defines an operating malfunction as an event that results in system or equipment being inoperable or its failure to perform all required functions as describe by TTC's specifications, subsequent Design Review, or required by procedures, protocols, and regulations for processing of electronic funds transfers and payments. Typically an operating malfunction would require maintenance in order to restore the system or equipment to normal operation.

REQ-QAT-29.7	Root cause analysis	Approved	NF

All operating malfunctions will be analyzed for root causes. Test results will not be considered complete unless a corresponding root cause analysis has been completed. Results of analysis will be logged in weekly reports. Root Cause analysis will include a description of remedial steps and a timeline for testing and completion of remedial actions.

REQ-QAT-29.8	Additional Testing	Approved	NF

Any additional tests identified in Field Trials Phase II required by PRESTO, its Affiliates, participants in the PRESTO program, and financial services and payments industry standards will be conducted and reported on during this phase. Only when all Parties have been satisfied as to the functionality, reliability and performance of the tests will the system move to the next step.

REQ-QAT-30	Testing of certification	Approved	NF

PRESTO will ensure that all required certifications and the testing/confirmation of same will be carried out.

REQ-QAT-31	Meeting of Performance Measures	Approved	NF

As a condition of TTC's final acceptance of the PRESTO system, all relevant Service Level Agreement and performance measures described in the TTC - PRESTO agreement must be met during Field Trials.

5 Test Results

REQ-QAT-32	Submission of Test Results	Approved	F

Submit written tests results within one week of test completion. Submitted test results will be accompanied by all documentation, including attestation by all responsible witnessing parties. Responsible witnessing parties include PRESTO's Quality Assurance/Quality Control manager.

REQ-QAT-33	Review of Test Results	Approved	NF

Consistent with RASCI, TTC and PRESTO will review, and mutually agree to accept or reject the test results. As previously noted, TTC will support in all PRESTO tests. TTC may choose to comment on tests, test procedures, coverage etc., at any time during the PRESTO test in order to expedite the test cycle.

6 Evaluation of Test Results

REQ-QAT-34	Pass - Fail criteria	Approved	NF

All Test Results will be evaluated on a pass or fail basis according to the test success criteria.

REQ-QAT-35	Remediation of failures	Approved	NF

PRESTO will be responsible for remediation of all failures prior to TTC's acceptance of the PRESTO system for revenue service, other than those failures arising solely as a direct result of an action or omission on the part of the TTC.

7 Requests for Test Waivers

REQ-QAT-36	Granting of Test Waivers	Approved	NF

At TTC's sole discretion, TTC may grant PRESTO a waiver for performance of portions of tests. PRESTO must request the waiver in writing and must provide documentation to TTC's satisfaction that proves that:

- Equipment, component, service, system etc., to be tested has previously undergone and passed tests (either by PRESTO, its affiliates, or accredited third party) that are acceptable to TTC;
- Equipment, component, service, system etc., shown as having been tested in the documentation submitted as part of the waiver request was performing similar functions to those required for the PRESTO system at TTC;
- Documentation submitted with the waiver request is from a certified test facility;
- Documentation submitted demonstrates that the test conditions and environment were substantially similar to those at TTC; and
- Tests performed in the documentation are identical or equivalent from a functional and technical standpoint as the tests required by TTC for the PRESTO system.

Should TTC grant a test waiver, the granting of such waiver will not be considered a change to TTC-PRESTO agreement or to the functionality of the PRESTO system/solution at TTC.

REQ-QAT-37	Granting of Partial Test Waivers	Approved	NF

At TTC's sole discretion, TTC may grant PRESTO a partial test waiver for performance of portions of tests. PRESTO must request the partial waiver in writing and must provide documentation that proves that equipment, components, services, systems etc., is shown as having been tested except for one or two additional features. This waiver for all intents and purposes allows for testing 'gap' TTC specifications for PRESTO services (components, systems) already in operating.

Full regression testing must still done for all partial test waivers.

Should TTC grant a test waiver, the granting of such waiver will not be considered a change to TTC-PRESTO agreement or to the functionality of the PRESTO system/solution at TTC.

REQ-QAT-38	Timing for Waivers	Approved	NF

PRESTO will identify tests for which waivers may be requested no later than the Conceptual Design Review phase of Design review.

8 Ongoing QA and Testing

REQ-QAT-39	Quality Assurance and Control Program	Approved	NF

PRESTO will maintain an ongoing quality assurance and control program/plan consisting of a quality control manual and supporting plans and procedures. The Quality Assurance and Control program will be based on industry standards. This plan will include but not be limited to:

- Factory inspections and test processes;
- Configuration Management;
- Procedures and records for equipment handling, inventory, storage, delivery, design control, document control, drawings, data, corrective action;
- Software development Quality Assurance Program (base on ISO9001 and/or IEEE 730);
- System installation, inspection;
- Discrepancy control;
- Feedback of issues, problems etc.; and

- Qualification and certification of all personnel performing work.

Specifically, the Quality Assurance functions will include:

- QA Audits;
- Training;
- System Controls;
- Handling and storage;
- Factory and Field Testing;
- Final Inspection;
- Field Installation; and
- Field Fabrication.

REQ-QAT-40	Ongoing Testing	Approved	NF

PRESTO will perform ongoing testing of PRESTO system Hardware, Software, components, services etc., to ensure SLAs are maintained and that the quality of the system is still of the same specifications as the day it first went into production. PRESTO may choose to perform ongoing testing as part of the SLA management process.

REQ-QAT-41	Defect Fixes and Testing	Approved	NF

PRESTO will perform root cause analysis for all found defects, effect repair and perform all necessary testing to verify the defect has been properly addressed and that the PRESTO system installed at TTC still meets all TTC Specifications. All defects, incidents, fixes, tests etc., will be fully documented.

REQ-QAT-42	Repair and Test of Equipment	Approved	NF

Equipment and systems found inoperative or defective will be repaired, replaced and re-tested.

REQ-QAT-43	Maintaining Certifications	Approved	NF

All required certifications will be maintained as current by PRESTO.   All required testing for certifications will be carried out by PRESTO.

In the event that new certifications are required for systems, components, devices, and other elements of the PRESTO system and these cannot be "grandfathered" into the current PRESTO solution, PRESTO must, at their expense and effort, upgrade, replace, modify, and re-certify all affected components of the PRESTO System.

In particular, PRESTO will maintain PCI compliance and will be responsible for all processes, services, software, hardware, and in general all costs associated with and required to maintain certification.

Cross Reference Table

This cross reference table matches PRESTO information to TTC Business Requirements. This table is in document order as defined in this document.

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-QAT-1	QAT	REQ-QAT-1/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-2	QAT	REQ-QAT-2/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-5	QAT	REQ-QAT-5/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-6	QAT	REQ-QAT-6/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-7	QAT	REQ-QAT-7/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-8.5	QAT	REQ-QAT-8.5/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-11	QAT	REQ-QAT-11/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-12	QAT	REQ-QAT-12/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-13	QAT	REQ-QAT-13/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-14	QAT	REQ-QAT-14/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-15	QAT	REQ-QAT-15/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-17	QAT	REQ-QAT-17/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-18	QAT	REQ-QAT-18/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-19	QAT	REQ-QAT-19/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-21	QAT	REQ-QAT-21/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-23	QAT	REQ-QAT-23/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-24	QAT	REQ-QAT-24/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-26	QAT	REQ-QAT-26/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-26.1	QAT	REQ-QAT-26.1/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-26.2	QAT	REQ-QAT-26.2/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-26.3	QAT	REQ-QAT-26.3/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-26.4	QAT	REQ-QAT-26.4/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-27	QAT	REQ-QAT-27/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-28	QAT	REQ-QAT-28/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-28.2	QAT	REQ-QAT-28.2/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-28.3	QAT	REQ-QAT-28.3/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-28.4	QAT	REQ-QAT-28.4/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-28.5	QAT	REQ-QAT-28.5/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-29	QAT	REQ-QAT-29/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-29.1	QAT	REQ-QAT-29.1/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-29.2	QAT	REQ-QAT-29.2/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-29.3	QAT	REQ-QAT-29.3/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-29.4	QAT	REQ-QAT-29.4/1	Other - Testing	F	*Approved*	NA
REQ-QAT-29.4.1	QAT	REQ-QAT-29.4/2	Other - Testing	F	*Approved*	NA
REQ-QAT-29.5	QAT	REQ-QAT-29.5/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-29.6	QAT	REQ-QAT-29.6/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-29.7	QAT	REQ-QAT-29.7/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-29.8	QAT	REQ-QAT-29.8/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-30	QAT	REQ-QAT-30/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-31	QAT	REQ-QAT-31/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-32	QAT	REQ-QAT-32/1	Other - Testing	F	*Approved*	NA
REQ-QAT-33	QAT	REQ-QAT-33/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-34	QAT	REQ-QAT-34/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-35	QAT	REQ-QAT-35/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-36	QAT	REQ-QAT-36/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-37	QAT	REQ-QAT-37/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-38	QAT	REQ-QAT-38/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-39	QAT	REQ-QAT-39/1	Other - Testing	NF	*Approved*	NA

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-QAT-40	QAT	REQ-QAT-40/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-41	QAT	REQ-QAT-41/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-42	QAT	REQ-QAT-42/1	Other - Testing	NF	*Approved*	NA
REQ-QAT-43	QAT	REQ-QAT-43/1	Other - Testing	NF	*Approved*	NA

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TTC Fare Card Group

Exhibit G

TTC Business Requirements

PRESTO Open Payments

Version *Final 8.0*

Date: 121210

This document was automatically generated on 10/12/2012

Document Version History

Page	Ver.	Version Date	Details
NA	Draft 1.0	111024	• This schedule contains Transit Expansion specific specifications that are not are not in common with TTC. These specifications are primarily center around, o Roles and Responsibilities o Power and Communications and o Field Equipment
NA	Draft 2.0	120221	• Intermediate files – TTC/PRESTO requirements process
NA	Draft 3.0	120326	• Incorporated PRESTO/TTC changes from the PRESTO/TTC Business Requirements review process • Changed format of the Requirements as per Format section. • Added Cross Reference table at the end of the document to map TTC IDs to PRESTO IDs.
NA	Draft 4.0	120420	• Clean up
NA	Draft 5.0	120619	• Changed MA to NF / F (non-functional / functional) • Removed the MA Reference – changed it to Cross Reference • Cross Reference table has been changed to include F/NF, whether the requirement is in the Device RFP and if so the Device Spec IDs are listed. • Change the Format of the TTC Specification slightly o NF with the PRESTO reference means it is a nonfunctional specification o If a functional specification is part of the PRESTO Device RFP it is highlighted with a green Y next to the PRESTO NG release number
NA	Draft 6.0		• Deleted REQ-POP-61 • Changed NF Requirements POP-29,20, 50.1, 59, 60 to Approved with mutually accepted wording • Changed the format of the document to remove any reference to RFP • Change Specifications to TTC Business Requirements
NA	FRC 7.0		• Changed name of document to Exhibit – now aligns with Master Agreement • Removed requirements associated with Tap Transaction speed (i.e. POP-92 removed – added statement that RAS-51 (customer throughput applies) POP-93 – deleted. • Changed version to Final Release Candidate
NA	Final 8.0	121210	• Changed version to Final and increased release number.

Table of Contents

List of Tables

List of Figures

Format

Each TTC Business Requirement has the following format:

TTC ID	Name of TTC Business Requirement	Status	Type
Description			

Definitions

TTC ID: Unique TTC Business Requirement Identification Number

Name of Specification: Name of TTC Business Requirement

Status: Review status of the TTC Business Requirement:

Approved: TTC and PRESTO mutually agreed on TTC Business Requirement

Pending: TTC and PRESTO are currently developing a mutually agreeable TTC Business Requirement

Type: **F**: functional; **NF**: Non-Functional

Description: Description of the Requirement including figures, charts, tables etc. if used in defining and describing the TTC Business Requirement.

Additionally, the cross-reference table at the end of the document will include the additional information:

TTC Area: Three letter identification code for the TTC Area the TTC Business Requirement applies to.

PLA: PRESTO Logical Area (PLA) the TTC Business Requirement applies to as determined by PRESTO.

PID: PRESTO Identification Number

TYPE[1]**:** **NF**: nonfunctional Requirement
F: functional Specification

Release[2]**:** PRESTO NG release number

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[1] As classified by PRESTO
[2] PRESTO to provide PRESTO NG release information

Document Order of Specifications

Requirements in this document (including the cross reference table at the end of the document) are presented in their TTC logical order. Logical order here means:

- Related requirements are grouped by document sections;
- Sections that deal with overall or general requirements are presented first;
- Within each section, general / overall requirements are presented first with detailed requirements following;
- Requirements are hierarchal (i.e. requirements that are presented later in the document are dependent on earlier presented requirements); and
- Requirements can refer to other requirements or document sections (i.e. named sections and all the requirements contained therein).

Note that TTC ID numbering does not necessarily reflect the document order of how the TTC requirements are presented.

1 Overview

REQ-POP-18	Scope	Approved	F

This schedule - PRESTO open payments outlines the specifications for supporting the use of Open Payments Media on the PRESTO System.

REQ-POP-19	Managed Service for PRESTO Open Payments	Approved	F

Support the use of Open Payments Media on the TTC system as a PRESTO managed service.

Unless otherwise stated, all aspects of the PRESTO Managed Service for the PRESTO System based on PRESTO Media, apply equally to the PRESTO Open Payments Service.

REQ-POP-20	Open Payments Support for all Modes of Transportation	Approved	F

Support the use of Open Payments Media on all modes of transportation at TTC.

REQ-POP-21	Open Payments Support for Current and New TTC Products	Approved	F

Deliver an account-based open payment fare system that will support TTC Fare Products and policy that can be used by Customers to pay for fares.

REQ-POP-21.1	Open Payments Support for Current and New TTC Products-2	Approved	F

Ensure that it is possible to add new types of products and payment methods (e.g. pay as you go)that can be used by Customers to pay for fares.

REQ-POP-21.2	Open Payments Support for Current and New TTC Products-3	Approved	F

The PRESTO open payments system solution will support TTC Customers in a payment experience for transit fares that in all key attributes meets or exceeds TTC Customers' experience in purchasing at a retail store.

REQ-POP-22	Seamless Integration with PRESTO Smart Card System	Approved	F

Integrate open payment seamlessly into the PRESTO System so that Customers can pay with either PRESTO Media or with debit or Credit Card.

REQ-POP-23	Open Payments Support at all POE	Approved	F

Ensure support of the use of Open Payments Media at every Point of Entry.

REQ-POP-24	References to PRESTO Schedules	Approved	F

This Schedule (G) makes extensive references to the following PRESTO System Schedules:

- Schedule A SLA Specifications;
- Schedule B System Specifications;
- Schedule C Service Specifications;
- Schedule D Project Plan Specifications;
- Schedule E Testing and Quality Assurance Specifications; and
- Schedule F Unique Transit Expansion Specifications.

REQ-POP-25	Outline of PRESTO Open Payments Specifications	Approved	F

PRESTO Open Payments Specifications in this Schedule are expressed in the following manner:

 - Specifications for the PRESTO System supporting Open Payments that are the same as those for the PRESTO System as defined in the referenced Schedules are simply referenced;

 - Specifications for PRESTO Open Payments that are different from, or in addition to the referenced Schedules outlined above are highlighted and elaborated on;

 - Specifications that taken directly from the PRESTO System RFP; and

- Specifications that require additional input, thought, consideration etc. from all parties are left for Design Review.

REQ-POP-26	Open Payments Equivalents for PRESTO System Specifications	Approved	F

Open payments specifications that are stated to be equivalent to those specifications referenced in the PRESTO System schedules as outlined in POP-24 will assume the following substitutions:

REQ-POP-26.1	Open Payments Equivalents for PRESTO System Specifications-2	Approved	F

 - PRESTO Media -> Open Payments Media

REQ-POP-26.2	Open Payments Equivalents for PRESTO System Specifications-3	Approved	F

 - PRESTO Card -> open payments card

REQ-POP-26.3	Open Payments Equivalents for PRESTO System Specifications-4	Approved	F

Specifications for the PRESTO System supporting open payments that are the same as those for the PRESTO System as defined in the referenced schedules are simply referenced

REQ-POP-27	On the Use of LUMs	Approved	F

Ensure LUM adhere to applicable Open Standards if LUM are based on open payment standards.

REQ-POP-28	On the Use of GPR Cards	Approved	F

OPTIONAL - For the PRESTO open payments system, PRESTO Cards as closed loop GPR cards (open payment) may be used for private non-revenue cards; and open loop GPR cards (open payment) may be used as Open Payments Media.

REQ-POP-29	On the Use of Design Review	Approved	NF

Any ambiguity, missing details, additional clarifications with regards to TTC Specifications for Open Payments will be addressed in Design Review.

2   General Open Payments Specifications

These specifications for the PRESTO Open Payments System have been extracted from Schedule 2.1.87 of the OSFS RFP.

2.1   Overview

REQ-POP-30	Role of PRESTO for Supporting Open Payments	Approved	NF

PRESTO will fund, acquire, install, operate, repair, refresh and maintain the Open Payments functionality of the PRESTO System.

REQ-POP-31	Layered Approach	Approved	F

Ensure all components, systems, business and operating solutions comprising the PRESTO open payments system will be installed to be Layered On to TTC's in-place physical infrastructure for its current fare system.

REQ-POP-32	Account Based	Approved	F

The PRESTO System for open payments will operate in an account-based manner consistent with business principals, procedures, and standards of the financial services and payments industries.

REQ-POP-33	Function as a Merchant	Approved	F

Enable TTC to function as a Merchant by accepting fare payment at points of entry (POE) to TTC system using Open Payments Media.

REQ-POP-34	Based on Financial Payments Sector	Approved	F

Acceptance of fare payment will be based on, and will strive to be as closely identical to business, technical, and TTC Customer services processes for acceptance of contactless, Open Standards financial industry payments at retail stores.

REQ-POP-35	Major Components for Open Payments Support	Approved	F

Figure 1 provides a general overview of the major components required for the PRESTO System in order to support open payments. From left to right, TTC Customer use their Open Payments Media in the form of contactless bank cards, cellular phones, general purpose reloadable cards (GPR), and other form factors by tapping at transit access points or points of entry (POEs) to transportation services.

For the excel version of the TTC Specifications this table is located in POP-35 in the document Appendix G for Excel Version of TTC Specifications.

Figure provides a general overview of the major components required for the support of Open Payments by the PRESTO System. From left to right, customer use their open payments media in the form of contactless bank cards, cellular phones, General Purpose Reloadable Cards (GPR), and other form factors by tapping at transit access points or points of entry (POEs) to transportation services.
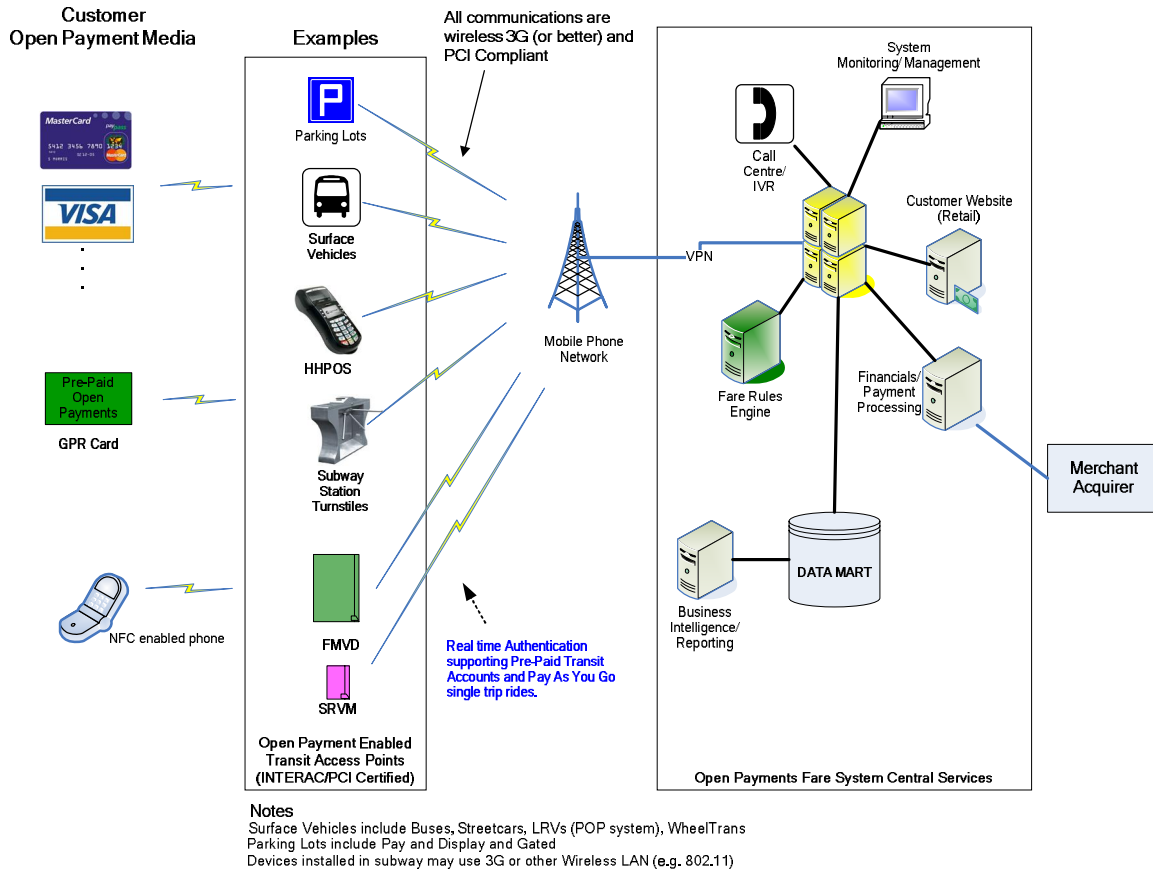
Figure PRESTO System Support for Open Payments

REQ-POP-36	Transit Tap Purchase	Approved	F

Ensure transit access points contain financial payment card reader assemblies that generate a financial transaction (transit purchase) when a Customer taps on.

REQ-POP-37	Real-Time Authorization to CBO	Approved	F

Ensure financial transaction is authenticated and authorized in real-time to the CBO over wired or cellular wireless data channels linking the access point to the central processor.

REQ-POP-38	Fare Policy and Pricing Encapsulated in Fare Rules Engine	Approved	F

What a Customer pays for a fare depends upon the fare policy and pricing determined by TTC and encapsulated within the fare rules engine.

REQ-POP-39	HHPOS for Enforcement	Approved	F

Enforcement is done via Hand-Held Point-of-Sale (HHPOS) devices.

HHPOS shall conform to Open Standards, account-based standards of the financial services and payments industries for use as point-of-sale devices for acceptance of Credit and Debit Cards.

REQ-POP-39.1	HHPOS for Enforcement-2	Approved	F

HHPOSs shall accept contactless, Open Standard media only, and shall be configured to perform all validation, sales, and reload functions.

REQ-POP-40	Checking and Accepting Fares with HHPOS	Approved	F

The HHPOSs shall be capable of checking Open Payment taps and accepting Open Payment fares if the Customer has not paid a fareas well as for use by operators of Wheel-trans vehicles for acceptance of fares from Wheel Trans Customers.

REQ-POP-41	Key Central System Services	Approved	F

Provide a Customer web site, Customer service call centre, financial payments processing, system monitoring and management, Data Mart and reporting/Business Intelligence services within the PRESTO System.

REQ-POP-42	Data Mart and Business Intelligence	Approved	F

The Data Mart provides TTC with a complete, raw transaction history of all open payment transactions (properly obfuscated). Reporting and Business Intelligence services using this Data Mart enables, among other things, service Level reporting for all business functions required by TTC, including planning purposes, audits, generation of tax receipts, financial reconciliation, and ad-hoc report generation for business and analytical purposes.

REQ-POP-43	Use of Commercial Off The Shelf Components	Approved	F

PRESTO will use proven, commercially available Hardware, Software, equipment, and services that were designed and certified for operation of Open Standards payment systems. All other components and systems for the PRESTO System will utilize principles, equipment, and services that comply with an open architecture approach to design, development, certification, testing, and implementation of business and operating systems.

2.2   Key System Components

REQ-POP-44	Turn-Key Solution	Approved	F

PRESTO will provide a turn-key solution for the PRESTO System that will include all equipment, Hardware, Software, operating systems, and other services specification document. System components will be deployed to enable purchase and use of contactless, Open Standard media on all TTC modes of transportation.

REQ-POP-44.1	Turn-Key Solution-2	Approved	F

Ensure turnkey components (e.g. Hardware, Software, operating systems and other services), are deployed to enable purchase and use of contactless, Open Standard media on all TTC modes of transportation.

REQ-POP-45	Specific Equipment for Open Payments Support	Approved	F

The following specific equipment and systems shall support Open Payments:

- Central Processor capable of processing, recording, and reporting all fare transactions and capable of providing computer processing in support of related systems and functions of the PRESTO System;

- Fare Media Vending Devices (FMVDs) capable of sale and reload of contactless General Purpose Reloadable media;

- Single-Ride Vending Machines (SRVMs) that are configurable to be capable, as required in this Specification, either of sale of contactless Limited Use Media (LUMs) when deployed TTC subway stations, or of sale of contactless LUM when deployed on TTC surface vehicles or when deployed Off-Board along LRV routes in support of TTC Legacy LRV operations;

- AVMs that will allow Customers to reload and as well as purchase TTC Fare Products;

- reader Assemblies designed for installation and operation on all TTC surface vehicles;

Reader Assemblies designed for installation and operation on all TTC streetcars (both legacy and LRV);

- reader Assemblies and associated Hardware designed to support Off-Board, Proof-of-Payment for TTC's new Light Rail Vehicle (LRV) system and Transit City;

- reader Assemblies designed for installation on all legacy TTC Faregates and for operation in Subway stations;

- reader Assemblies designed for installation at TTC commuter parking lots;

- Hand-held Point of Sale devices capable of reload and validation of fares in circumstances where TTC utilizes a Proof of Payment (POP) approach, fare enforcement (such as the Legacy LRV), for Wheel-Trans Taxi Services or when supplementing fare payment capacity at public events and other high volume loading circumstances ;

- Customer Service Call Centre with IVR facilities and with access to staffed TTC Customer service representatives that enable TTC Customers to purchase, reload, and manage transit accounts and to support all TTC Customer business interactions with the PRESTO System, including all supporting payment equipment;

- Web Site to enable TTC Customers to purchase, reload, and manage transit accounts.

2.3   Software for Open Payments

REQ-POP-46	Use of Non-Proprietary Open Standards and Architecture	Approved	F

PRESTO will ensure that PRESTO System uses non-proprietary, Open Standards technology to the fullest extent possible. PRESTO will adopt principles of Open Architecture design, development and implementation when providing the PRESTO System.

REQ-POP-47	Interchangeability of Components	Approved	F

Ensure that all equipment and services integral to the stand-alone PRESTO System allow for "plug-and-play" or immediate interchangeability of components without:

REQ-POP-47.1	Interchangeability of Components-2	Approved	F

 - violation of PRESTO's or any third party's proprietary rights.

REQ-POP-47.2	Interchangeability of Components-3	Approved	F

 - requiring modification of new component add-ins.

REQ-POP-47.3	Interchangeability of Components-4	Approved	F

- any remediation by PRESTO or, by extension, by TTC to components remaining from PRESTO's original implementation

REQ-POP-48	Standardization and Documentation of Components	Approved	F

To ensure TTC's requirements are met, TTC further requires that all equipment, Software, firmware, and system interfaces will be standardized and documented for use by TTC.

REQ-POP-49	No Barriers to Plug and Play	Approved	F

Ensure that no Software or operating system solution for any aspect of the PRESTO System will inherently hinder or prevent TTC's "plug-and-play" requirement (POP-47).

REQ-POP-50	Forward Compatibility	Approved	F

All Software and operating system solutions for the PRESTO System will be forward compatible with Open Standards of the financial services and payments industry.

REQ-POP-50.1	Maintaining Software	Approved	NF

PRESTO will ensure that all deployed Software is maintained, version controlled, updated and Software patches are applied as they become available.

2.4   Revenue Security and Servicing

REQ-POP-51	Revenue Integrity and Accuracy	Approved	F

Without derogating from the obligations of PRESTO set forth in schedule A - SLAs, PRESTO will ensure that all equipment for the PRESTO System that supports open payments will provide the highest degree of security, accuracy, and integrity in the handling of revenues.

2.4.1   Revenue Accountability

REQ-POP-52	Tracking of all Open Payments Transactions	Approved	F

Ensure that all components of the PRESTO System supporting open payments will be capable of tracking all transaction activities involving purchase, reload, and use at reader assemblies mounted on Fare Gates and all surface vehicles, and at any other point of acceptance, sale, reload, initialization, or other activity related to the required functionalities of the PRESTO System of contactless fare media, transit accounts, general purpose reloadable cards, Limited Use Media (LUM) and other devices used in connection with the PRESTO System.

REQ-POP-53	Open Payments 'Raw' Data	Approved	F

Ensure to provide all raw data as specified in this schedule. This raw data will include all tap transactions, transaction decisions, maintenance records associated with the use of Open Payments Media.

REQ-POP-53.1	Revenue Tracking	Approved	F

Revenue tracking includes real-time tracking of all sales channels in the PRESTO System.

REQ-POP-54	Capture of this data will be in a manner that permits TTC, PRESTO, and an	Approved	F

Ensure capture of this data will be in a manner that permits TTC, PRESTO, and an authorized independent auditor to reconstruct, track and analyze all elements in the transaction process from initiation by Customer through completion of the exchange of funds between Customer, PRESTO, and TTC.

2.5   Standards Compliance

REQ-POP-55	Open Payments Standards	Approved	F

Ensure that the PRESTO System, the Contactless Reader, the Reader Assembly, the central processor and all media or devices distributed for sales and reload of transit accounts, will at a minimum comply with the following standards for payment processing and exchanges of data for the purpose of electronic transfers of funds:

REQ-POP-55.1	Open Payments Standards-2	Approved	F

- American ExpressSM

REQ-POP-55.2	Open Payments Standards-3	Approved	F

- ANSI standard-general purpose plastic cards

REQ-POP-55.3	Open Payments Standards-4	Approved	F

- ANSI X9.2 and 8 PIN Pad unique key encryption

REQ-POP-55.4	Open Payments Standards-5	Approved	F

- BSIS 7799:2002

REQ-POP-55.5	Open Payments Standards-6	Approved	F

- Canadian banking association

REQ-POP-55.6	Open Payments Standards-7	Approved	F

- Canadian department of finance

REQ-POP-55.7	Open Payments Standards-8	Approved	F

- Canadian bankers association

REQ-POP-55.8	Open Payments Standards-9	Approved	F

- Discover zip

REQ-POP-55.9	Open Payments Standards-10	Approved	F

- security (3DES, AES, Master/Session, SSL)

REQ-POP-55.10	Open Payments Standards-11	Approved	F

- INTERAC

REQ-POP-55.11	Open Payments Standards-12	Approved	F

- ISO/IEC7811

| REQ-POP-55.12 | Open Payments Standards-13 | Approved | F |

- ISO/IEC7813

| REQ-POP-55.13 | Open Payments Standards-14 | Approved | F |

- ISO/IEC7816

| REQ-POP-55.14 | Open Payments Standards-15 | Approved | F |

- ISO/IEC8584

| REQ-POP-55.15 | Open Payments Standards-16 | Approved | F |

- ISO/IEC 15693-1 (NFC)

| REQ-POP-55.16 | Open Payments Standards-17 | Approved | F |

- EMV Level 1 and Level 2 along with EMV contactless

| REQ-POP-55.17 | Open Payments Standards-18 | Approved | F |

- ISO/IEC14443, Parts 1-4

| REQ-POP-55.18 | Open Payments Standards-19 | Approved | F |

- ISO/IEC10373

| REQ-POP-55.19 | Open Payments Standards-20 | Approved | F |

- ISO18092/ECMA-340-NFCIP-1

| REQ-POP-55.20 | Open Payments Standards-21 | Approved | F |

- ISO 27001

| REQ-POP-55.21 | Open Payments Standards-22 | Approved | F |

- J Smart

| REQ-POP-55.22 | Open Payments Standards-23 | Approved | F |

- MasterCard EMV MChip

| REQ-POP-55.23 | Open Payments Standards-24 | Approved | F |

- MasterCard PayPass

| REQ-POP-55.24 | Open Payments Standards-25 | Approved | F |

- MasterCard PayPass MStripe

| REQ-POP-55.25 | Open Payments Standards-26 | Approved | F |

- Mifare

| REQ-POP-55.26 | Open Payments Standards-27 | Approved | F |

- NCITS 322-2002

| REQ-POP-55.27 | Open Payments Standards-28 | Approved | F |

- NFC ECMA-352

REQ-POP-55.28	Open Payments Standards-29	Approved	F

- PCI (all applicable standards such as PCI DSS, PCI PED, PA-DSS)

REQ-POP-55.29	Open Payments Standards-30	Approved	F

- VISA PayWave

REQ-POP-55.30	Open Payments Standards-31	Approved	F

- VISA PayWave MSD

REQ-POP-55.31	Open Payments Standards-32	Approved	F

- VISA EMV PayWave (qVSDC)

REQ-POP-56	Compliance with Evolving Standards	Approved	F

PRESTO will comply with such further standards, requirements and certifications as are identified, as all such standards, requirements and certifications evolve over the term.

REQ-POP-57	Compliance to Electronic Funds Transfer Processes	Approved	F

Enable accommodation of all standards, procedures, processes and protocols applicable to electronic funds transfers and payment systems developed and used by the financial services and payments industries in Canada during the process of implementation, testing, piloting and during normal operations.

REQ-POP-58	Maintaining Compliance and Certification	Approved	F

Initial certifications and subsequent maintenance of continuous certification through the term of the agreement of all payment devices, processes, services, and systems in accordance with all applicable business and technical standards will be the responsibility of PRESTO.

REQ-POP-59	Ongoing Standards Compliance	Approved	NF

PRESTO will be responsible for, and pay for all ongoing security standards, audits, system checks, and other functionalities, as required by the financial payments industry/Canadian banking regulations.

