

Section C2—Services Delivery Plan

REDACTED

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

C. Summary of the NRSLO Service Delivery Team

The Service Delivery Team (together with the business support functions) will deliver the maintenance services contract. The team will bring together the right people with a single mandate. Our Operations and Maintenance Director will lead this team, using direct reporting lines to every project function to monitor and manage the effective delivery of services at Bombardier Ilford 'A' Maintenance Depot, Willesden, and the stabling outstations.

The Service Delivery Team will report to the NRSLO Project Director. The team will be composed of senior managers from the operational and functional areas required to deliver the maintenance services. The team will include the roles of:

- Operations and Maintenance Director
- Mobilisation Project Manager
- Service Introduction Manager (Product Introduction)
- Production Managers
- Engineering Manager
- Procurement and Materials Manager

The Service Delivery Team will be supported by a business support team who will provide support, expertise and best practice in the areas of project administration, quality assurance, finance and human resources. The business support team will include the:

- Training and Competency Manager
- Finance Manager
- Human Resources Manager
- QHSE Business Partner
- Facility Manager for the depot assets
- Technical Publications
- Design for Maintenance (Engineering)
- Material Management
- Technology development (Asset Information Management Services / Automated Vehicle Inspection Systems)
- Project Management Office
- Operations (including cleaning)
- Warranty Management.

Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project



London Overground Rolling Stock
Confidential and Proprietary

7/120

BOMBARDIER
the evolution of mobility

Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project



Figure 3:

London Overground Rolling Stock
Confidential and Proprietary

8/120

BOMBARDIER
the evolution of mobility

Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
*New Rolling Stock for London
Overground Project*

C1 Central Support

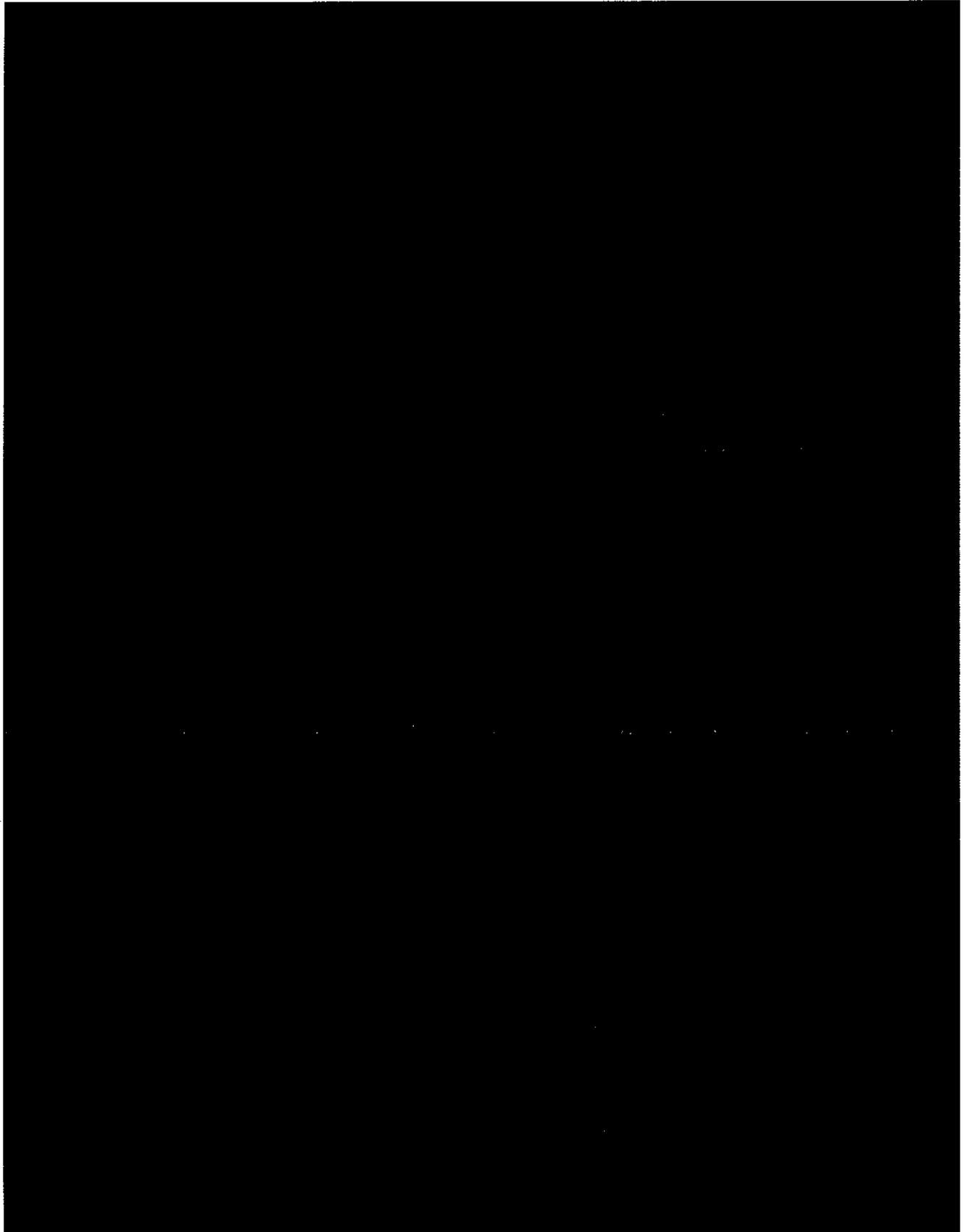


Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

*New Rolling Stock for London
Overground Project*



Section C2–Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
*New Rolling Stock for London
Overground Project*



Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

*New Rolling Stock for London
Overground Project*



Section C2–Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
*New Rolling Stock for London
Overground Project*