REQ-POP-60	Responsibility for Establishing Compliance	Approved	NF

PRESTO will be responsible and bear all expenses for achieving and/or establishing compliance with all Federal, Provincial, and Municipal Government regulations.

3   Business Processes and Functional Requirements

These specifications for the PRESTO Open Payments System have been extracted from Schedule 2.1.87 of the OSFS RFP.

REQ-POP-66	Overview	Approved	F

This section provides requirements of the technical functionality and business processes needed to support all stakeholders in the operation of the PRESTO System. Business and functional requirements for the PRESTO System fall into three major areas:

- Revenue assurance;
- Risk mitigation and management; and
- Business intelligence reporting and management.

3.1   Revenue Assurance

REQ-POP-67	Revenue Assurance	Approved	F

Ensure that revenue assurance encompasses all revenue collection, verification and settlement processes. Including financial control, auditing, and reporting, as well as the IT systems and equipment necessary to support such functions.

3.1.1   Fare Acceptance

REQ-POP-68	Acceptance Functionality	Approved	F

Ensure the PRESTO System back office will support the following acceptance functionality at reader assemblies for fare payment processing:

REQ-POP-68.1	In-System	Approved	F

In-system-acceptance functionality using standard, financial industry and card association type-certified readers for all contactless media and devices – including:

REQ-POP-68.1.1	In-System-2	Approved	F

 - EMV

REQ-POP-68.1.2	In-System-3	Approved	F

 - Credit

REQ-POP-68.1.3	In-System-4	Approved	F

 - Debit

REQ-POP-68.1.4	In-System-5	Approved	F

 - Pre-paid co-branded open and closed-loop cards

REQ-POP-68.1.5	In-System-6	Approved	F

 - Other contactless media and devices and processing methodologies that directly or indirectly rely on Open Standards for processing of electronic paymentssuch as NFC as listed in these specifications.

REQ-POP-68.2	Out-of-System	Approved	F

Out-of-system-processing and management functionality of acceptance environments using standard card association type-certified POS devices of all contactless and magnetic stripe media including:

REQ-POP-68.2.1	Out-of-System -2	Approved	F

 - EMV compliant media

REQ-POP-68.2.2	Out-of-System -3	Approved	F

 - devices and processes conforming to ISO 14443A/B standards

REQ-POP-68.2.3	Out-of-System -4	Approved	F

 - other applicable standards issued by the financial services industry and other certified issuing entities

| REQ-POP-68.2.4 | Out-of-System -5 | Approved | F |

This will include:

 - Credit;
 - Debit;
 - Prepaid co-branded open and closed-loop cards,
 - as well as other form factors or processing methodologies that directly or
   indirectly rely on Open Standards for processing of electronic payments

| REQ-POP-68.3 | Acceptance of EMV | Approved | F |

Migration to EMV - Fare acceptance in Canada must comply with the EMV migration currently taking place in the Canadian marketplace. A wide variety of EMV compliant and non-EMV compliant contactless TTC Customer bank cards will be in place for quite some time. Contactless debit (INTERAC) is evolving (along the lines of contactless EMV but may have some additional constraints), contactless magnetic stripe, and contactless EMV etc. will need to be considered not only at the front-end equipment assembly, but also at the central processor depending on the type of payment made and the processing option of either pay-as-you-go (PAYG) or Pre-Funded. Furthermore, EMV allows on-line and off-line transactions as well as supporting various security schemes determined by the card issuer which directly affect TTC Customer tap experience. These must be taken into account by PRESTO.

| REQ-POP-68.4 | Open Payments Media | Approved | F |

Ensure acceptance and processing functionality for any form factors or devices that contain contactless chips conforming to financial industry standards and ISO/IEC 8583/BASE24 and all other relevant standards for the exchange of data used in electronic processing financial transactions.

3.1.2   Fare Calculation

| REQ-POP-69 | Centralized Fare Calculation | Approved | F |

Ensure that fare calculation will be performed by a centralized, table/rules-driven payment module that calculates and differentiates appropriate transit fare charges processed via the PRESTO System.

| REQ-POP-70 | Configurable Fare Rules | Approved | F |

Ensure that the table/rules-driven payment module, as well as other configurable systems, shall have an operational support and administration application for configuration and types of values.

| REQ-POP-70.1 | Configurable Fare Rules-2 | Approved | F |

Ensure the central processor uses an account-based methodology.

| REQ-POP-71 | Contactless Open Payments Acceptance | Approved | F |

Ensure that in-system at TTC, the form of payment media or devices accepted at reader assemblies on Fare Gates and TTC buses, streetcars and LRVs will be contactless media and devices.

| REQ-POP-72 | Payment at Out of System and Non POE Locations | Approved | F |

At out-of-system locations, and at non-POE locations in-system, payment media processed by the PRESTO System may use any means of data transfer, provided that the media is ISO/IEC 14443 compliant and recognized by the financial services payments industries as being consistent with generally accepted payment card associations' business and technical standards in a manner that does not interfere with or cause material modification of those standards. Note that this does not preclude the use of NFC payment devices that may be present in cellular phones in the future.

REQ-POP-73	Use of COTs and Plug and Play	Approved	F

Ensure conformity with financial services and payment industry guidelines; such that all end devices, systems, media, and related support services can be supported in a "plug-and-play" manner through reliance on commercial, COTS equipment and services. Ensure no aspect of the technical design or the actual implementation will impede forward compatibility with financial service and payment industry products and services, or COTS devices, systems, media, and related support services.

REQ-POP-74	Acceptance of EMV and non-EMV Media	Approved	F

Ensure that the central processor will be capable of processing and accepting both EMV and non-EMV-compliant media as well as account-based, Pre-Funded, PAYG, single ride trips and non-revenue fare products type transactions.

REQ-POP-75	Open Payments Best Practise	Approved	F

Ensure the employment of best practices with respect to security pertaining to the PRESTO System. (such as, Tokenization, End-to-End Encryption, etc.)

REQ-POP-76	PCI Compliance	Approved	F

Ensure that the PRESTO System complies with payment card industry data security standards (PCI-DSS), and any other security standards required by card associations, issuer, and authorized standards bodies and regulators for the financial services and payments industries.

REQ-POP-77	Open Payments Media as a Transit Credential	Approved	F

Ensure that bank-issued payment media, when presented in the transit Merchant environment being implemented at TTC, will serve the dual purpose of a transit credential and a general payment device. In this dual purpose, all aspects of the PRESTO System will comply with card associations' standards and generally accepted practices of the financial services and payments industries.

REQ-POP-78	TTC Fare Products	Approved	F

Ensure that all TTC Fare Products fall within one of four categories for sales, reloads, and processing of payments:

REQ-POP-78.2	TTC Fare Products-2	Approved	F

 - single trips processed as PAYG trips (e.g.., trips that are flagged for aggregation into a post-paid transaction)

REQ-POP-78.3	TTC Fare Products-3	Approved	F

 - Pre-Funded fare products(e.g., Trips paid in advance, such as period passes, bulk purchases of "value-based fares", and Transit Purse);

REQ-POP-78.4	TTC Fare Products-4	Approved	F

 - single ride trips(e.g.., single trips purchased for cash at Single Ride Vending Machines and taken using Limited Use Media (LUMs))

REQ-POP-78.5	TTC Fare Products-5	Approved	F

 - non-revenue fare that are issued on a controlled basis for use of TTC transportation services by individuals meeting certain criteria for eligibility and use

(e.g., employee passes, transfers on LUMs issued only from Bus LUM Dispensers, etc.)

REQ-POP-241	Transit Purse	Approved	F

Ensure a transit purse may be used in conjunction with a tiered transit loyalty plan.

REQ-POP-242	Multiple Transit Products per Transit Account	Approved	F

Ensure that multiple Pre-Funded fare products can be associated with the same transit account.

REQ-POP-242.1	Multiple Transit Products per Transit Account-2	Approved	F

Ensure that only one fare product will be active at a time.

REQ-POP-242.2	Multiple Transit Products per Transit Account-3	Approved	F

Ensure that the PRESTO System will determine through TTC fare rules and product precedent rules which fare product will be used first. For example, a TTC Customer with trips) from a Pre-Funded purchase (for example, after a five or ten-trip discounted bulk purchase)left on their transit account may purchase at any time a monthly pass.   If the monthly pass becomes active before the Pre-Funded trip products are used up, the monthly pass will take precedence over any remaining Pre-Funded trips.   Once the monthly pass expires, any remaining Pre-Funded trips will then be used.

3.1.2.1 General Fare Processing

REQ-POP-79	Pricing and usage control of all TTC Fare Products and processing categories,	Approved	F

Ensure pricing and usage control of all TTC Fare Products and processing categories, inclusive of those trips associated with discounting or Concession fares shall occur based on table/rule driven parameters.

REQ-POP-79.1	Pricing and usage control of all TTC Fare Products and processing categories,-2	Approved	F

Ensure parameters are comprehensively defined in tables encompassing and enabling all pricings and authorized uses available under current TTC fare policy.

REQ-POP-80	The range and flexibility of such parameter settings will also enable pricing	Approved	F

The range and flexibility of parameter settings will enable pricing options by mode of transportation, route, location of devices, time of day, as well as other criteria stated in TTC's fare policy or determined by TTC's executive management.

REQ-POP-80.1	The range and flexibility of such parameter settings will also enable pricing-2	Approved	F

Enable parameter table settings to be controlled through the central processor.

REQ-POP-81	A comprehensive listing of parameter settings required for the PRESTO System will be	Approved	F

A comprehensive listing of parameter settings required for the PRESTO System will be detailed and will take into account the PRESTO System offered by PRESTO. PRESTO may offer additional parameter settings and functionalities as options in addition to the parameter settings and functionalities that are required by TTC and that will be provided by TTC in the Fare Matrix.

REQ-POP-82	PRESTO will ensure that fare calculation will occur in the following manner:	Approved	F

PRESTO will ensure that fare calculation will occur in the following manner:

| REQ-POP-82.1 | PRESTO will ensure that fare calculation will occur in the following manner:-2 | Approved | F |

Capture data read from the fare media as distinct trips.

| REQ-POP-82.2 | PRESTO will ensure that fare calculation will occur in the following manner:-3 | Approved | F |

Distinguish payment taps on transit devices from other financial payments, and from unpaid or non-revenue "taps" or Boardings for which no payment is due according to TTC's fare policies.

| REQ-POP-82.3 | PRESTO will ensure that fare calculation will occur in the following manner:-4 | Approved | F |

Apply trips and associated charges to transit accounts based on the type of processing established for the Customer's account.

| REQ-POP-82.4 | PRESTO will ensure that fare calculation will occur in the following manner:-5 | Approved | F |

Route to and store, trips and charges captured in the central processor in order to support all business support functions:

| REQ-POP-82.5 | PRESTO will ensure that fare calculation will occur in the following manner:-6 | Approved | F |

 - revenue assurance

| REQ-POP-82.6 | PRESTO will ensure that fare calculation will occur in the following manner:-7 | Approved | F |

 - risk management

| REQ-POP-82.7 | PRESTO will ensure that fare calculation will occur in the following manner:-8 | Approved | F |

 - ridership reporting

| REQ-POP-82.8 | PRESTO will ensure that fare calculation will occur in the following manner:-9 | Approved | F |

 - Business Intelligence functions such as revenue assurance, risk management, ridership reporting (e.g. Linked and Unlinked Trips)

| REQ-POP-82.9 | PRESTO will ensure that fare calculation will occur in the following manner:-10 | Approved | F |

Use data read and captured from fare media for calculating payments and authenticating transit usage, must only use those data fields present and readable on Open Standards compliant media.

| REQ-POP-82.10 | PRESTO will ensure that fare calculation will occur in the following manner:-11 | Approved | F |

Associate transit trips with an account number that can be an obfuscation of the financial account number through Tokenization, which will be assigned to the payment media in a manner to ensure compliance with PCI-DSS standards and all other applicable security standards and payment industry best practices.

| REQ-POP-82.11 | PRESTO will ensure that fare calculation will occur in the following manner:-12 | Approved | F |

Capture data read from payment media and then process it as either PAYG, Pre-Funded, single rides, or non-revenue fares, applying the appropriate charges within these processing categories.

REQ-POP-82.12	PRESTO will ensure that fare calculation will occur in the following manner:-13	Approved	F

Capture and process data from LUM in a manner consistent with the processing solution for all other Open Standard, account-based contactless media, except that LUM media will be treated in a closed-loop manner for payment of fares.

REQ-POP-82.13	PRESTO will ensure that fare calculation will occur in the following manner:-14	Approved	F

Ensure the application of pricing for PAYG, Pre-Funded, and single-ride trips shall be based on table/rules-driven parameters stored in the central processor. This includes functionality capable of managing Authorization and Pre-Authorization of open-loop payment media issued by banks and non-banking financial services entities, and direct funding service providers made possible through electronic transfers of funds.

REQ-POP-82.14	PRESTO will ensure that fare calculation will occur in the following manner:-15	Approved	F

Ensure the tables/rules-driven parameters will also encapsulate TTC's order of fare product precedence.

The order of fare product precedence rules will allow TTC to determine the order of fare product use for those Customers with multiple fare products associated with one transit account.

REQ-POP-82.15	PRESTO will ensure that fare calculation will occur in the following manner:-16	Approved	F

Ensure the application of usage criteria for non-revenue fare products shall be based on table/rules-driven parameters stored in the central processor.

REQ-POP-82.16	PRESTO will ensure that fare calculation will occur in the following manner:-17	Approved	F

Ensure all payment and usage transactions, and the associated processes by which the values and trips thereof are derived, shall be verifiable, reversible and repeatable by the PRESTO System, including the Data Mart

REQ-POP-82.17	PRESTO will ensure that fare calculation will occur in the following manner:-18	Approved	F

Ensure the central processor shall convert PAYG trips into a format consistent with retail Merchant payment transactions. Options for this configuration shall be:

REQ-POP-82.18	PRESTO will ensure that fare calculation will occur in the following manner:-19	Approved	F

 - parameter driven, and must include options for transaction aggregation and for non-aggregation capabilities consistent with card association standards and accepted card association and Merchant practices

REQ-POP-82.19	PRESTO will ensure that fare calculation will occur in the following manner:-20	Approved	F

 - consistent with practices available to closed-loop, as well as general purpose reloadable (GPR) Open Standards payment media. Although, closed-loop and GPR cards may have different transit rules

associated with them, both card types and devices must follow the same processes within the central processor

REQ-POP-82.20	PRESTO will ensure that fare calculation will occur in the following manner:-21	Approved	F

Ensure the central processor is capable of parameter settings that are tailored to and accommodate the unique processing requirements of Open Standard card association products, products of other certified issuers, such that all Open Standard card products that are contactless can be accepted and processed.

REQ-POP-82.21	PRESTO will ensure that fare calculation will occur in the following manner:-22	Approved	F

Ensure the system is capable of processing standard, ISO/IEC 8583/BASE 24 data from all form factors.

REQ-POP-82.22	PRESTO will ensure that fare calculation will occur in the following manner:-23	Approved	F

Provide the necessary interface, configurations and files for processing payments with any commercially available Merchant Acquirer.

REQ-POP-82.23	PRESTO will ensure that fare calculation will occur in the following manner:-24	Approved	F

Ensure functionality of managing Authorization and pre-Authorization of open-loop payment media issued by banks and non-banking financial services entities and direct funding service providers is made possible through electronic transfers of funds.

REQ-POP-83	The Central Processor must be capable of accepting, and appropriately	Approved	F

Ensure the system is capable of accepting, and appropriately processing, third party closed-loop media that conform to Open Standards business and technical guidelines for transit payment such as employee identification cards, student payment cards, government subsidized social benefit cards, and other direct payment media. It is expected that the Closed Loop card would contain a contactless payment application identical to the open card, but that it would be restricted to use at TTC.

3.1.2.2   Fare Policy Matrix

REQ-POP-84	The following tables and discussion present a summary of TTC's current fare	Approved	F

The following tables and discussion present a summary of TTC's current fare products and their pricings, where applicable, according to the aforementioned processing categories. A further, comprehensive presentation of TTC Fare Products, processing categories, and fare policy and business rules will be provided in the Fare Matrix as mutually agreed upon by TTC and PRESTO prior to Final Design.

For the excel version of the TTC Specifications these tables are located in POP-84 in the document Appendix G for Excel Version of TTC Specifications.

Pre-Funded Processing Category Adult Fares (72% of total Linked Trips)			
Fare Product	Price	% of Total TTC Linked	Notes

Pre-Funded Processing Category Adult Fares (72% of total Linked Trips)			
		Trips	
5 tokens	$12.50	26.2%	Minimum purchase is 5 tokens.
10 tokens	$25.00		Minimum purchase is 10 tokens.
Monthly Pass	$121.00	44.2%	
MDP Monthly Pass	$111.00		MDP program: for more information for MDP and VIP, please refer to the appendices.
VIP	Various		
Weekly Pass	$36.00	1.9%	

Table Pre-Funded - Adult Fares

Pre-Funded Processing Category Senior/Student Fares (12% of total Linked Trips)			
Fare Product	**Price**	**% of Total TTC Linked Trips**	**Notes**
5 tickets	$8.25	8.2%	Minimum purchase is 5 tickets.
10 tickets	$16.50		Minimum purchase is 10 tickets.
Monthly Pass	$99.00	3.3%	MDP program: for more information for MDP and VIP, please refer to the appendices.
MDP Monthly Pass	$89.00		
Weekly Pass	$28.00	0.2%	

Table Pre-Funded - Senior/Student Fares

Pre-Funded Processing Category Other Fares (5.5% of total Linked Trips)			
Fare Product	**Price**	**% of Total TTC Linked Trips**	**Notes**
Day/Family Pass	$10.00	2.4%	Weekdays-one person. Holidays/weekends-up to 6 persons, a maximum of 2 adults. Special promotions during holidays.
Child Ten Ticket	$5.50	1.8%	Sold in strips of ten rides.
GTA Pass	$52.00	1.2%	TTC; Mississauga; Brampton; York Region
Downtown Express	Second fare equal to ticket or token rate, or Express Sticker	0.1%	Available to adults, seniors, students, and children; sold in minimum quantities of 5 and 10 rides.

Table Pre-Funded - Other Fares

Pay-As-You-Go of Single Ride Trip Processing Category (10.5% of total Linked Trips)			
Fare Product	**Price**	**% of Total TTC Linked Trips**	**Notes**
Adult Cash Fare	$3.00	8.8%	
Senior/Student Cash Fare	$2.00	1.2%	
Child Cash	$0.75	0.5%	

Table Pay-As-You-Go - Single Ride Trip

REQ-POP-85	**Other Pre-Funded Revenue Fares**	Approved	F

Ensure the system is capable of multiple Pre-Funded revenue fares. Such as convention passes, special events passes or post-secondary passes

REQ-POP-86	**Single-Ride Fares Sold as LUMs, Transfers with LUMs**	Approved	F

Support LUM as a single ride fare media for cash paying Customers.

REQ-POP-86.2	**Single-Ride Fares Sold as LUMs, Transfers with LUMs-2**	Approved	F

Support LUM as a transfer media

REQ-POP-86.3	**PRESTO shall enable the PRESTO System to support issuance and processing of contactless,**	Approved	F

Support issuance and processing of contactless, Open Standard universal media in an account-based manner.

REQ-POP-86.3.1	**PRESTO shall enable the PRESTO System to support issuance and processing of contactless,-2**	Approved	F

Make LUM purchased at Single Ride Vending Machines valid for a single trip and applicable transfers.

REQ-POP-86.4	**The Central Processor will recognize a LUM dispensed from a SRVM as a single**	Approved	F

The central processor shall recognize a LUM dispensed from a SRVM:

REQ-POP-86.4.1	**The Central Processor will recognize a LUM dispensed from a SRVM as a single-2**	Approved	F

- as a single trip instrument with transfer privileges

REQ-POP-86.4.2	**The Central Processor will recognize a LUM dispensed from a SRVM as a single-3**	Approved	F

- will report, track, monitor, and otherwise perform all PRESTO System business functions as apply to any contactless, Open Standard account-based media accepted for payment by the PRESTO System

REQ-POP-86.4.3	The Central Processor will recognize a LUM dispensed from a SRVM as a single-4	Approved	F

Ensure that the PRESTO System treats each LUM in an account-based manner for processing, revenue integrity, Customer inquiries and support and revenue accountability purposes.

REQ-POP-86.5	In addition, to support purchasers of single rides with cash on buses who wish	Approved	F

Support Customers who have been issued a contactless LUM from a bus operator for use as a transfer.

REQ-POP-86.6	The Central Processor will recognize a LUM dispensed from a LUM On Bus	Approved	F

Recognize a LUM dispensed from a LUM on Bus Dispenser as a transfer. Report, track, monitor, and otherwise perform all PRESTO System business functions including Customer inquiries and support, as apply to any contactless, Open Standard account-based media accepted for payment by the PRESTO System. The PRESTO System treats each LUM used as a transfer in an account-based manner for processing revenue integrity, and revenue accountability purposes.

REQ-POP-86.7	LUMs dispense by SRVMS on-board LRVs are activated on purchase;	Approved	F

Make LUM dispensed by SRVMs on-board LRVs activated on purchase; no tap is required.

REQ-POP-86.7.1	LUMs dispense by SRVMS on-board LRVs are activated on purchase;-2	Approved	F

Make LUM dispensed on street and subways activated on first tap.

REQ-POP-86.7.2	LUMs dispense by SRVMS on-board LRVs are activated on purchase;-3	Approved	F

Make LUM dispensed by the bus operator activated when the operator issues the LUM.

REQ-POP-87	Non-Revenue Fares	Approved	F

Ensure that the non-revenue fare products will be processed and managed in a Pre-Funded manner.

REQ-POP-87.1	For non-revenue fare products, this means PRESTO will enable the PRESTO System to	Approved	F

Support distribution, administration, reporting, TTC Customer support, and issuance of contactless Open Standards, account-based media for specific use as closed-loop fare payment devices on TTC transportation services, and other services defined as part of the PRESTO System for non-revenue fare products.

REQ-POP-87.1.1	For non-revenue fare products, this means PRESTO will enable the PRESTO System to-2	Approved	F

Provide three (3) sets of issuing equipment for issuing contactless media for use as non-revenue fare media and all media required for issuance.

REQ-POP-87.2	These fare products and the TTC Customers served include, but are not limited to	Approved	F

Ensure fare products and the TTC Customers served include:
 - Passes for TTC employees - TTC pensioners - TTC student employees

REQ-POP-88	Fare Policy	Approved	F

Fare policy: PRESTO and TTC will consider fare policy options that could enhance TTC Customer service and result in increased ridership and in increased general use of public transportation. In offering proposals for processing these fare products PRESTO will need to take into account the specific requirements, rules, and regulations that govern the management, distribution, eligibility for, and use of these fare products.

REQ-POP-88.1	PRESTO will ensure that processing of these fare products will comply with	Approved	F

Ensure that processing of these fare products will comply with processes and procedures of the financial services and payments industries.

REQ-POP-88.2	PRESTO will ensure that PRESTO System calculates PAYG, Pre-Funded, Single-Ride Trips,	Approved	F

Ensure that PRESTO System calculates PAYG, Pre-Funded; single-ride trips, non-revenue fares, and transfers in an account-based manner.

REQ-POP-88.2.1	PRESTO will ensure that PRESTO System calculates PAYG, Pre-Funded, Single-Ride Trips,-2	Approved	F

Capture all usages of contactless media and devices used for payment of fares, including LUM, and calculate payments due TTC, if any.

REQ-POP-88.2.2	PRESTO will ensure that PRESTO System calculates PAYG, Pre-Funded, Single-Ride Trips,-3	Approved	F

Authorize each usage in real-time against information about the transit account that is either stored in or available through the central processor.

REQ-POP-88.3	An Authorization that returns an "approval" will permit entry to the system	Approved	F

An Authorization that returns an "approval" will permit entry to the system. An Authorization approval will be conditional on a validation of the active status of Customer's account with the PRESTO System using standard Authorization protocols of the financial services and payments industry. The Authorization process shall check for:

REQ-POP-88.3.1	An Authorization that returns an "approval" will permit entry to the system-2	Approved	F

- active status of a Pre-Funded transit account

REQ-POP-88.3.2	An Authorization that returns an "approval" will permit entry to the system-3	Approved	F

- active status of Customer's credit, debit, or GPR contactless media or device to pay fares as single trips (PAYG)

REQ-POP-88.3.3	An Authorization that returns an "approval" will permit entry to the system-4	Approved	F

- status of LUM as a single-ride trip or transfer, and appropriate usage according to TTC fare policies

REQ-POP-88.3.4	An Authorization that returns an "approval" will permit entry to the system-5	Approved	F

- active status of a non-revenue fare account

| REQ-POP-88.3.5 | An Authorization that returns an "approval" will permit entry to the system-6 | Approved | F |

- authenticity of the contactless payment media or device

| REQ-POP-88.4 | In determining the actual payment due from Customers, the PRESTO will ensure | Approved | F |

Apply all TTC fare policy and business rules on free transfers, Velocity Checks and Passbacks, such as those governing free transfers (including transaction-free transfers), Velocity Checks, or Passbacks..

| REQ-POP-88.5 | During Design Review, TTC will work with the PRESTO to create a comprehensive | Approved | F |

TTC will work with PRESTO to create a comprehensive Fare Matrix that summarizes all current TTC fare policy pricings and usage guidelines for processing fare transactions with the PRESTO System. PRESTO will submit a comprehensive flow chart that illustrates transaction processing flows for programming the central processor for each of the fare processing categories.

3.1.3   General Transaction Processing

| REQ-POP-89 | Replication of Retail Merchant Experience | Approved | F |

Replicate the TTC Customers' experience at a retail Merchant by allowing direct presentment of a contactless credit, debit, or GPR without any intervening steps.

| REQ-POP-89.1 | Replication of Retail Merchant Experience-2 | Approved | F |

Functionality will be realized in a manner that protects TTC's revenue, as well conforms to business and technical guidelines for Open Standards payments for Authentication of contactless payment instruments and Authorization processes for retail payments as required and certified by card associations and the financial services industry.

| REQ-POP-90 | Fare Processing Options | Approved | F |

Ensure that fare and processing options to be made available and implemented on demand are:
 - Non-calendar based, or "rolling" passes- Discounting options

| REQ-POP-90.1 | Configurable Fare Pricing Options | Approved | F |

Ensure that PRESTO System will be configured in a manner that will permit other fare pricing options at TTC's discretion.

| REQ-POP-90.2 | Fare Processing Options-2 | Approved | F |

Ensure flexibility to allow the additional functionality of permitting time, distance and direction based trips.

| REQ-POP-91 | Real time Fare Payment | Approved | F |

Ensure that upon presentation of contactless payment media to a reader, processes required to ensure payment of fare will be configured to be executed in real-time.

| REQ-POP-91.2 | Real time Fare Payment-2 | Approved | F |

Ensure the system will possess functionality to authenticate locally all contactless media presented for payment in the event that network communications between readers and the PRESTO System back-office are not operational.

REQ-POP-91.3	Off-line EMV transactions	Approved	F

OPTIONAL - For EMV-compliant Open Payments Media, an off-line EMV transaction is permitted if the PRESTO System supports off-line EMV transactions.

REQ-POP-91.4	Store and Forward	Approved	F

OPTIONAL - Enable Store and Forward functionality for non-EMV-compliant cards.

REQ-POP-91.5	Seamless Off-Line Transactions at Reader Assemblies	Approved	F

Off-Line transactions at reader Assemblies shall not be noticeable by the TTC Customer.

REQ-POP-91.6	Restoration of Network Connectivity	Approved	F

Should an off-line transaction occur, PRESTO will ensure that on-line connectivity is restored in accordance with the requirements set forth in this schedule.

REQ-POP-91.7	Reader Assembly Hot List	Approved	F

Ensure the Open Standards system has the capability of supporting a "local" Hotlist and BIN table resident at the Reader Assembly.

REQ-POP-91.8	Reader Hot List Optimization	Approved	F

Ensure the design of the local Hotlist enables TTC to sustain its risk management efforts within norms for TTC Merchant environment, and within thresholds established by the financial services and payments industries for management of fraud.

REQ-POP-91.8.1	Reader Hot List Optimization-2	Approved	F

Ensure that when network communications with the back-office are re-established, the PRESTO System is capable of resuming normal operations. This includes appropriate processing of fare payment transactions performed during any period of network communications outage.

REQ-POP-91.10	Central Processor Capacity	Approved	F

Ensure that the central processor has sufficient power to process any spike in transactions that may occur once the network connection has been re-established.

REQ-POP-92	Tap Transaction Speed	Approved	F

The Tap Transaction Speed requirement has been removed.   Customer throughput as defined by RAS-51 applies to Open Payments Media as well as PRESTO Media.

REQ-POP-92.1	Twice Anticipated Transactions Per Second	Approved	F

Ensure that the central processor process at least twice the maximum anticipated transactions per second at TTC.

REQ-POP-92.2	Tap Transaction Speed-2	Approved	F

Ensure that the valid - invalid response from the central processor to the reader assemblies is based on financial payment processes and/or TTC approved acceptance/denial parameters.

REQ-POP-94	Operator Independent of Financial Risk	Approved	F

The financial payment risk arising from the operation of the PRESTO System is to be independent from the operator or the interpretation of Open Standards. In addition, PRESTO will ensure that the services levels are designed in such manner as to standardize the risk profile for the operation of the

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PRESTO System, regardless of operator.

REQ-POP-95	Use of Financial Payment Test Card Suites	Approved	F

PRESTO will test and measure the financial payment test card suites for the whole range of EMV and non-EMV that are in TTC Customers hands will be tested and system performance measured for test cards in the suites.

3.1.4   PAYG Transaction Processing

REQ-POP-96	Support for PAYG	Approved	F

Ensure support of the payment of fares as PAYG.

REQ-POP-96.1	Support for PAYG-2	Approved	F

Ensure that all Customers can purchase single trips as PAYG at the Point of Entry to TTC system, whether at Fare Gates or on vehicles equipped with reader assemblies when Customers use contactless bank-issued credit and Debit Cards or devices, GPR cards, or other Open Standard, account-based contactless media.

REQ-POP-97	PAYG Aggregation	Approved	F

Ensure the capability of aggregating individual single trips (PAYG) - subject to predetermined time and/or dollar value parameters by the back-office into a single payment transaction. (e.g. 2 weeks or $15.00, whichever comes first).

by the back-office into a single Payment Transaction. Such time and dollar value functionality must be resident in the Central Processor and managed via a table/rules-driven methodology, or via an alternate, easily modifiable means. Such aggregation rules and table settings may be subject to card association financial industry approval.

REQ-POP-98	Central Processor Support for Open Payments	Approved	F

Ensure central processor is programmed with additional functionalities consistent with capabilities needed to support Open Standards payments in a retail Merchant environment such as:

 - The dollar value of an Authorization after the first tap within the predetermined aggregation period;
- Single or dual Authorization capability; and - Customer-directed Authorization (i.e., use the INTERAC network as opposed to the VISA or MasterCard network with regards to future Debit Contactless).

Note that the TTC Customer will not be forced to register for PAYG type transactions; however the PRESTO System will be designed to allow Customers to direct the PRESTO System transit account financial payment Authorizations as per Canadian banking rules.

REQ-POP-98.1	Flexibility to Address Branding Variability	Approved	F

The purpose of such parameter settings is to permit flexibility when addressing processing requirements of unique brands, rate issues, and operating impacts associated with certain processing modes for differing brands and card associations.

REQ-POP-99	Reposting Payment Transactions	Approved	F

Ensure reposting payment transactions presented at the end of the aggregation period or once the predetermined dollar value threshold is reached.

REQ-POP-99.1	Reposting Payment Transactions-2	Approved	F

Ensure the system will capture the decline code returned by a Merchant Acquirer and determine whether such decline was a hard decline or a soft decline.

REQ-POP-100	Flexible Soft Decline Support	Approved	F

Ensure support of reposting soft-declines for Authorization based on table-driven time and count parameters.

REQ-POP-100.1	Flexible Soft Decline Support-2	Approved	F

Enable the flexibility of treatment of hard and soft declines when allowing TTC Customers to enter the transit system.

REQ-POP-101	Support for Transition to Pre-Funded Accounts	Approved	F

Ensure support of orderly, auditable close-out of PAYG transit accounts and TTC Customers' transition to and enrolment in Pre-Funded accounts.

REQ-POP-101.1	Support for Transition to Pre-Funded Accounts-2	Approved	F

Ensure that PRESTO System will be capable of supporting orderly, auditable close-out of PAYG transit accounts and Customers' transition to and enrolment in Pre-Funded accounts.

Ensure ability to aggregate all PAYG transactions, whether posted at the time or subsequent to the TTC Customers' enrolment and transition to a Pre-Funded account.

REQ-POP-102	Accurate Calculation of Interchange Fees	Approved	F

Ensure that PRESTO System will incorporate all functionality and data elements required by the financial services and payments industries to enable and ensure accurate calculation, processing, auditing and payment of interchange rates and other fees.

REQ-POP-103	Chargeback Processes	Approved	F

Ensure to incorporate all functionality, processes, and data elements required by the financial services and payments industries to enable and ensure protection (e.g. minimize financial losses) against Chargebacks.

3.1.5   Pre-Funded Transactions

REQ-POP-104	Support for Pre-Funded Products	Approved	F

Ensure processing of the sale and use of TTC Fare Products categorized as Pre-Funded as traditional retail purchases using Open Standards payment devices.

Ensure the ability for the Customer to "reload" their transit account with sufficient funds to make a Pre-Funded purchase, as well as the capability to permit recurring reloads according to parameters permitted by TTC.

REQ-POP-105	Pre-Funded Sales Channels	Approved	F

Venues for making purchases of Pre-Funded fare products will include, but are not limited to the fare media vending machines, AVMs, the web site, the Customer service call centre, non-TTC retail sales and reload locations provided by PRESTO, and other sites participating in the PRESTO System as required in the schedule.

REQ-POP-106	Conformance to Financial Services Standards	Approved	F

Ensure acceptance of contactless credit, debit, and GPR devices at all sales and reload locations.

TTC transit fares will conform to financial services industry and card association rules, procedures, and processes.

REQ-POP-107	Payment Settlement Process	Approved	F

Ensure recording and support of the payment settlement process once a payment transaction is authorized.

A denial response from the Authorization process will end the sales transaction and/or deny Customer's entry to or use of TTC's transportation services. In addition, the PRESTO System must associate the fare product purchase with a unique TTC Customer account number in a manner that complies with PCI-DSS. For each Pre-Funded fare option available, the central processor will apply appropriate corresponding fare rules for use of the Pre-Funded fare product.

3.1.6   TTC Customer Support of Fare Payment

REQ-POP-108	Centralized Customer Account Information	Approved	F

Ensure that all Customer support functions are being enabled by account information within the PRESTO System's central processor.

REQ-POP-108.1	Centralized Customer Account Information -2	Approved	F

Ensure reader assemblies at points-of-entry provide simple approval and denial of payments in response to Authorization requests.

REQ-POP-109	No Amount Value at Reader Assemblies	Approved	F

Information about dollar value of payments, the type of Pre-Funded fare purchase associated with accounts, and whether or not a charge will be incurred will be unavailable at reader assemblies.

REQ-POP-110	Alternative Payment Methods	Approved	F

Ensure the central processor is capable of supporting alternative payment methods, provided that such payment methods conform to generally-accepted financial and payment industry standards, and Customers have funds guaranteed through their personal banking relationships, cell phone payments, bill payment providers, and other means and entities that use Open Standards of the financial services and payments industries.

REQ-POP-111	On-line Registration Process	Approved	F

Ensure access to account-based information resident in the central processor is accommodated via an online registration process.

REQ-POP-111.1	On-line Registration Process	Approved	F

Enable the central processor to support establishment of a unique password or personal identification number or equivalent process, such as user defined queries, as defined by Canadian financial standards, to access payment and trip information for an account.

REQ-POP-112	Customer Directed Account Management	Approved	F

Ensure that the central processor supports the following functionalities of Customer-directed account management and inquiries via the web site:

REQ-POP-112.1	Customer Directed Account Management-2	Approved	F

 - selecting and purchasing all Pre-Funded products available under TTC's fare policy(excluding any PAYG, Single Trip, and Non-Revenue fare products)

REQ-POP-112.2	Customer Directed Account Management-3	Approved	F

- Authentication and eligibility administration processes consistent with TTC and other applicable policies and procedures for TTC Customers eligible for Concession fares.

REQ-POP-112.3	Customer Directed Account Management-4	Approved	F

- account management and summary information relating to trips taken, per trip charges, payments, account setups and registrations, account cancellations and refund processing, auto-reload management, account transfers, and claims status for all TTC Fare Products.

REQ-POP-112.4	Customer Directed Account Management-5	Approved	F

- secure report generation of trips, charges, and other account information, as required by the Customer direct to their printer or to additional common formats and Software.

REQ-POP-113	Real-time Sales Transactions	Approved	F

Ensure that sales transactions and Customer inquiries through the web site will be executed in real-time.

REQ-POP-113.1	Use of Credit / Debit Cards for Sales	Approved	F

Sales transaction processing will permit TTC Customers to use credit or debit as forms of payment and any form of payment that is enabled through electronic transfer of funds in a manner consistent with Open Standards of the financial services and payments industries. Customers preferring to use PIN-based Debit Cards will be supported according to financial industry guidelines for processing PIN-based debit transactions.

This functionality may require use of commercially available, card association type-certified Software and Hardware. It may also require development of additional capabilities, such as end-to-end encryption, to ensure protection of restricted PIN data, secure storage of TTC Customer information, and acknowledgements of participation in compliance with PCI-DSS.

REQ-POP-114	Collection of Necessary Information for Authorizations	Approved	F

Ensure that the central processor supports collection of required information for executing Authorizations according to financial services and payment industry guidelines.

Information required will include, card validation codes, postal codes, and telephone numbers required as part of address verification services, and card expiration data.

REQ-POP-115	Fare Sales via Call Centre	Approved	F

Ensure that fare sales through a staffed Customer service call centre, or through a combination of a staffed sales centre and IVR is supported in the same manner as sales through the web site.

REQ-POP-115.1	Secure Access to Customer Accounts	Approved	F

Ensure the central processor supports secure access to Customer account information in compliance with PCI-DSS. The credit or Debit Card account used for payment will be the same card account that a Customer will be required to present for validation at TTC points-of-entry.

REQ-POP-116	Customer Access to Historical Data	Approved	F

Ensure that the central processor will retain and enable access to historical Customer fare payment and usage transaction information related to trips taken and payment transactions made by Customers.

REQ-POP-116.1	Historical Transaction Data Consistent with Open Payment Standards	Approved	F

Ensure all payment transactions are made available to Customers in a manner consistent with information captured by Open Standards media used in processing retail payments.

REQ-POP-116.2	Adherence to PCI Standards	Approved	F

For historical information, capture and access should conform to PCI-DSS, all applicable Canadian privacy laws as well as appropriate laws regarding receipts.

REQ-POP-116.2.1	Adherence to PCI Standards-2	Approved	F

For information about trips taken, TTC Customers will have access to detailed historical information through the web site and the Customer service centre's IVR and live agents.

REQ-POP-117	Consistent Transaction Data	Approved	F

Ensure Customer fare payment and usage transaction information captured is identical for all Open Standards media accepted, including any closed-loop media.

REQ-POP-118	Real-Time Transaction Data Available to Customers	Approved	F

Ensure Customer fare payment and usage transaction information is captured and made available to Customers in real time.

REQ-POP-118.1	Additional Transit Information	Approved	F

The PRESTO System will be capable of supplementing payment transaction information with information provided from TTC as a transit Merchant regarding points of entry to TTC's transportation services.

REQ-POP-118.2	Customer Information	Approved	F

Provide the capability of supporting access to information voluntarily provided by Customers in establishing transit accounts, including details of Customers' processing and payment preferences.

REQ-POP-119	Information Available to Customer	Approved	F

Ensure that information available to the Customer will consist of at least the following:

REQ-POP-119.1	Information Available to Customer-2	Approved	F

- trips taken, identified by date, time, and location of contactless media acceptance

REQ-POP-119.2	Information Available to Customer-3	Approved	F

- the dollar value of the trip(s) taken, including a record of transfers taken at no additional cost to the Customer

REQ-POP-119.3	Information Available to Customer-4	Approved	F

- the date and time billing for exchange of funds occurred

REQ-POP-119.4	Information Available to Customer-5	Approved	F

- the fare product purchased

REQ-POP-119.5	Information Available to Customer-6	Approved	F

- the Merchant paid

REQ-POP-120	Transfer of Customer Account Balances	Approved	F

Ensure that as part of its support of web site operations, the central processor will enable Customers and Customer agents to transfer account balances and associated activities, from one Open Standard compliant contactless media to another or from a PRESTO System transit account to another PRESTO System transit account.

REQ-POP-120.1	Self-Service Transfers	Approved	F

Self-service transfers will be restricted to bank-issued media and to media that has been registered at the central processor by TTC Customers. This capability will be available at the Customer service call centre to TTC Customer service staff and to TTC Customers who chose to use the IVR system, provided that access is in conjunction secure entry of a PIN by TTC Customers themselves. This capability will also be available at non-TTC retail sales and reload network locations, in accordance with rules allowed by the CBA and bank- issued cards.

REQ-POP-121	Support for Customer Claims	Approved	F

Ensure that the central processor will support Customer claims and requests for refunds or credits.

REQ-POP-121.1	Support for Usage Related and Payment Related Claims	Approved	F

Ensure that two categories of claims are supported:

REQ-POP-121.1.1	Support for Usage Related and Payment Related Claims-2	Approved	F

- usage related claims. Usage claims concern all issues arising from individual transit trips taken and paid using an account established through the PRESTO System

REQ-POP-121.1.2	Support for Usage Related and Payment Related Claims-3	Approved	F

- payment related claims

REQ-POP-121.2	Uniqueness of Claims	Approved	F

These claims are unique in that they originate with use of payment media at the Point of Entry or acceptance to TTC's transportation services. Resolution may require TTC expertise.

REQ-POP-122	Availability of Claims Resolutions	Approved	F

Ensure that the central processor will record and make available information about payments made from a Customers' accounts, Customers and authorized personnel for the purpose of supporting the resolution of payment claims made through their issuer.

REQ-POP-122.1	Sufficient Information for Claims and Chargebacks	Approved	F

Ensure the back-office claims functionality supported via the central processor are certified as PCI-DSS compliant and contain all necessary and sufficient information to support any and all claims that Customers could potentially make.

REQ-POP-122.2	Auditing and Issue Tracking	Approved	F

Ensure the central processor provides auditing and issue tracking capabilities for intake and resolution of all Customer claims. All claims and issues will be tracked to completion and archived.

REQ-POP-123	Refund Functionality	Approved	F

The central processor will be capable of processing a refund or adjustment to a TTC Customer's credit or Debit Card on the same Business Day, or as determined by CBA rules, at an appropriate time after an investigation by representatives of PRESTO determines that resolution via a refund is appropriate and Authorization for a refund or adjustment is given. Refunds and adjustments will only be made to a TTC Customer account that is active and registered with the central processor.

REQ-POP-124	Generation of Refund Statement	Approved	F

Ensure all refunds result in automatic generation of a statement for financial reporting and auditing purposes.

REQ-POP-124.1	Generation of Refund Statement-2	Approved	F

Ensure the refund process interfaces with risk management and Business Intelligence functions.

REQ-POP-124.2	Generation of Refund Statement-3	Approved	F

Ensure this interface supports analysis and investigation of account usage and payments as well as other risk management activities required of Merchants.

REQ-POP-125	Balance Protection	Approved	F

Provide a balance protection program for Pre-Funded TTC Fare Products.

Customers registered their transit accounts in the balance protection program in advance of the loss of their contactless media according to guidelines established by TTC and PRESTO;

Customers reported their contactless media as lost or stolen according to guidelines established for the program.

REQ-POP-126	Use of LUM for Cash Customer	Approved	F

PRESTO will note that the single ride Cash Customer fare product (i.e. LUM), and all non-revenue fare products will not be eligible for enrolment in the balance protection program.

REQ-POP-127	Validity of Protection Plan	Approved	F

Ensure that any proposed protection plan complies with existing accepted regulations, rules, and practices of the financial services and payments industry in Canada.

REQ-POP-128	Email Notification for Balance Protection	Approved	F

Ensure the system generates a notification about the balance protection claim.

REQ-POP-129	Renewal and Re-issuance Notifications	Approved	F

Ensure the system will support renewal and re-issuance notifications for co-branded closed-loop media (excluding single ride trips paid with LUMs) issued directly by TTC or through a third party on TTC's behalf.

REQ-POP-129.1	Registration Process	Approved	F

Registration will be accomplished under TTC's balance protection program, as outlined above, and will be a prerequisite for providing this Customer service option.

REQ-POP-129.2	Self-Directed Information Access	Approved	F

Ensure support for self-directed information access and media renewal through interactive processes accessible on the web site and through the Customer service call centre as part of the notification and re-issuance processes.

REQ-POP-130	Immediate Broadcast of Lost or Stolen Open Payments Media	Approved	F

Ensure immediate broadcasting of the addition of a lost or stolen contactless payment media to the centralized Hotlist, as well as to any local Hotlists, should these be incorporated in the proposed solution, on all Contactless Readers at all points-of-entry.

REQ-POP-130.1	Use of Global (Card Association) Hot Lists	Approved	F

The central processor will be capable of accepting Hotlists from card associations and other financial industry service providers, and populating the centralized Hotlist on the central processor, or at other components and functionalities comprising the PRESTO System solution. Processing and procedures for updating Reader Assembly Hotlists will need to be designed and implemented according to accepted standards of the financial services and payments industry.

REQ-POP-131	Receipt of Updated Hot Listed Information	Approved	F

Ensure affirmation of receipt of updated Hotlist information by all components of the PRESTO System will be a prerequisite for the timing of Customer refunds.

REQ-POP-131.1	Receipt of Updated Hot Listed Information-2	Approved	F

The central processor will be configured to transfer the remaining balance to another account provided that the account was established using a contactless device accepted by TTC.

3.2 Processes Specific to Transit Merchants

3.2.1 Autoload of Transit Accounts

REQ-POP-132	Support for Autoload	Approved	F

Ensure support of the auto load of all Pre-Funded fare purchases, excluding non-revenue fare products processed using the Pre-Funded processing model.

REQ-POP-132.1	Support for Autoload-2	Approved	F

Enable opportunity for Customers to "opt-in" for automatic reloading of their transit account.

REQ-POP-133	Customer Selection of Autoload Option	Approved	F

Ensure auto load function will be available as an option to Customers who wish to maintain an account balance or renew purchases of a specific fare product on an ongoing basis.

REQ-POP-133.1	Customer Selection of Autoload Option-2	Approved	F

The procedure will require registration and establishment of a means of payment acceptable to TTC.

REQ-POP-134	Autoload Parameters	Approved	F

The PRESTO System shall support the following Customer options for automatic reloading:

REQ-POP-134.1	Autoload Parameters-2	Approved	F

- the frequency of the auto load

REQ-POP-134.2	Autoload Parameters-3	Approved	F

 - for Pre-Funded pass products only, the number of days prior to their expiration that auto load will occur

REQ-POP-134.3	Autoload Parameters-4	Approved	F

 - for value-based, Pre-Funded reloads only, the balance threshold at which the auto load will occur for any value-based Pre-Funded products.

REQ-POP-135	Authorization Attempts for Autoload	Approved	F

Enable table/rule-driven settings of the number of Authorization attempts that will be allowed for the purpose of automatically reloading an account.

REQ-POP-135.1	Status Alerts	Approved	F

Enable alerting registered auto load users of the card status via email or SMS text messages in the event that a Pre-Funded account is no longer valid due to excessive decline responses.

REQ-POP-135.2	Authorization Attempts for Autoload-2	Approved	F

For each declined Authorization, the PRESTO System will operate consistent with the procedures listed in this schedule.

REQ-POP-136	Autoload Complying to Canadian Banking Standards	Approved	F

All auto load of transit accounts will comply with Canadian banking standards. In particular, auto reloads using debit accounts will only be done on a strictly periodic basis (i.e., monthly) and only for a fixed amount. If any of these parameters changes, the PRESTO System will notify and obtain from the TTC Customer permission to accept these changes.

3.2.2   TTC Customer Claims (Non-Chargeback) Intake and Processing

REQ-POP-137	Claims Processing	Approved	F

The PRESTO System will efficiently process complaints and inquiries from TTC Customers. Processing of claims supported by the back-office (other than Chargebacks) will be addressed in two categories:

REQ-POP-137.1	Claims Processing-2	Approved	F

 - claims of an inaccurate fare payment calculation resulting from the acceptance of an Open Standard, bank-issued credit and debit contactless devices.

REQ-POP-137.2	Claims Processing-3	Approved	F

 - claims resulting from the sale or reload of anonymous open or closed-loop Open Standard contactless devices at points of sale owned or operated by TTC that accept cash.

REQ-POP-138	Compilation and Management of Claims	Approved	F

The PRESTO System will be capable of supporting compilation and management of claims from all sources of TTC Customer contact with TTC, including:

REQ-POP-138.1	Compilation and Management of Claims-2	Approved	F

 - the web site provided by PRESTO

| REQ-POP-138.2 | Compilation and Management of Claims-3 | Approved | F |

- Customers' phone communications with the Customer service call centre

| REQ-POP-138.3 | Compilation and Management of Claims-4 | Approved | F |

- letters and e-mails directed to TTC

| REQ-POP-138.4 | Compilation and Management of Claims-5 | Approved | F |

- walk-in claims submitted at TTC's Customer service centre at 1900 Yonge Street.

| REQ-POP-139 | Data for Claims Processing | Approved | F |

Data captured for claims processing will be consistent with data required for processing payment claims in an Open Standards processing or retail Merchant environment. At a minimum, the PRESTO System will capture, process, and support management of the following information:

| REQ-POP-139.1 | Data for Claims Processing-2 | Approved | F |

- Customer name, address, phone number, and email account

| REQ-POP-139.2 | Data for Claims Processing-3 | Approved | F |

- account number and payment media type and Issuer

| REQ-POP-139.3 | Data for Claims Processing-4 | Approved | F |

- claim reference number

| REQ-POP-139.4 | Data for Claims Processing-5 | Approved | F |

- date, time and location of incident

| REQ-POP-139.5 | Data for Claims Processing-6 | Approved | F |

- amount of claim

| REQ-POP-139.6 | Data for Claims Processing-7 | Approved | F |

- description of claim, with comments field

| REQ-POP-139.7 | Data for Claims Processing-8 | Approved | F |

- Point of Entry or hand-held point of sale device serial number

| REQ-POP-139.8 | Data for Claims Processing-9 | Approved | F |

- comments field for investigation process

| REQ-POP-139.9 | Data for Claims Processing-10 | Approved | F |

- investigation result code

| REQ-POP-139.10 | Data for Claims Processing-11 | Approved | F |

- approval code and authorizing entity or individual

REQ-POP-139.11	Data for Claims Processing-12	Approved	F

- claim resolution amount

REQ-POP-139.12	Data for Claims Processing-13	Approved	F

- method of claim resolution

REQ-POP-139.13	Data for Claims Processing-14	Approved	F

- resolution date

REQ-POP-139.14	Data for Claims Processing-15	Approved	F

- processing date

REQ-POP-140	Once an investigation has been completed and a determination made, PRESTO will	Approved	F

Ensure that the claim disposition will be fully automated so that investigation and resolution can occur in less than two calendar days once an investigation has been completed and a determination made.

REQ-POP-140.1	Once an investigation has been completed and a determination made, PRESTO will-2	Approved	F

The resolution period will be explicitly presented to the TTC Customer as part of the terms and agreement.

REQ-POP-141	Claim Resolution and Disposition Process	Approved	F

Ensure support of the following claim resolution and disposition processes:

REQ-POP-141.1	Claim Resolution and Disposition Process-2	Approved	F

 - calculation of pro rata payment amounts for all fare products based on time and date of claim receipt

REQ-POP-141.2	Claim Resolution and Disposition Process-3	Approved	F

 - preparation of a claim disposition statement that can be generated and sent to TTC Customers as an e-mail, an SMS text message, or as automatically generated reprinted correspondence for mailing to the TTC Customer

REQ-POP-141.3	Claim Resolution and Disposition Process-4	Approved	F

- menu driven selection of resolution codes and descriptions

REQ-POP-141.4	Claim Resolution and Disposition Process-5	Approved	F

- ability to apply Credits to TTC Customer accounts for next Business Day payment

REQ-POP-141.5	Claim Resolution and Disposition Process-6	Approved	F

- reporting of claims resolved

REQ-POP-141.6	Claim Resolution and Disposition Process-7	Approved	F

- preparation of a consolidated financial statement and reconciliation to settlement files

REQ-POP-141.7	Claim Resolution and Disposition Process-8	Approved	F

- tracking of claims processed and

REQ-POP-141.8	Claim Resolution and Disposition Process-9	Approved	F

- outstanding claims in queue

REQ-POP-141.9	Claim Resolution and Disposition Process-10	Approved	F

- account closeout

REQ-POP-141.10	Claim Resolution and Disposition Process-11	Approved	F

- transfers of balances and historical data to new accounts.

Additional functionality regarding the administrative support of TTC Customer inquiries and claims will mutually agreed upon by TTC and PRESTO prior to Final Design.

3.2.3   Risk Mitigation

REQ-POP-142	Minimization of Risk Due to Fraud	Approved	F

During the term of the agreement, PRESTO will utilize capabilities and tools in the PRESTO System required to minimize the risk of revenue loss through fraud. Subject to TTC's review, PRESTO will act on behalf of TTC as a Merchant and utilize analysis, techniques and procedures typical of retail Merchants and within accepted financial payments practice, in executing fraud and risk management controls in order to minimize incidents of fraud and loss of revenue.

3.2.3.1   Fraud Detection and Analysis

REQ-POP-143	Support Dynamic Review of Ongoing and Historical Processing Data	Approved	F

PRESTO will ensure that PRESTO System will be capable of and support end users in dynamic review of ongoing and historical processing data in order to detect suspicious purchase, payment, and usage activity. This dynamic review will permit immediate remedial steps, primarily in the form of hot-listing of card devices and broadcasting to stakeholders, as well as system-wide to all PRESTO System end devices and operating infrastructure, of information or instructions that is pertinent to managing risk.

REQ-POP-144	Timely Review and Gathering of Information	Approved	F

Ensure timely review of data and the gathering of information on suspicious activity and potential fraud. Fraud detection and analysis will use best-in-class financial industry practices and procedures, including, but not limited to :

REQ-POP-144.1	Timely Review and Gathering of Information-2	Approved	F

- batching of inquiries to payment device Issuer

REQ-POP-144.2	Timely Review and Gathering of Information-3	Approved	F

- conversion of inquiries into Hotlists ready for uploading and broadcasting to end devices

| REQ-POP-144.3 | Timely Review and Gathering of Information-4 | Approved | F |

 - matching TTC Customer inquiries originating from the Web Site, the Customer service call centre, and other sources to Merchant-hot-listed contactless media and devices

| REQ-POP-144.4 | Timely Review and Gathering of Information-5 | Approved | F |

 - analysis of use and purchase patterns that are considered suspicious

| REQ-POP-144.5 | Timely Review and Gathering of Information-6 | Approved | F |

 - detection of abnormal, or extraordinary contactless device usage

| REQ-POP-144.6 | Timely Review and Gathering of Information-7 | Approved | F |

 - device tracking issues

| REQ-POP-144.7 | Timely Review and Gathering of Information-8 | Approved | F |

 - additional parameters, procedures and techniques for fraud detection and analysis as yet to be determined

| REQ-POP-145 | Support for Risk Management in a Retail Environment | Approved | F |

Ensure the system supports effective risk management in a retail Merchant environment, as well as capabilities specifically demanded by transit Merchant operations.

| REQ-POP-145.1 | Use of TTC Expertise | Approved | F |

Transit expertise from TTC will be used by PRESTO in this case to further enhance PRESTO's risk management efforts.

| REQ-POP-145.2 | Alert and Status Reports | Approved | F |

Ensure that the fraud detection and analysis system will be capable of generating alerts, state and status reports automatically and will not solely rely on manual investigations.

| REQ-POP-146 | Tracking and Reporting of Fraud Detection Activities | Approved | F |

Results from all risk management and fraud detection activities will be tracked and reported to TTC and other stakeholders and partners in the PRESTO System and business network.

3.2.3.2   On-Line Authorization

| REQ-POP-147 | On-line Real-time Authorization | Approved | F |

Ensure real-time access to all required pre-Authorization, Authorization, and Authentication capabilities of the financial services industry and other entities issuing devices for acceptance at TTC.

| REQ-POP-147.1 | Real-Time Access to Central Processor Information | Approved | F |

Ensure PRESTO System permits active, real-time access to databases and information stored at the central processor.

| REQ-POP-148 | Support for Retail Risk Management Processes | Approved | F |

Ensure support of risk management procedures, systems and activities that are consistent with those of retail Merchants, as well as activities required by TTC acting as Merchant accepting payments using Open Standards devices. This capability will extend across a full range of parameters, including:

REQ-POP-148.1	Support for Retail Risk Management Processes-2	Approved	F

- Pre-Funded purchase amount by account

REQ-POP-148.2	Support for Retail Risk Management Processes-3	Approved	F

- Pre-Funded fare product purchase by type

REQ-POP-148.3	Support for Retail Risk Management Processes-4	Approved	F

- frequency of Pre-Funded intra-Business Day purchases, set by time interval and location of usage

REQ-POP-148.4	Support for Retail Risk Management Processes-5	Approved	F

- frequency of Pre-Funded inter-Business Day purchases, set by time interval and location of usage

REQ-POP-148.5	Support for Retail Risk Management Processes-6	Approved	F

- PAYG usage and payment transactions, by day, time, and location of usage

REQ-POP-148.6	Support for Retail Risk Management Processes-7	Approved	F

- single ride trip payment and usage transactions using LUM by day, time and location of purchase and usage

REQ-POP-148.7	Support for Retail Risk Management Processes-8	Approved	F

- device status, functionality history and data regarding tampering

REQ-POP-149	Usage Data Security	Approved	F

Parameter settings and data about usage will be controlled and accessed through the central processor. Access and control will be made available to authorized personnel in a secure manner in compliance with PCI-DSS.

3.2.3.3   Operation in Orphan Mode

REQ-POP-150	Orphan Mode	Approved	F

In the event that real-time Authorizations or pre-Authorizations and other, dependent or related business operations are interrupted because of telecommunications failures or degraded service, ensure capability of and support of the operation of all equipment, components, services and systems in orphan mode, or off-line mode, performing "stand-in" transactions until network communications are restored.

REQ-POP-150.1	Parameter Driven Processing	Approved	F

Ensure the characteristics of "stand-in" processing are parameter driven and include the setting to stop all processing until full system functionality is restored.

REQ-POP-150.2	Parameters for Mitigation Off-line Processing	Approved	F

This setting may be based on time or number of transactions as determined by further risk profile analysis. Once telecommunications are re-established the stored transactions will be forwarded to the central processor and processed as stored and forward transactions

REQ-POP-151	Additional Orphan Mode Risk Mitigation	Approved	F

Orphan mode operation will require additional risk mitigation capabilities. Store and forward will require the payment devices storing the transactions to be PCI compliant. It will also require additional business logic for accepting timely payments at reader assemblies.

REQ-POP-152	Use of EMV Off-line Mode	Approved	F

Note that EMV-compliant media are specified completely for off-line Authentication and may require additional parameters or processes to be executed once the telecommunications path is restored.

REQ-POP-153	Use of a Local Hot List	Approved	F

Provide a second layer of risk mitigation to control acceptance of Contactless Devices through the presence of a local resident Hotlist at Reader Assemblies.

Enable periodic downloads of transit-Merchant Hotlists to readers.

REQ-POP-153.1	Merchant Hot List	Approved	F

The Merchant Hotlists may be distinct from the global Hotlists generated by the financial industry as well as limited in number and scope.

REQ-POP-154	Options for Hot List and Passback Protection	Approved	F

Enable localized reader-resident Hotlists to be capable of retaining information about recent transactions at both an individual, stand-alone reader or from readers that have been daisy-chained as part of a Fare Gate array in a station complex.

This capability in orphan mode will be identical to the on-line capability available through the central processor for the PRESTO System. PRESTO may propose alternative solutions that ensure that Passback protection for either an array of faregates at a station entrance and/or a combination of station entrances or stations is possible.

REQ-POP-155	Reader Assembly Decision	Approved	F

In orphan or off-line mode, the entire decision to allow a TTC Customer to proceed is contained with the Reader Assembly.   From a risk mitigation point of view and TTC Customer acceptance, this mode must appear no different than the on-line mode.

REQ-POP-156	Uploading Off-line Transactions	Approved	F

Ensure capability of uploading data from orphaned POS's devices. This will include globally refreshing all end devices, components, and the PRESTO System and accounting for all payment and usage transactions once the device is back online.

3.2.4   Business Processes in Support of Revenue Assurance

3.2.4.1   Sales Reconciliation and Reporting

REQ-POP-157	Financial Reports	Approved	F

Support of the preparation of financial reports in accordance with all TTC's business practices required for fare payment business operations.

REQ-POP-157.1	Financial Reports-2	Approved	F

In addition, the PRESTO System will be designed to provide processing and posting detail for every transaction that occurs.

"Transaction" refers to all activities involving the exchange of funds, whether electronic or in cash (for example, at fare media vending machines), or the usage of payment media at any point of acceptance in the PRESTO System.

REQ-POP-158	Transaction Details	Approved	F

All details regarding the transaction will be captured by PRESTO in a manner that ensures accurate and comprehensive identification and posting of all fare payment and usage activity required by TTC; prevents loss of data and accounts for possible processing delays due to intra- and inter-day business activities; ensures data security, integrity, and completeness; and that enables full compliance with PCI-DSS.

REQ-POP-158.1	Incorporation of Financial Functionalities and Controls	Approved	F

Incorporate functionalities, controls and features that fully recognize and compensate for operating conditions that will occur in the TTC "Merchant" environment.

REQ-POP-159	Auditing and Reconciliation	Approved	F

Ensure support of auditing, reconciliation and reporting of sales and usage activity by capturing and providing access to comprehensive information on the status of all system components and functionalities in the transaction processing chain.

REQ-POP-160	Minimum Reporting Capabilities	Approved	F

Ensure the following reporting capabilities are available in electronic format using commercial off-the-shelf programs and in on-demand printable format:

REQ-POP-160.2	Minimum Reporting Capabilities-2	Approved	F

 - on demand one-to-one reconciliation of PAYG and Pre-Funded transaction clearings with bank deposits made by the Merchant Acquirer to TTC's depository account at the transaction-level detail

REQ-POP-160.3	Minimum Reporting Capabilities-3	Approved	F

 - on demand one-to-one reconciliation of single ride trip (LUM) and transfer (LUM) payment and usage transactions

REQ-POP-160.4	Minimum Reporting Capabilities-4	Approved	F

 - calculation and recording of all revenues, fees, and Chargebacks in the deposit ledger account of TTC

REQ-POP-160.5	Minimum Reporting Capabilities-5	Approved	F

 - on-demand reconciliation by unique usage and payment transaction of fees charged by card associations, networks, TTC's internal switch application and TTC's Merchant Acquirer

REQ-POP-160.6	Minimum Reporting Capabilities-6	Approved	F

 - on-demand capture and comparison by individual points of sale and by unique fare product types of all usages

REQ-POP-160.7	Minimum Reporting Capabilities-7	Approved	F

 - report of refunds pending and processed because of claims, account transfers and account close-outs

REQ-POP-160.8	Minimum Reporting Capabilities-8	Approved	F

 - one-to-one matching of Pre-Funded transaction clearing records to bank deposit records

REQ-POP-160.9	Minimum Reporting Capabilities-9	Approved	F

- one-to-one matching of (PAYG) trips to the transaction clearing records to bank deposit records

REQ-POP-160.10	Minimum Reporting Capabilities-10	Approved	F

- one-to-one matching of single ride trip purchases (LUM) to usage records of LUM

REQ-POP-160.11	Minimum Reporting Capabilities-11	Approved	F

- receivables report for each by issuer

REQ-POP-160.12	Minimum Reporting Capabilities-12	Approved	F

- PAYG usage report

REQ-POP-160.13	Minimum Reporting Capabilities-13	Approved	F

- Pre-Funded liability report that captures all funds added, usage, refunds and Chargebacks, as well as the opening balance liability to Customers at the beginning and at the end of each calendar month

REQ-POP-160.14	Minimum Reporting Capabilities-14	Approved	F

- non-revenue card usage

REQ-POP-160.15	Minimum Reporting Capabilities-15	Approved	F

- transfers

Detailed reporting capabilities will be identified, defined, and finalized by TTC and PRESTO prior to Final Design.

REQ-POP-160.1	Access to Relevant Data	Approved	F

Ensure that the full range of reports required by TTC are made available. PRESTO will provide:

REQ-POP-160.1.1	Access to Relevant Data-2	Approved	F

- access to raw financial transactional data (appropriately obfuscated through Tokenization or other comparable, secure means)

REQ-POP-160.1.2	Access to Relevant Data-3	Approved	F

- access to transit data associated with each of the above transactions, including transactions relating to: date, time, Reader Assembly position and location, direction of travel

REQ-POP-160.1.3	Access to Relevant Data-4	Approved	F

- ability to integrate this data with other TTC data/services into an independent Data Mart and Business Intelligence services system

REQ-POP-161	Reliance on the Data Mart	Approved	F

As described below, TTC will rely on a Data Mart provided, operated, maintained and updated by PRESTO to access data and generate reports.

Prior to Final Design, TTC will provide specific examples of report formats that it requires to ensure that the Data Mart is capable of satisfying TTC's business requirements.

REQ-POP-162	TTC to Define Data Universe	Approved	F

PRESTO will define data sets and comprehensive Data Universe cooperatively with TTC in order to meet the business requirements of TTC. PRESTO will program the Data Mart to query the data sets in a manner approved by TTC that otherwise meets the description of Data Mart below.

REQ-POP-162.1	Refinement of Datasets	Approved	F

Data sets must be readily available to TTC; and complete and accurate, including with respect to payment and processing standards PRESTO will cooperatively interact with TTC in order to refine the data sets and Data Universe for TTC's Merchant-specific requirements, and ensure accessibility to all data sets and the Data Universe in a manner that meets the performance standards.

REQ-POP-162.2	Identification of Essential Financial and Transit Data Elements	Approved	F

Of primary importance will be the identification by TTC with aid and cooperation from PRESTO, of essential financial and transit data elements required for the Data Mart and Business Intelligence function. All data sets and data elements, whether unique or derived, will be identified, reviewed, and finalized.

3.2.4.2 Chargeback Management

REQ-POP-163	Chargeback Management	Approved	F

Support and manage Chargebacks, related inquiries and disputes according to business rules and procedural requirements defined by card associations and Merchant Acquirers

REQ-POP-163.1	Responsibility of Chargebacks	Approved	F

For clarity PRESTO is responsible for all Chargebacks.

REQ-POP-164	Collection of all Data Elements supporting Chargebacks	Approved	F

Incorporate all functionality and data elements required by the financial services and payments industries to enable and ensure management of Chargebacks, including accurate calculation, processing and payment of interchange rates and other fees.