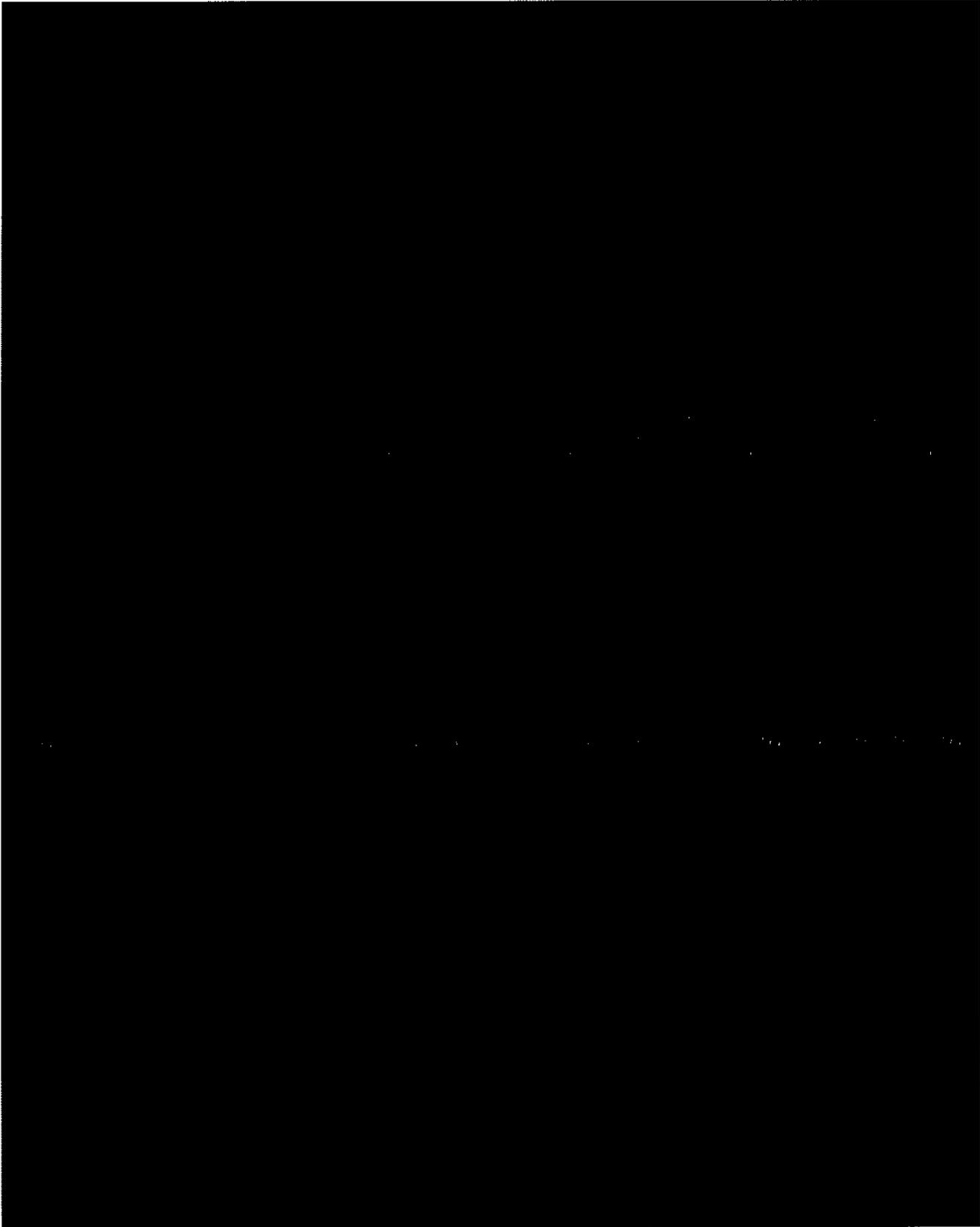


Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

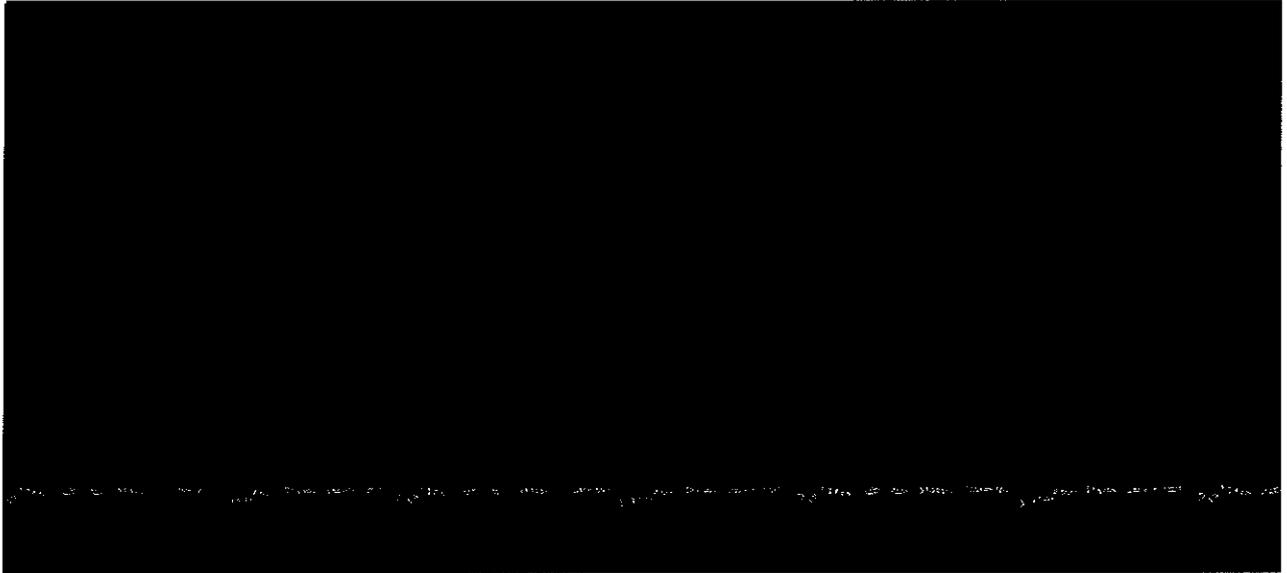
*New Rolling Stock for London
Overground Project*



Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
*New Rolling Stock for London
Overground Project*



Section C2–Services Delivery Plan

REDACTED

New Rolling Stock for London
Overground Project

Bombardier_PartC2.05 - Version 2

Key Parameters	Fleet	
	14 Dual Voltage Units maintained at Willesden	31 AC only units maintained at Ilford A
	Willesden	either Chingford or Ilford A
Periodic heavy exterior clean	< 30 days	< 30 days (Chingford)
Aesthetic Exam	30 days	30 days
Material Management	Satellite	Main material storage to be located at Ilford A. Satellite at Chingford
Train Preparation	Both depots and all stabling locations will be technically supported for train preparation and train presentation	
Average annual mileage	94,571	61,911
MTIN Target	50,000	50,000
Availability Requirements	13	27

In addition to the parameters identified within the above table, the following general but key points should also be considered:

- Train preparation: Automated train preparation (plus 10 minutes manual) will be undertaken at both train maintenance depots and all identified stabling locations
- Weekend demand assumed to be in line with current timetable (November 2013).
- Support / management staff located at Ilford 'A' maintenance depot
- In service technical support to be located at The Train Operator's Control Centres (Swiss Cottage and East Anglia House)
- 24/7 technical support will be provided from our Service Delivery team at Willesden and Ilford 'A' Maintenance depot
- All required wheel turning carried out at Bombardier Ilford facility

Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

*New Rolling Stock for London
Overground Project*



Section C2—Services Delivery Plan

REDACTED

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

G. Maintenance Plan

G1 Introduction

A key aspect in reducing train preparation, corrective and planned preventative maintenance activities, whilst sustaining operational safety integrity, fleet availability, and achieving the desired train reliability targets will be Bombardier's Integrated Vehicle Health and Monitoring system (IVHM).

Our IVHM system will monitor the condition of all key systems, including:

- [REDACTED]

Section C2–Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

[REDACTED]

Train Prep Task No	[REDACTED]
[REDACTED]	[REDACTED]

[REDACTED]

Section C2–Services Delivery Plan

REDACTED

New Rolling Stock for London
Overground Project

Bombardier_PartC2.05 - Version 2



WARNING

- **Personal Protection.** Follow local depot procedure for the utilisation of personal protective equipment (P.P.E.).
- **Electrocution.** All electrical isolations to be carried out in accordance with local depot instructions.
- **Entrapment.** Ensure wheel scotches are in position before commencing work.
- **Electrocution.** Keep clear of live shoe gear. Ensure the 3rd rail is not live, if necessary fit a suitable 3rd rail cover.

Activity 2: Fill

1. Remove cap from auto close/fill valve on anti-icing tank.
2. Make sure auto close/fill valve and bowser fast fill nozzle interfaces are clean.
3. Make sure anti-icing tank level gauge glass is clean.
4. Connect bowser fast fill nozzle to auto close/fill valve on anti-icing tank.
5. Fill anti-icing tank to FULL mark (450 litres max.) on anti-icing tank level sight glass.
6. Switch off bowser pump and remove bowser fast fill nozzle from auto close/fill valve on anti-icing tank
7. Check auto close/fill valve for leaks. Repair any leaks.
8. Check the cap for damage. If necessary, replace the cap.
9. Install cap on auto close/fill valve.

Activity 3: Test



NOTE

Only do the test section of this task if the tank has been filled from empty. This is required to ensure air locks are purged from the system.

1. On the end of the control box, press the TEST button and check:
 - A. anti-icing fluid is dispensed at the collector shoes.
 - B. The TCMS for any system faults.
2. If necessary repeat step 1 to verify that fluid is being dispensed at each collector shoe due to air in the system.

END OF PROCEDURE

G3.5.1

[REDACTED]

Section C2—Services Delivery Plan

REDACTED

Bombardier_PartC2.05 - Version 2

G3.6.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

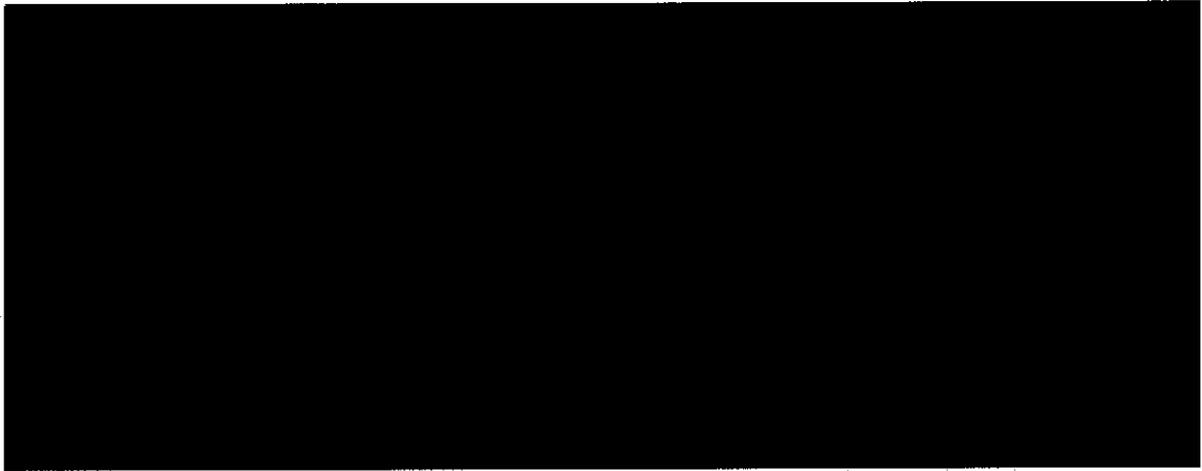
	DV (14 units) Willesden Preventive (Planned) Maintenance Blue Collar Allocation	
[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]

Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project



[Redacted line of text]

[Redacted block of text]

[Redacted block of text]

[Redacted block of text]

[Redacted block of text]

[Redacted line of text]

[Redacted]									
[Redacted]									
[Redacted]									
[Redacted]									

[Redacted footer text]

Section C2–Services Delivery Plan

REDACTED

Bombardier_PartC2.05 - Version 2

Table 12 - DV Willesden balanced exam periodicities

[REDACTED]

[REDACTED]

Table 13 - Predictive maintenance activities

	Predictive maintenance activity	
a	[REDACTED]	[REDACTED]
b	[REDACTED]	[REDACTED]
c	[REDACTED]	[REDACTED]
d	[REDACTED]	[REDACTED]

[REDACTED]

	[REDACTED]	[REDACTED]
	[REDACTED]	[REDACTED]

H. Integrated Vehicle Health Monitoring

To enhance our value proposition, Bombardier has developed maintenance tools and processes with the specific purpose of enabling the optimisation of fleet performance and availability, whilst driving down the total cost of ownership of rolling stock assets.

Bombardier's proposal for optimising the maintenance support for the *AVENTRA* trains forms the backbone of the NRSLO operation. Specifically, proposals for fleet optimisation through;

- Automated Vehicle Inspection
- Maintenance Optimisation
- Condition Based Maintenance through the use of diagnostic and prognostic data
- Integrated Information Systems
- Optimisation of maintenance operations through deployment of Lean Manufacturing and Continuous Improvement

We are proposing two depot locations for maintenance of the *AVENTRA* fleet, nominally Willesden and Bombardier's Ilford 'A' Shop. However it is proposed that the core locations for investment in advanced maintenance technology will be Willesden depot for the dual voltage units and Chingford sidings for the AC units. These locations have been identified as optimal locations, considering diagram information and the regular frequency at which units visits these prime locations. Trains will be examined by AVIS through their visits to Willesden depot and Chingford sidings with an average three days period between AVIS inspections to facilitate semi auto train prep. Considering 20 out of the 29 AC units required for the West Anglia Inner diagrams are stabled overnight at Chingford, the frequency of visits equates to each unit being inspected by AVIS every 1.55 nights.