REQ-POP-165	Key Chargeback Processes	Approved	F

Ensure the following key business processes are supported:

REQ-POP-165.1	Key Chargeback Processes-2	Approved	F

 - management of Chargeback inquiries and disputes, including accessing, compiling and responding with required transaction information

REQ-POP-165.2	Key Chargeback Processes-3	Approved	F

 - determination, processing and administration of refunds

REQ-POP-165.3	Key Chargeback Processes-4	Approved	F

- identification and analysis of opportunities for Chargeback claim rebuttals stemming from duplicate processing, TTC Customer error and improper application of association rules

REQ-POP-165.4	Key Chargeback Processes-5	Approved	F

- processing and reporting of financial and data streams

REQ-POP-165.5	Key Chargeback Processes-6	Approved	F

- automated daily and monthly reconciliation by card types and by fraud and non-fraud Chargeback categories

REQ-POP-165.6	Key Chargeback Processes-7	Approved	F

- end-user initiated ad hoc status reports across all processing, reconciliation and reporting functions

REQ-POP-165.7	Key Chargeback Processes-8	Approved	F

- direct electronic data transfer from Merchant Acquirers as required, including the receipt and storage of claim or informational requests originating with Merchant Acquirers

REQ-POP-165.8	Key Chargeback Processes-9	Approved	F

Supporting analytical tasks performed during the investigative process, including:

REQ-POP-165.9	Key Chargeback Processes-10	Approved	F

- review incoming data for financial accuracy and completeness

REQ-POP-165.10	Key Chargeback Processes-11	Approved	F

- ascertain data integrity

REQ-POP-165.11	Key Chargeback Processes-12	Approved	F

- validate of charge backs against original transactions

REQ-POP-165.12	Key Chargeback Processes-13	Approved	F

- analyse historical activity by account, including search capabilities for multiple charge backs by a single account, pending charge backs and pending reversal actions

REQ-POP-165.13	Key Chargeback Processes-14	Approved	F

- online formulation and preparation of a rebuttal response

REQ-POP-165.14	Key Chargeback Processes-15	Approved	F

- online classification of Chargeback records and documentation of actions taken

REQ-POP-165.15	Key Chargeback Processes-16	Approved	F

- automate monitoring of Chargeback claim progress towards resolution consistent with deadlines prescribed by card associations

REQ-POP-165.16	Key Chargeback Processes-17	Approved	F

- track charge backs for closed-loop, TTC-issued products, or with co-branded, general purpose reloadable products

REQ-POP-165.17	Key Chargeback Processes-18	Approved	F

- query balances and transactional histories for both payment and usage for closed-loop fare payment media

REQ-POP-165.18	Key Chargeback Processes-19	Approved	F

- automate capabilities to negative list media and report recovered funds for closed-loop fare payment media

REQ-POP-165.19	Key Chargeback Processes-20	Approved	F

- assemble and exchange, in electronic format, documentation from the back-office system for use in dispute resolution.

REQ-POP-165.20	Key Chargeback Processes-21	Approved	F

- automate data integrity and uniqueness tests which match and load incoming data with updated and transaction-specific information that concern prior reversal activity and duplications, and loading and storing of compiled data in dedicated tables

REQ-POP-165.21	Key Chargeback Processes-22	Approved	F

- generate facsimile receipts for use in disputing charge backs

REQ-POP-165.22	Key Chargeback Processes-23	Approved	F

- manage processing of and administration of payment adjustments TTC Customer claims

3.2.4.3 Data Integrity and Quality

REQ-POP-166	Data Integrity Checks	Approved	F

Ensure performance of periodic data integrity checks for all data that is captured for reporting, analysis and support of business operations.

Ensure accurate and complete transaction file downloads.

REQ-POP-166.1	Accounting for Timing Issues	Approved	F

Ensure that data integrity checks account for timing issues that may occur because of unavailability of telecommunications with reader assemblies and other equipment operating as part of the PRESTO System at the time of data transfers.

REQ-POP-167	Accurate Data Representation	Approved	F

Procedures to ensure data quality will be configured in a manner so that the data capture is an accurate representation of the actual data are de facto actual, or within a high degree of certainty correspond to the actual coordinates where the transaction took place.

REQ-POP-168	Use of Best Practices	Approved	F

Financial services and payments industry best practices for ensuring data integrity and quality must be followed. PRESTO must demonstrate capability and positive results experience in assuring data integrity in processing electronic funds transfers and payments.

3.3   Business Intelligence Reporting and Processing

REQ-POP-169	Business Intelligence	Approved	F

Ensure provision and support of Business Intelligence reporting and processing across all business and functional requirements.

Investigations into how the PRESTO System is working, discovering issues, addressing Customer issues will all be done using a Business Intelligence service.The business ETL (Extract, Transform, Load) processing metric in Schedule A ensures that all reports are timely, accurate, and are based on relevant daily data and that the ETL process achieves the required Service Level.

REQ-POP-169.1	Business Intelligence-2	Approved	F

Ensure the Business Intelligence and reporting function is scalable and fully redundant.

REQ-POP-170	Minimum Business Intelligence Functionality	Approved	F

Ensure that the Business Intelligence functionality supports all financial and planning functions in addition to the following three areas:

REQ-POP-170.1	Minimum Business Intelligence Functionality-2	Approved	F

 - transactional integrity, as described in section 3.3.1

REQ-POP-170.2	Minimum Business Intelligence Functionality-3	Approved	F

 - operations performance , as described in section 3.3.2

REQ-POP-170.3	Minimum Business Intelligence Functionality-4	Approved	F

 - Customer satisfaction, as described in section 3.4.

3.3.1   Transactional Integrity Processing

REQ-POP-171	One-to-one Usage and Payment Transaction Reconciliation	Approved	F

Ensure support of reconciliation of all usage and payment activity on a one-by-one usage and payment transaction basis. Reconciliation will be enabled by capturing specific data that originates from the following sources:

REQ-POP-171.1	One-to-one Usage and Payment Transaction Reconciliation-2	Approved	F

- contactless devices presented for payment and access to TTC system

REQ-POP-171.2	One-to-one Usage and Payment Transaction Reconciliation-3	Approved	F

- Contactless Readers at the point of sale or system entry

REQ-POP-171.3	One-to-one Usage and Payment Transaction Reconciliation-4	Approved	F

- field devices that respond to contactless media acceptance and permit access to transportation

REQ-POP-171.4	One-to-one Usage and Payment Transaction Reconciliation-5	Approved	F

- field devices that provide location specific data that is used to enhance data capture for usage and financial transactions

REQ-POP-171.5	One-to-one Usage and Payment Transaction Reconciliation-6	Approved	F

- communication devices that enable processing of contactless device data upstream from the back-office, the Merchant Acquirer and an issuing entity

REQ-POP-171.6	One-to-one Usage and Payment Transaction Reconciliation-7	Approved	F

- the web site and its operating system

REQ-POP-171.7	One-to-one Usage and Payment Transaction Reconciliation-8	Approved	F

- the Customer service call centre and associated IVR system

REQ-POP-171.8	One-to-one Usage and Payment Transaction Reconciliation-9	Approved	F

- all point of sale and/or reload locations, or other entities, involved in permitting use of TTC's transportation services through issuance or use of Open Standards contactless media.

REQ-POP-172	Automated Reconciliation	Approved	F

Ensure functionality to populate specific data fields that have been created for the reconciliation process, as well as comply with PCI-DSS requirements.

REQ-POP-172.1	Automated Reconciliation-2	Approved	F

Ensure capability of exception processing so that corrective actions may be taken in the event of an interruption in communications.

REQ-POP-173	Exception Processing	Approved	F

Accepted practices for exception processing must be followed, including automated exception processing procedures.

3.3.2   Operations Performance

REQ-POP-174	Performance Monitoring	Approved	F

An account-based PRESTO System requires performance monitoring to ensure compliance with card association procedures, sustain operational viability, and track progress towards business goals.

REQ-POP-174.1	Performance Monitoring-2	Approved	F

Ensure back-office has access information in real-time, as well as produce standard and ad hoc reports.

REQ-POP-175	Minimum Performance Criteria	Approved	F

Ensure performance criteria that applies to account-based systems includes:

REQ-POP-175.1	Minimum Performance Criteria-2	Approved	F

- Sales Availability

REQ-POP-175.2	Minimum Performance Criteria-3	Approved	F

- real-time versus store-and-forward processing ratio

REQ-POP-175.3	Minimum Performance Criteria-4	Approved	F

- transaction success rate for real-time versus orphan mode

REQ-POP-175.4	Minimum Performance Criteria-5	Approved	F

- wireless Network Availability for buses

REQ-POP-175.5	Minimum Performance Criteria-6	Approved	F

- Authorization speeds

REQ-POP-175.6	Minimum Performance Criteria-7	Approved	F

- denial processing rates for single trips (PAYG) and Pre-Funded payments

REQ-POP-175.7	Minimum Performance Criteria-8	Approved	F

- fraud loss rates

REQ-POP-175.8	Minimum Performance Criteria-9	Approved	F

- size, accuracy and refresh performance of Hotlists

REQ-POP-175.9	Minimum Performance Criteria-10	Approved	F

- data accuracy and capture rate

REQ-POP-175.10	Minimum Performance Criteria-11	Approved	F

Details regarding Service Level agreements and performance measures are provided in Schedule A.

REQ-POP-176	High Quality of Service Network/Telecommunications	Approved	F

Ensure efficient, robust, high quality of service (QOS) telecommunications network and supporting telecommunications operations environment.

REQ-POP-176.1	High Quality of Service Network/Telecommunications-2	Approved	F

Support network operations by active real-time monitoring and reporting through dashboards to ensure all components of the PRESTO System operate via a real-time connection to the central processor.

REQ-POP-177	Information for Remediation and Root Cause Analysis	Approved	F

Monitor, record and provide access to information essential for remediation, root cause analysis and disaster recovery of all network operations.

REQ-POP-177.1	Information for Remediation and Root Cause Analysis-2	Approved	F

Ensure that the central processor is enabled with a Data Mart component that permits end users direct access to and control over use of data required to support telecommunications operations.

REQ-POP-178	Minimal System Status Information	Approved	F

Capture information about the status of the following system components and functions through a series of programmable system sweeps made available through on-screen reports, dashboards and alarms including:

REQ-POP-178.1	Minimal System Status Information-2	Approved	F

 - communications network status: the central processor must use and/or compile information from a monitoring program of network status, including disaster recovery sites, as well as all remote sites where payment system equipment resides

REQ-POP-178.2	Minimal System Status Information-3	Approved	F

 - field equipment: the central processor must compile the status of equipment in the payment processing chain, including reader assemblies, FMVDs, AVMs, SRVMs and HHPOS

REQ-POP-178.3	Minimal System Status Information-4	Approved	F

 - transaction processing: the central processor must enable analysis, data accumulation and placeholders for individual messages or thresholds to scan transaction log files from the current processing stream. This process must automatically generate reports on:

REQ-POP-178.4	Minimal System Status Information-5	Approved	F

 - gaps in transaction processing according to POS location, time and volume based parameter settings

REQ-POP-178.5	Minimal System Status Information-6	Approved	F

- excessive delay request before reaching the Merchant Acquirer

REQ-POP-178.6	Minimal System Status Information-7	Approved	F

- slow response times from the Merchant Acquirer

REQ-POP-178.7	Minimal System Status Information-8	Approved	F

- reversal processing from the Merchant Acquirer or internal to the central processor

REQ-POP-178.8	Minimal System Status Information-9	Approved	F

- denial processing by code

REQ-POP-178.9	Minimal System Status Information-10	Approved	F

- issuer or switch unavailability

REQ-POP-178.10	Minimal System Status Information-11	Approved	F

- in-system, off-line processing volumes

REQ-POP-178.11	Minimal System Status Information-12	Approved	F

- in-system response times

REQ-POP-178.12	Minimal System Status Information-13	Approved	F

- any interruptions in normal real-time transaction processing

REQ-POP-179	Automatic and Manual Work Orders	Approved	F

Ensure automatic and manual initiation of work orders and targeted alerts to predetermined recipients responsible for equipment and network preventive and Corrective Maintenance, event remediation, field operations and Customer support.

REQ-POP-179.1	Other Channels for Work Orders	Approved	F

Disseminate automated alerts by email, web alerts and SMS text messaging.

REQ-POP-179.2	Manual Work Orders	Approved	F

Support the generation and dissemination of manual alerts and work orders as the result of observed field conditions by PRESTO, TTC personnel, as a result of information intake at the Customer service call centre, or centrally via the Maintenance Management System as defined in Schedule C.

REQ-POP-180	Monthly Management Reports	Approved	F

Support the generation of monthly management reports summarizing all performance measures and reconciling processing monitoring Software messages with opened work orders and event reports.

3.3.2.1 Sales Availability

REQ-POP-181	Sales Availability	Approved	F

Ensure the provision of a universal metric of system readiness to accept fare payments.

REQ-POP-181.1	Sales Availability-2	Approved	F

This metric, hereafter referred to as Sales Availability (as defined in schedule A), reflects a TTC Customer-centric perspective in the required readiness and full functionality of the end-to-end payment system to perform sales transactions, and/or accept payments at system points-of-entry in a real-time processing environment. It is also intended to reflect the requirement of financial institutions and payment industry business partners for "on-line, real-time" pre-Authorizations, Authorizations and Authentications, as well as timely processing of funds transfers by end-of-Business Day in a manner that is typical of a retail Merchant sales environment.

REQ-POP-182	Daily Sales Availability Reports	Approved	F

PRESTO will report daily on the Sales Availability of all PRESTO System Hardware, Software, firmware, and related support systems that are in operation for TTC.

| REQ-POP-182.1 | Daily Sales Availability Reports-2 | Approved | F |

Enable the generation of ad-hoc on-demand updates for Sales Availability in the PRESTO System.

| REQ-POP-183 | Automatic Generation of Sales Availability Reports | Approved | F |

Automatically generate the Sales Availability report in an accepted format (EXCEL, PDF, web page).

| REQ-POP-184 | Data Used in Sales Availability Calculations | Approved | F |

Calculate Sales Availability using performance data in terms of hours of full functionality from the following:

| REQ-POP-184.1 | Data Used in Sales Availability Calculations-2 | Approved | F |

 - telecommunications network

| REQ-POP-184.2 | Data Used in Sales Availability Calculations-3 | Approved | F |

 - central processor internal operations

| REQ-POP-184.3 | Data Used in Sales Availability Calculations-4 | Approved | F |

 - external processing operations and systems

| REQ-POP-184.4 | Data Used in Sales Availability Calculations-5 | Approved | F |

 - Field Maintenance and revenue collection/servicing operations

Details regarding Service Level Agreements and performance measure are provided in Schedule A.

3.3.2.2   Telecommunications Network

| REQ-POP-185 | Maximization of Operational Up Time | Approved | F |

Optimal revenue processing and risk management requires maximum possible operational up time or availability. While all POS devices in the system must be capable of processing payment transactions in orphan mode (off-line), network unavailability prevents Authorization/pre-Authorization by the central processor, either independently or in conjunction with the financial and payment networks.

| REQ-POP-186 | Network Availability | Approved | F |

Ensure capability of uploading network status messages, details of work orders and trouble tickets that impact network Uptime. The starting and ending times of such events will be accumulated by day and stored in the back-office for inclusion in the overall calculation of Sales Availability.

3.3.2.3   Central Processor

3.3.2.3.1   External Processor Operations

| REQ-POP-187 | Authorizations to Issuers | Approved | F |

Ensure processing of an Authorization request to the issuing entity of the contactless payment device in order to process PAYG or Pre-Funded payment transactions.

REQ-POP-187.1	Authorization Process	Approved	F

Provide the capability to initiate Authorization requests and capture results. Unsuccessful transactions, stemming from failures in the processing stream, are to be recorded as denial messages from the Merchant Acquirer.

REQ-POP-188	Authorization Responses	Approved	F

Track responses from issuers and processing systems external to the PRESTO System.

REQ-POP-188.1	Authorization Responses-2	Approved	F

 - record the date, time, and frequency of such messages for calculation of the overall Sales Availability, and according to standard financial industry and payment services practices.

3.3.2.3.2   Field Maintenance and Revenue Collection/Servicing Activity

REQ-POP-189	Monitoring and Reporting of all Field Maintenance	Approved	F

Monitor and report the impact of all Field Maintenance and revenue collection/servicing activity on Sales Availability.

All maintenance activity that effects normal operation of PRESTO System equipment will be monitored and reported through the central processor.

REQ-POP-189.1	Maintenance Reports Scope	Approved	F

Reports will encompass all system and equipment events that result in or have an impact on corrective and preventive maintenance.

REQ-POP-190	Role of Central Processor	Approved	F

Capture and report specifics of start and end dates, times, locations of events and specific equipment affected and all other necessary details to support assessment of equipment and system status, and manage and report on remediation efforts.

REQ-POP-191	Maintenance Management System	Approved	F

Ensure reporting function is supplemented by implementation of a commercially available Maintenance Management System.

REQ-POP-191.1	Maintenance Management System-2	Approved	F

The design and implementation of the Maintenance Management System as described in Schedule 9, will be accomplished in a manner that supports efficient management of the full range of maintenance activities required to support the PRESTO System and meet TTC's performance standards. At the same time, the design and implementation of the Maintenance Management System will not impede or interfere with security and risk management requirements of PRESTO System. PRESTO will not impede or interfere with normal TTC service

3.4   TTC Customer Satisfaction

REQ-POP-192	Customer Satisfaction	Approved	F

Ensure provision of a repository for quantitative information that can be used to assess Customer satisfaction across the range of services and interactions being offered.

REQ-POP-192.1	Customer Satisfaction-2	Approved	F

The repository will be capable of compiling the results of activities performed by PRESTO, including other participants and participants in the PRESTO System, such as Customer service call centre activities, TTC Customer inquiries through the web site.

3.5   Central Processor

3.5.1   Overview

REQ-POP-193	Account Based Fare Payment System	Approved	F

Ensure TTC will be an account-based fare payment system. It will be built according to business, operating, and technical principals and standards for electronic transfers of funds through credit, PIN-debit, ACH, and other proven means used by the financial service and payments industry. TTC requires that the system solution support its TTC Customers in a payment experience for transit fares that in all key attributes meets or exceeds TTC Customers' experience in purchasing at a retail store.

REQ-POP-194	Critical Business Functions	Approved	F

Ensure that central processor fulfills the following critical business functions:

REQ-POP-194.1	Critical Business Functions-2	Approved	F

 - fare engine for all sales and reloads of transit accounts including the web site, the Customer service call centre and non-TTC retail sales and reload locations

REQ-POP-194.2	Critical Business Functions-3	Approved	F

 - payment Authorization and transaction processing for all sales and reload of transit accounts initiated at locations managed by PRESTO, including settlement of accounts and deposit of funds to TTC's DDA bank account

REQ-POP-194.3	Critical Business Functions-4	Approved	F

 - issuance , acceptance and related business functions to support use of LUM

REQ-POP-194.4	Critical Business Functions-5	Approved	F

 - tracking of all transfers

REQ-POP-194.5	Critical Business Functions-6	Approved	F

 - central data repository and control location for all PRESTO System business operations and integrated devices installed on TTC property or interfacing with the central processor.

REQ-POP-194.6	Critical Business Functions-7	Approved	F

 - central data repository for all business and operating reporting and Data Mart functions required by TTC to support TTC's financial and business reporting requirements, its revenue operations as Merchant, its continuous monitoring of system performance and management of PRESTO under terms of TTC's agreement with PRESTO.

REQ-POP-195	Central Processor Functionality	Approved	F

PRESTO will design, build, operate, and maintain the central processor according to the requirements provided in the following sections. Only individuals authorized by TTC and PRESTO will have access to

and control over functionalities, data, information, operating parameters, and all other business functions of the PRESTO System.

REQ-POP-196	Authority to Implement Fare Policy	Approved	F

Only TTC will have authority to implement policies pertaining to fares and pricing changes for fare products, determine procedures and rules for acceptance of contactless media and devices for fare payment, and affect any changes to the operation of the PRESTO System that would impact its TTC Customers and revenue operations that control access to TTC's transportation services.

3.5.2 General Requirements

REQ-POP-197	Use of COTS Equipment and Software	Approved	F

Ensure the central processor will be built using commercially available equipment and Software that conform with and support all payment industry standards.

REQ-POP-197.1	Use of COTS Equipment and Software-2	Approved	F

All Hardware, operating systems, database manager, components, and peripherals of the central processor will consist of commercially available equipment from OEM suppliers.

REQ-POP-198	Turnkey Solution	Approved	F

PRESTO will provide the central processor with a turnkey solution, with all necessary processing, memory and expandability, data storage, and Software applications to operate, monitor and manage the PRESTO System.

REQ-POP-199	Minimum Capabilities	Approved	F

Ensure the central processor has at least the following:

REQ-POP-199.1	Minimum Capabilities-2	Approved	F

 - unified applications and controls for the entire PRESTO System

REQ-POP-199.2	Minimum Capabilities-3	Approved	F

 - table/template-driven parameters for all business functions

REQ-POP-199.3	Minimum Capabilities-4	Approved	F

 - data download for fare pricing tables, fare product tables and fare policy procedures

REQ-POP-199.4	Minimum Capabilities-5	Approved	F

 - processing in real-time and according to required transaction speeds of all payment, sales, reload and acceptance transactions for contactless media and devices accepted for payment of TTC faresfrom all end devices and points of sale and reload.

REQ-POP-199.5	Minimum Capabilities-6	Approved	F

 - Authorization, clearing and settlement of credit, signature and PIN-debit, and GPR pre-paid devices through Merchant Acquirers and all established networks for electronic transfers of fundsin real-time and according to required transaction speeds and all payment industry standards and protocols, including ISO/IEC, Canadian banking regulations and applicable laws and regulations of the Province of Ontario, through Merchant Acquirers all established networks for electronic transfers of funds

REQ-POP-199.6	Minimum Capabilities-7	Approved	F

- full range of risk management operations and procedures to support Merchant acceptance of contactless Open Standard media and devices

REQ-POP-199.7	Minimum Capabilities-8	Approved	F

- standard report generation as defined by TTC and financial industry requirements

REQ-POP-199.8	Minimum Capabilities-9	Approved	F

- Data Mart operations built on commercially available, distributed, multi-user industrial strength relational database

REQ-POP-199.9	Minimum Capabilities-10	Approved	F

- a test region capability and functionality to permit loading and testing of changes to business and operating parameters prior to implementation. A version control system for these changes and an area for in-field device testing for replaced/installed devices

REQ-POP-199.10	Minimum Capabilities-11	Approved	F

- flexible database design to permit pre-loading of business and operating parameters prior to implementation

REQ-POP-199.11	Minimum Capabilities-12	Approved	F

- transaction processing control and monitoring

REQ-POP-199.12	Minimum Capabilities-13	Approved	F

- point of sale and end-device monitoring and control

REQ-POP-199.13	Minimum Capabilities-14	Approved	F

- event monitoring, data capture and storage across all business functions

REQ-POP-199.14	Minimum Capabilities-15	Approved	F

- monitor system security

REQ-POP-199.15	Minimum Capabilities-16	Approved	F

- capture and storage of historical parameter settings

REQ-POP-199.16	Minimum Capabilities-17	Approved	F

- automated reporting of a security breach of any end-device installed on TTC property

REQ-POP-199.17	Minimum Capabilities-18	Approved	F

- automate user-programmable data redundancy, backup, and archiving for all transactions, data and Software to secure media without user intervention, such that no system or subsystem failure will

result in loss or degradation of data

REQ-POP-199.18	Minimum Capabilities-19	Approved	F

 - disaster recovery processes that are automatic and seamless, and that can be incorporated into a TTC disaster recovery program if required

REQ-POP-199.19	Minimum Capabilities-20	Approved	F

 - scalable and independent applications to ensure that changes to unique business functions have no impact to core central processor operations

REQ-POP-199.20	Minimum Capabilities-21	Approved	F

 - secure, controlled access and remote operation of central processor functions via a system administrative function

REQ-POP-199.21	Minimum Capabilities-22	Approved	F

 - user-friendly, menu-driven GUI interfaces with help functions

REQ-POP-199.22	Minimum Capabilities-23	Approved	F

 - support daily payment and/or usage transactions without degradation of performance levels

REQ-POP-199.23	Minimum Capabilities-24	Approved	F

 - support TPS (Transactions Per Second) during peak rush hour activity as defined in Schedule A.

REQ-POP-199.24	Minimum Capabilities-25	Approved	F

 - full redundancy capability to allow continuous operation and transition to recovery sites without effect on fare payment acceptance at TTC and other participants in the PRESTO System

REQ-POP-199.25	Minimum Capabilities-26	Approved	F

 - storage capacity that grows with PRESTO System usage and is at any point in time 200% of the storage capability required for the PRESTO System

REQ-POP-199.26	Minimum Capabilities-27	Approved	F

 - archive all PRESTO System data commensurate with all applicable laws

REQ-POP-199.27	Minimum Capabilities-28	Approved	F

 - accommodate a 200% increase of system wide daily Usage Taps and financial payment transactions at FMVDs and the Customer website

REQ-POP-199.28	Minimum Capabilities-29	Approved	F

 - encrypt all data processing according to Canadian banking standards and under full compliance with PCI

REQ-POP-199.29	Minimum Capabilities-30	Approved	F

 - continuous global synchronization of all PRESTO System end devices with the central processor for all business functions, Fare Matrix settings, data transfers and time settings

REQ-POP-199.30	Minimum Capabilities-31	Approved	F

 - simultaneous receipt and processing of transaction data from all end devices in the PRESTO System without impacting TTC's required performance standards or any perceptible impact to TTC Customers' interactions with the PRESTO System

REQ-POP-199.31	Minimum Capabilities-32	Approved	F

 - process error control and remediation, so that the central processor can capture data needed to detect processing errors, compile data on erroneous transactions, and format and stream data into appropriate formats that allow same-day event remediation

REQ-POP-199.32	Minimum Capabilities-33	Approved	F

 - table/rule driven parameters used for detection analysis and reporting on all data captured by the central processor.

3.5.3   Fare Engine

REQ-POP-200	Calculation of Fare Rules	Approved	F

Ensure calculation and application of all fare products, pricings and usage rules of TTC's fare policy in processing payment transactions.

REQ-POP-201	Use of a Fare Matrix	Approved	F

The central processor will capture TTC's Fare Matrix in a comprehensive series of parameter-driven fare tables. Under direction and Authorization from TTC, the fare tables will permit PRESTO to globally set and change all parameters for the sale and use of TTC's fare products. TTC will sign-off on fare table changes.

REQ-POP-202	Access to this capability will be provided through a secure protocol that will	Approved	F

Access to this capability will be provided through a secure protocol that will not only require two-factor Authentication to be enabled, but also record access and all changes to fare tables according to PCI-DSS standards.

REQ-POP-203	The Central Processor will distinguish and record all categories of fare tables	Approved	F

Record all categories of fare tables developed for implementation of TTC's Fare Matrix.

REQ-POP-203.1	**The Central Processor will distinguish and record all categories of fare tables-2**	Approved	F

Record the status of fare tables throughout the history of their development, use and expiration.

REQ-POP-203.2	**The Central Processor will distinguish and record all categories of fare tables-3**	Approved	F

Provide secure, auditable records of all changes made to fare tables and related central processor functions.

REQ-POP-204	**Additionally, the Central Processor will be designed by PRESTO to:**	Approved	F

The central processor will be designed to:

REQ-POP-204.1	**Additionally, the Central Processor will be designed by PRESTO to:-2**	Approved	F

 - permit menu-driven fare pricing changes that can be set for global application or can be targeted to apply to specific TTC routes, lines, events using effective start/end dates, start/end times and location settings in any combination

REQ-POP-204.2	**Additionally, the Central Processor will be designed by PRESTO to:-3**	Approved	F

 - control all visual displays throughout the PRESTO System.

REQ-POP-204.3	**Additionally, the Central Processor will be designed by PRESTO to:-4**	Approved	F

 - store, automatically load and automatically remove predetermined changes to the Fare Matrix

REQ-POP-205	**Downloadable Fare Tables to Sales and Reload Devices**	Approved	F

Ensure all fare tables and applicable parameter settings are downloadable to end devices used for sale and reload of fare media through any commercially available wireless telecommunications network.

REQ-POP-205.1	**Downloadable Fare Tables to Sales and Reload Devices-2**	Approved	F

Downloading of fare tables and applicable parameter settings affecting contactless media acceptance will not interfere with normal transaction processing and acceptance of fare payment at points of entry to TTC's transportation services.

3.5.4   Autoload of Transit Accounts

REQ-POP-206	**Autoload for Pre-Funded Accounts**	Approved	F

Ensure that the central processor will support auto load of Pre-Funded transit accounts. Provide detailed process and transaction flows for Autoload to the TTC prior to Final Design.

3.5.5   Data Mart

REQ-POP-207	**Responsibility for Data Mart**	Approved	F

Develop, operate, maintain and update a Data Mart for TTC.

REQ-POP-208	Data Mart Users	Approved	F

TTC intends for the Data Mart to be used by personnel whose principal experience and competencies reside in management and operation of TTC's fare payment operation and its transportation services. As such, the Data Mart will be outfitted in a manner that supports easy access and use by these "power" business end users, without the need for special, professional competencies in computer programming and computer science. TTC's business end users will be expected to have competency in common, commercially available office programs, such as the Microsoft suite of office products in order to understand and utilize Data Mart tools and functionalities.

REQ-POP-208.1	Responsibility for Data Mart-2	Approved	F

Ensure business and operating data is stored and accessible to TTC and PRESTO through the Data Mart.

REQ-POP-209	Data Mart Technology	Approved	F

Ensure that the Data Mart uses state-of-the-art principles of relational database design and management. It will be ODBC compliant, support SQL commands and queries, and contain only standard, non-proprietary instructions, procedures, and commands.

REQ-POP-210	Use of Open Standards	Approved	F

Ensure that the Data Mart will interface - using Open Standards - with TTC's existing network.

REQ-POP-210.1	Use of Open Standards-2	Approved	F

The Data Mart will be equipped with security Software that allows for secure, two-factor Authentication access for use of the Data Mart.

REQ-POP-210.2	Use of Open Standards-3	Approved	F

Security Software for the Data Mart will comply with PCI-DSS, as well as all other applicable security standards required by card associations, issuers, financial services and payment industry regulators, and other entities responsible for assuring the security of electronic funds transfers and payment processing.

REQ-POP-211	Hosting of Data Mart	Approved	F

Ensure that the Data Mart will be hosted at an Ontario site and will comply with all applicable financial, security, and privacy standards, including but not limited to PCI-DSS and MFIPPA.

REQ-POP-212	Data Mart Business Tools	Approved	F

Design and implement a Data Mart with a full range of business tools that permit TTC personnel easy access to:

REQ-POP-212.1	Data Mart Business Tools-2	Approved	F

 - generate reports

REQ-POP-212.2	Data Mart Business Tools-3	Approved	F

 - configure and query all database tables and relationships

REQ-POP-212.3	Data Mart Business Tools-4	Approved	F

 - customize and edit queries and reports

REQ-POP-212.4	Data Mart Business Tools-5	Approved	F

- download data either on an ad hoc or regular, pre-determined bases without impacting the processing capabilities of the central processor

REQ-POP-212.5	Data Mart Business Tools-6	Approved	F

- allow creation of new datasets, tables and other Business Intelligence functionalities and tools as required

REQ-POP-212.6	Data Mart Business Tools-7	Approved	F

- allow data integration and fusion with other TTC data and services

REQ-POP-213	Data Mart Data	Approved	F

Ensure that the Data Mart will automatically capture and retain all data and information related to the operation of the PRESTO System. At a minimum, data sets described in subsequent sections will be generated by the Central Processor and captured by the Data Mart. A final, comprehensive listing of data sets and a definition of the Data Universe will be developed during Design Review.

REQ-POP-214	Duration of Data in Data Mart	Approved	F

Ensure the Data Mart supplied by PRESTO will have the capability to store and retrieve required data for a period of no less than seven (7) years.

REQ-POP-214.1	Duration of Data in Data Mart-2	Approved	F

Ensure data that exceeds this time limit will be automatically transferred to permanent archival storage.

REQ-POP-214.2	Duration of Data in Data Mart-3	Approved	F

Ensure archived data will be easily reloaded to the Data Mart for query and reporting purposes without excessive delays and in a timeframe that permits TTC and other authorized end users timely support of business operations.

REQ-POP-215	Private Data	Approved	F

Ensure that all data capture, storage and retrieval functionalities of the Data Mart comply with all applicable laws, including laws regarding the storage, access, and use of private data.

REQ-POP-216	Weekly reporting schedule of 445	Approved	F

The Data Mart, reporting tools and Business Intelligence service will support TTC's current reporting cycle based on a weekly 4/4/5 schedule. Note that the 4/4/5 calendar divides a year into 4 quarters with each quarter having 13 weeks grouped in 4 week months and one 5 week month.

3.5.5.1   Standard Reports

REQ-POP-217	Standard Reports	Approved	F

Ensure that the Data Mart is capable of supporting the production of standard reports.

REQ-POP-217.1	Standard Reports-2	Approved	F

Ensure reports are viewable on-line and capable of being downloaded and produced as hard copy.

REQ-POP-218	Development of Standard Reports	Approved	F

The Data Mart will be configured so that TTC, or other authorized users, can develop and place into regular production any number of standardized reports using pre-defined data sets populated by the central processor and available through the Data Mart.

REQ-POP-219	Exporting Standard Reports	Approved	F

Ensure any standard reports are exportable to commercially available Software applications without the need for extraordinary steps or procedures arising from the design of the central processor or the Data Mart.

REQ-POP-220	Menu Driven Generation of Standard Reports	Approved	F

Ensure standard reports are available in a menu-driven format to allow for preliminary reports on an ad-hoc basis.

REQ-POP-221	Development of Standard Reports	Approved	F

Ensure all required reports are available to TTC in a variety of formats, including PDF, EXCEL, and web page. All standard reports will be resourced out of the Data Universe from which standard reports are developed; all ad-hoc reports will be developed in accordance with this schedule and Schedule C. A full description of the reports and supporting data elements will be provided prior to Final Design.

REQ-POP-222	General Standard Reports Required	Approved	F

Required standard reports are predefined reports that the system is capable of generating and will include the following:

REQ-POP-222.1	General Standard Reports Required-2	Approved	F

 - revenue and ridership reports

REQ-POP-222.2	General Standard Reports Required-3	Approved	F

 - system status and maintenance

REQ-POP-222.3	General Standard Reports Required-4	Approved	F

 - financial reconciliation and reporting

REQ-POP-222.4	General Standard Reports Required-5	Approved	F

 - reports required by TTC for planning purposes

REQ-POP-222.5	General Standard Reports Required-6	Approved	F

 - sales and reload

Additional reports will be specified during Design Review.

3.5.5.2 Ad Hoc Reports

REQ-POP-223	Ad Hoc Reports	Approved	F

Support queries and extracts of data through a series of web-based menus and screens; scaled to support TTC transaction volumes defined in the Service Levels that enable multiple end users to construct ad-hoc reports.