H1

[REDACTED]

Section C2–Services Delivery Plan

REDACTED
New Rolling Stock for London
Overground Project

Bombardier_PartC2.05 - Version 2

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Section C2—Services Delivery Plan

REDACTED
*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

[REDACTED]

Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
*New Rolling Stock for London
Overground Project*

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]

■ [REDACTED]

- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]
- | [REDACTED]

Section C2—Services Delivery Plan

REDACTED
New Rolling Stock for London
Overground Project

Bombardier_PartC2.05 - Version 2

[REDACTED]

Section C2–Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

*New Rolling Stock for London
Overground Project*

[REDACTED]

Section C2–Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

*New Rolling Stock for London
Overground Project*

[REDACTED]

[REDACTED]

H4.1. Grouping

[REDACTED]

Section C2—Services Delivery Plan

REDACTED
New Rolling Stock for London
Overground Project

Bombardier_PartC2.05 - Version 2

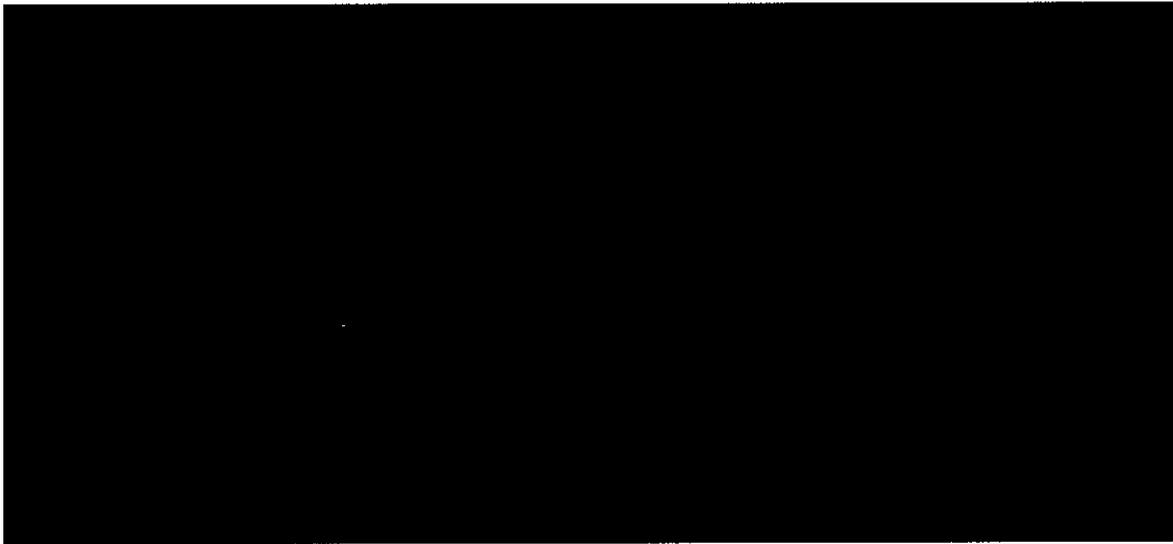
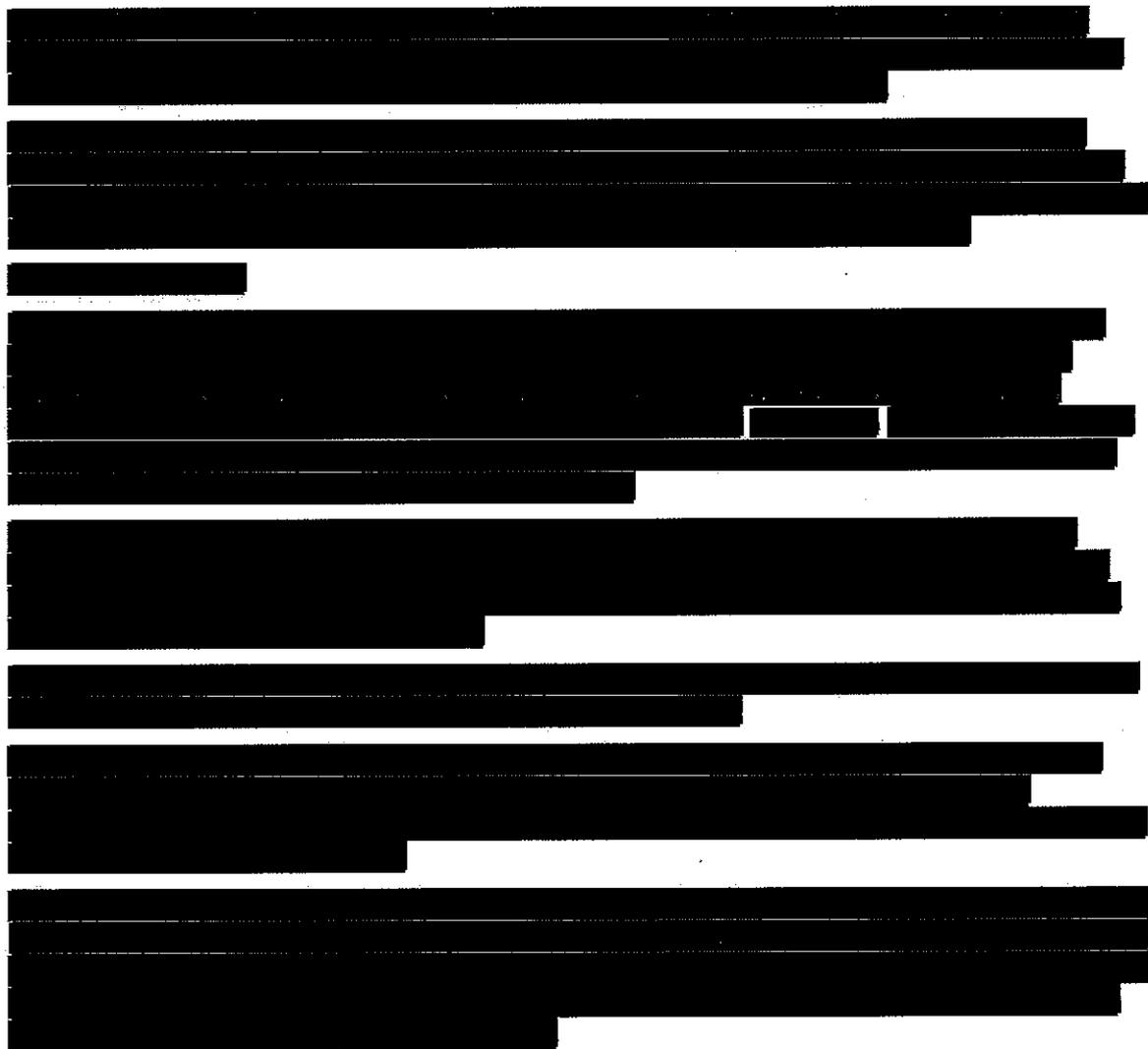


Figure 9: Grouping Concept



Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

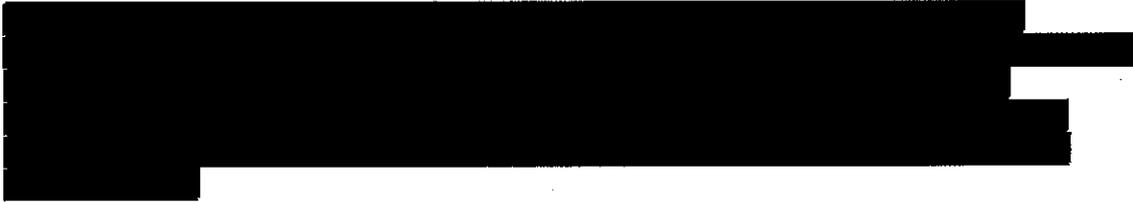
[REDACTED]

Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

*New Rolling Stock for London
Overground Project*



Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

New Rolling Stock for London
Overground Project

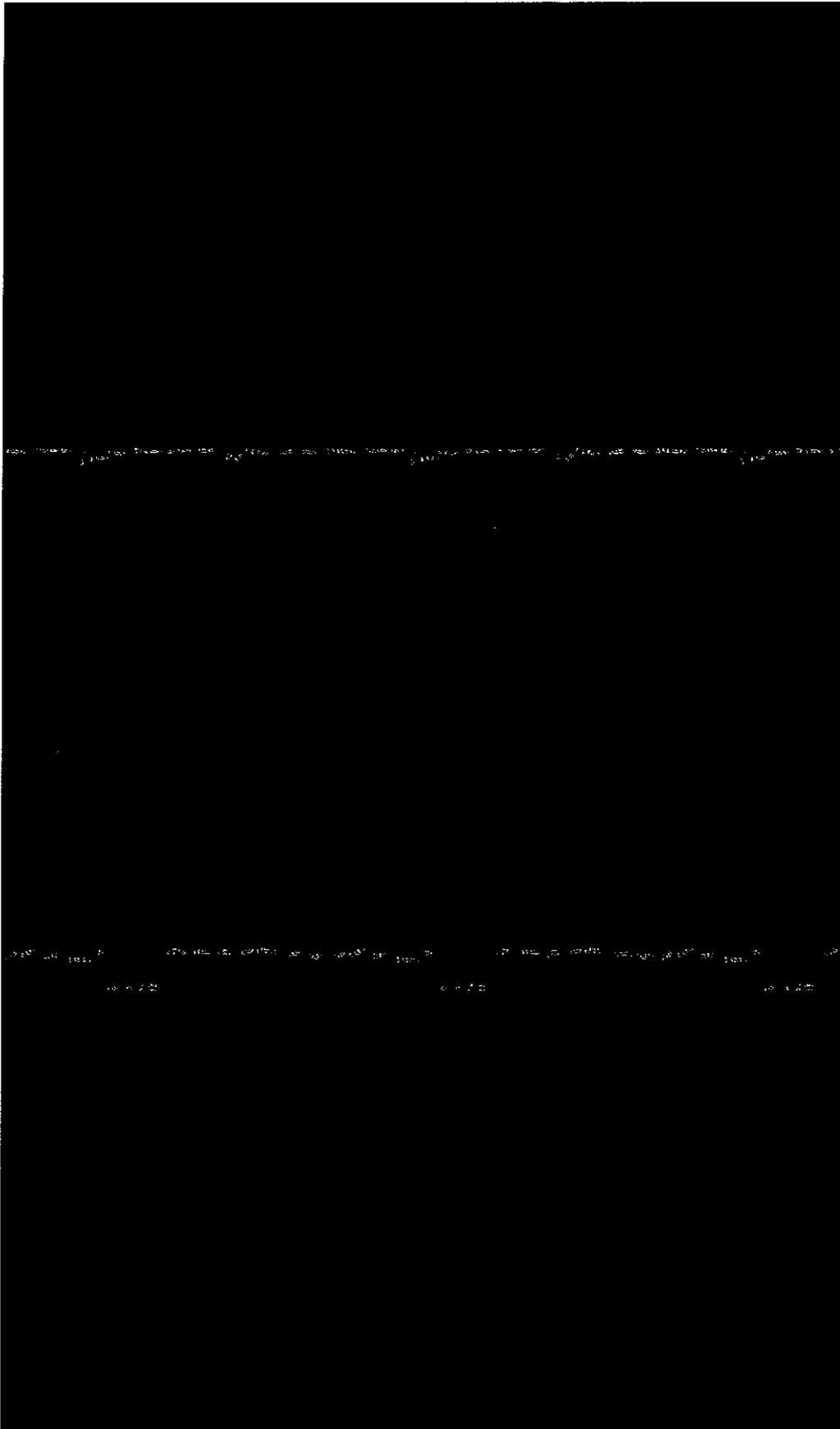


Figure 10 - Integrated Vehicle Health Monitoring System (v7.10)