REQ-POP-223.1	Ad Hoc Reports-2	Approved	F

Ensure all defined queries are available both as screen displays and as outputs for printing by each authorized user.

REQ-POP-223.2	Ad Hoc Reports-3	Approved	F

Ensure the Data Mart is capable of storing queries for future use, or for use as the basis of a standard report.

REQ-POP-223.3	Ad Hoc Reports-4	Approved	F

Ensure that the Data Mart is structured such that at least twenty (20) simultaneous TTC end-users are capable of accessing the Data Mart for ad-hoc queries and reports without any degradation to the performance of the Data Mart.

REQ-POP-223.4	Ad Hoc Reports-5	Approved	F

Ensure that the Data Mart is architected in such a manner as to permit an increase in the number of simultaneous users during the initial operating phase of the PRESTO System when TTC personnel are qualifying and quantifying the reports required.

REQ-POP-223.5	Ad Hoc Reports-6	Approved	F

Ensure architecture is capable of adding future users.

3.5.5.3 Data Universe

REQ-POP-224	Development of Data Universe	Approved	F

PRESTO will, with input and cooperation from TTC, define the universe of all data elements required to support the generation of standard reports, as well as those elements required for all monitoring and reporting functions of the PRESTO System. This description must include details of the data base environment, connections, roles, tools, and business process support functionality in support of the Data Mart. Subsequent to launch, PRESTO, with review and approval of TTC may recommend refinements and changes to the Data Universe that aim to improve PRESTO System business results.

REQ-POP-225	Scope of Data Elements	Approved	F

In defining the Data Universe, PRESTO will incorporate all data elements necessary to:

REQ-POP-225.2	Scope of Data Elements-2	Approved	F

 - support operation of an Open Standards "Merchant" approach to fare payment, transaction processing and settlement, risk management, business operations and TTC Customer service

REQ-POP-225.3	Scope of Data Elements-3	Approved	F

 - support specific requirements of TTC as a "transit" Merchant

REQ-POP-225.4	Scope of Data Elements-4	Approved	F

At a minimum, the Data Universe will consist of the following data fields:

REQ-POP-225.5	Scope of Data Elements-5	Approved	F

 - transaction type (e.g.Pre-Funded or PAYG, single ride trip (LUM), non-revenue fare categories and pricing)

REQ-POP-225.6	Scope of Data Elements-6	Approved	F

- posting date of transaction at the back office

REQ-POP-225.7	Scope of Data Elements-7	Approved	F

- Authorization request amount

REQ-POP-225.8	Scope of Data Elements-8	Approved	F

- Authorization transaction amount

REQ-POP-225.9	Scope of Data Elements-9	Approved	F

- Authorization response code

REQ-POP-225.10	Scope of Data Elements-10	Approved	F

- address verification response code (Pre-Funded transactions only)

REQ-POP-225.11	Scope of Data Elements-11	Approved	F

- bank Authorization trace number

REQ-POP-225.12	Scope of Data Elements-12	Approved	F

- Merchant ID number

REQ-POP-225.13	Scope of Data Elements-13	Approved	F

- transaction reference number (distinct from the PAN)

REQ-POP-225.14	Scope of Data Elements-14	Approved	F

- transit agency

REQ-POP-225.15	Scope of Data Elements-15	Approved	F

- transit service type (i.e., bus, streetcar, subway, train, etc.)

REQ-POP-225.16	Scope of Data Elements-16	Approved	F

- card type (credit, debit, signature debit, GPR card)

REQ-POP-225.17	Scope of Data Elements-17	Approved	F

- unique issuer ID (for banks, BINs)

REQ-POP-225.18	Scope of Data Elements-18	Approved	F

- unique device ID

REQ-POP-225.19	Scope of Data Elements-19	Approved	F

- unique terminal ID

REQ-POP-225.20	Scope of Data Elements-20	Approved	F

- unique device ID; terminal ID

REQ-POP-225.21	Scope of Data Elements-21	Approved	F

- route number

REQ-POP-225.22	Scope of Data Elements-22	Approved	F

- stop ID location

REQ-POP-225.23	Scope of Data Elements-23	Approved	F

- GPS location

REQ-POP-225.24	Scope of Data Elements-24	Approved	F

- Authorization ID

REQ-POP-225.25	Scope of Data Elements-25	Approved	F

- clearing ID

REQ-POP-225.26	Scope of Data Elements-26	Approved	F

- denial date

REQ-POP-225.27	Scope of Data Elements-27	Approved	F

- denial reason code

REQ-POP-225.28	Scope of Data Elements-28	Approved	F

- denial reason source

REQ-POP-225.29	Scope of Data Elements-29	Approved	F

- registration date and time

REQ-POP-225.30	Scope of Data Elements-30	Approved	F

- registration cancellation date and time

REQ-POP-225.31	Scope of Data Elements-31	Approved	F

- source of sale

REQ-POP-225.32	Scope of Data Elements-32	Approved	F

- pre-fund account reference number

REQ-POP-225.33	Scope of Data Elements-33	Approved	F

- purchase type ID

REQ-POP-225.34	Scope of Data Elements-34	Approved	F

- Hotlist calendar date

REQ-POP-225.35	Scope of Data Elements-35	Approved	F

- Hotlist reason code

REQ-POP-225.36	Scope of Data Elements-36	Approved	F

- total count of Hotlist additions

REQ-POP-225.37	Scope of Data Elements-37	Approved	F

- total count of Hotlist as of date

REQ-POP-225.38	Scope of Data Elements-38	Approved	F

- unique refund ID number

REQ-POP-225.39	Scope of Data Elements-39	Approved	F

- refund date and time

REQ-POP-225.40	Scope of Data Elements-40	Approved	F

- refund amount

REQ-POP-225.41	Scope of Data Elements-41	Approved	F

- refund reason code

REQ-POP-225.42	Scope of Data Elements-42	Approved	F

- refund approval code

REQ-POP-225.43	Scope of Data Elements-43	Approved	F

- refund destination PAN

REQ-POP-225.44	Scope of Data Elements-44	Approved	F

- authorized approver name

REQ-POP-225.45	Scope of Data Elements-45	Approved	F

- authorized approver ID

REQ-POP-225.46	Scope of Data Elements-46	Approved	F

- date and time authorized approver added to file

REQ-POP-225.47	Scope of Data Elements-47	Approved	F

- date and time authorized approver deleted from file

REQ-POP-225.48	Scope of Data Elements-48	Approved	F

- transfer original PAN number

REQ-POP-225.49	Scope of Data Elements-49	Approved	F

- transfer unique PAN substitute identifier

REQ-POP-225.50	Scope of Data Elements-50	Approved	F

- replacement PAN

REQ-POP-225.51	Scope of Data Elements-51	Approved	F

- replacement of unique PAN substitute identifier

REQ-POP-225.52	Scope of Data Elements-52	Approved	F

- transfer amount

REQ-POP-225.53	Scope of Data Elements-53	Approved	F

- account balance file: date account balance file is created

REQ-POP-225.54	Scope of Data Elements-54	Approved	F

- paid balance

REQ-POP-225.55	Scope of Data Elements-55	Approved	F

- transfer balance

REQ-POP-225.56	Scope of Data Elements-56	Approved	F

- refund balance

REQ-POP-225.57	Scope of Data Elements-57	Approved	F

- other balance(s)

REQ-POP-225.58	Scope of Data Elements-58	Approved	F

- passes start date

REQ-POP-225.59	Scope of Data Elements-59	Approved	F

- passes end date;

REQ-POP-225.60	Scope of Data Elements-60	Approved	F

- terminal failure start date

REQ-POP-225.61	Scope of Data Elements-61	Approved	F

- terminal failure end date

REQ-POP-225.62	Scope of Data Elements-62	Approved	F

- failure code

REQ-POP-225.63	Scope of Data Elements-63	Approved	F

- terminal disposition code

REQ-POP-225.64	Scope of Data Elements-64	Approved	F

- test card PAN

REQ-POP-225.65	Scope of Data Elements-65	Approved	F

- source of test card

REQ-POP-225.66	Scope of Data Elements-66	Approved	F

- test reason

REQ-POP-225.67	Scope of Data Elements-67	Approved	F

- ride status code

REQ-POP-225.68	Scope of Data Elements-68	Approved	F

- tap number

REQ-POP-225.69	Scope of Data Elements-69	Approved	F

- fare implementation date

REQ-POP-225.70	Scope of Data Elements-70	Approved	F

- fare expiration date

REQ-POP-225.71	Scope of Data Elements-71	Approved	F

- cost of tap

REQ-POP-225.72	Additional Transaction Fields	Approved	F

PRESTO will identify and provide any additional transaction fields required by the Canadian financial payments industry in support of TTC open payments, including EMV. Other types of data strictly associated with transit (e.g. location and direction or travel of reader assemblies deployed on surface vehicles).

REQ-POP-225.73	Select Data Sets	Approved	F

As determined by TTC, the back-office must generate specific files compromised of select data sets from the lists above. The files are the basis of specific reconciliation and reporting reports that may be required by TTC, and that as a minimum, have been described as reports above. They also serve as the basis for ad hoc reporting.

REQ-POP-225.74	Minimum Files and Datasets	Approved	F

The composition and structure of files will enable:

REQ-POP-225.74.1	Minimum Files and Datasets-2	Approved	F

 - financial reconciliation through capture of processing and posting details of each transaction performed by the central processor

REQ-POP-225.74.2	Minimum Files and Datasets-3	Approved	F

 - exception processing through capture of processing, settlement and posting details of each transaction performed by the central processor

REQ-POP-225.74.3	Minimum Files and Datasets-4	Approved	F

- Authorization tracking and control through capture of all requests and responses from the central processor and other systems

REQ-POP-225.74.4	Minimum Files and Datasets-5	Approved	F

- clearing and processing reconciliation for banks, Merchant Acquirers and all other entities engaged in the processing of payment and/or usage transactions

REQ-POP-225.74.5	Minimum Files and Datasets-6	Approved	F

- reconciliation of PAYG settlement and clearing details through one-to-one matching of transactions

REQ-POP-225.74.6	Minimum Files and Datasets-7	Approved	F

- Pre-Funded account activity tracking and management, including activities by TTC Customers or Customer agents

REQ-POP-225.74.7	Minimum Files and Datasets-8	Approved	F

- single ride LUM sales tracking and management

REQ-POP-225.74.8	Minimum Files and Datasets-9	Approved	F

- LUM transfer usage tracking and management

REQ-POP-225.74.9	Minimum Files and Datasets-10	Approved	F

- transfer tracking and management of use of LUM as transfer stock

REQ-POP-225.74.10	Minimum Files and Datasets-11	Approved	F

- tracking of reader assemblies and other field equipment deployed or installed on TTC property

REQ-POP-225.74.11	Minimum Files and Datasets-12	Approved	F

- tracking of all non-revenue fare products

REQ-POP-225.74.12	Minimum Files and Datasets-13	Approved	F

- tracking of unpaid transactions

REQ-POP-225.74.13	Minimum Files and Datasets-14	Approved	F

- tracking of all hot listing activity by source of Hotlist action

REQ-POP-225.74.14	Minimum Files and Datasets-15	Approved	F

- tracking and management of refunds to TTC Customers

REQ-POP-225.74.15	Minimum Files and Datasets-16	Approved	F

- management of communications and other systems failures

REQ-POP-225.74.16	Minimum Files and Datasets-17	Approved	F

- "cradle-to-grave" monitoring and management of TTC Customer claims

REQ-POP-225.74.17	Minimum Files and Datasets-18	Approved	F

- comprehensive tracking of all configuration and activity result messages, including decline reason codes, Reader Assembly acceptance result codes, failure codes, test card usage, Customer service codes for resolution of inquiries and authorized approver codes

REQ-POP-225.74.18	Minimum Files and Datasets-19	Approved	F

- tracking of account balances on all transit accounts

REQ-POP-225.74.19	Minimum Files and Datasets-20	Approved	F

- monitoring of current processing categories and fare pricings

REQ-POP-225.74.20	Minimum Files and Datasets-21	Approved	F

- tracking of positive and negative exception lists for transfers between all modes of transportation by tap sequence

The above is provided in order to gauge the scope of what is required only and is by no means exhaustive. During Design Review, TTC and PRESTO will finalize the Data Universe.

REQ-POP-226	Final Approval of Data Universe	Approved	F

Final approval of the Data Universe by TTC is required prior to PRESTO moving ahead with programming of the central processor, Final Design of equipment, and manufacture of system components.

4   GPR Cards in the Transit Environment

These specifications for the PRESTO Open Payments System have been extracted from Schedule 2.1.87 of the OSFS RFP.

REQ-POP-1	Support for GPR Cards	Approved	F

Ensure capability of processing all open payment (open loop) GPR cards, regardless of issuer.

REQ-POP-1.1	Support for Anonymous and Registered GPR Cards	Approved	F

Ensure full support of both anonymous and registered GPR cards.

REQ-POP-2	Instant Issued GPR Cards	Approved	F

An anonymous GPR Card will be instant issued card not linked to a particular individual.

REQ-POP-3	Registered GPR Cards	Approved	F

A registered GPR card will be a GPR card that is issued to TTC Customers who complete a registration process. Registered GPR card accounts will bear the name of the cardholder.

REQ-POP-4	Support for GPR Card Registration	Approved	F

Ensure full support of GPR card registration and all registration processes required to allow Customers to register their GPR cards.

REQ-POP-5	Customer Education and Messaging for GPR Cards	Approved	F

The PRESTO System GPR card registration option and procedure will be communicated to Customers via a comprehensive and sustained Customer education and messaging campaign by PRESTO.

REQ-POP-6	Registration Process	Approved	F

Ensure full support of all processes and procedures required for anonymous GPR cardholders to register their GPR card.

REQ-POP-7	Issuance fees	Approved	F

Issuance fees for GPR cards will be determined by location of GPR card sale and GPR card registration status. This is illustrated in the following table.

For the excel version of the TTC Specifications this table is located in POP-7 in the document Appendix G for Excel Version of TTC Specifications.

Location Where Customer Acquired GPR Card	Registration Status of GPR Card	
	Anonymous	Registered
In-System	GPR Card Deposit Model Applies	No issuance fee
Out-of-System	PRESTO Option	PRESTO Option

Table Issuance Fee by Location of Sale and GPR Registration Status
In the above table where PRESTO Option is specified, the Vendor has the option of charging a fee.

REQ-POP-8	No Issuance Fee for GPR Cards Aquired In-System	Approved	F

Registered GPR cards acquired In-system will not have any issuance fee.

REQ-POP-9	GPR Card Deposit Model	Approved	F

Anonymous GPR cards acquired In-system will not have an issuance fee

REQ-POP-9.1	GPR Card Deposit Model-2	Approved	F

Enable the application of the GPR card deposit model for the GPR card when the Customer purchases the anonymous GPR card.

For example, the TTC Customer would be charge a 'deposit fee' in lieu of an issuance fee upon acquiring an anonymous GPR card (e.g. $3.00). This deposit fee will be refunded to the TTC Customer up to the original deposit amount at a set rate base on a time period (e.g. $1.00/month for 3 months). The rate and time period will be determined by PRESTO and TTC prior to Final Design

REQ-POP-9.2	GPR Card Deposit Model-3	Approved	F

Enable the deposit fee to be refunded to the Customer up to the original deposit amount at a set rate base on a time period.

For example, the TTC Customer would be charge a 'deposit fee' in lieu of an issuance fee upon acquiring an anonymous GPR card (e.g. $3.00). This deposit fee will be refunded to the TTC Customer up to the original deposit amount at a set rate base on a time period (e.g. $1.00/month for 3 months). The rate and time period will be determined by PRESTO and TTC prior to Final Design.

REQ-POP-10	Fees Allowed Based on Customer Action	Approved	F

The following table outlines the fees for GPR cards acquired in-system based on TTC Customer action. Specifically, the table states when the PRESTO has the option (stated as vender option in table) of charging TTC Customer GPR cardholders fees for:

- Transactions
- Monthly maintenance
- Reloads

For the excel version of the TTC Specifications this table is located in POP-10 in the document Appendix G for Excel Version of TTC Specifications.

Customer Action	GPR Card Fees		
	Transaction Fee	Monthly Maintenance Fee	Reload Fee
Uses GPR Card exclusively In-System (i.e. all use and reloads)	No	No	No
Uses GPR Card exclusively In-System but reloads Out-of-System	No	No	PRESTO Option for Out-of-System reloads
Uses GPR Card exclusively Out-of-System (i.e. all use and reloads)	PRESTO Option	PRESTO Option	PRESTO Option
Uses GPR Card exclusively Out-System but reloads In-System	PRESTO Option	PRESTO Option	No
Uses GPR Card both In- and Out-of-System	No for In-System use; PRESTO Option for Out-of-System use	PRESTO Option	No for In-System reloads; PRESTO Option for Out-of-System reloads

Table Breakdown of Fees for GPR Cards Acquired In-System

In the above table where PRESTO Option is specified, the Vendor has the option of charging a fee.

REQ-POP-11	No Fees for Exclusive In-System Usage	Approved	F

Ensure that Customers who acquire GPR cards in-system and use them exclusively in-system (including reloads) will not have any fees charged.

REQ-POP-12	Outline of Fees for Out-of-System GPR Cards	Approved	F

The following table outlines the fees for GPR cards acquired out-of-system based on TTC Customer action. Specifically, the table states when the PRESTO has the option (stated as vender option in table) of charging TTC Customer GPR cardholders fees for:

- Transactions;
- Monthly maintenance; and,
- Reloads.

For the excel version of the TTC Specifications this table is located in POP-12 in the document Appendix G for Excel Version of TTC Specifications.

Customer Action	GPR Card Fees		
	Transaction Fee	**Monthly Maintenance Fee**	**Reload Fee**
Uses GPR Card exclusively In-System (i.e. all use and reloads)	No	PRESTO Option	No
Uses GPR Card exclusively In-System but reloads Out-of-System	No	PRESTO Option	PRESTO Option for Out-of-System reloads
Uses GPR Card exclusively Out-of-System (i.e. all use and reloads)	PRESTO Option	PRESTO Option	PRESTO Option
Uses GPR Card exclusively Out-System but reloads In-System	PRESTO Option	PRESTO Option	No
Uses GPR Card both In- and Out-of-System	No for In-System use; PRESTO Option for Out-of-System use	PRESTO Option	No for In-System reloads; PRESTO Option for Out-of-System reloads

Table Breakdown of Fees for GPR Cards Acquired Out-of-System

In the above table where PRESTO Option is specified, the Vendor has the option of charging a fee.

REQ-POP-13	Fees for GPR Cards Acquired Out of System but used Exclusively for Transit	Approved	F

Ensure that Customers who acquire GPR cards out-of-system and use them exclusively in-system (including reloads) will not have any additional PRESTO fees charged other than the PRESTO option of a monthly maintenance fee.

5   Open Payments Specifications Relating to Schedule B - System

REQ-POP-227	PRESTO System	Approved	F

All specifications stated in REQ-SYS, section - PRESTO System will be equivalently supported by the PRESTO open payments system.

REQ-POP-228	Concept of Operations	Approved	F

All specifications stated in schedule B, section - Concept of Operations will be equivalently supported by the PRESTO open payments system.

REQ-POP-229	Field Equipment	Approved	F

All specifications stated in schedule B, section - Field Equipment will be equivalently supported by the PRESTO open payments system. This includes all the specifications:

REQ-POP-229.2	Field Equipment-2	Approved	F

 - REQ-GES-XX (general equipment specifications)

REQ-POP-229.3	Field Equipment-3	Approved	F

 - REQ-RAS-XX (all reader assemblies)

REQ-POP-229.4	Field Equipment-4	Approved	F

 - REQ-GSR-XX (general sales and reload devices)

REQ-POP-229.5	Field Equipment-5	Approved	F

 - REQ-FMV-XX (fare media vending machine)

REQ-POP-229.6	Field Equipment-6	Approved	F

 - REQ-AVM-XX (Add Value Machine)

REQ-POP-229.7	Field Equipment-7	Approved	F

 - REQ-OBS-XX (Off-Board SRVM)

REQ-POP-229.8	Field Equipment-8	Approved	F

 - REQ-ONS-XX (Onboard SRVM)

REQ-POP-229.9	Field Equipment-9	Approved	F

 - REQ-HHP-XX (HHPOS)

REQ-POP-229.10	Field Equipment-10	Approved	F

 - REQ-LBD-XX (LUM on bus)

REQ-POP-229.11	Field Equipment-11	Approved	F

- REQ-DEQ-XX (distribution equipment)

REQ-POP-229.12	Field Equipment-12	Approved	F

- REQ-POS-XX (point of sale equipment)

REQ-POP-229.13	Field Equipment-13	Approved	F

Several clarifications for fare equipment supporting open payment media follow.

REQ-POP-229.14	Real Time Connectivity of Reader Assemblies	Approved	F

Ensure all reader assemblies on all modes of transportation will have real-time connectivity to the PRESTO System CBO when accepting open payment media as fare payment.

REQ-POP-229.15	GPR Card Sales Channels	Approved	F

PRESTO may elect to sell GPR cards via FMVDs.   The sale and reload of GPR cards will follow the specifications as outlined in the section GPR cards in the transit environment in this schedule.

REQ-POP-230	Installation of Field Equipment	Approved	F

All specifications stated in Schedule B, section - Installation of PRESTO Field System, will be equivalently supported by the PRESTO open payments system.

REQ-POP-231	Estimated Operating Equipment	Approved	F

All specifications stated in REQ-EOF section - Estimated operating Equipment, will be equivalently supported by the PRESTO open payments system. All reader assemblies will be open payments capable as well as PRESTO Media capable and will meet all specifications as outlined in this agreement.   It is expected that all Reader Assemblies will be Open Payments capable (i.e. not just a certain select Reader Assemblies at for example a turnstile bank.)

REQ-POP-232	TTC Fare Rules and Policy	Approved	F

All specifications stated in REQ-FRP, section - Fare Rules and Policy will be equivalently supported by the PRESTO open payments system.

To be clear, TTC Fare Rules and Policy are identical for PRESTO Media and Open Payments Media.

REQ-POP-233	TTC Customer Service Centre	Approved	F

All specifications stated in REQ-CSC, section - TTC Customer Service Centre will be equivalently supported by the PRESTO open payments system.

REQ-POP-234	Cash Customer	Approved	F

All specifications stated in REQ-CAC, section - Cash Customer will be equivalently supported by the PRESTO open payments system. Note that the LUM may or may not be an open payments LUM as per POP-27.

REQ-POP-235	PRESTO-TTC Test Lab	Approved	F

All specifications stated in REQ-TTL, section - PRESTO-TTC test lab, will be equivalently supported by the PRESTO open payments system.   The PRESTO-TTC test lab will support the testing of all Open Payments Media, all PRESTO Devices and all PRESTO System/services with respect to fully supporting open payments.

REQ-POP-236	Cross Boundary Service	Approved	F

All specifications stated in REQ-CBD-XX, section - Cross boundary service will be equivalently supported by the PRESTO open payments system.

REQ-POP-237	Transit Expansion Service	Approved	F

All specifications stated in REQ-TEO, section - Transit expansion operations, will be equivalently supported by the PRESTO open payments system.

REQ-POP-238	Parking Requirements	Approved	F

All specifications stated in REQ-PRK, section - parking will be equivalently supported by the PRESTO open payments system.

REQ-POP-239	Wheel-Trans	Approved	F

All specifications stated in REQ-WTS, section - Wheel-trans, will be equivalently supported by the PRESTO open payments system.

REQ-POP-240	Third Party Network	Approved	F

All specifications stated in REQ-TPN, section - Third party network, will be equivalently supported by the PRESTO open payments system.

REQ-POP-240.1	Use of GPR Cards for TPN	Approved	F

PRESTO may elect to use GPR cards as the media of choice for third party networks; however this choice can only be made if all reader assemblies on all modes of transportation accept Open Payments Media.

6 Open Payments Specifications Relating to Schedule C - Services

REQ-POP-62	PRESTO Open Payments System Services Specifications	Approved	F

All specifications stated below will be equivalently supported by the PRESTO open payments system.

 - Roles and Responsibilities (REQ-RAR-XX);
 - Customer Management (REQ-CMG-XX);
 - Field System Management (REQ-FSM-XX);
 - Business Intelligence (which includes Reporting and Dashboards) (REQ-BIN-XX);
 - Data Management (which includes the Data Mart) (REQ-DMG-XX);
 - Fare Management (which includes Fare Groups) (REQ-FAM-XX);
 - Revenue Management (REQ-RVM-XX);
 - System Management (which includes Audit, Fraud Detection and Risk Mitigation) (REQ-SMG-XX);
- Order and Distribution Management (REQ-ODM-XX); and
 - Training (REQ-TRN-XX).

REQ-POP-63	Additional Specifications for Open Payments	Approved	F

Additional specifications for open payments especially with regards to Business Intelligence, reporting, dashboards and data fields will be determined at a later date.

REQ-POP-64	Non-Duplication of Services	Approved	F

OPTIONAL -PRESTO Open payments system may use services that may be already in place for the traditional PRESTO System as long as they meet all the specifications as outlined in this schedule and comply with all applicable open payments standards and certifications.

REQ-POP-65	Customer Transit Accounts	Approved	F

The PRESTO System will present Customer transit accounts based on Customer and media that can be associated to a single registered Customer.

7   Open Payments Specifications Relating to Schedule A - SLA

REQ-POP-14	Service Level Management and Service Levels	Approved	F

The Service Level agreement and all Service Levels stated in schedule A will be equivalently supported by the PRESTO open payments system.

REQ-POP-15	Additional Open Payments SLAS	Approved	F

The PRESTO System will support the following additional SLAs (i.e. additional to TTC Schedule A) when processing open payments fare transactions:

 - Financial Loss Rate,BO-23 of <0.5% as defined in this Schedule. Details of this SLA are given in Schedule A.

REQ-POP-15.2	Additional Open Payments SLAS-2	Approved	F

 - payment processing claims rate for PAYG, BO-9 of <0.2% as defined in this Schedule. Details of this SLA are given in Schedule A.

REQ-POP-15.3	Additional Open Payments SLAS-3	Approved	F

 - Usage Tap claims rate for PAYG, BO-11of <0.1% as defined in this Schedule. Details of this SLA are given in Schedule A.

REQ-POP-15.4	Additional Open Payments SLAS-4	Approved	F

 - network latency, NT-1 of < 120 milliseconds as defined in this Schedule. Details of this SLA are given in Schedule A.

8   Open Payments Specifications Relating to Schedule D - Project Plan

REQ-POP-16	Project Plan Specifications	Approved	F

All specifications stated in REQ-PRJ will be equivalently supported by the PRESTO open payments system.

9   Open Payments Specifications Relating to Schedule E - QA and Testing

REQ-POP-17	QA and Testing	Approved	F

All specifications stated in REQ-QAT will be equivalently supported by the PRESTO open payments system.

Cross Reference Table

This cross reference table matches PRESTO information to TTC Business Requirements. This table is in document order as defined in this document.

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-18	POP	REQ-POP-18/1	Open Payments	F	*Approved*	R?.?
REQ-POP-19	POP	REQ-POP-19/1	Open Payments	F	*Approved*	R?.?
REQ-POP-20	POP	REQ-POP-20/1	Open Payments	F	*Approved*	R?.?
REQ-POP-21	POP	REQ-POP-21/1	Open Payments	F	*Approved*	R?.?
REQ-POP-21.1	POP	REQ-POP-21/2	Open Payments	F	*Approved*	R?.?
REQ-POP-21.2	POP	REQ-POP-21/3	Open Payments	F	*Approved*	R?.?
REQ-POP-22	POP	REQ-POP-22/1	Card/Media Management	F	Approved	R?.?
REQ-POP-23	POP	REQ-POP-23/1	Open Payments	F	*Approved*	R?.?
REQ-POP-24	POP	REQ-POP-24/1	Other - Program Management	F	Approved	R?.?
REQ-POP-25	POP	REQ-POP-25/1	Other - Program Management	F	Approved	R?.?
REQ-POP-26	POP	REQ-POP-26/1	Open Payments	F	*Approved*	R?.?
REQ-POP-26.1	POP	REQ-POP-26/2	Open Payments	F	*Approved*	R?.?
REQ-POP-26.2	POP	REQ-POP-26/3	Open Payments	F	*Approved*	R?.?
REQ-POP-26.3	POP	REQ-POP-26/4	Open Payments	F	*Approved*	R?.?
REQ-POP-27	POP	REQ-POP-27/1	Card/Media Management	F	Approved	R?.?
REQ-POP-28	POP	REQ-POP-28/1	Open Payments	F	*Approved*	R?.?
REQ-POP-29	POP	REQ-POP-29/1	Other - Program Management	NF	Approved	R?.?
REQ-POP-30	POP	REQ-POP-30/1	Other - Program Management	NF	Approved	R?.?
REQ-POP-31	POP	REQ-POP-31/1	Other - Program Management	F	Approved	R?.?
REQ-POP-32	POP	REQ-POP-32/1	Open Payments	F	*Approved*	R?.?
REQ-POP-33	POP	REQ-POP-33/1	Open Payments	F	*Approved*	R?.?
REQ-POP-34	POP	REQ-POP-34/1	Open Payments	F	*Approved*	R?.?
REQ-POP-35	POP	REQ-POP-35/1	Open Payments	F	*Approved*	R?.?
REQ-POP-36	POP	REQ-POP-36/1	Open Payments	F	*Approved*	R?.?
REQ-POP-37	POP	REQ-POP-37/1	Open Payments	F	*Approved*	R?.?
REQ-POP-38	POP	REQ-POP-38/1	Open Payments	F	*Approved*	R?.?
REQ-POP-39	POP	REQ-POP-39/1	Devices	F	*Approved*	R?.?
REQ-POP-39.1	POP	REQ-POP-39/2	Devices	F	*Approved*	R?.?
REQ-POP-40	POP	REQ-POP-40/1	Devices	F	*Approved*	R?.?
REQ-POP-41	POP	REQ-POP-41/1	Channels	F	*Approved*	R?.?
REQ-POP-42	POP	REQ-POP-42/1	Data Management	F	*Approved*	R?.?
REQ-POP-43	POP	REQ-POP-43/1	Open Payments	F	*Approved*	R?.?
REQ-POP-44	POP	REQ-POP-44/1	Open Payments	F	*Approved*	R?.?
REQ-POP-44.1	POP	REQ-POP-44/2	Open Payments	F	*Approved*	R?.?
REQ-POP-45	POP	REQ-POP-45/1	Devices	F	*Approved*	R?.?
REQ-POP-46	POP	REQ-POP-46/1	Other - Program Management	F	Approved	R?.?
REQ-POP-47	POP	REQ-POP-47/1	Open Payments	F	*Approved*	R?.?
REQ-POP-47.1	POP	REQ-POP-47/2	Open Payments	F	*Approved*	R?.?
REQ-POP-47.2	POP	REQ-POP-47/3	Open Payments	F	*Approved*	R?.?
REQ-POP-47.3	POP	REQ-POP-47/4	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-48	POP	REQ-POP-48/1	Other - Program Management	F	*Approved*	R?.?
REQ-POP-49	POP	REQ-POP-49/1	Open Payments	F	*Approved*	R?.?
REQ-POP-50	POP	REQ-POP-50/1	Open Payments	F	*Approved*	R?.?
REQ-POP-50.1	POP	REQ-POP-50.1/1	Other - Deployment	NF	*Approved*	R?.?
REQ-POP-51	POP	REQ-POP-51/1	Open Payments	F	*Approved*	R?.?
REQ-POP-52	POP	REQ-POP-52/1	Open Payments	F	*Approved*	R?.?
REQ-POP-53	POP	REQ-POP-53/1	Open Payments	F	*Approved*	R?.?
REQ-POP-53.1	POP	REQ-POP-53.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-54	POP	REQ-POP-54/1	Open Payments	F	*Approved*	R?.?
REQ-POP-55	POP	REQ-POP-55/1	Open Payments	F	*Approved*	R?.?
REQ-POP-55.1	POP	REQ-POP-55/2	Open Payments	F	*Approved*	R?.?
REQ-POP-55.2	POP	REQ-POP-55/3	Open Payments	F	*Approved*	R?.?
REQ-POP-55.3	POP	REQ-POP-55/4	Open Payments	F	*Approved*	R?.?
REQ-POP-55.4	POP	REQ-POP-55/5	Open Payments	F	*Approved*	R?.?
REQ-POP-55.5	POP	REQ-POP-55/6	Open Payments	F	*Approved*	R?.?
REQ-POP-55.6	POP	REQ-POP-55/7	Open Payments	F	*Approved*	R?.?
REQ-POP-55.7	POP	REQ-POP-55/8	Open Payments	F	*Approved*	R?.?
REQ-POP-55.8	POP	REQ-POP-55/9	Open Payments	F	*Approved*	R?.?
REQ-POP-55.9	POP	REQ-POP-55/10	Open Payments	F	*Approved*	R?.?
REQ-POP-55.10	POP	REQ-POP-55/11	Open Payments	F	*Approved*	R?.?
REQ-POP-55.11	POP	REQ-POP-55/12	Open Payments	F	*Approved*	R?.?
REQ-POP-55.12	POP	REQ-POP-55/13	Open Payments	F	*Approved*	R?.?
REQ-POP-55.13	POP	REQ-POP-55/14	Open Payments	F	*Approved*	R?.?
REQ-POP-55.14	POP	REQ-POP-55/15	Open Payments	F	*Approved*	R?.?
REQ-POP-55.15	POP	REQ-POP-55/16	Open Payments	F	*Approved*	R?.?
REQ-POP-55.16	POP	REQ-POP-55/17	Open Payments	F	*Approved*	R?.?
REQ-POP-55.17	POP	REQ-POP-55/18	Open Payments	F	*Approved*	R?.?
REQ-POP-55.18	POP	REQ-POP-55/19	Open Payments	F	*Approved*	R?.?
REQ-POP-55.19	POP	REQ-POP-55/20	Open Payments	F	*Approved*	R?.?
REQ-POP-55.20	POP	REQ-POP-55/21	Open Payments	F	*Approved*	R?.?
REQ-POP-55.21	POP	REQ-POP-55/22	Open Payments	F	*Approved*	R?.?
REQ-POP-55.22	POP	REQ-POP-55/23	Open Payments	F	*Approved*	R?.?
REQ-POP-55.23	POP	REQ-POP-55/24	Open Payments	F	*Approved*	R?.?
REQ-POP-55.24	POP	REQ-POP-55/25	Open Payments	F	*Approved*	R?.?
REQ-POP-55.25	POP	REQ-POP-55/26	Open Payments	F	*Approved*	R?.?
REQ-POP-55.26	POP	REQ-POP-55/27	Open Payments	F	*Approved*	R?.?
REQ-POP-55.27	POP	REQ-POP-55/28	Open Payments	F	*Approved*	R?.?
REQ-POP-55.28	POP	REQ-POP-55/29	Open Payments	F	*Approved*	R?.?
REQ-POP-55.29	POP	REQ-POP-55/30	Open Payments	F	*Approved*	R?.?
REQ-POP-55.30	POP	REQ-POP-55/31	Open Payments	F	*Approved*	R?.?
REQ-POP-55.31	POP	REQ-POP-55/32	Open Payments	F	*Approved*	R?.?
REQ-POP-56	POP	REQ-POP-56/1	Open Payments	F	*Approved*	R?.?
REQ-POP-57	POP	REQ-POP-57/1	Open Payments	F	*Approved*	R?.?
REQ-POP-58	POP	REQ-POP-58/1	Open Payments	F	*Approved*	R?.?
REQ-POP-59	POP	REQ-POP-59/1	Other - Program Management	NF	*Approved*	R?.?
REQ-POP-60	POP	REQ-POP-60/1	Other - Program Management	NF	*Approved*	R?.?
REQ-POP-66	POP	REQ-POP-66/1	Open Payments	F	*Approved*	R?.?
REQ-POP-67	POP	REQ-POP-67/1	Open Payments	F	*Approved*	R?.?
REQ-POP-68	POP	REQ-POP-68/1	Open Payments	F	*Approved*	R?.?
REQ-POP-68.1	POP	REQ-POP-68.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-68.1.1	POP	REQ-POP-68.1/2	Open Payments	F	*Approved*	R?.?
REQ-POP-68.1.2	POP	REQ-POP-68.1/3	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-68.1.3	POP	REQ-POP-68.1/4	Open Payments	F	*Approved*	R?.?
REQ-POP-68.1.4	POP	REQ-POP-68.1/5	Open Payments	F	*Approved*	R?.?
REQ-POP-68.1.5	POP	REQ-POP-68.1/6	Open Payments	F	*Approved*	R?.?
REQ-POP-68.2	POP	REQ-POP-68.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-68.2.1	POP	REQ-POP-68.2/2	Open Payments	F	*Approved*	R?.?
REQ-POP-68.2.2	POP	REQ-POP-68.2/3	Open Payments	F	*Approved*	R?.?
REQ-POP-68.2.3	POP	REQ-POP-68.2/4	Open Payments	F	*Approved*	R?.?
REQ-POP-68.2.4	POP	REQ-POP-68.2/5	Open Payments	F	*Approved*	R?.?
REQ-POP-68.3	POP	REQ-POP-68.3/1	Open Payments	F	*Approved*	R?.?
REQ-POP-68.4	POP	REQ-POP-68.4/1	Open Payments	F	*Approved*	R?.?
REQ-POP-69	POP	REQ-POP-69/1	Open Payments	F	*Approved*	R?.?
REQ-POP-70	POP	REQ-POP-70/1	Open Payments	F	*Approved*	R?.?
REQ-POP-70.1	POP	REQ-POP-70/2	Open Payments	F	*Approved*	R?.?
REQ-POP-71	POP	REQ-POP-71/1	Open Payments	F	*Approved*	R?.?
REQ-POP-72	POP	REQ-POP-72/1	Open Payments	F	*Approved*	R?.?
REQ-POP-73	POP	REQ-POP-73/1	Open Payments	F	*Approved*	R?.?
REQ-POP-74	POP	REQ-POP-74/1	Open Payments	F	*Approved*	R?.?
REQ-POP-75	POP	REQ-POP-75/1	Open Payments	F	*Approved*	R?.?
REQ-POP-76	POP	REQ-POP-76/1	Open Payments	F	*Approved*	R?.?
REQ-POP-77	POP	REQ-POP-77/1	Open Payments	F	*Approved*	R?.?
REQ-POP-78	POP	REQ-POP-78/1	Fare Management	F	*Approved*	R?.?
REQ-POP-78.2	POP	REQ-POP-78/2	Fare Management	F	*Approved*	R?.?
REQ-POP-78.3	POP	REQ-POP-78/3	Fare Management	F	*Approved*	R?.?
REQ-POP-78.4	POP	REQ-POP-78/4	Fare Management	F	*Approved*	R?.?
REQ-POP-78.5	POP	REQ-POP-78/5	Fare Management	F	*Approved*	R?.?
REQ-POP-241	POP	REQ-POP-78.1/1	Fare Management	F	*Approved*	R?.?
REQ-POP-242	POP	REQ-POP-78.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-242.1	POP	REQ-POP-78.2/2	Open Payments	F	*Approved*	R?.?
REQ-POP-242.2	POP	REQ-POP-78.2/3	Open Payments	F	*Approved*	R?.?
REQ-POP-79	POP	REQ-POP-79/1	Fare Management	F	*Approved*	R?.?
REQ-POP-79.1	POP	REQ-POP-79/2	Fare Management	F	*Approved*	R?.?
REQ-POP-80	POP	REQ-POP-80/1	Open Payments	F	*Approved*	R?.?
REQ-POP-80.1	POP	REQ-POP-80/2	Open Payments	F	*Approved*	R?.?
REQ-POP-81	POP	REQ-POP-81/1	Open Payments	F	*Approved*	R?.?
REQ-POP-82	POP	REQ-POP-82/1	Fare Management	F	*Approved*	R?.?
REQ-POP-82.1	POP	REQ-POP-82/2	Fare Management	F	*Approved*	R?.?
REQ-POP-82.2	POP	REQ-POP-82/3	Fare Management	F	*Approved*	R?.?
REQ-POP-82.3	POP	REQ-POP-82/4	Fare Management	F	*Approved*	R?.?
REQ-POP-82.4	POP	REQ-POP-82/5	Fare Management	F	*Approved*	R?.?
REQ-POP-82.5	POP	REQ-POP-82/6	Fare Management	F	*Approved*	R?.?
REQ-POP-82.6	POP	REQ-POP-82/7	Fare Management	F	*Approved*	R?.?
REQ-POP-82.7	POP	REQ-POP-82/8	Fare Management	F	*Approved*	R?.?
REQ-POP-82.8	POP	REQ-POP-82/9	Fare Management	F	*Approved*	R?.?
REQ-POP-82.9	POP	REQ-POP-82/10	Fare Management	F	*Approved*	R?.?
REQ-POP-82.10	POP	REQ-POP-82/11	Fare Management	F	*Approved*	R?.?
REQ-POP-82.11	POP	REQ-POP-82/12	Fare Management	F	*Approved*	R?.?
REQ-POP-82.12	POP	REQ-POP-82/13	Fare Management	F	*Approved*	R?.?
REQ-POP-82.13	POP	REQ-POP-82/14	Fare Management	F	*Approved*	R?.?
REQ-POP-82.14	POP	REQ-POP-82/15	Fare Management	F	*Approved*	R?.?
REQ-POP-82.15	POP	REQ-POP-82/16	Fare Management	F	*Approved*	R?.?
REQ-POP-82.16	POP	REQ-POP-82/17	Fare Management	F	*Approved*	R?.?
REQ-POP-82.17	POP	REQ-POP-82/18	Fare Management	F	*Approved*	R?.?
REQ-POP-82.18	POP	REQ-POP-82/19	Fare Management	F	*Approved*	R?.?
REQ-POP-82.19	POP	REQ-POP-82/20	Fare Management	F	*Approved*	R?.?
REQ-POP-82.20	POP	REQ-POP-82/21	Fare Management	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-82.21	POP	REQ-POP-82/22	Fare Management	F	*Approved*	R?.?
REQ-POP-82.22	POP	REQ-POP-82/23	Fare Management	F	*Approved*	R?.?
REQ-POP-82.23	POP	REQ-POP-82/24	Fare Management	F	*Approved*	R?.?
REQ-POP-83	POP	REQ-POP-83/1	Fare Management	F	*Approved*	R?.?
REQ-POP-84	POP	REQ-POP-84/1	Fare Management	F	*Approved*	R?.?
REQ-POP-85	POP	REQ-POP-85/1	Fare Management	F	*Approved*	R?.?
REQ-POP-86	POP	REQ-POP-86/1	Open Payments	F	*Approved*	R?.?
REQ-POP-86.2	POP	REQ-POP-86/2	Open Payments	F	*Approved*	R?.?
REQ-POP-86.3	POP	REQ-POP-86.1/1	Card/Media Management	F	*Approved*	R?.?
REQ-POP-86.3.1	POP	REQ-POP-86.1/2	Card/Media Management	F	*Approved*	R?.?
REQ-POP-86.4	POP	REQ-POP-86.2/1	Fare Management	F	*Approved*	R?.?
REQ-POP-86.4.1	POP	REQ-POP-86.2/2	Fare Management	F	*Approved*	R?.?
REQ-POP-86.4.2	POP	REQ-POP-86.2/3	Fare Management	F	*Approved*	R?.?
REQ-POP-86.4.3	POP	REQ-POP-86.2/4	Fare Management	F	*Approved*	R?.?
REQ-POP-86.5	POP	REQ-POP-86.3/1	Fare Management	F	*Approved*	R?.?
REQ-POP-86.6	POP	REQ-POP-86.4/1	Fare Management	F	*Approved*	R?.?
REQ-POP-86.7	POP	REQ-POP-86.5/1	Card/Media Management	F	*Approved*	R?.?
REQ-POP-86.7.1	POP	REQ-POP-86.5/2	Card/Media Management	F	*Approved*	R?.?
REQ-POP-86.7.2	POP	REQ-POP-86.5/3	Card/Media Management	F	*Approved*	R?.?
REQ-POP-87	POP	REQ-POP-87/1	Fare Management	F	*Approved*	R?.?
REQ-POP-87.1	POP	REQ-POP-87.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-87.1.1	POP	REQ-POP-87.1/2	Open Payments	F	*Approved*	R?.?
REQ-POP-87.2	POP	REQ-POP-87.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-88	POP	REQ-POP-88/1	Fare Management	F	*Approved*	R?.?
REQ-POP-88.1	POP	REQ-POP-88.1/1	Fare Management	F	*Approved*	R?.?
REQ-POP-88.2	POP	REQ-POP-88.2/1	Fare Management	F	*Approved*	R?.?
REQ-POP-88.2.1	POP	REQ-POP-88.2/2	Fare Management	F	*Approved*	R?.?
REQ-POP-88.2.2	POP	REQ-POP-88.2/3	Fare Management	F	*Approved*	R?.?
REQ-POP-88.3	POP	REQ-POP-88.3/1	Fare Management	F	*Approved*	R?.?
REQ-POP-88.3.1	POP	REQ-POP-88.3/2	Fare Management	F	*Approved*	R?.?
REQ-POP-88.3.2	POP	REQ-POP-88.3/3	Fare Management	F	*Approved*	R?.?
REQ-POP-88.3.3	POP	REQ-POP-88.3/4	Fare Management	F	*Approved*	R?.?
REQ-POP-88.3.4	POP	REQ-POP-88.3/5	Fare Management	F	*Approved*	R?.?
REQ-POP-88.3.5	POP	REQ-POP-88.3/6	Fare Management	F	*Approved*	R?.?
REQ-POP-88.4	POP	REQ-POP-88.4/1	Fare Management	F	*Approved*	R?.?
REQ-POP-88.5	POP	REQ-POP-88.5/1	Fare Management	F	*Approved*	R?.?
REQ-POP-89	POP	REQ-POP-89/1	Open Payments	F	*Approved*	R?.?
REQ-POP-89.1	POP	REQ-POP-89/2	Open Payments	F	*Approved*	R?.?
REQ-POP-90	POP	REQ-POP-90/1	Open Payments	F	*Approved*	R?.?
REQ-POP-90.1	POP	REQ-POP-90.1/1	Fare Management	F	*Approved*	R?.?
REQ-POP-90.2	POP	REQ-POP-90/2	Open Payments	F	*Approved*	R?.?
REQ-POP-91	POP	REQ-POP-91/1	Open Payments	F	*Approved*	R?.?
REQ-POP-91.2	POP	REQ-POP-91/2	Open Payments	F	*Approved*	R?.?
REQ-POP-91.3	POP	REQ-POP-91.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-91.4	POP	REQ-POP-91.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-91.5	POP	REQ-POP-91.3/1	Devices	F	*Approved*	R?.?
REQ-POP-91.6	POP	REQ-POP-91.4/1	Open Payments	F	*Approved*	R?.?
REQ-POP-91.7	POP	REQ-POP-91.5/1	Open Payments	F	*Approved*	R?.?
REQ-POP-91.8	POP	REQ-POP-91.6/1	Open Payments	F	*Approved*	R?.?
REQ-POP-91.8.1	POP	REQ-POP-91.6/2	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-91.10	POP	REQ-POP-91.7/1	Open Payments	F	*Approved*	R?.?
REQ-POP-92	POP	REQ-POP-92/1	Open Payments	F	*Approved*	R?.?
REQ-POP-92.1	POP	REQ-POP-92.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-92.2	POP	REQ-POP-92/2	Open Payments	F	*Approved*	R?.?
REQ-POP-94	POP	REQ-POP-94/1	Open Payments	F	*Approved*	R?.?
REQ-POP-95	POP	REQ-POP-95/1	Open Payments	F	*Approved*	R?.?
REQ-POP-96	POP	REQ-POP-96/1	Open Payments	F	*Approved*	R?.?
REQ-POP-96.1	POP	REQ-POP-96/2	Open Payments	F	*Approved*	R?.?
REQ-POP-97	POP	REQ-POP-97/1	Open Payments	F	*Approved*	R?.?
REQ-POP-98	POP	REQ-POP-98/1	Open Payments	F	*Approved*	R?.?
REQ-POP-98.1	POP	REQ-POP-98.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-99	POP	REQ-POP-99/1	Open Payments	F	*Approved*	R?.?
REQ-POP-99.1	POP	REQ-POP-99/2	Open Payments	F	*Approved*	R?.?
REQ-POP-100	POP	REQ-POP-100/1	Open Payments	F	*Approved*	R?.?
REQ-POP-100.1	POP	REQ-POP-100/2	Open Payments	F	*Approved*	R?.?
REQ-POP-101	POP	REQ-POP-101/1	Open Payments	F	*Approved*	R?.?
REQ-POP-101.1	POP	REQ-POP-101/2	Open Payments	F	*Approved*	R?.?
REQ-POP-102	POP	REQ-POP-102/1	Open Payments	F	*Approved*	R?.?
REQ-POP-103	POP	REQ-POP-103/1	Open Payments	F	*Approved*	R?.?
REQ-POP-104	POP	REQ-POP-104/1	Open Payments	F	*Approved*	R?.?
REQ-POP-105	POP	REQ-POP-105/1	Open Payments	F	*Approved*	R?.?
REQ-POP-106	POP	REQ-POP-106/1	Open Payments	F	*Approved*	R?.?
REQ-POP-107	POP	REQ-POP-107/1	Open Payments	F	*Approved*	R?.?
REQ-POP-108	POP	REQ-POP-108/1	Open Payments	F	*Approved*	R?.?
REQ-POP-108.1	POP	REQ-POP-108/2	Open Payments	F	*Approved*	R?.?
REQ-POP-109	POP	REQ-POP-109/1	Open Payments	F	*Approved*	R?.?
REQ-POP-110	POP	REQ-POP-110/1	Open Payments	F	*Approved*	R?.?
REQ-POP-111	POP	REQ-POP-111/1	Open Payments	F	*Approved*	R?.?
REQ-POP-111.1	POP	REQ-POP-111.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-112	POP	REQ-POP-112/1	Open Payments	F	*Approved*	R?.?
REQ-POP-112.1	POP	REQ-POP-112/2	Open Payments	F	*Approved*	R?.?
REQ-POP-112.2	POP	REQ-POP-112/3	Open Payments	F	*Approved*	R?.?
REQ-POP-112.3	POP	REQ-POP-112/4	Open Payments	F	*Approved*	R?.?
REQ-POP-112.4	POP	REQ-POP-112/5	Open Payments	F	*Approved*	R?.?
REQ-POP-113	POP	REQ-POP-113/1	Open Payments	F	*Approved*	R?.?
REQ-POP-113.1	POP	REQ-POP-113.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-114	POP	REQ-POP-114/1	Open Payments	F	*Approved*	R?.?
REQ-POP-115	POP	REQ-POP-115/1	Open Payments	F	*Approved*	R?.?
REQ-POP-115.1	POP	REQ-POP-115.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-116	POP	REQ-POP-116/1	Open Payments	F	*Approved*	R?.?
REQ-POP-116.1	POP	REQ-POP-116.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-116.2	POP	REQ-POP-116.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-116.2.1	POP	REQ-POP-116.2/2	Open Payments	F	*Approved*	R?.?
REQ-POP-117	POP	REQ-POP-117/1	Open Payments	F	*Approved*	R?.?
REQ-POP-118	POP	REQ-POP-118/1	Open Payments	F	*Approved*	R?.?
REQ-POP-118.1	POP	REQ-POP-118.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-118.2	POP	REQ-POP-118.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-119	POP	REQ-POP-119/1	Open Payments	F	*Approved*	R?.?
REQ-POP-119.1	POP	REQ-POP-119/2	Open Payments	F	*Approved*	R?.?
REQ-POP-119.2	POP	REQ-POP-119/3	Open Payments	F	*Approved*	R?.?
REQ-POP-119.3	POP	REQ-POP-119/4	Open Payments	F	*Approved*	R?.?
REQ-POP-119.4	POP	REQ-POP-119/5	Open Payments	F	*Approved*	R?.?
REQ-POP-119.5	POP	REQ-POP-119/6	Open Payments	F	*Approved*	R?.?
REQ-POP-120	POP	REQ-POP-120/1	Open Payments	F	*Approved*	R?.?
REQ-POP-120.1	POP	REQ-POP-120.1/1	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-121	POP	REQ-POP-121/1	Open Payments	F	*Approved*	R?.?
REQ-POP-121.1	POP	REQ-POP-121.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-121.1.1	POP	REQ-POP-121.1/2	Open Payments	F	*Approved*	R?.?
REQ-POP-121.1.2	POP	REQ-POP-121.1/3	Open Payments	F	*Approved*	R?.?
REQ-POP-121.2	POP	REQ-POP-121.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-122	POP	REQ-POP-122/1	Open Payments	F	*Approved*	R?.?
REQ-POP-122.1	POP	REQ-POP-122.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-122.2	POP	REQ-POP-122.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-123	POP	REQ-POP-123/1	Open Payments	F	*Approved*	R?.?
REQ-POP-124	POP	REQ-POP-124/1	Open Payments	F	*Approved*	R?.?
REQ-POP-124.1	POP	REQ-POP-124/2	Open Payments	F	*Approved*	R?.?
REQ-POP-124.2	POP	REQ-POP-124/3	Open Payments	F	*Approved*	R?.?
REQ-POP-125	POP	REQ-POP-125/1	Open Payments	F	*Approved*	R?.?
REQ-POP-126	POP	REQ-POP-126/1	Open Payments	F	*Approved*	R?.?
REQ-POP-127	POP	REQ-POP-127/1	Open Payments	F	*Approved*	R?.?
REQ-POP-128	POP	REQ-POP-128/1	Open Payments	F	*Approved*	R?.?
REQ-POP-129	POP	REQ-POP-129/1	Open Payments	F	*Approved*	R?.?
REQ-POP-129.1	POP	REQ-POP-129.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-129.2	POP	REQ-POP-129.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-130	POP	REQ-POP-130/1	Open Payments	F	*Approved*	R?.?
REQ-POP-130.1	POP	REQ-POP-130.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-131	POP	REQ-POP-131/1	Open Payments	F	*Approved*	R?.?
REQ-POP-131.1	POP	REQ-POP-131/2	Open Payments	F	*Approved*	R?.?
REQ-POP-132	POP	REQ-POP-132/1	Open Payments	F	*Approved*	R?.?
REQ-POP-132.1	POP	REQ-POP-132/2	Open Payments	F	*Approved*	R?.?
REQ-POP-133	POP	REQ-POP-133/1	Open Payments	F	*Approved*	R?.?
REQ-POP-133.1	POP	REQ-POP-133/2	Open Payments	F	*Approved*	R?.?
REQ-POP-134	POP	REQ-POP-134/1	Open Payments	F	*Approved*	R?.?
REQ-POP-134.1	POP	REQ-POP-134/2	Open Payments	F	*Approved*	R?.?
REQ-POP-134.2	POP	REQ-POP-134/3	Open Payments	F	*Approved*	R?.?
REQ-POP-134.3	POP	REQ-POP-134/4	Open Payments	F	*Approved*	R?.?
REQ-POP-135	POP	REQ-POP-135/1	Open Payments	F	*Approved*	R?.?
REQ-POP-135.1	POP	REQ-POP-135.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-135.2	POP	REQ-POP-135/2	Open Payments	F	*Approved*	R?.?
REQ-POP-136	POP	REQ-POP-136/1	Open Payments	F	*Approved*	R?.?
REQ-POP-137	POP	REQ-POP-137/1	Open Payments	F	*Approved*	R?.?
REQ-POP-137.1	POP	REQ-POP-137/2	Open Payments	F	*Approved*	R?.?
REQ-POP-137.2	POP	REQ-POP-137/3	Open Payments	F	*Approved*	R?.?
REQ-POP-138	POP	REQ-POP-138/1	Open Payments	F	*Approved*	R?.?
REQ-POP-138.1	POP	REQ-POP-138/2	Open Payments	F	*Approved*	R?.?
REQ-POP-138.2	POP	REQ-POP-138/3	Open Payments	F	*Approved*	R?.?
REQ-POP-138.3	POP	REQ-POP-138/4	Open Payments	F	*Approved*	R?.?
REQ-POP-138.4	POP	REQ-POP-138/5	Open Payments	F	*Approved*	R?.?
REQ-POP-139	POP	REQ-POP-139/1	Open Payments	F	*Approved*	R?.?
REQ-POP-139.1	POP	REQ-POP-139/2	Open Payments	F	*Approved*	R?.?
REQ-POP-139.2	POP	REQ-POP-139/3	Open Payments	F	*Approved*	R?.?
REQ-POP-139.3	POP	REQ-POP-139/4	Open Payments	F	*Approved*	R?.?
REQ-POP-139.4	POP	REQ-POP-139/5	Open Payments	F	*Approved*	R?.?
REQ-POP-139.5	POP	REQ-POP-139/6	Open Payments	F	*Approved*	R?.?
REQ-POP-139.6	POP	REQ-POP-139/7	Open Payments	F	*Approved*	R?.?
REQ-POP-139.7	POP	REQ-POP-139/8	Open Payments	F	*Approved*	R?.?
REQ-POP-139.8	POP	REQ-POP-139/9	Open Payments	F	*Approved*	R?.?
REQ-POP-139.9	POP	REQ-POP-139/10	Open Payments	F	*Approved*	R?.?
REQ-POP-139.10	POP	REQ-POP-139/11	Open Payments	F	*Approved*	R?.?
REQ-POP-139.11	POP	REQ-POP-139/12	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-139.12	POP	REQ-POP-139/13	Open Payments	F	*Approved*	R?.?
REQ-POP-139.13	POP	REQ-POP-139/14	Open Payments	F	*Approved*	R?.?
REQ-POP-139.14	POP	REQ-POP-139/15	Open Payments	F	*Approved*	R?.?
REQ-POP-140	POP	REQ-POP-140/1	Open Payments	F	*Approved*	R?.?
REQ-POP-140.1	POP	REQ-POP-140/2	Open Payments	F	*Approved*	R?.?
REQ-POP-141	POP	REQ-POP-141/1	Open Payments	F	*Approved*	R?.?
REQ-POP-141.1	POP	REQ-POP-141/2	Open Payments	F	*Approved*	R?.?
REQ-POP-141.2	POP	REQ-POP-141/3	Open Payments	F	*Approved*	R?.?
REQ-POP-141.3	POP	REQ-POP-141/4	Open Payments	F	*Approved*	R?.?
REQ-POP-141.4	POP	REQ-POP-141/5	Open Payments	F	*Approved*	R?.?
REQ-POP-141.5	POP	REQ-POP-141/6	Open Payments	F	*Approved*	R?.?
REQ-POP-141.6	POP	REQ-POP-141/7	Open Payments	F	*Approved*	R?.?
REQ-POP-141.7	POP	REQ-POP-141/8	Open Payments	F	*Approved*	R?.?
REQ-POP-141.8	POP	REQ-POP-141/9	Open Payments	F	*Approved*	R?.?
REQ-POP-141.9	POP	REQ-POP-141/10	Open Payments	F	*Approved*	R?.?
REQ-POP-141.10	POP	REQ-POP-141/11	Open Payments	F	*Approved*	R?.?
REQ-POP-142	POP	REQ-POP-142/1	Open Payments	F	*Approved*	R?.?
REQ-POP-143	POP	REQ-POP-143/1	Open Payments	F	*Approved*	R?.?
REQ-POP-144	POP	REQ-POP-144/1	Open Payments	F	*Approved*	R?.?
REQ-POP-144.1	POP	REQ-POP-144/2	Open Payments	F	*Approved*	R?.?
REQ-POP-144.2	POP	REQ-POP-144/3	Open Payments	F	*Approved*	R?.?
REQ-POP-144.3	POP	REQ-POP-144/4	Open Payments	F	*Approved*	R?.?
REQ-POP-144.4	POP	REQ-POP-144/5	Open Payments	F	*Approved*	R?.?
REQ-POP-144.5	POP	REQ-POP-144/6	Open Payments	F	*Approved*	R?.?
REQ-POP-144.6	POP	REQ-POP-144/7	Open Payments	F	*Approved*	R?.?
REQ-POP-144.7	POP	REQ-POP-144/8	Open Payments	F	*Approved*	R?.?
REQ-POP-145	POP	REQ-POP-145/1	Open Payments	F	*Approved*	R?.?
REQ-POP-145.1	POP	REQ-POP-145.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-145.2	POP	REQ-POP-145.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-146	POP	REQ-POP-146/1	Open Payments	F	*Approved*	R?.?
REQ-POP-147	POP	REQ-POP-147/1	Open Payments	F	*Approved*	R?.?
REQ-POP-147.1	POP	REQ-POP-147.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-148	POP	REQ-POP-148/1	Open Payments	F	*Approved*	R?.?
REQ-POP-148.1	POP	REQ-POP-148/2	Open Payments	F	*Approved*	R?.?
REQ-POP-148.2	POP	REQ-POP-148/3	Open Payments	F	*Approved*	R?.?
REQ-POP-148.3	POP	REQ-POP-148/4	Open Payments	F	*Approved*	R?.?
REQ-POP-148.4	POP	REQ-POP-148/5	Open Payments	F	*Approved*	R?.?
REQ-POP-148.5	POP	REQ-POP-148/6	Open Payments	F	*Approved*	R?.?
REQ-POP-148.6	POP	REQ-POP-148/7	Open Payments	F	*Approved*	R?.?
REQ-POP-148.7	POP	REQ-POP-148/8	Open Payments	F	*Approved*	R?.?
REQ-POP-149	POP	REQ-POP-149/1	Open Payments	F	*Approved*	R?.?
REQ-POP-150	POP	REQ-POP-150/1	Open Payments	F	*Approved*	R?.?
REQ-POP-150.1	POP	REQ-POP-150.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-150.2	POP	REQ-POP-150.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-151	POP	REQ-POP-151/1	Open Payments	F	*Approved*	R?.?
REQ-POP-152	POP	REQ-POP-152/1	Open Payments	F	*Approved*	R?.?
REQ-POP-153	POP	REQ-POP-153/1	Open Payments	F	*Approved*	R?.?
REQ-POP-153.1	POP	REQ-POP-153.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-154	POP	REQ-POP-154/1	Open Payments	F	*Approved*	R?.?
REQ-POP-155	POP	REQ-POP-155/1	Open Payments	F	*Approved*	R?.?
REQ-POP-156	POP	REQ-POP-156/1	Open Payments	F	*Approved*	R?.?
REQ-POP-157	POP	REQ-POP-157/1	Open Payments	F	*Approved*	R?.?
REQ-POP-157.1	POP	REQ-POP-157/2	Open Payments	F	*Approved*	R?.?
REQ-POP-158	POP	REQ-POP-158/1	Open Payments	F	*Approved*	R?.?
REQ-POP-158.1	POP	REQ-POP-158.1/1	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-159	POP	REQ-POP-159/1	Open Payments	F	*Approved*	R?.?
REQ-POP-160	POP	REQ-POP-160/1	Open Payments	F	*Approved*	R?.?
REQ-POP-160.2	POP	REQ-POP-160/2	Open Payments	F	*Approved*	R?.?
REQ-POP-160.3	POP	REQ-POP-160/3	Open Payments	F	*Approved*	R?.?
REQ-POP-160.4	POP	REQ-POP-160/4	Open Payments	F	*Approved*	R?.?
REQ-POP-160.5	POP	REQ-POP-160/5	Open Payments	F	*Approved*	R?.?
REQ-POP-160.6	POP	REQ-POP-160/6	Open Payments	F	*Approved*	R?.?
REQ-POP-160.7	POP	REQ-POP-160/7	Open Payments	F	*Approved*	R?.?
REQ-POP-160.8	POP	REQ-POP-160/8	Open Payments	F	*Approved*	R?.?
REQ-POP-160.9	POP	REQ-POP-160/9	Open Payments	F	*Approved*	R?.?
REQ-POP-160.10	POP	REQ-POP-160/10	Open Payments	F	*Approved*	R?.?
REQ-POP-160.11	POP	REQ-POP-160/11	Open Payments	F	*Approved*	R?.?
REQ-POP-160.12	POP	REQ-POP-160/12	Open Payments	F	*Approved*	R?.?
REQ-POP-160.13	POP	REQ-POP-160/13	Open Payments	F	*Approved*	R?.?
REQ-POP-160.14	POP	REQ-POP-160/14	Open Payments	F	*Approved*	R?.?
REQ-POP-160.15	POP	REQ-POP-160/15	Open Payments	F	*Approved*	R?.?
REQ-POP-160.1	POP	REQ-POP-160.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-160.1.1	POP	REQ-POP-160.1/2	Open Payments	F	*Approved*	R?.?
REQ-POP-160.1.2	POP	REQ-POP-160.1/3	Open Payments	F	*Approved*	R?.?
REQ-POP-160.1.3	POP	REQ-POP-160.1/4	Open Payments	F	*Approved*	R?.?
REQ-POP-161	POP	REQ-POP-161/1	Open Payments	F	*Approved*	R?.?
REQ-POP-162	POP	REQ-POP-162/1	Open Payments	F	*Approved*	R?.?
REQ-POP-162.1	POP	REQ-POP-162.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-162.2	POP	REQ-POP-162.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-163	POP	REQ-POP-163/1	Open Payments	F	*Approved*	R?.?
REQ-POP-163.1	POP	REQ-POP-163.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-164	POP	REQ-POP-164/1	Open Payments	F	*Approved*	R?.?
REQ-POP-165	POP	REQ-POP-165/1	Open Payments	F	*Approved*	R?.?
REQ-POP-165.1	POP	REQ-POP-165/2	Open Payments	F	*Approved*	R?.?
REQ-POP-165.2	POP	REQ-POP-165/3	Open Payments	F	*Approved*	R?.?
REQ-POP-165.3	POP	REQ-POP-165/4	Open Payments	F	*Approved*	R?.?
REQ-POP-165.4	POP	REQ-POP-165/5	Open Payments	F	*Approved*	R?.?
REQ-POP-165.5	POP	REQ-POP-165/6	Open Payments	F	*Approved*	R?.?
REQ-POP-165.6	POP	REQ-POP-165/7	Open Payments	F	*Approved*	R?.?
REQ-POP-165.7	POP	REQ-POP-165/8	Open Payments	F	*Approved*	R?.?
REQ-POP-165.8	POP	REQ-POP-165/9	Open Payments	F	*Approved*	R?.?
REQ-POP-165.9	POP	REQ-POP-165/10	Open Payments	F	*Approved*	R?.?
REQ-POP-165.10	POP	REQ-POP-165/11	Open Payments	F	*Approved*	R?.?
REQ-POP-165.11	POP	REQ-POP-165/12	Open Payments	F	*Approved*	R?.?
REQ-POP-165.12	POP	REQ-POP-165/13	Open Payments	F	*Approved*	R?.?
REQ-POP-165.13	POP	REQ-POP-165/14	Open Payments	F	*Approved*	R?.?
REQ-POP-165.14	POP	REQ-POP-165/15	Open Payments	F	*Approved*	R?.?
REQ-POP-165.15	POP	REQ-POP-165/16	Open Payments	F	*Approved*	R?.?
REQ-POP-165.16	POP	REQ-POP-165/17	Open Payments	F	*Approved*	R?.?
REQ-POP-165.17	POP	REQ-POP-165/18	Open Payments	F	*Approved*	R?.?
REQ-POP-165.18	POP	REQ-POP-165/19	Open Payments	F	*Approved*	R?.?
REQ-POP-165.19	POP	REQ-POP-165/20	Open Payments	F	*Approved*	R?.?
REQ-POP-165.20	POP	REQ-POP-165/21	Open Payments	F	*Approved*	R?.?
REQ-POP-165.21	POP	REQ-POP-165/22	Open Payments	F	*Approved*	R?.?
REQ-POP-165.22	POP	REQ-POP-165/23	Open Payments	F	*Approved*	R?.?
REQ-POP-166	POP	REQ-POP-166/1	Open Payments	F	*Approved*	R?.?
REQ-POP-166.1	POP	REQ-POP-166.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-167	POP	REQ-POP-167/1	Open Payments	F	*Approved*	R?.?
REQ-POP-168	POP	REQ-POP-168/1	Open Payments	F	*Approved*	R?.?
REQ-POP-169	POP	REQ-POP-169/1	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-169.1	POP	REQ-POP-169/2	Open Payments	F	*Approved*	R?.?
REQ-POP-170	POP	REQ-POP-170/1	Open Payments	F	*Approved*	R?.?
REQ-POP-170.1	POP	REQ-POP-170/2	Open Payments	F	*Approved*	R?.?
REQ-POP-170.2	POP	REQ-POP-170/3	Open Payments	F	*Approved*	R?.?
REQ-POP-170.3	POP	REQ-POP-170/4	Open Payments	F	*Approved*	R?.?
REQ-POP-171	POP	REQ-POP-171/1	Open Payments	F	*Approved*	R?.?
REQ-POP-171.1	POP	REQ-POP-171/2	Open Payments	F	*Approved*	R?.?
REQ-POP-171.2	POP	REQ-POP-171/3	Open Payments	F	*Approved*	R?.?
REQ-POP-171.3	POP	REQ-POP-171/4	Open Payments	F	*Approved*	R?.?
REQ-POP-171.4	POP	REQ-POP-171/5	Open Payments	F	*Approved*	R?.?
REQ-POP-171.5	POP	REQ-POP-171/6	Open Payments	F	*Approved*	R?.?
REQ-POP-171.6	POP	REQ-POP-171/7	Open Payments	F	*Approved*	R?.?
REQ-POP-171.7	POP	REQ-POP-171/8	Open Payments	F	*Approved*	R?.?
REQ-POP-171.8	POP	REQ-POP-171/9	Open Payments	F	*Approved*	R?.?
REQ-POP-172	POP	REQ-POP-172/1	Open Payments	F	*Approved*	R?.?
REQ-POP-172.1	POP	REQ-POP-172/2	Open Payments	F	*Approved*	R?.?
REQ-POP-173	POP	REQ-POP-173/1	Open Payments	F	*Approved*	R?.?
REQ-POP-174	POP	REQ-POP-174/1	Open Payments	F	*Approved*	R?.?
REQ-POP-174.1	POP	REQ-POP-174/2	Open Payments	F	*Approved*	R?.?
REQ-POP-175	POP	REQ-POP-175/1	Open Payments	F	*Approved*	R?.?
REQ-POP-175.1	POP	REQ-POP-175/2	Open Payments	F	*Approved*	R?.?
REQ-POP-175.2	POP	REQ-POP-175/3	Open Payments	F	*Approved*	R?.?
REQ-POP-175.3	POP	REQ-POP-175/4	Open Payments	F	*Approved*	R?.?
REQ-POP-175.4	POP	REQ-POP-175/5	Open Payments	F	*Approved*	R?.?
REQ-POP-175.5	POP	REQ-POP-175/6	Open Payments	F	*Approved*	R?.?
REQ-POP-175.6	POP	REQ-POP-175/7	Open Payments	F	*Approved*	R?.?
REQ-POP-175.7	POP	REQ-POP-175/8	Open Payments	F	*Approved*	R?.?
REQ-POP-175.8	POP	REQ-POP-175/9	Open Payments	F	*Approved*	R?.?
REQ-POP-175.9	POP	REQ-POP-175/10	Open Payments	F	*Approved*	R?.?
REQ-POP-175.10	POP	REQ-POP-175/11	Open Payments	F	*Approved*	R?.?
REQ-POP-176	POP	REQ-POP-176/1	Open Payments	F	*Approved*	R?.?
REQ-POP-176.1	POP	REQ-POP-176/2	Open Payments	F	*Approved*	R?.?
REQ-POP-177	POP	REQ-POP-177/1	Open Payments	F	*Approved*	R?.?
REQ-POP-177.1	POP	REQ-POP-177/2	Open Payments	F	*Approved*	R?.?
REQ-POP-178	POP	REQ-POP-178/1	Open Payments	F	*Approved*	R?.?
REQ-POP-178.1	POP	REQ-POP-178/2	Open Payments	F	*Approved*	R?.?
REQ-POP-178.2	POP	REQ-POP-178/3	Open Payments	F	*Approved*	R?.?
REQ-POP-178.3	POP	REQ-POP-178/4	Open Payments	F	*Approved*	R?.?
REQ-POP-178.4	POP	REQ-POP-178/5	Open Payments	F	*Approved*	R?.?
REQ-POP-178.5	POP	REQ-POP-178/6	Open Payments	F	*Approved*	R?.?
REQ-POP-178.6	POP	REQ-POP-178/7	Open Payments	F	*Approved*	R?.?
REQ-POP-178.7	POP	REQ-POP-178/8	Open Payments	F	*Approved*	R?.?
REQ-POP-178.8	POP	REQ-POP-178/9	Open Payments	F	*Approved*	R?.?
REQ-POP-178.9	POP	REQ-POP-178/10	Open Payments	F	*Approved*	R?.?
REQ-POP-178.10	POP	REQ-POP-178/11	Open Payments	F	*Approved*	R?.?
REQ-POP-178.11	POP	REQ-POP-178/12	Open Payments	F	*Approved*	R?.?
REQ-POP-178.12	POP	REQ-POP-178/13	Open Payments	F	*Approved*	R?.?
REQ-POP-179	POP	REQ-POP-179/1	Open Payments	F	*Approved*	R?.?
REQ-POP-179.1	POP	REQ-POP-179.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-179.2	POP	REQ-POP-179.2/1	Open Payments	F	*Approved*	R?.?
REQ-POP-180	POP	REQ-POP-180/1	Open Payments	F	*Approved*	R?.?
REQ-POP-181	POP	REQ-POP-181/1	Open Payments	F	*Approved*	R?.?
REQ-POP-181.1	POP	REQ-POP-181/2	Open Payments	F	*Approved*	R?.?
REQ-POP-182	POP	REQ-POP-182/1	Open Payments	F	*Approved*	R?.?
REQ-POP-182.1	POP	REQ-POP-182/2	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-183	POP	REQ-POP-183/1	Open Payments	F	*Approved*	R?.?
REQ-POP-184	POP	REQ-POP-184/1	Open Payments	F	*Approved*	R?.?
REQ-POP-184.1	POP	REQ-POP-184/2	Open Payments	F	*Approved*	R?.?
REQ-POP-184.2	POP	REQ-POP-184/3	Open Payments	F	*Approved*	R?.?
REQ-POP-184.3	POP	REQ-POP-184/4	Open Payments	F	*Approved*	R?.?
REQ-POP-184.4	POP	REQ-POP-184/5	Open Payments	F	*Approved*	R?.?
REQ-POP-185	POP	REQ-POP-185/1	Open Payments	F	*Approved*	R?.?
REQ-POP-186	POP	REQ-POP-186/1	Open Payments	F	*Approved*	R?.?
REQ-POP-187	POP	REQ-POP-187/1	Open Payments	F	*Approved*	R?.?
REQ-POP-187.1	POP	REQ-POP-187.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-188	POP	REQ-POP-188/1	Open Payments	F	*Approved*	R?.?
REQ-POP-188.1	POP	REQ-POP-188/2	Open Payments	F	*Approved*	R?.?
REQ-POP-189	POP	REQ-POP-189/1	Open Payments	F	*Approved*	R?.?
REQ-POP-189.1	POP	REQ-POP-189.1/1	Open Payments	F	*Approved*	R?.?
REQ-POP-190	POP	REQ-POP-190/1	Open Payments	F	*Approved*	R?.?
REQ-POP-191	POP	REQ-POP-191/1	Open Payments	F	*Approved*	R?.?
REQ-POP-191.1	POP	REQ-POP-191/2	Open Payments	F	*Approved*	R?.?
REQ-POP-192	POP	REQ-POP-192/1	Open Payments	F	*Approved*	R?.?
REQ-POP-192.1	POP	REQ-POP-192/2	Open Payments	F	*Approved*	R?.?
REQ-POP-193	POP	REQ-POP-193/1	Open Payments	F	*Approved*	R?.?
REQ-POP-194	POP	REQ-POP-194/1	Open Payments	F	*Approved*	R?.?
REQ-POP-194.1	POP	REQ-POP-194/2	Open Payments	F	*Approved*	R?.?
REQ-POP-194.2	POP	REQ-POP-194/3	Open Payments	F	*Approved*	R?.?
REQ-POP-194.3	POP	REQ-POP-194/4	Open Payments	F	*Approved*	R?.?
REQ-POP-194.4	POP	REQ-POP-194/5	Open Payments	F	*Approved*	R?.?
REQ-POP-194.5	POP	REQ-POP-194/6	Open Payments	F	*Approved*	R?.?
REQ-POP-194.6	POP	REQ-POP-194/7	Open Payments	F	*Approved*	R?.?
REQ-POP-195	POP	REQ-POP-195/1	Open Payments	F	*Approved*	R?.?
REQ-POP-196	POP	REQ-POP-196/1	Open Payments	F	*Approved*	R?.?
REQ-POP-197	POP	REQ-POP-197/1	Open Payments	F	*Approved*	R?.?
REQ-POP-197.1	POP	REQ-POP-197/2	Open Payments	F	*Approved*	R?.?
REQ-POP-198	POP	REQ-POP-198/1	Open Payments	F	*Approved*	R?.?
REQ-POP-199	POP	REQ-POP-199/1	Open Payments	F	*Approved*	R?.?
REQ-POP-199.1	POP	REQ-POP-199/2	Open Payments	F	*Approved*	R?.?
REQ-POP-199.2	POP	REQ-POP-199/3	Open Payments	F	*Approved*	R?.?
REQ-POP-199.3	POP	REQ-POP-199/4	Open Payments	F	*Approved*	R?.?
REQ-POP-199.4	POP	REQ-POP-199/5	Open Payments	F	*Approved*	R?.?
REQ-POP-199.5	POP	REQ-POP-199/6	Open Payments	F	*Approved*	R?.?
REQ-POP-199.6	POP	REQ-POP-199/7	Open Payments	F	*Approved*	R?.?
REQ-POP-199.7	POP	REQ-POP-199/8	Open Payments	F	*Approved*	R?.?
REQ-POP-199.8	POP	REQ-POP-199/9	Open Payments	F	*Approved*	R?.?
REQ-POP-199.9	POP	REQ-POP-199/10	Open Payments	F	*Approved*	R?.?
REQ-POP-199.10	POP	REQ-POP-199/11	Open Payments	F	*Approved*	R?.?
REQ-POP-199.11	POP	REQ-POP-199/12	Open Payments	F	*Approved*	R?.?
REQ-POP-199.12	POP	REQ-POP-199/13	Open Payments	F	*Approved*	R?.?
REQ-POP-199.13	POP	REQ-POP-199/14	Open Payments	F	*Approved*	R?.?
REQ-POP-199.14	POP	REQ-POP-199/15	Open Payments	F	*Approved*	R?.?
REQ-POP-199.15	POP	REQ-POP-199/16	Open Payments	F	*Approved*	R?.?
REQ-POP-199.16	POP	REQ-POP-199/17	Open Payments	F	*Approved*	R?.?
REQ-POP-199.17	POP	REQ-POP-199/18	Open Payments	F	*Approved*	R?.?
REQ-POP-199.18	POP	REQ-POP-199/19	Open Payments	F	*Approved*	R?.?
REQ-POP-199.19	POP	REQ-POP-199/20	Open Payments	F	*Approved*	R?.?
REQ-POP-199.20	POP	REQ-POP-199/21	Open Payments	F	*Approved*	R?.?
REQ-POP-199.21	POP	REQ-POP-199/22	Open Payments	F	*Approved*	R?.?
REQ-POP-199.22	POP	REQ-POP-199/23	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-199.23	POP	REQ-POP-199/24	Open Payments	F	*Approved*	R?.?
REQ-POP-199.24	POP	REQ-POP-199/25	Open Payments	F	*Approved*	R?.?
REQ-POP-199.25	POP	REQ-POP-199/26	Open Payments	F	*Approved*	R?.?
REQ-POP-199.26	POP	REQ-POP-199/27	Open Payments	F	*Approved*	R?.?
REQ-POP-199.27	POP	REQ-POP-199/28	Open Payments	F	*Approved*	R?.?
REQ-POP-199.28	POP	REQ-POP-199/29	Open Payments	F	*Approved*	R?.?
REQ-POP-199.29	POP	REQ-POP-199/30	Open Payments	F	*Approved*	R?.?
REQ-POP-199.30	POP	REQ-POP-199/31	Open Payments	F	*Approved*	R?.?
REQ-POP-199.31	POP	REQ-POP-199/32	Open Payments	F	*Approved*	R?.?
REQ-POP-199.32	POP	REQ-POP-199/33	Open Payments	F	*Approved*	R?.?
REQ-POP-200	POP	REQ-POP-200/1	Open Payments	F	*Approved*	R?.?
REQ-POP-201	POP	REQ-POP-201/1	Open Payments	F	*Approved*	R?.?
REQ-POP-202	POP	REQ-POP-202/1	Open Payments	F	*Approved*	R?.?
REQ-POP-203	POP	REQ-POP-203/1	Open Payments	F	*Approved*	R?.?
REQ-POP-203.1	POP	REQ-POP-203/2	Open Payments	F	*Approved*	R?.?
REQ-POP-203.2	POP	REQ-POP-203/3	Open Payments	F	*Approved*	R?.?
REQ-POP-204	POP	REQ-POP-204/1	Open Payments	F	*Approved*	R?.?
REQ-POP-204.1	POP	REQ-POP-204/2	Open Payments	F	*Approved*	R?.?
REQ-POP-204.2	POP	REQ-POP-204/3	Open Payments	F	*Approved*	R?.?
REQ-POP-204.3	POP	REQ-POP-204/4	Open Payments	F	*Approved*	R?.?
REQ-POP-205	POP	REQ-POP-205/1	Open Payments	F	*Approved*	R?.?
REQ-POP-205.1	POP	REQ-POP-205/2	Open Payments	F	*Approved*	R?.?
REQ-POP-206	POP	REQ-POP-206/1	Open Payments	F	*Approved*	R?.?
REQ-POP-207	POP	REQ-POP-207/1	Open Payments	F	*Approved*	R?.?
REQ-POP-208	POP	REQ-POP-208/1	Open Payments	F	*Approved*	R?.?
REQ-POP-208.1	POP	REQ-POP-207/2	Open Payments	F	*Approved*	R?.?
REQ-POP-209	POP	REQ-POP-209/1	Open Payments	F	*Approved*	R?.?
REQ-POP-210	POP	REQ-POP-210/1	Open Payments	F	*Approved*	R?.?
REQ-POP-210.1	POP	REQ-POP-210/2	Open Payments	F	*Approved*	R?.?
REQ-POP-210.2	POP	REQ-POP-210/3	Open Payments	F	*Approved*	R?.?
REQ-POP-211	POP	REQ-POP-211/1	Open Payments	F	*Approved*	R?.?
REQ-POP-212	POP	REQ-POP-212/1	Open Payments	F	*Approved*	R?.?
REQ-POP-212.1	POP	REQ-POP-212/2	Open Payments	F	*Approved*	R?.?
REQ-POP-212.2	POP	REQ-POP-212/3	Open Payments	F	*Approved*	R?.?
REQ-POP-212.3	POP	REQ-POP-212/4	Open Payments	F	*Approved*	R?.?
REQ-POP-212.4	POP	REQ-POP-212/5	Open Payments	F	*Approved*	R?.?
REQ-POP-212.5	POP	REQ-POP-212/6	Open Payments	F	*Approved*	R?.?
REQ-POP-212.6	POP	REQ-POP-212/7	Open Payments	F	*Approved*	R?.?
REQ-POP-213	POP	REQ-POP-213/1	Open Payments	F	*Approved*	R?.?
REQ-POP-214	POP	REQ-POP-214/1	Open Payments	F	*Approved*	R?.?
REQ-POP-214.1	POP	REQ-POP-214/2	Open Payments	F	*Approved*	R?.?
REQ-POP-214.2	POP	REQ-POP-214/3	Open Payments	F	*Approved*	R?.?
REQ-POP-215	POP	REQ-POP-215/1	Open Payments	F	*Approved*	R?.?
REQ-POP-216	POP	REQ-POP-216/1	Open Payments	F	*Approved*	R?.?
REQ-POP-217	POP	REQ-POP-217/1	Open Payments	F	*Approved*	R?.?
REQ-POP-217.1	POP	REQ-POP-217/2	Open Payments	F	*Approved*	R?.?
REQ-POP-218	POP	REQ-POP-218/1	Open Payments	F	*Approved*	R?.?
REQ-POP-219	POP	REQ-POP-219/1	Open Payments	F	*Approved*	R?.?
REQ-POP-220	POP	REQ-POP-220/1	Open Payments	F	*Approved*	R?.?
REQ-POP-221	POP	REQ-POP-221/1	Open Payments	F	*Approved*	R?.?
REQ-POP-222	POP	REQ-POP-222/1	Open Payments	F	*Approved*	R?.?
REQ-POP-222.1	POP	REQ-POP-222/2	Open Payments	F	*Approved*	R?.?
REQ-POP-222.2	POP	REQ-POP-222/3	Open Payments	F	*Approved*	R?.?
REQ-POP-222.3	POP	REQ-POP-222/4	Open Payments	F	*Approved*	R?.?
REQ-POP-222.4	POP	REQ-POP-222/5	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
REQ-POP-222.5	POP	REQ-POP-222/6	Open Payments	F	*Approved*	R?.?
REQ-POP-223	POP	REQ-POP-223/1	Open Payments	F	*Approved*	R?.?
REQ-POP-223.1	POP	REQ-POP-223/2	Open Payments	F	*Approved*	R?.?
REQ-POP-223.2	POP	REQ-POP-223/3	Open Payments	F	*Approved*	R?.?
REQ-POP-223.3	POP	REQ-POP-223/4	Open Payments	F	*Approved*	R?.?
REQ-POP-223.4	POP	REQ-POP-223/5	Open Payments	F	*Approved*	R?.?
REQ-POP-223.5	POP	REQ-POP-223/6	Open Payments	F	*Approved*	R?.?
REQ-POP-224	POP	REQ-POP-224/1	Open Payments	F	*Approved*	R?.?
REQ-POP-225	POP	REQ-POP-225/1	Open Payments	F	*Approved*	R?.?
REQ-POP-225.2	POP	REQ-POP-225/2	Open Payments	F	*Approved*	R?.?
REQ-POP-225.3	POP	REQ-POP-225/3	Open Payments	F	*Approved*	R?.?
REQ-POP-225.4	POP	REQ-POP-225/4	Open Payments	F	*Approved*	R?.?
REQ-POP-225.5	POP	REQ-POP-225/5	Open Payments	F	*Approved*	R?.?
REQ-POP-225.6	POP	REQ-POP-225/6	Open Payments	F	*Approved*	R?.?
REQ-POP-225.7	POP	REQ-POP-225/7	Open Payments	F	*Approved*	R?.?
REQ-POP-225.8	POP	REQ-POP-225/8	Open Payments	F	*Approved*	R?.?
REQ-POP-225.9	POP	REQ-POP-225/9	Open Payments	F	*Approved*	R?.?
REQ-POP-225.10	POP	REQ-POP-225/10	Open Payments	F	*Approved*	R?.?
REQ-POP-225.11	POP	REQ-POP-225/11	Open Payments	F	*Approved*	R?.?
REQ-POP-225.12	POP	REQ-POP-225/12	Open Payments	F	*Approved*	R?.?
REQ-POP-225.13	POP	REQ-POP-225/13	Open Payments	F	*Approved*	R?.?
REQ-POP-225.14	POP	REQ-POP-225/14	Open Payments	F	*Approved*	R?.?
REQ-POP-225.15	POP	REQ-POP-225/15	Open Payments	F	*Approved*	R?.?
REQ-POP-225.16	POP	REQ-POP-225/16	Open Payments	F	*Approved*	R?.?
REQ-POP-225.17	POP	REQ-POP-225/17	Open Payments	F	*Approved*	R?.?
REQ-POP-225.18	POP	REQ-POP-225/18	Open Payments	F	*Approved*	R?.?
REQ-POP-225.19	POP	REQ-POP-225/19	Open Payments	F	*Approved*	R?.?
REQ-POP-225.20	POP	REQ-POP-225/20	Open Payments	F	*Approved*	R?.?
REQ-POP-225.21	POP	REQ-POP-225/21	Open Payments	F	*Approved*	R?.?
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REQ-POP-225.46	POP	REQ-POP-225/46	Open Payments	F	*Approved*	R?.?
REQ-POP-225.47	POP	REQ-POP-225/47	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
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REQ-POP-225.64	POP	REQ-POP-225/64	Open Payments	F	*Approved*	R?.?
REQ-POP-225.65	POP	REQ-POP-225/65	Open Payments	F	*Approved*	R?.?
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REQ-POP-3	POP	REQ-POP-3/1	Open Payments	F	*Approved*	R?.?
REQ-POP-4	POP	REQ-POP-4/1	Open Payments	F	*Approved*	R?.?
REQ-POP-5	POP	REQ-POP-5/1	Open Payments	F	*Approved*	R?.?
REQ-POP-6	POP	REQ-POP-6/1	Open Payments	F	*Approved*	R?.?