London Overground Rolling Stock
Confidential and Proprietary

47/120

BOMBARDIER
the evolution of mobility

Section C2–Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
*New Rolling Stock for London
Overground Project*

[REDACTED]

Section C2–Services Delivery Plan

Bombardier_PartC2.05 - Version 2

H15

[REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]

[REDACTED]
[REDACTED]
depots

Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

*New Rolling Stock for London
Overground Project*

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Section C2–Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

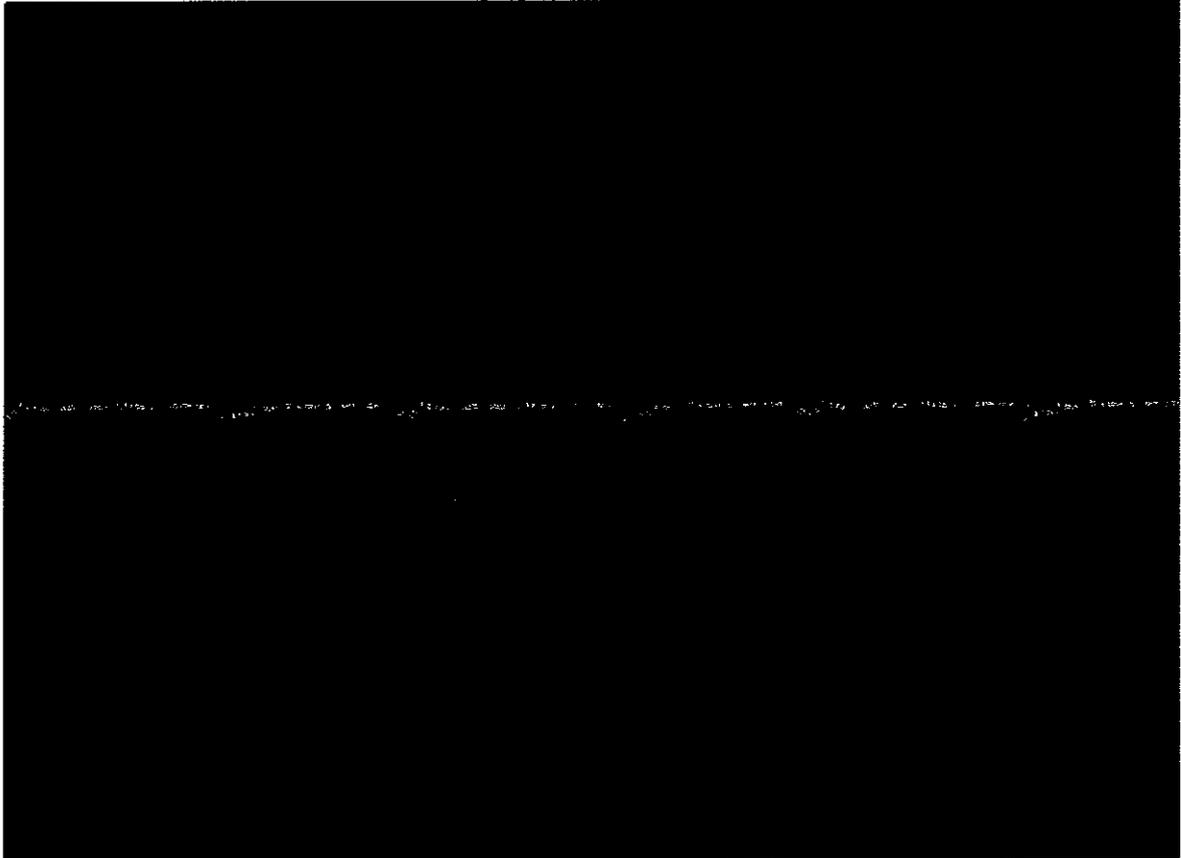


Figure 11 - Screenshot from the Trainmate® System



- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]



[Redacted], First TransPennine Express, LOROL, Greater Anglia and London Underground contracts.

Section C2—Services Delivery Plan

REDACTED

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

I. Development and Updating of the Maintenance Plan

In order to develop the preliminary maintenance plan, component maintenance plans from each supplier (OEM) are obtained. Our maintenance development engineers then combine this information into a list of required maintenance activities and train-level maintenance activities, such as car-body and underframe inspections.

As the train design matures, the potential failure points for components, systems and the train as a whole are identified using Failure Mode, Effects and Criticality Analyses (FMECAs). These FMECAs are compiled from:

- Supplier reliability data
- Service experience from other projects, such as reliability, safety incident and maintenance history data
- Mandatory and best practice standards such as the requirements of GMRT2004 Rail Vehicle Maintenance and GM/GN2646 Guidance on Axle Bearing Maintenance.

Once the FMECAs have been compiled, credible failure modes are identified and mitigating maintenance tasks included in the maintenance requirements. These maintenance tasks minimise the risk of these identified failures occurring.

The final part of this maintenance task identification exercise is to influence the compiled maintenance task list using our maintenance optimisation process. This process uses service history and reliability data from current Bombardier fleet maintenance projects to identify any additional tasks and to challenge the content and interval of every exam task in order to optimise the exam regime whilst improving safety, availability, reliability and whole life cost.

The maintenance plan will be continually reviewed and updated accordingly, to ensure it remains a true reflection of the maintenance requirements. In addition to this continual review we will carry out a full review of the plan every two years, following the principles of the maintenance optimisation process. This full review will use an analysis of the fleet reliability Failure Reporting and Corrective Action System (FRACAS) to fine tune the maintenance plan so ensuring the maintenance process continues to maximise unit reliability and availability.

Section C2–Services Delivery Plan

REDACTED

New Rolling Stock for London
Overground Project

Bombardier_PartC2.05 - Version 2

J. Managing Failures in Traffic

Our approach to managing failures in traffic is influenced by the following key factors:

- The design reliability of the Aventura units
- The design philosophy of the Aventura units and its ability to self-recover
- The potential under utilization of manpower if In Service Support Technicians were specifically located at locations throughout the network.
- Line of route cover will be provided by our:
 - Operating hours 'In service support' at the Operations Control Centre at Swiss Cottage, and at East Anglia House.
 - Bombardiers NLR/ELR In Service Support Technicians based at New Cross Gate will cover the Euston – Watford and Gospel Oak – Barking
 - 24/7 presence at Ilford TMD, Willesden TMD
 - In Service Support Technicians based in and around London in support of other operations e.g. Crossrail, East Ham, Willesden

[REDACTED]

Class	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	2 ¹	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

The dominant contributor (half of the events) to Class 377 'assistance' events is the braking system. The AVENTRA braking system has more commonalities with the system the VLU Units are equipped with. This fleet has never experienced a brake failure requiring external assistance.

In addition, the AVENTRA Units will be designed with the necessary functionality to recover from or mitigate for technical failures, so that delays are minimised.

¹ This value is not extracted from recorded data but has come from feedback from the experience of Services engineers. This indicates that on average class 379 suffers one to two failures requiring assistance a year.

Section C2—Services Delivery Plan

*New Rolling Stock for London
Overground Project*

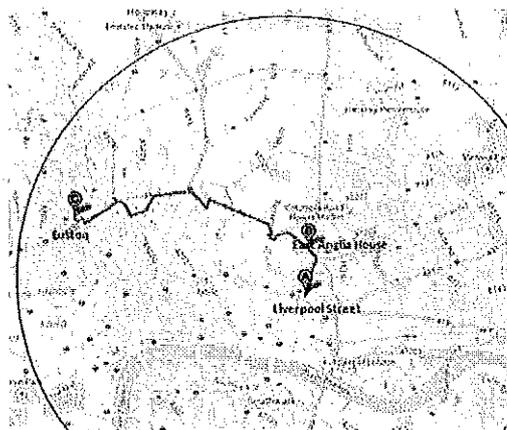
Bombardier_PartC2.05 - Version 2

Rapid recovery will be provided for all credible failure modes, with minimal intervention by the driver. Except for failures arising from mechanical defect or damage to running gear, that makes it physically unsafe to move the Unit without immediate technical attention, it shall be possible for the Unit to be moved under its own power within ten minutes of the Unit becoming immobilised by a fault condition. Such movement may be at reduced speed but shall be of sufficient distance and duration for passengers to be taken forward to the next station and for the Unit to proceed to a maintenance depot, stabling point or terminus station.

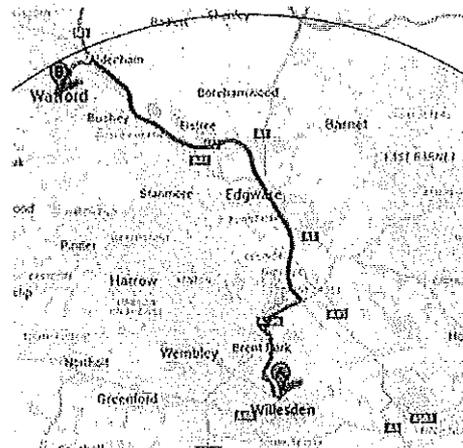
Any failures where a driver action needs to take place to mitigate the failure or reduce the impact of the failure, would result in a driver event being generated and sent to the driver at the appropriate time. The timing of the event would be based on the type of failure and what the driver needs to do to respond to the failure. For example, if an air leak resulted in the emergency brakes being applied, the driver would be informed of the reason for the emergency brake once the Unit had come to a stand. The driver would then be advised of the best course of action to enable the Unit to continue. If there is a failure that can be detected by the Unit e.g. door slow to open, the door would be automatically isolated by the Unit and the driver informed of the action. In these cases the driver action is minimised and at best totally removed.