TTC ID	Area	PID	PLA	Type	Status	Release
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REQ-POP-8	POP	REQ-POP-8/1	Open Payments	F	*Approved*	R?.?
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REQ-POP-13	POP	REQ-POP-13/1	Open Payments	F	*Approved*	R?.?
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REQ-POP-230	POP	REQ-POP-230/1	Open Payments	F	*Approved*	R?.?
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REQ-POP-15.2	POP	REQ-POP-15/2	Open Payments	F	*Approved*	R?.?
REQ-POP-15.3	POP	REQ-POP-15/3	Open Payments	F	*Approved*	R?.?
REQ-POP-15.4	POP	REQ-POP-15/4	Open Payments	F	*Approved*	R?.?
REQ-POP-16	POP	REQ-POP-16/1	Open Payments	F	*Approved*	R?.?
REQ-POP-17	POP	REQ-POP-17/1	Open Payments	F	*Approved*	R?.?

TTC Fare Card Group

Exhibit I

TTC Business Requirements

Definitions

Version **Final 1.9**

Date: 121210

This document was automatically generated on 10/12/2012

Document Version History

Page	Ver.	Version Date	Details
NA	Draft 1.6	120712	• Initial consolidation of all TTC Business Requirement Definitions
NA	Draft 1.7	121201	• Added Metadata • Added terms used in Operations RASCI. Operations RASCI cross references terms and sections used in the TTC BR hence their definitions are located here. • Assessed PRESTO input and made changes were deemed appropriate. • Provided definitions for all 'undefined' terms • Changed name to Exhibit I – now aligns with Master Agreement.
NA	FRC 1.8	121204	• Made mutually agreed changes with PRESTO • Changed version name to Final Release Candidate
NA	Final 1.9	121210	• Fixed several grammatical errors • Changed version to Final and increased release Number

Accessibility for Ontarians with Disabilities Act   **AODA**

A law passed by the Ontario legislature in 2005 directed at developing, implementing and enforcing accessibility standards to achieve accessibility for Ontarians with disabilities on or before January 1, 2025. The legislation established accessibility transportation standards and introduced requirements for transportation service providers along with a compliance framework.

Account Query

A Customer initiated process that allows the Customer to query their PRESTO System account.

Acquirer

A processor (that is often times an affiliated financial institution) that acts as processing intermediary for the acceptance of payment media and the exchange of funds between the Merchant and the TTC Customer. The Acquirer gathers transaction data from the Merchant, routes it through the appropriate network to the issuing bank, and relays information from the issuing bank back to the Merchant that enables the payment transaction to complete. The Acquirer also acts as a Clearing House for the settlement of funds between the TTC Customer's issuing bank and, ultimately, the Merchant's depository bank.

Action List

A list of PRESTO Media or Open Payment Media logical IDs on which defined actions are to be carried out by PRESTO Devices, on presentation of the media to the Card Interface Device.

Activation

The process of placing PRESTO Media in an active state for Customer use. Processes for Activation may vary by PRESTO Media type as well as location of purchase (e.g. LUM purchase at Onboard SRVM is activated at time of purchase, whereas LUM purchased at Off-board SRVM and FMVD is activated on first tap).

Add Value Machine   **AVM**

An automated, self-service vending device that will be installed at all TTC subway stations for use by Customers to load and reload TTC Product and e-Purse value to PRESTO Media. Products purchased will be immediately usable for payment of fares.

Address Verification System   **AVS**

The functionality used to supplement verification of the identity of the Person presenting a Credit/Debit Card for payment, whereby the address details (usually the postal code of the billing address on file with the Card Issuer) are compared with information provided by such Person presenting the card at the Point of Sale.

Advanced Encryption Standard   **AES**

A symmetric key encryption standard, adopted and used widely, that uses 128-bit block ciphers and key sizes of 128, 192, and 256 bits.

Advanced Wireless Service   **AWS**

Wireless service in the 1710-2155 MHz range.

Agent

Any person employed to facilitate and carry-out Attended Device functionality. The Agent does not need to be the Merchant Of Record. For example, the Agent may be a TTC Customer Service Centre employee.

Alternating Current   **AC**

An electric current that reverses direction in a circuit at regular intervals.

American National Standards Institute   **ANSI**

An American organization that fosters the development of technology standards.

American Society for Testing and Materials   **ASTM**

An American organization that publishes voluntary consensus technical standards for a wide range of materials, products, systems and services.

Anti-Passback

Time based parameter allowing only one Customer to use a single PRESTO Media or Open Payments Media at a Point of Entry at the same time.

Application and Services Monitoring

The management and monitoring of applications and services as defined in Exhibit C, section - Field System Management.

Application Programming Interface   **API**

A specification intended to be used as an interface by software components to communicate with each other.

Attended Device

A device which allows a Customer to perform various functions including purchases with the need for an Agent to be present. For example, SPOS and HHPOS devices are Attended Devices.

Audit

An examination of records, transactions or financial accounts to check their accuracy.

Authentication

The verification process for financial payment systems used to assess the genuineness of the financial payment card (or equivalent) being used at a point of sale device in order to complete a transaction.

Authorization

The financial process of evaluating the status of an account and, more specifically, the financial readiness to ensure payment to a Merchant for the requested amount.

Authorization Response Code

For financial payment systems, a three-digit number code that is generated as part of Authorization. The code represents a short hand description of the response and the reason for the response (e.g., "insufficient funds" or "lost or stolen") from the Issuer of the payment card to the Authorization request.

Autoload

A function or process made available and managed by PRESTO, with respect to transit fare payment, providing for the capability for automated replenishment of the account with sufficient funds or with a specific capability, such as a TTC Fare Product with specific use privileges, so the account holder may continue to use the credential associated with the account without initiating the replenishment steps repetitively.

Automated Clearing House   **ACH**

A batch-oriented, electronic funds transfer System governed by the National Automated Clearing House Association (NACHA) Operating Rules, which provides for

the inter-bank clearing of electronic payments for participating depository financial institutions.

Automatic Train Control   **ATC**

A train protection system for railways that uses cab signaling and smooth deceleration patterns ensuring the safe and smooth operation of trains.

Availability

A measure, as a percentage, for a particular period that equals: (Uptime for the designated PRESTO System component and/or PRESTO Service for such particular period) divided by (Uptime for the designated PRESTO Component and/or PRESTO Service for such particular period plus Downtime for the designated PRESTO Component and/or PRESTO Service for such particular period)) multiplied by 100.

Bank Identification Number

A number comprised of a series of digits established according to ISO/IEC 7812 guidelines, which number is used to identify the issuing institution for Credit and Debit Cards and consists of a major industry identifier, a six-digit number denoting the issuing financial institution, and a single digit check sum that uses the Luhn algorithm as an authenticity check.

BASE24

A financial transaction protocol.

Bill Acceptor

A component, usually as part of an automated vending machine or similar device such as a bank ATM, that is designed to verify the authenticity of currency.

Bill Escrow

A secure component of the Bill System that functions to store, on a temporary basis, all currency notes authenticated by the Bill System until sufficient payment is authenticated by the Bill System and the transaction can be completed. In the event the transaction is not completed, or cancelled by the Customer, the Bill Escrow component returns all bills temporarily stored to the Customer.

Bill Handling Unit

All modules in the FMVD that together comprise the necessary hardware and software to authenticate, escrow, accept, and store all Canadian bills (i.e., currency) used to execute a payment transaction.

Bill System

All modules in the Fare Media Vending Devices (FMVDs) that together comprise the necessary Hardware and Software to authenticate, escrow, accept, and store all Canadian bills (i.e., currency) used to execute a Payment Transaction.

Bill Vault

A secure, uniquely identified container used to hold currency accepted by a Bill System, usually as part of an automated vending machine or similar device.

Blocked

PRESTO Media or Open Payments Media that is no longer valid and will not be accepted by the PRESTO System. The Blocked/Unblocked status is determined by the contents of the Hotlist.

Boarding

Has the same meaning as Unlinked Trip.

Bus Fare Transaction Processor   **BFTP**

A Fare Transaction Processor located on a bus. Fare Transaction Processors located on Buses, Streetcars and LRVs have the same functionality.

Business Day

As defined in the Master Agreement.

Business Intelligence   **BI**

Business Intelligence means concepts and methods used to

improve business decision making by using fact-based support systems; and
provide historical, current and predictive views of business operations.

For greater certainty, common functions of business intelligence technologies include reporting, analytical processing, data mining, process mining, complex event processing, business performance management, benchmarking, text mining and predictive analytics. Detailed functionality, service and performance for a COTS Business Intelligence system are provided in the TTC Business Requirements.

Call Scripts

A structured series of statements created for use by Customer Service Call Centre personnel and intended to assist these personnel in developing and effectively using responses to TTC Customer inquiries that are accurate, consistent, and comprehensive.

Canadian Bankers Association   **CBA**

A Canadian banking industry association focused on promoting an understanding of the banking industry in Canada.

Canadian Electric Code   **CEC**

A standard published by the Canadian Standards Association pertaining to the installation and maintenance of electrical equipment in Canada.

Canadian Standards Association   **CSA**

A not for profit standards organization which develops a wide range of standards for Canadian industry including standards on energy, electrical, construction, quality management, health care, environment, and information technology.

Card Interface Device   **CID**

Has the same meaning as Contactless Reader.

Card Issuer

An institution that is authorized to issue financial payment cards.

Card Query

A Customer initiated action to determine the status, state, configuration and contents of a PRESTO Media. Card Queries retrieve information stored on the PRESTO Media and may be done at all Attended Device and Unattended Devices. Note that the contents of the PRESTO Media will include such information as last trips, PRESTO Products, TTC Products, balance of products etc.

Cash Customer

Means a Customer who uses cash (bills and/coins) to buy PRESTO Media from a SSD, or . a Cash Customer is also a customer who places coins in the fare box.

Central Back Office   **CBO**

Means the Central Services of the PRESTO System. This is the centralized, back-office data and operations System for business function outsourcing that enables and controls all business functions in support of processing fare payments for the PRESTO System, including the following business functions:

fare payment processing;
revenue management and settlement;

business activity, financial, network, and operational monitoring;
data management, broadcasting, and field worker specific messaging; and
Customer Service Call Centre and web site operation and support.

Central System   **CS**

Has the same meaning as CBO.

Chargeback

Means when a Credit Card company withdraws the money for a transaction from a Merchants account and deposits it in the Customer's account following a dispute resolution.

Chargeback Request

Means when a Customer claims they never made a payment or that they are dissatisfied with the product.

Clearing House

An entity that provides for the processing of financial payments, such that payments between transacting parties are cleared and settled accurately and timely according to rules of the financial services and payments industries.

Closed Circuit Television   **CCTV**

A TV system in which signals are not publicly distributed but are monitored primarily for surveillance and security purposes.

Closed State

Has the same meaning as Out Of Service.

Code Division Multiple Access   **CDMA**

A method of transmitting multiple digital signals simultaneously over the same carrier frequency.

Coin Acceptor

A module in the Coin System required for SRVMs and FMVDs that authenticates Canadian coins inserted for payment.

Coin Box

A secure, uniquely identified container used to hold coins, usually as part of an automated vending machine or similar device.

Coin Escrow

A secure component of the Coin System in the SRVM and FMVD that functions to store on a temporary basis all coins authenticated by the Coin System until sufficient payment is authenticated by the Coin System and the transaction can be completed. In the event the transaction is not completed, the Coin Escrow component returns all coins temporarily stored to the TTC Customer.

Coin Handling Unit

All modules in the FMVD and SRVMs that together comprise the necessary hardware and software to authenticate, escrow, accept, and store all Canadian coins used to execute a Payment Transaction.

Coin System

All modules in SRVMs and FMVDs that together comprise the necessary Hardware and Software to authenticate, escrow, accept, and store all Canadian coins used to execute a Payment Transaction.

Commercial Off The shelf   **COTS**

Hardware and Software available from commercial sources.

Communication Based Train Control System   **CBTC**

A railway signaling system that makes use of the telecommunications between the train and the track equipment control and infrastructure.

Conceptual Design

As defined in the Master Agreement.

Concession

A reduction in the usual price of a fare granted by the TTC to an identifiable group of Customers.

Concession Fare Products

Has the same meaning as Concession Products.

Concession Indication System

A System of audible and visible displays that are configured to identify acceptance of Concession Fare Products including all non-adult and non-revenue fares identified in the TTC Business Requirements.

Concession Products

TTC Fare Products (such as Concession monthly passes) that can only be used by TTC Customers who qualify for the Concession.

Contact Reader

Hardware that uses physical contact technology in order to support reading of Smart Cards that use electrical contact surfaces as the interface for communications. Contact Readers conform to ISO standards and allow for the communication between the Smart Card and other systems, and which itself communicates with other components in a larger System for processing information.

Contactless Reader

Hardware that:

uses RF induction technology in order to support proximity reading of Contactless Smart Cards;
conforms to ISO 14443/ISO15963 standards for proximity telecommunications for Contactless Smart Cards and readers; and
enables communication between the Contactless Smart Card and other Systems, and which itself communicates with other components in a larger system for processing information.

Contactless Smart Card

has the same meaning as Smart Card with the added feature of using wireless signals for both power and communications.

Corrective Maintenance   **CM**

Unplanned maintenance services carried out by PRESTO to restore defective PRESTO Components and/or PRESTO Services to their normal operable state such that they comply with the TTC Specifications for the PRESTO System.