The following visuals provide evidence and therefore reassurance that using all reasonable endeavours, we can meet the response times (30 minutes for the Liverpool Street Approach and otherwise 60 minutes) from our identified located support network.

Liverpool Street Approach covered from East Anglia House within 4 minutes, Euston Station covered from East Anglia House within 11 minutes. Radius shown approximately 20 minutes.



Watford covered from Willesden Depot within 30 minutes, Radius shown approximately 30 minutes.



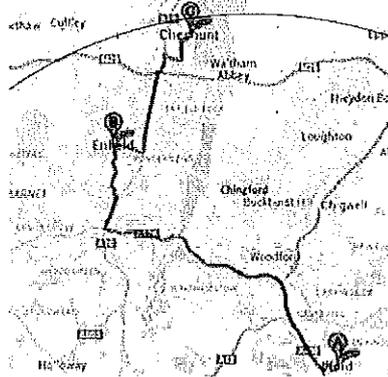
Section C2–Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

*New Rolling Stock for London
Overground Project*

Cheshunt covered from Ilford Depot within 29 minutes. Enfield covered from Ilford Depot within 22 minutes, Chingford covered from Ilford Depot (as required) within 17. Radius shown approximately 30 minutes.



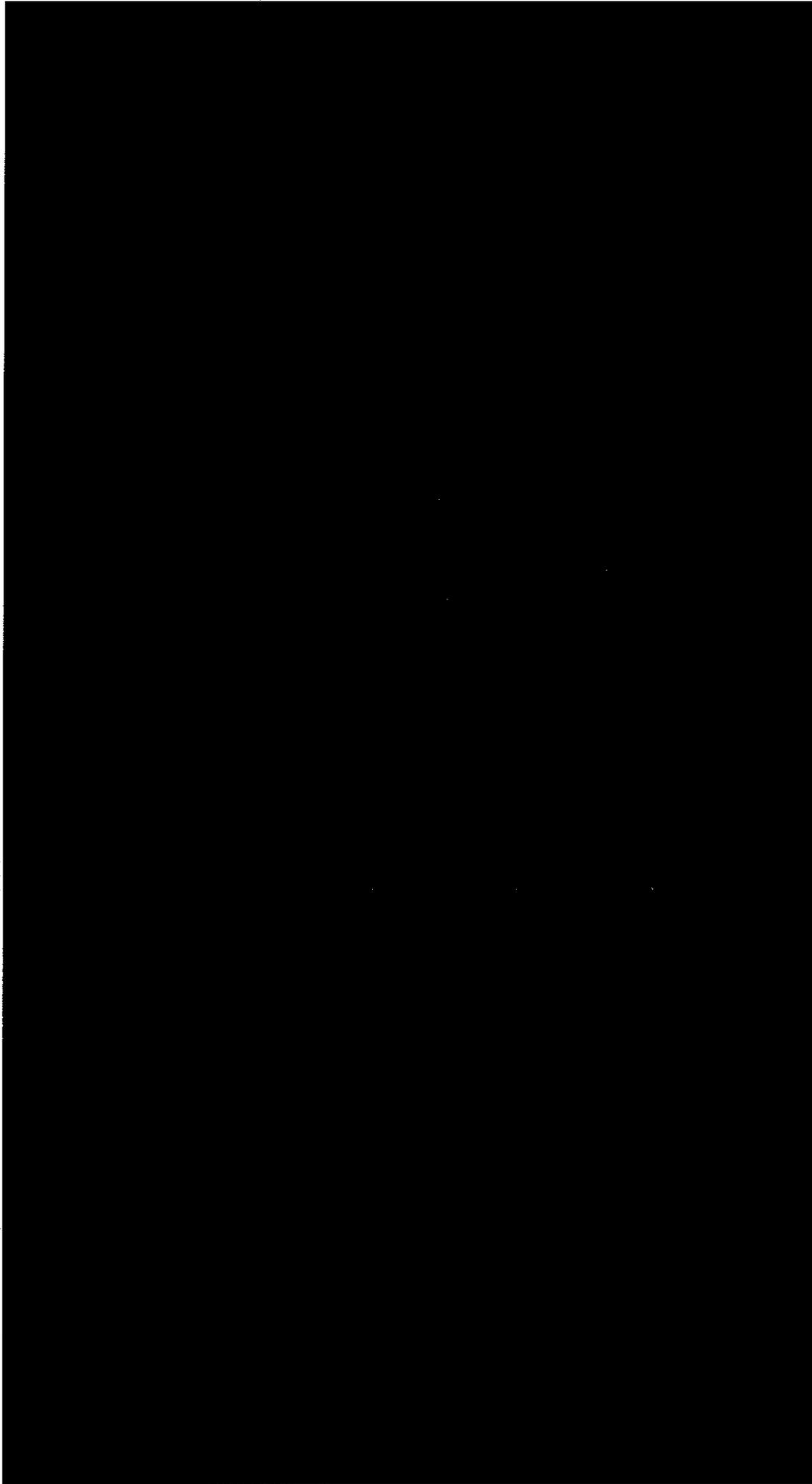
Our system of competency management ensures that our In Service Support Technicians retain the relevant level of competence to undertake the required level of support. Competency management / assessment is covered in more detail in our proposal document ref C3.1.2 (c) Competency Management.

Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

J1 RIL Appendix One: Star Chart of Maintenance task for the AC Units (31 Units)





Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

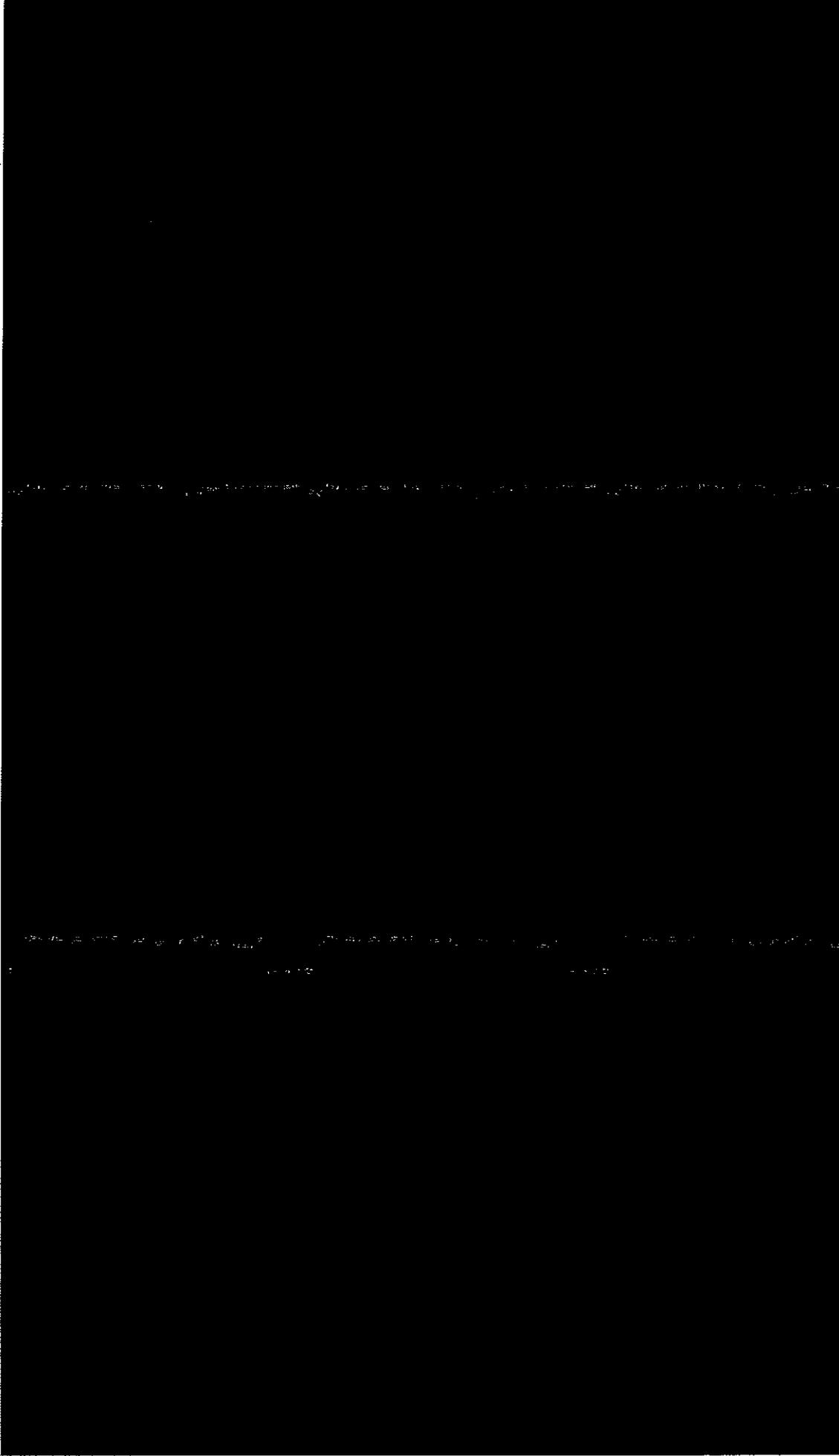


Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

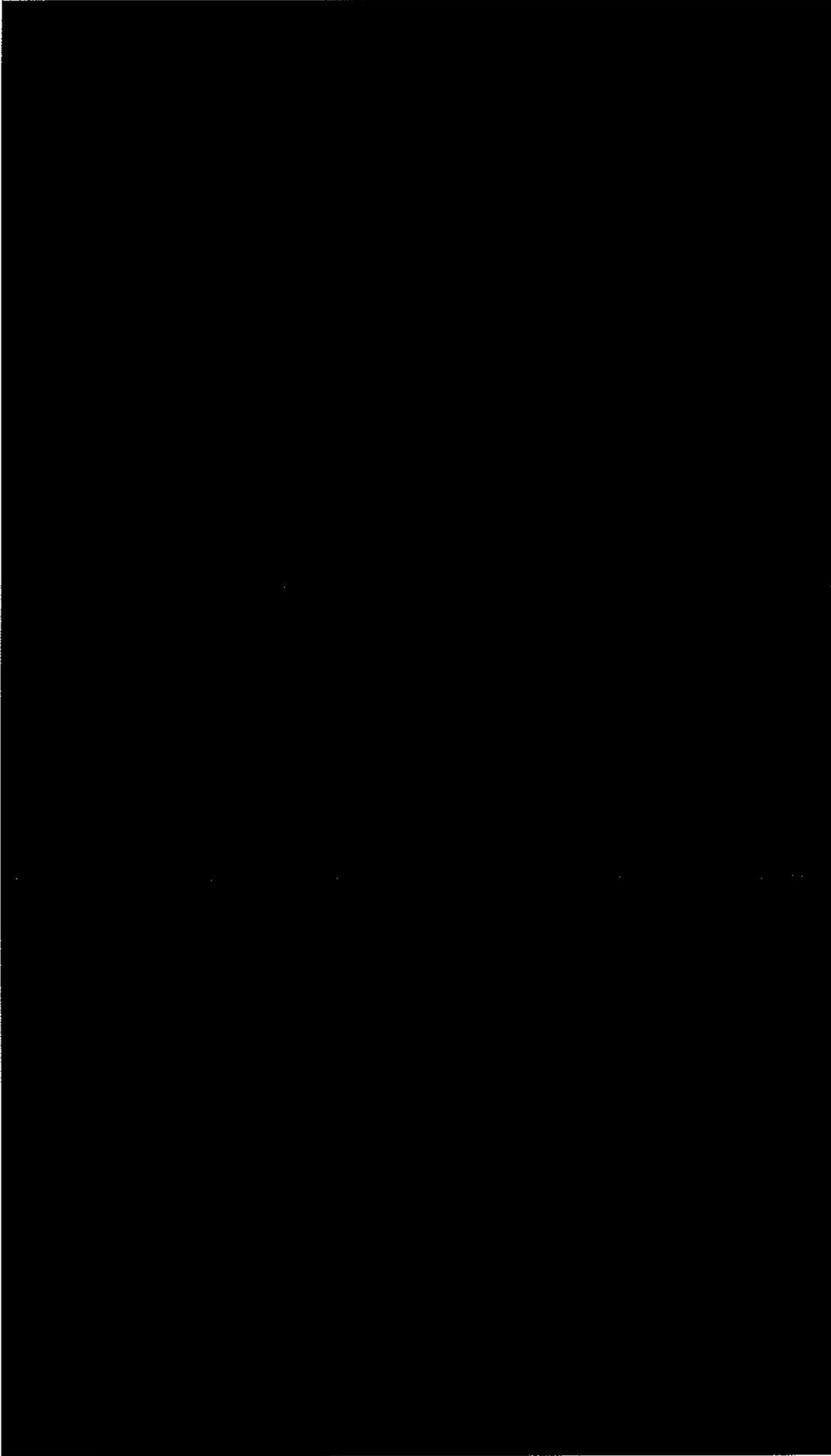
New Rolling Stock for London
Overground Project



Section C2--Services Delivery Plan.

Bombardier_PartC2.05 - Version 2

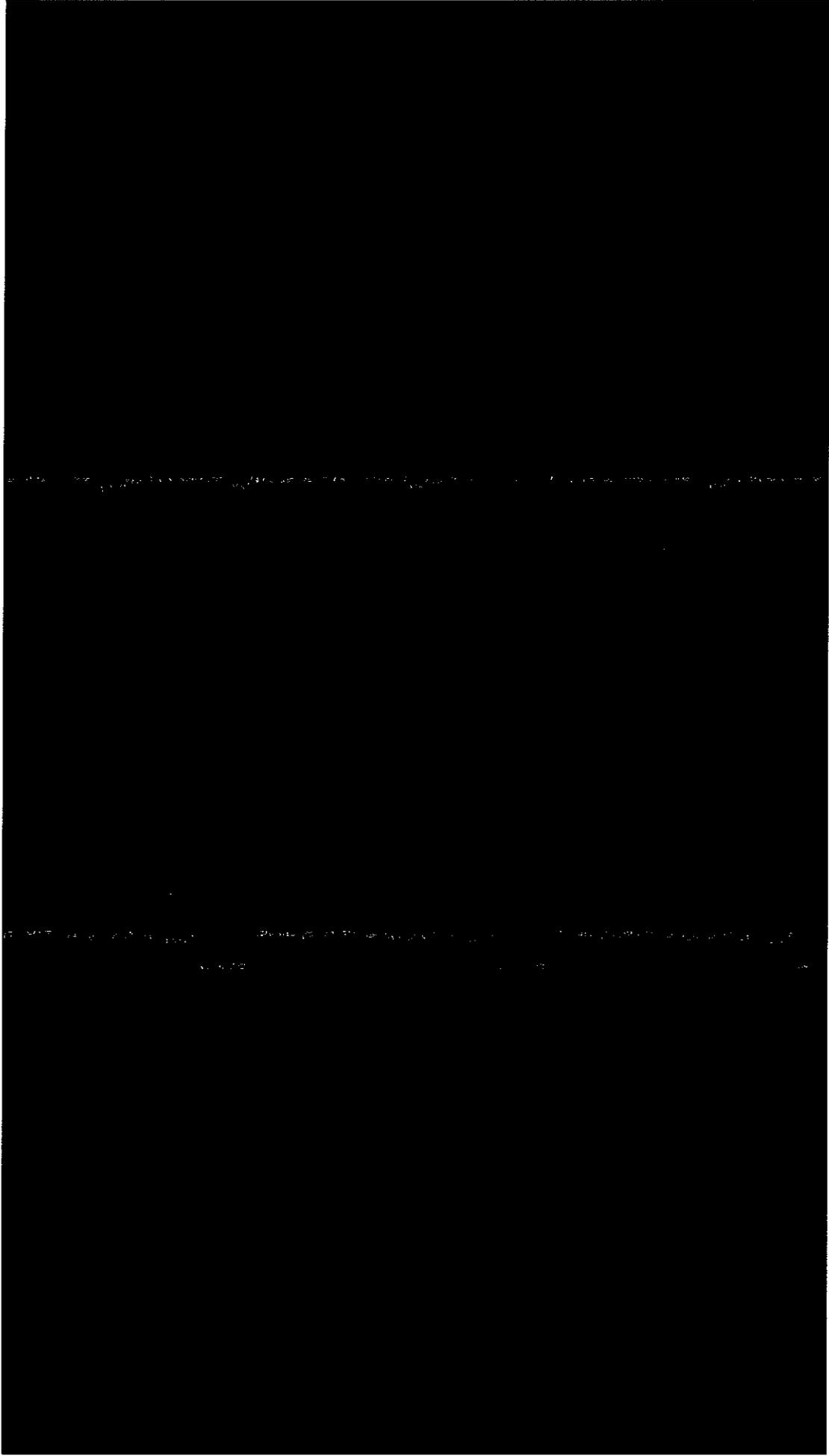
REDACTED
New Rolling Stock for London
Overground Project



Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2

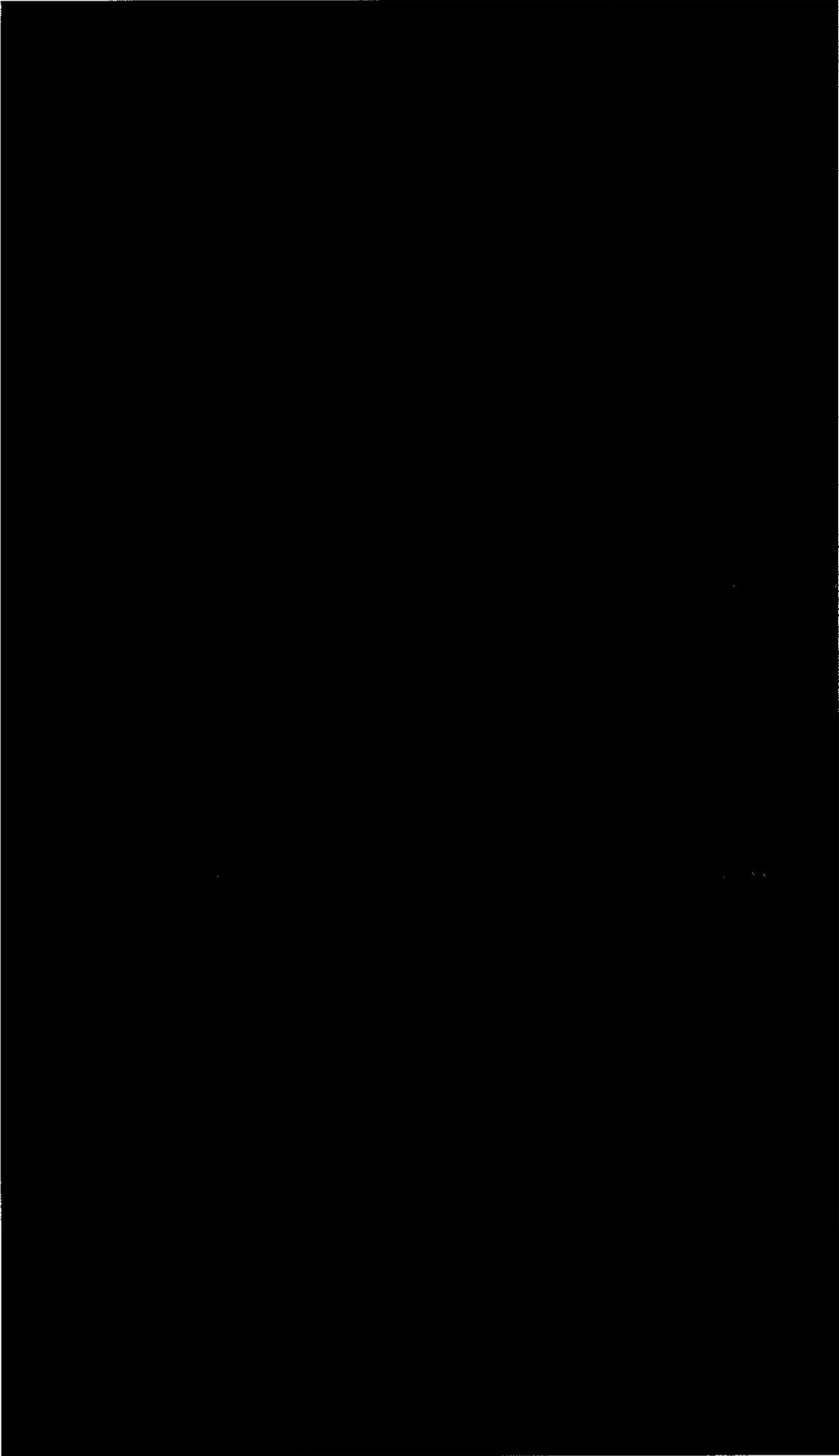
REDACTED
New Rolling Stock for London
Overground Project