Corrective Maintenance Plan   **CMP**

A formal series of procedures, usually developed both based on recommendations of equipment manufacturers and from practical, in-field operating results of the equipment, designed to identify, isolate and rectify a fault so that the failed equipment, machine or system can be restored to an operational condition within the tolerances or limits established for In-Service.

Credit Card

Payment cards, media or applications (e.g. cell phone application) issued by financial institutions certified to issue them under the laws and regulations of Canada or other country in which they are issued, to TTC Customers who qualify, which cards conform to physical, technical, and operating standards developed, promulgated, and enforced by the financial services and payments industries, and their representatives and affiliates. A Credit Card allows Customers to borrow funds, pay for goods or services.

Current System

All current TTC Hardware, Software, firmware, Systems, equipment and supporting infrastructure built for and supporting the collection of fares at TTC and parking fees at commuter parking lots.

Customer

Means any person that uses, or attempts to use the services of the TTC.   This includes the use of the PRESTO System (field equipment, sales channels, service channels, etc.)

Customer Management

Has the meaning defined in Exhibit C, section - Customer Management.

Customer Service Call Centre

The facility that is provided by PRESTO that houses Hardware, Software, Systems, personnel, and other items in connection with the PRESTO System, and which is required to establish, manage, and maintain TTC Customer accounts and provide TTC Customer service.

Data Mart

Means the storage of all un-aggregated fare data collected, from all sources, integrated and derived from the PRESTO System, over the entire history of its operation at the TTC. Detailed Data Mart functionality, services and performance are given in Exhibit C.

Data Universe

All data elements stored in the Data Mart as defined by the TTC Business Requirements.

Data Warehouse

Has the same meaning as Data Mart

Debit Card

Payment cards, media or applications (e.g. cell phone application) issued by financial institutions certified to issue them under the laws and regulations of Canada or other country in which they are issued, to Customers who qualify, which cards conform to physical, technical, and operating standards developed, promulgated, and enforced by the financial services and payments industries, and their representatives and affiliates. A Debit Card allows Customers to access their account to withdraw cash or pay for goods or services.

Degraded State

The device or system has limited functionality and communications with the Central System. For example, the devices shall not process financial transactions with bank cards when not able to connect to a acquirer.   Devices in Degraded State will communicate to Customers and operations their limited functionality.

Design Review

The activities associated with reviewing the TTC Business Requirements and developing Conceptual, Preliminary and Final Design documentation and artifacts consistent with the PRESTO Design Process, with the expressed intent of verifying

the design meets TTC Business Requirements and needs. PRESTO will inform and consult TTC throughout PRESTO's design development stage so that a mutually agreed upon solution is effectively arrived at.

Detailed Design

As defined in the Master Agreement.

Detailed Design Review

Has the same meaning as Final Design.

Device Maintenance - First Line

Has the same meaning as Finger-Tip Maintenance.

Device Maintenance - Second Line

The maintenance activities that include all Corrective Maintenance and Preventative Maintenance. Finger-Tip Maintenance may also be performed as part of the processes and procedures involved in performing corrective and Preventative Maintenance.

Device Management and Monitoring System

The management and monitoring of operating equipment as defined in Exhibit C, section - Field System Management.

Direct Deposit Account   **DDA**

An electronic account where electronic funds are deposited directly.

Documentation

As defined in the Master Agreement.

Downtime

The time (in seconds or hours), a designated device or service is not fully functional or operational (e.g. degraded mode where only limited functionality is available, or is down with no functionality). There may be a variety of reasons for Downtime including but not limited to Preventative Maintenance, Corrective Maintenance, Revenue Collection, etc.

Driver Control Unit   **DCU**

A PRESTO device located onboard a Surface Vehicle that allows a driver to interact with the onboard PRESTO System.

Effective Date

As defined in the Master Agreement.

Electromagnetic Interference   **EMI**

The disruption of operation of an electronic device when in the vicinity of an electromagnetic field.

Emergency State

A state specifically associated with turnstiles. In Emergency State, turnstiles can be in either, Exit Only Mode or Entry and Exit Mode. Modes for Emergency State can be set locally or remotely (via the PRESTO System).

EMV Standard   **EMV**

Eurocard, Mastercard, Visa payment application standard for universal, secure debit/credit payments.

End-to-End Encryption   **E2EE**

The process of uninterrupted protection of the confidentiality and integrity of transmitted data by encrypting it at its starting point and decrypting it at its destination.

Enforcement Device

A device which contains all the required functionality to compel observance of or obedience to all TTC fare rules and policies. For example, the HHPOS can act as an Enforcement Device across all modes of transportation and accepted media (PRESTO, Open Payments etc.).

e-Pass   **ePass**

The electronic equivalent of a Pass Product.

e-Purse   **ePurse**

An electronic purse or cash value equivalent, loaded onto a Smart Card that can be used to make purchases / pay for trip.

Equipment Operating Data   **EOD**

All data required to operate devices as defined by PRESTO in order to achieve the desired PRESTO System functionality and meet TTC Business Requirements. The EOD will consist of, but not be limited to, the fare tables, programmable messages, Device operating parameters, Hotlist, Load Value List and Action List.

Exception Processing

A process design to handle transactions that cannot be automatically settled.

Exhibit A

TTC Business Requirements - SLAs.

Exhibit B

TTC Business Requirements - System

Exhibit C

TTC Business Requirements - Services

Exhibit D

TTC Business Requirements - Project Plan

Exhibit E

TTC Business Requirements - Quality Assurance and Testing

Exhibit G

TTC Business Requirements - PRESTO Open Payments

Exhibit I

TTC Business Requirements - Definitions

Extensible Markup Language   **XML**

A meta-language that allows users to define their own customizable markup languages. For example, it can be used to describe document structure, content and format and is typically used for web sites.

Fare Group

A Fare Group is a collection of transit devices, stations, routes, stops, areas, directions etc. that share a common, TTC specified, set of parameters.

Fare Group Management

The management of Fare Groups as detailed in Exhibit C, section - Fare Group Management.

Fare Matrix

A comprehensive compilation and representation of TTC's fare policies, products, pricing and usage. The Fare Matrix, which will be developed by TTC and made available for Design Review, will provide specific details to be used by PRESTO in configuring the PRESTO System so that TTC Customers are charged correct fares according to TTC's policies. The Fare Matrix will provide details of all fare products, both revenue and non-revenue, including but not limited to fare product types, pricings (both regular full fare and Concession fares), rules governing acquisition and use of fare media, and details by TTC route and stop regarding valid transfers among TTC transportation services, including permitted free-body transfers.

Fare Media Tray

A component of Fare Media Vending Devices and Single Ride Vending Machines that is integral to the fare media dispensing System for each type of automated vending device. It is the component into which a piece of fare media, either a PRESTO Card or a LUM, is dispensed and held until a TTC Customer retrieves it.

Fare Media Vending Machine   **FMVD**

An automated, self-service vending device used by Customers to purchase, reload, and dispense PRESTO Media. FMVDs are also equipped and configured to enable Customers to access information about and manage their transit accounts. PRESTO Media purchased or reloaded with adequate funds will be immediately usable for payment of fares.

Fare Products

Has the same meaning as TTC Fare Product.

Fare Rules and Policies

A set of business rules and policies that define fare payment for use of the TTC service.   Details of TTC Fare Rules and Policies are provided in the TTC Business Requirements.

Fare Transaction Processor

Has the same meaning as Reader Assembly.

Faregates

Means turnstiles that are typically found in TTC subway stations and provide a Point of Entry (or exit) between the unpaid area of the TTC System and the paid area of the TTC System.

Federal Communications Commission   **FCC**

An independent American government agency that regulates interstate and international communications by radio and television by wire, cable and satellite.

Field Maintenance   **FM**

The maintenance activities that are scheduled to occur on Hardware, Software and/or Systems forming part of the PRESTO System where it has been deployed for normal business operations. It is comprised of Finger-Tip Maintenance (if applicable) and Second Line Maintenance.

Field System

All Hardware and Software of the PRESTO System other than the Central Back Office. The Field System is located in the field for customer and operation use.

Finger-Tip Maintenance   **FTM**

The maintenance procedure performed on a piece of Hardware or equipment that requires no, or minimal, hand tools or other devices in order to be completed.

Fraud Detection and Analysis

Has the meaning detailed in Exhibit C, section - Fraud Detection and Analysis.

General Purpose Reloadable Card   **GPR Card**

This is an Open Payments prepaid Debit Card.   The value associated with the GPR Card is stored in a central account.

Global Positioning System   **GPS**

An accurate worldwide navigational and surveying service based on the reception of signals from an array of satellites.

Global System Mobile Communication   **GSM**

A digital cellular phone standard based on time division, multiple access technology.

Graphical User Interface   **GUI**

A graphical computer interface that uses windows, icons and menus that can be manipulated by a keyboard, mouse or other input devices.

Hand-Held Point of Sale Device   **HHPOS**

A portable device forming part of the PRESTO System that can be used for payments, validation of paid fares, potential sale and reloads of PRESTO Media, and accessing information about TTC Customers' account status.

Hardware

As defined in the Master Agreement.

Hot Transfer

Means the simultaneous transfer of a telephone call and its associated data from one agent or agency to another agent, agency or supervisor.

Hotlist

A list of PRESTO Media or Open Payments Media (by ID) that are to be blocked by PRESTO Devices, on presentation of the media on that list to a Card Interface Device.

In-Service

A device or System that is functioning as specified in the TTC Business Requirements. Note that In-Service devices and Services may have several different operating modes.

Inventory System

A system that tracks all devices, components, and PRESTO Media that comprise the PRESTO System as defined in Exhibit C, section - Field Management System.

Layered On

An approach to development, design, and implementation of the PRESTO System that avoids the active, co-dependent integration of the PRESTO System with other operating, business, or technical Systems in the interest of preserving the stand-alone nature of the PRESTO System.

LFTP

LRV Fare Transaction Processor. Has the same meaning as LRV Reader Assembly.

Light Rail Vehicle   **LRV**

An urban rail vehicle.

Limited Use Media   **LUM**

LUMs are contactless, non-reloadable media that can be used at all TTC Points of Entry.

Linked Trip

Means a continuous passenger journey from origin to destination, which may entail several Boardings or transfers during a one-way journey to the passenger's destination. For clarity purposes a Linked Trip includes all vehicle Boardings (including transfers) that would equal one Revenue Passenger Trip consistent with TTC fare policies. .

Load Value List

A List of PRESTO Media (by ID) to which PRESTO Products or TTC Fare Products shall be loaded on presentation of the media to the Card Interface Device.

Long Term Evolution   **LTE**

A fourth generation (4G) mobile communications standard.

Low Voltage Power System   **LVPS**

A power system that uses voltages of 50V or less.

LRV Reader Assembly

A Reader Assembly located at the door of an LRV that allows Customers to tap their PRESTO Media or Open Payments Media as payment on Boarding.

LUM Dispenser

An electronic device that dispenses LUMs within a SRVM or FMVD.

LUM on Bus Dispenser

A LUM Dispenser appropriately adapted for mounting on TTC surface vehicles. The LUM on Bus Dispenser is a stand-alone, mechanical device that requires no power or electronic interface with the PRESTO System, or any other equipment on TTC surface vehicles, other than the Hardware needed for secure mounting. The LUM on Bus Dispenser is designed to dispense a single LUM at a time through a simple, mechanical process activated by the surface vehicle operator.

Magnetic Card Reader   **MCR**

A device comprising of hardware and software used to read magnetic stripes commonly found on payment cards.

Maintenance Management System   **MMS**

A System that enables monitoring and management of operation and maintenance of other specific Systems forming part of the PRESTO System through a series of equipment sensors, computer applications, dispatching and information sharing capabilities, and reporting and analytical functions.

Maintenance Plan

A comprehensive plan consisting of the Preventative Maintenance Plan and the Corrective Maintenance plan.

Man Machine Interface   **MMI**

Contains all the elements that the customer will have to interact with when using a device (screen, PIN pad, Reader Assembly, etc.)

Mean Cycles Between Failure   **MCBF**

A calculation arrived at by dividing Mean Time Before Failure by the duration of a cycle.

Mean Time Before Failure   **MTBF**

Has the same meaning as Mean Time To Failure.

Mean Time to Failure   **MTTF**

The average time to failures with the assumption that the failed system is not repaired (infinite repair rate).

Mean Time to Repair   **MTTR**

A measurement of the arithmetic mean (average) time to repair or replace a device or component in a device and to bring that device back into operation.

Merchant

The seller of products that, with respect to card payment Systems, has agreed to terms and conditions for acceptance of payment cards and devices issued by financial institutions and other entities, the terms and conditions of which address technology standards, security, protocols for exchanges of funds, and guidelines governing the acceptance of certain types of payment products.

Merchant Of Record   **MOR**

The Merchant Of Record is the company that holds the relationship with the Payment Processor.   For the PRESTO System this is PRESTO.   PRESTO is ultimately responsible for the financial transactions associated with the use of PRESTO and Open Payments media on the PRESTO System.

Metadata

Term used to describe electronically presented, stored or archived data in terms of definition, structure, and administration of such data, with all contents in context to ease the use of the captured and archived data for further use.

Near Field Communications   **NFC**

A technology (primarily associated with mobile phones) that enables short-range, wireless exchanges of data between similarly-equipped devices, which technology is compliant with ISO 14443 standards for proximity devices, and combines the capabilities of a Contactless Smart Card and a Contactless Reader into a single piece of equipment.

New Streetcar

Has the same meaning as LRV.

Non-Concession

The adult TTC fare that is distinguished from discounted fares offered to children, seniors, students and other eligible groups (i.e. Concession Fares).

non-PRESTO Device

Any device not associated with the PRESTO System.   This includes those devices that may be interfaced to a PRESTO Device such as turnstiles.   Further examples include Pass Vending Machines, Ticket Validators, etc.

non-PRESTO Services

Any service not associated with the PRESTO System.

Off-board SRVM

An SRVM that is located at or near an LRV stop.

Offline

Means any device that does not have a live network communication.

Onboard SRVM

An SRVM located onboard an LRV.

Online

The device has a live network communication

Ontarians with Disabilities Act   **ODA**

An Ontario Act passed in 2001, to improve the identification, removal and prevention of barriers faced by persons with disabilities.

Open Architecture

Hardware, Software and Systems solutions that permit adding, upgrading and swapping components without proprietary constraints. Typically, an Open Architecture publishes all or parts of its architecture that the developer or integrator wants to share. The open business processes involved with an Open Architecture may require some license agreements between entities sharing the architecture information. The ''Software architecture'' of a program or computing System is the structure or structures of the Software System, which comprise Software components, the externally visible properties of those components, and the relationships between them.

Open Database Connectivity

An approach to computer Systems and database design that provides a standard, independent interface for communication with databases. The solution layers-in Software that acts as a translator between an application and a database, such that both the database and the application can use their native programming language in exchanging data.

Open Interface Standard   **OIS**

This is the standard, designed by PRESTO, that explicitly targets interoperability between Smart Cards and field devices wherever PRESTO is installed.

Open Loop

A term used to describe general purpose payment cards that are branded with a card association logo such as Visa, Mastercard, American Express, etc and can be used wherever those cards are accepted.

Open Loop HotList

A list of Open Payment Media that will not be accepted by the PRESTO System.   The Open Loop Hotlist is based on the Acquirer's ability to process fare payment(s) made by Open Loop cards.   The PRESTO System updates and distributes this list to Reader Assemblies.

Open Media

Has the same meaning as Open Payment Media.

Open Payment Media

Payment media issued by financial institutions certified to issue them under the laws and regulations of Canada or other country to Customers who qualify, which cards conform to physical, technical and operating standards developed, promulgated and enforced by the financial services and payments industries, and their representatives and affiliates.   Open Payment Media includes credit cards, debit cards as well as other forms of media such as Open Payment enabled NFC mobile phones.

Open Standard

The Open Architecture solutions developed by financial institutions and the payments industry, and are regulated under Canadian banking laws that have enabled the development, distribution, implementation, and ongoing operational support of payment devices, processing Systems, and business protocols for the exchange of funds typically between consumers and Merchants that provide products and services.

Open Standards Fare System   **OSFS**

An electronic fare system based on open standards and COTS equipment and services. In general, a fare system based on the use of financial payment cards and services.

Open State

Has the same meaning as In-Service.

Order and Distribution Management

Has the meaning detailed in Exhibit C, section Order and Distribution Management.

Ordering System

A system that is integrated with the MMS and in particular the inventory system for ordering equipment, media, and consumables as defined in Exhibit C, section Field System Management.

Original Equipment Manufacturer **OEM**

An organization that makes devices from component parts bought from other organizations.

Out Of Service

A device that is no longer functioning as specified. Out Of Service devices will indicate to Customers and operations that they are Out Of Service.

Parking Fare Transaction Processor **PFTP**

A Fare Transaction Processor located a gated parking lot. In particular, a PFTP is interfaced to a TTC parking gate and determines the whether the gate opens or remains depending on the result of a PRESTO or Open Media tap.

Pass Product

A pre-paid product that allows a Customer to use transit and transit services (e.g. parking) for the time duration the pass is valid for.

Pass Vending Machine **PVM**

A TTC Self Service Device that dispenses TTC passes.

Passback

Allowing more than one Customer to use a single PRESTO Media or Open Payments Media at a Point of Entry at the same time. Details regarding Passback functionality are provided in the TTC Business Requirements.

Pay-As-You-Go **PAYG**

The ability to use contactless Open Payment Media at a Point of Entry with no prior registration, sign-up or notification. Details of functionality, services, and performance with regard to PAYG are provided in the TTC Business Requirements, Exhibit G.

Payment Card Industry **PCI**

Payment Card Industry (Standards). These are a set of security standards enforced by the payment industry that minimize the risk of fraud and enhance security in financial payment systems.

Payment Device Management System

A System that manages all payment certified devices such as PIN Pads and point of sale devices and as defined in Exhibit C, section - Field System Management.

Pedestal Reader Assembly

A Reader Assembly located on a stand or pedestal.

Performance Management and Monitoring

The management and monitoring of the PRESTO System Performance Levels.

Personal Identification Number **PIN**

A number allocated to an individual and used to validate electronic transactions.

PIN Pad

A component used for entering Personal Identification Numbers and other information required for interactions between the Customer and payment devices.

Point of Entry   **POE**

Any physical location designated by TTC as a point of paid access to TTC's transportation services, including for example, locations that are in subway stations (i.e. a turnstile) and are protected through a gating or barrier System, on surface vehicles where a particular location is designated for TTC Customer to pay fares (e.g. at the front of the bus on or near the fare box), or commuter parking lots.

Point of Sale   **POS**

The location where a financial transaction occurs. POS commonly refers to the physical device used by the Customer in making a purchase at that location.

Portable Communication System   **PCS**

A communication system similar to a cellular phone service that emphasizes personal service.

Pre-Funded

A processing category for "bulk" transit fares in which the fare product is purchased in advance and, therefore, is intended to be used for an extended period. Examples of these fare products are transit passes and advance, value-based fare product where the value of the purchase exceeds the cost of a single ride.

Preliminary Design

Has the meaning defined in the Master Agreement.

PRESTO Call Centre

A call centre and associated services provided by PRESTO for Customers.

PRESTO Card

Means a contactless re-useable Smart Card issued by PRESTO. Note that this card may be reloadable with PRESTO Products or TTC Fare Products as needed whereas a LUM is a non-reloadable media containing a defined set of TTC Fare Products.

PRESTO Device

Any device associated with the PRESTO System whether it is used for the sale of PRESTO Media and/or capable of accepting PRESTO Media taps. Examples of PRESTO Devices include AVMs, FMVD, HHPOS, SRVMs and Reader Assemblies.

PRESTO Documentation

Means all Documentation required by TTC in connection with its use, operation, support or maintenance of the PRESTO System or any part thereof, including the PRESTO training materials, and all fixes, enhancements or other changes to such documentation.

PRESTO Managed Services

Has the same meaning as Managed Services defined in the Master Agreement.

PRESTO Media

A PRESTO Card, LUM or any other media that supports the PRESTO System apart from Open Payment Media.

PRESTO Open Payments

Has the same meaning as PRESTO Open Payments System.

PRESTO Open Payments System

Means the support and management of Open Payments Media on the PRESTO System. Detailed functionality, services and performance required from the PRESTO Open Payments System are provided in Exhibit G.

PRESTO Products

Fare Products on PRESTO Media or supported by Open Payments Media that are defined and supported by PRESTO. An example of a PRESTO Product is e-Purse.

PRESTO Services

Means all services provided and operated by PRESTO for supporting the complete implementation and operation of the PRESTO System at TTC.

PRESTO System

As defined in the Master Agreement.

PRESTO System Design Process

Has the same meaning as RASCI for PRESTO System Development defined in the Project Management Agreement.

PRESTO System Infrastructure   **PSI**

All devices, Hardware, Software, and services required to support the PRESTO System at TTC. This includes all network services and network support hardware.

PRESTO Website

A public website provided by PRESTO for Customers.

PRESTO-TTC Device Interface

Means the Hardware and Software connection between a PRESTO Device and non-PRESTO Device (i.e. TTC equipment) that is required by the PRESTO System. For example, the connection between the Turnstile Reader Assembly and the Turnstile release mechanism is one such interface.

PRESTO-TTC System Interface

Means the Hardware and Software connection between a PRESTO System and non-PRESTO System (i.e. TTC System) that is required by the PRESTO System. For example, the connection between the Data Warehouse and the TTC reporting services may be one such interface.

Preventative Maintenance   **PM**

The care and servicing of devices, Systems, etc. For the purpose of maintaining the PRESTO System and facilities in satisfactory operating condition (including as required by the TTC Specifications) by providing for Systematic inspection, detection, and correction of incipient failures either before they occur or develop into an error.

Preventative Maintenance Plan   **PMP**

A formal series of procedures, usually developed both based on recommendations of equipment manufacturers and from practical, in-field operating results of the equipment, that if performed according to schedule, minimize the number of unanticipated equipment failures that occur. The plan is intended to maximize the time that equipment is operational and limit maintenance activities to predictable actions along a structured timeline. This approach enables the maintenance provider to manage its resources more effectively, as well as minimize disruptions in service to a narrow range of uncontrollable events (such as vandalism or major disasters).

Primary Hotlist
The Hotlist that is built and distributed on daily basis.

Problem Incident and Management System
A System that automatically tracks, reports and manages all PRESTO System incidents as defined in Exhibit C, section - Field System Management.

Proof Of Payment   **POP**
An honour based transit fare collection approach where each Customer must carry a receipt of fare payment or demonstrably prove by other means that they have tapped their PRESTO or Open Payments Media and that they have paid the fare.

Quality of Service   **QOS**
A defined measure of performance in a system.

Quick Response Code   **QRC**
Quick Response Codes are two-dimensional barcodes that can be scanned via camera technology, into and read by electronic devices.

Reader Assembly   **RA**
A device that accepts payment and/or transfers from PRESTO Media and Open Payments Media based on a set of Fare Rules and Policies. A Reader Assembly is generally comprised of various sub-components such as: a Contactless Reader, a main processing unit, a communications module and a power conditioning.

Remote Lists
Remote Lists include Hotlist, Action List, Load Value list and Open Loop Hotlists. Remote lists reside on field equipment.

Remote Load
The loading of either e-Purse or Pass Product via remote Customer channels such as the PRESTO Website or PRESTO Call Centre.

Restriction of Hazardous Substances   **RoHS**
A compliance standard on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Revenue Collection / Servicing   **RC/S**
Consists of the following procedures,

Remove currency from devices
Deposit currency in portable vault and deliver for revenue processing as necessary
Replenish - load paper, receipts, LUMs etc. into PRESTO Devices

Revenue Collection Plan
A plan to collect bills and coins from Self Service Devices as detailed in Exhibit C, section - Field System Management.

Revenue Passenger Trip
Has the same meaning as Linked Trip

Revenue Service
The TTC defined time or time period when a Point of Entry is in operation and collecting paid fares.

Revenue Servicing Plan
A plan to service Self Service Devices as detailed in Exhibit C, section - Field System Management.

Risk Mitigation

The efforts taken to reduce either the probability or consequences of a system/service threat.

Schedule A

Has the same meaning as Exhibit A

Schedule B

Has the same meaning as Exhibit B

Schedule C

Has the same meaning as Exhibit C

Schedule D

Has the same meaning as Exhibit D

Schedule E

Has the same meaning as Exhibit E

Schedule G

Has the same meaning as Exhibit G

Second Line Maintenance

The maintenance activities that include corrective and preventative maintenance. Finger-Tip Maintenance may also be performed as part of the processes and procedures involved in performing corrective and preventative maintenance.

Secondary Hotlist

The Hotlist that is built and distributed periodically during the day - consisting of items that have been added throughout that day. At the end of each day, the contents of the Secondary Hotlist are inserted in the Primary Hotlist.

Security Authentication Module   **SAM**

A secure Smart Card used for storing and computing cryptographic keys for the purposes of authenticating processes, Software, Hardware etc.

Self Service Device   **SSD**

A device which allows a Customer to perform various functions and purchases without the need for an Agent to be present. AVM, FMVD, Onboard SRVM and Off-board SRVM are all SSDs.

Service Provider   **SP**

A transit service provider

Single Ride Vending Machine   **SRVM**

A SSD where cash Customers can purchase LUMs for use on the PRESTO System.

Smart Card

A plastic card with a built in microprocessor and security components used in electronic processes such as financial transactions, ticketing, secure access etc.

Software

As defined in the Master Agreement.

State of Good Repair

As defined in the Master Agreement.

Station Fare Transaction Processor   **SFTP**

A Fare Transaction Processor located in the subway. In particular, a SFTP is interfaced to a TTC turnstile and determines whether or not to release (open) the turnstile depending on the result of a PRESTO or Open Payment Media tap

Station Point of Sale   **SPOS**

An Attended Device that may be located in various locations throughout the TTC.

Store and Forward

A technique, in processing data over a telecommunications network, of enabling an intermediate holding place for data so that it can later be sent to its final destination. This capability is usually provided in circumstances where telecommunications service may be interrupted or not available, typically where mobile communications are being used, as a means of preventing loss of data gathered from ongoing activities that generate the data.   All data (transactions and other information) are stored locally in secure, persistent storage.

Streetcar

Current TTC surface vehicles that run on rails and are propelled by electricity. In particular, Streetcars will be replaced by New Streetcars (LRVs) over the next few years.

Subway Radio Antenna System   **SRAS**

A wireless communication system used for communications, public address announcements, intercom and digital message handling that is customized for use in the subway

Surface Vehicle

A TTC vehicle other than a subway train, used to carry Customers.

System

Means any combination of Hardware and Software, including any telecommunications lines, wireless Systems, or other networking devices used to link such combination of Hardware and Software.

Tap and Go

Tap and Go is the process that occurs when a Customer taps their PRESTO Media or Open Payments Media to a Reader Assembly.   The Reader Assembly will determine if the tap has resulted in an accepted or denied fare.   The results of the tap will be presented visually and audibly to the customer clearly indicating the result.   If required, the Reader Assembly will also interact with any TTC equipment (e.g. turnstile) at the Point Of Entry.

Tap Transaction Speed

The time as measured from the moment a contactless device enters the operating volume of the Reader Assembly until such time as the Reader Assembly returns a response to the Customer.

Terrestrial Trunked Radio   **TETRA**

A set of radio standards that describes a common mobile radio communications infrastructure throughout Europe.

Ticket Validator

A device that validates a paper ticket by printing a time and date on the ticket and physically punching unique hole(s) in the ticket.

Token Acceptor   **TA**

A device that accepts TTC tokens as fare payment

Tokenization

A process for obfuscating and securing private and financial data.

Train Control and Management System   **TCMS**

This is a protocol based network present on the LRVs and dedicated to the management and control of various LRV sub-Systems.

Transit Expansion

New Light Rail Vehicle lines.

Transition Phase

The period of time at the TTC when both legacy fare products (e.g. tokens, tickets, paper transfers etc.) and PRESTO Media (along with Open Payments Media) are accepted for travel.

Trip History

A Customer initiated action to determine the history of customer trips made using their PRESTO Media or Open Payments Media. Customers may obtain their trip history at all Unattended Devices as well as Attended Devices. The amount of Trip History in terms of time periods varies by Unattended Device and is outlined in the TTC Business Requirements.

TTC Business Requirements   **TTC BR**

A set of specific requirements that define the functionality, services and performance the PRESTO System must have in order to support automatic fare payment, operations and policies, etc. At TTC.

TTC Current System

Has the same meaning as Current System.

TTC Customer

Has the same meaning as Customer.

TTC Customer Service Centre

The Customer Service Centre owned and operated by the TTC.

TTC Fare Product

Fare products as defined by TTC. For example Monthly Pass, Weekly Pass, Day Pass, Convention Pass, pre-funded or bulk media purchases (e.g. tokens). TTC Fare Products are outlined in the TTC Business Requirements.

TTC Fare Rules and Policies

Has the same meaning as defined in Exhibit B, section - TTC Fare Rules and Policies.

TTC Private Card

A PRESTO Card that is used by TTC employees which may enable functionality not available to the public (e.g. free travel, access etc.).

TTC Product

Has the same meaning as TTC Fare Product.

TTC Specifications

Has the same meaning as TTC Business Requirements.

Turnstile Reader Assembly

A Reader Assembly located at/on a turnstile. This Reader Assembly is interfaced to the turnstile mechanism such that a valid tap results in the Reader Assembly signaling the turnstile to open allowing the Customer to enter the fare paid zone.

Two Factor Authentication

The process whereby two independent Authentication methods are used in order to access a System, location or perform an action. For example, the secure access to the Central Processor Fare Engine will require a password and security token.

Unattended Device

Has the same meaning as SSD.

Unblocked

PRESTO Media or Open Payments Media that is valid and will be accepted by the PRESTO System. The Blocked/Unblocked status is determined by the contents of the Hotlist.

Uninterruptable Power Supply   **UPS**

A device that provides battery backup when the electrical power fails or drops to an unacceptable voltage level.

Universal Mobile Telecom System   **UMTS**

A third generation (3G) cellular communications network

Unlinked Trip

Trips whereby a TTC Customer boards a TTC vehicle and/or transfers between modes, whether it is part of a continuing TTC trip (i.e. transfer from another TTC vehicle) or the first time a TTC Customer boards a vehicle and a fare payment is required consistent with TTC fare policies. For clarity purposes, a Linked Trip can be made up of a number of Unlinked Trips

Uptime

The time (in seconds, hours), a designated device or service is fully functional and operational over the course of a fixed time period (e.g. day, week, month, or year).

Usage Tap

PRESTO Media or Open Payments Media tap made by a TTC Customer on a Reader Assembly.

User Interface   **UI**

The means by which a user and a computer system interact.

Velocity Checks

Rules that are based on the frequency of tap transactions over a given time period.

Warm Transfer

Means the simultaneous transfer of a telephone call and its associated data from one agent to the queue of another agent or supervisor.

WiFi

Wireless local area technology based on 802.11 standards

Wireless Access Point   **WAP**

A device that allows wireless communication devices to connect to a wired network using WiFi or related standards.

Wireless Local Area Network   **WLAN**

A local area network that uses high frequency radio signals to transmit and receive data over distances of a few hundred feet.

Work Order System

A system used for managing work orders that will be used by maintenance personnel for logging, investigating, repairing and /or replacing PRESTO field equipment.

Yard Maintenance Support System   **YMSS**

A wireless network used by TTC to support maintenance at its surface level yards.

ATTACHMENT 3
PRESTO BUSINESS CONTINUITY PLAN

This Attachment is a summary of the current PRESTO Business Continuity Plan ("**BCP**") and process, and has been modified to incorporate the TTC. This Attachment shall supplement but, to the extent that the BCP provided for herein is less than that required in the TTC Business Requirements, shall not restrict or limit the TTC Business Requirements to govern the BCP used in the Managed Services. This Attachment may be amended from time to time to meet the TTC Business Requirements.

The PRESTO BCP, as well as this summary, will be reviewed and updated in line with the Managed Service.

1.   Business Continuity Plan Overview

        (a)   Metrolinx will maintain a business continuity plan, which will include plans and procedures for disaster recovery, business interruption and business continuity. This plan will meet the minimum requirements set forth in the PRESTO BCP This PRESTO BCP addresses the continuation of the following critical business services:

                 (i)   Financial Management;

                 (ii)   Customer/SP Support;

                 (iii)   Card Management;

                 (iv)   Asset Management;

                 (v)   Fare Management;

                 (vi)   Marketing and Communications.

        (b)   The current PRESTO BCP will be initially reviewed and updated pursuant to the Project Plan and on a regular, ongoing basis to keep pace with the growth of PRESTO and changes that may occur to the TTC Business Requirements.

        (c)   The PRESTO BCP will be updated and will cover the scope of what Metrolinx is responsible for as part of the Managed Services.

        (d)   As applicable, TTC will maintain their own business continuity plan relevant to its responsibilities within the scope of the Managed Services, and share such business continuity plan with Metrolinx as required.

        (e)   Metrolinx and TTC will cooperate and jointly participate to the extent required, in the respective implementation, maintenance, testing and updating of TTC's and Metrolinx's respective business continuity plans.

(f)   Upon the occurrence of a business interruption event, PRESTO will comply with the PRESTO BCP to restore the Managed Services.

(g)   Without limiting Metrolinx's obligations or TTC's remedies, Metrolinx agrees to respond to a business interruption, to implement the PRESTO BCP and to use its resources and efforts to restore PRESTO NG and the Managed Services in a manner that is at least as favourable as the response, resources and efforts provided to other SPs.

(h)   Metrolinx will maintain continuous provision of Managed Services to the extent that it can reasonably be addressed by the implementation of the PRESTO BCP and to take any other prudent back-up and recovery measures and procedures that might reasonably be required.

(i)   To the extent that Metrolinx is unable to maintain continuity of the Managed Services through the invoking of PRESTO BCP, Metrolinx will take all commercially reasonable steps to provide the Managed Services (or an element thereof), as applicable, in order to fulfil its obligations hereunder, and that alternate source may claim the benefit of a Force Majeure Event only if the Force Majeure Event prevents or adversely affects that alternate source in fulfilling those obligations.