Section C2—Services Delivery Plan

Bombardier_PattC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

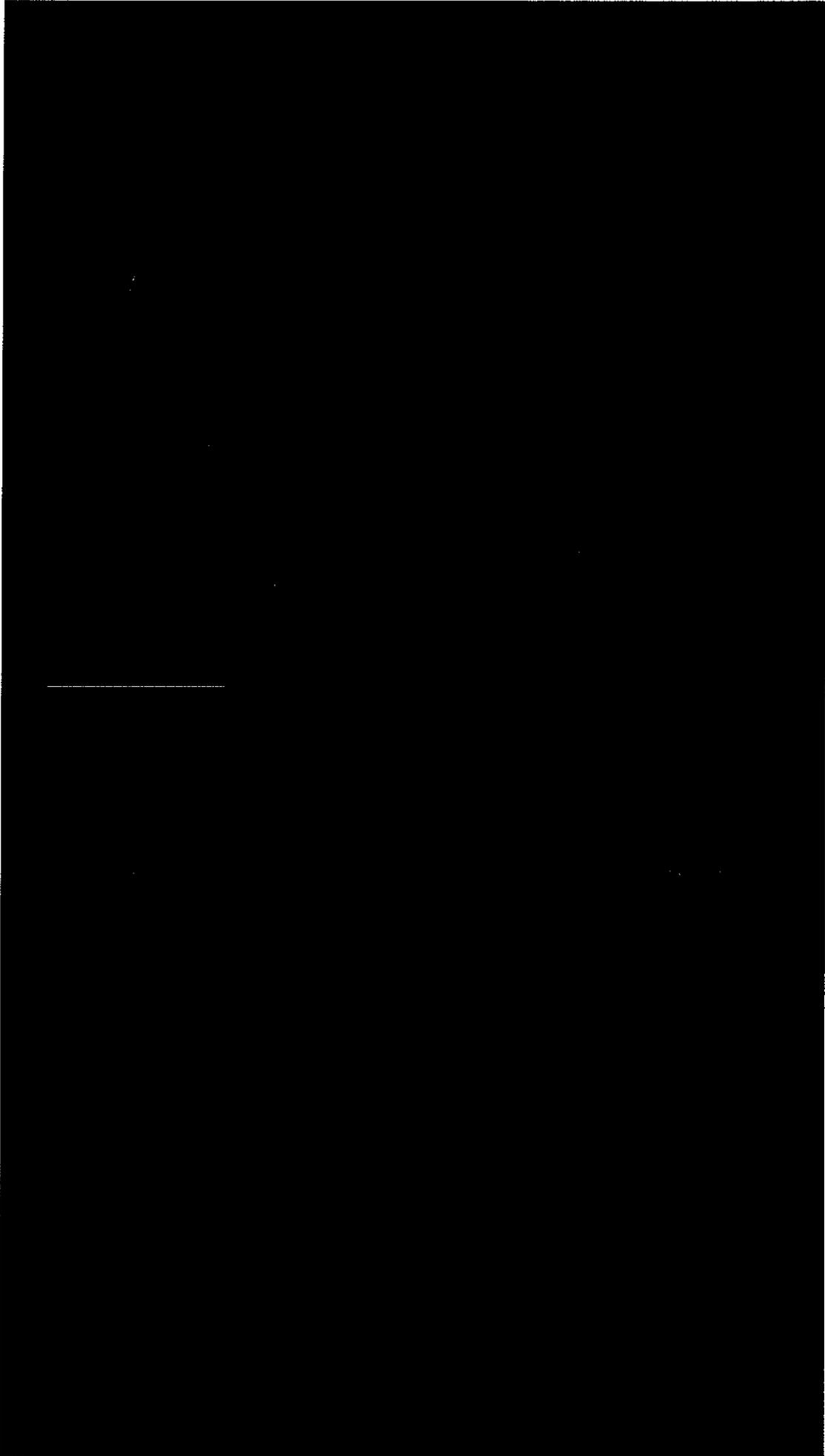


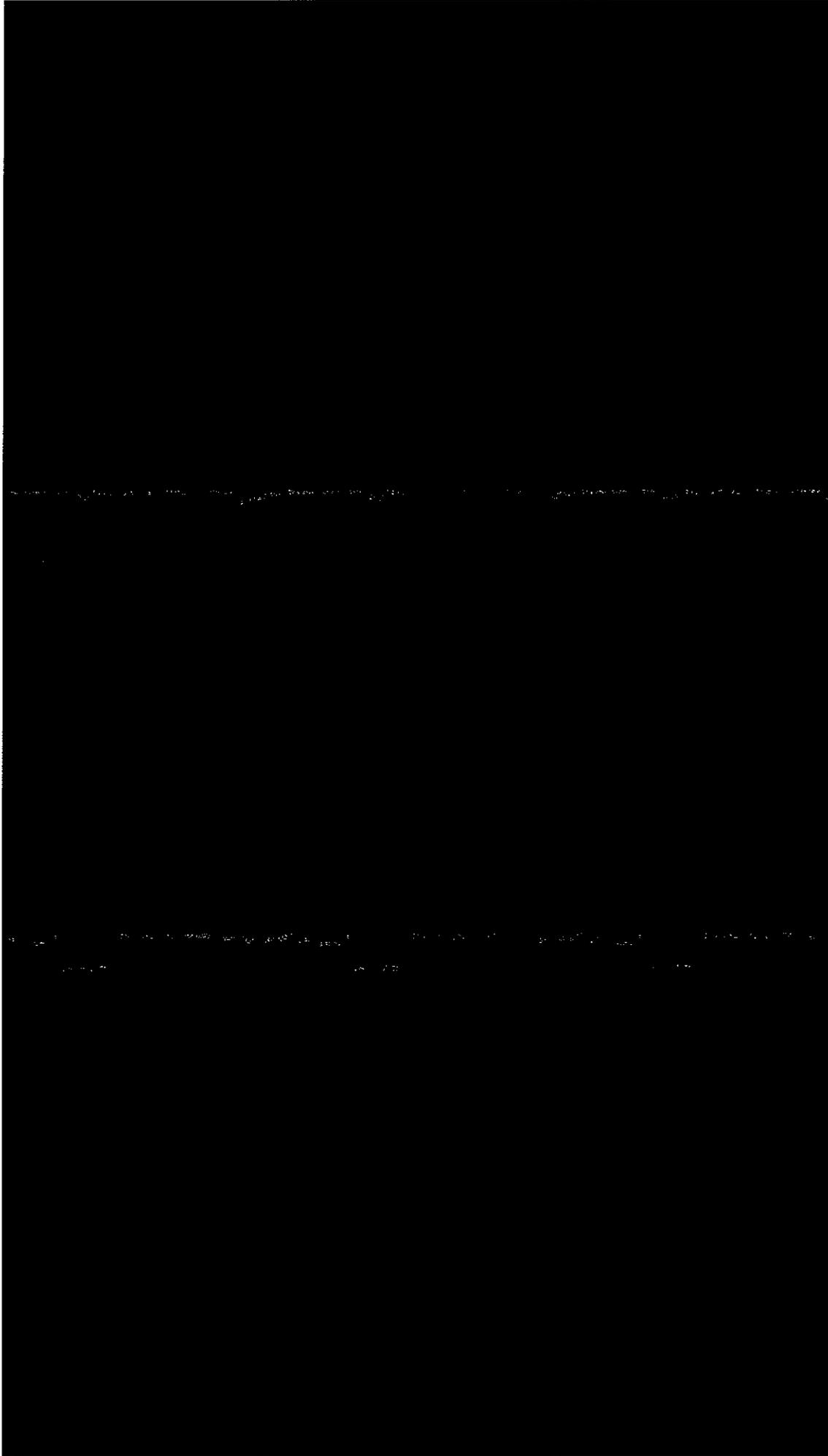


Section C2--Services Delivery Plan

Bombardier_PartC2:05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

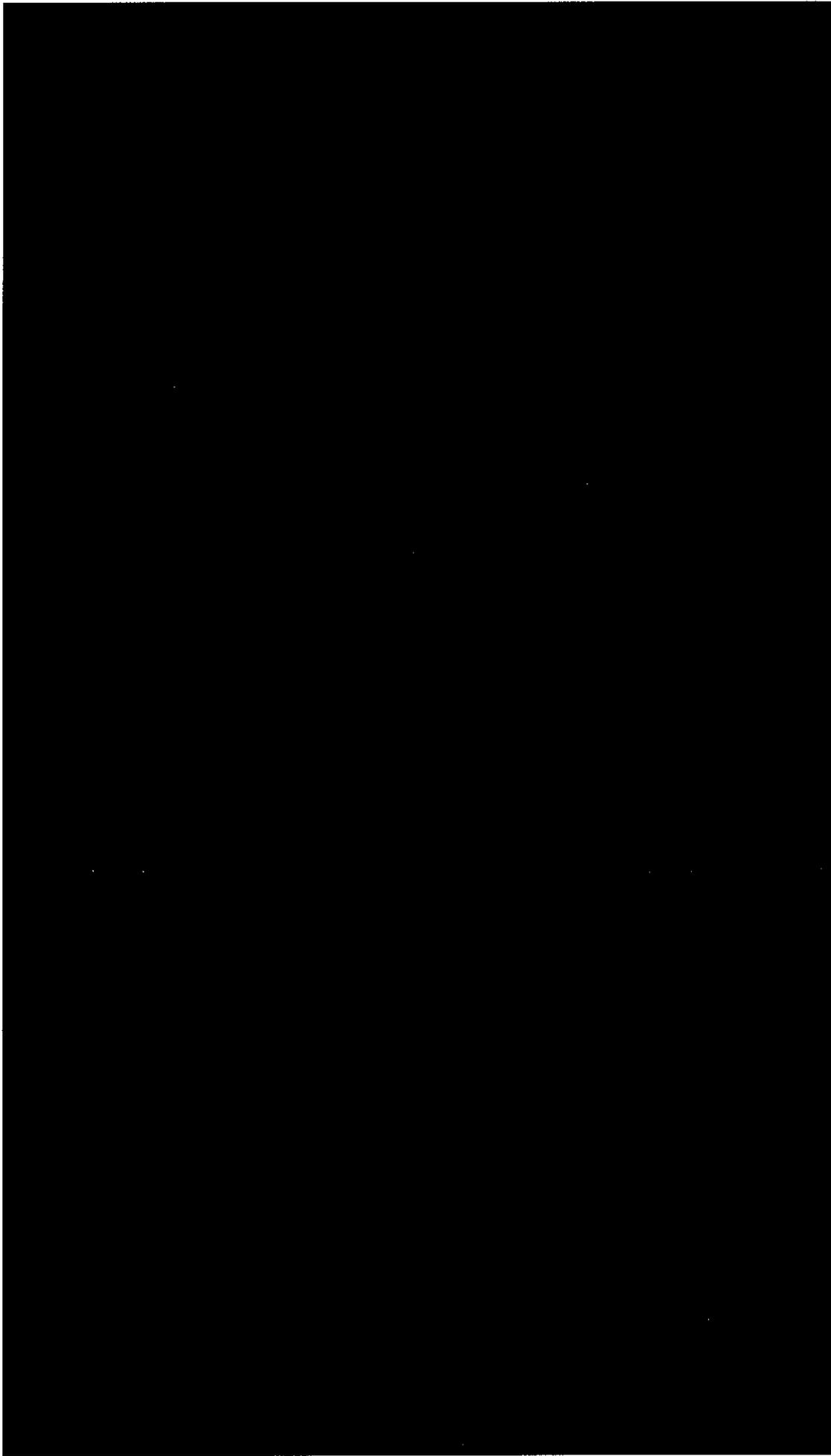




Section C2--Services Delivery Plan

Bombardier_Part C2.05 - Version 2

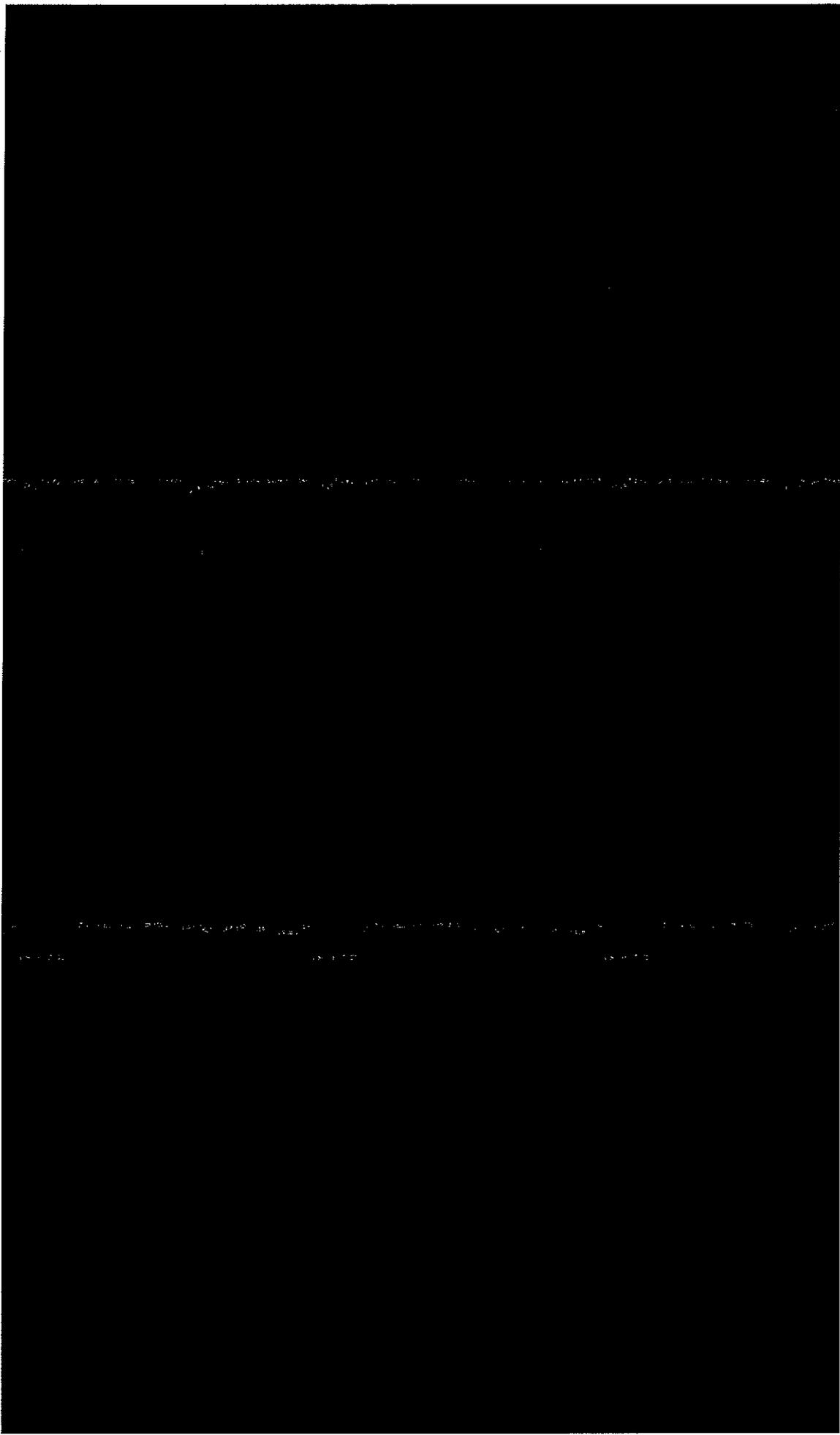
REDACTED
New Rolling Stock for London
Overground Project



Section C2—Services Delivery Plan

Bombardier_PaitC2.05 - Version 2

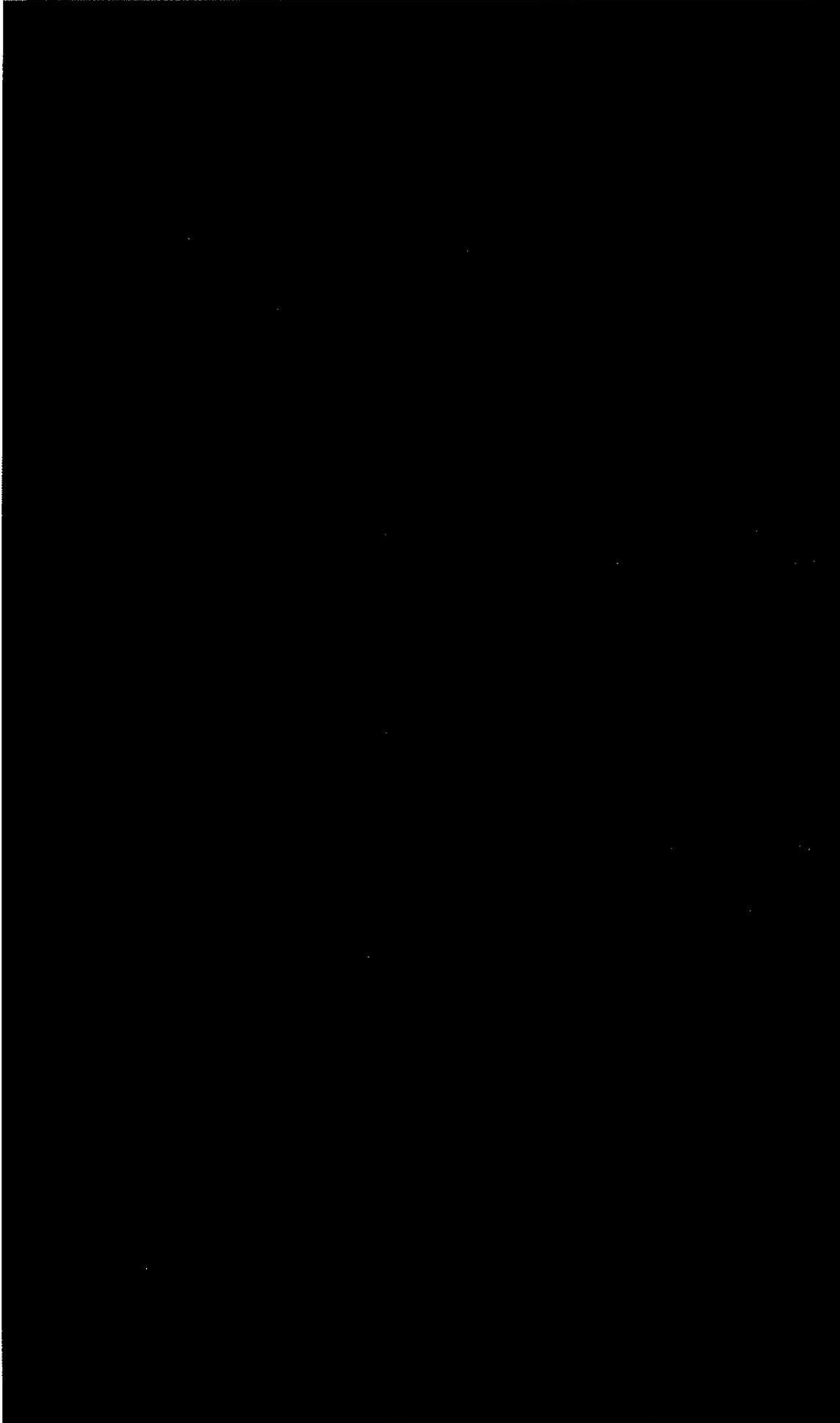
REDACTED
New Rolling Stock for London
Overground Project



Section C2—Services Delivery Plan

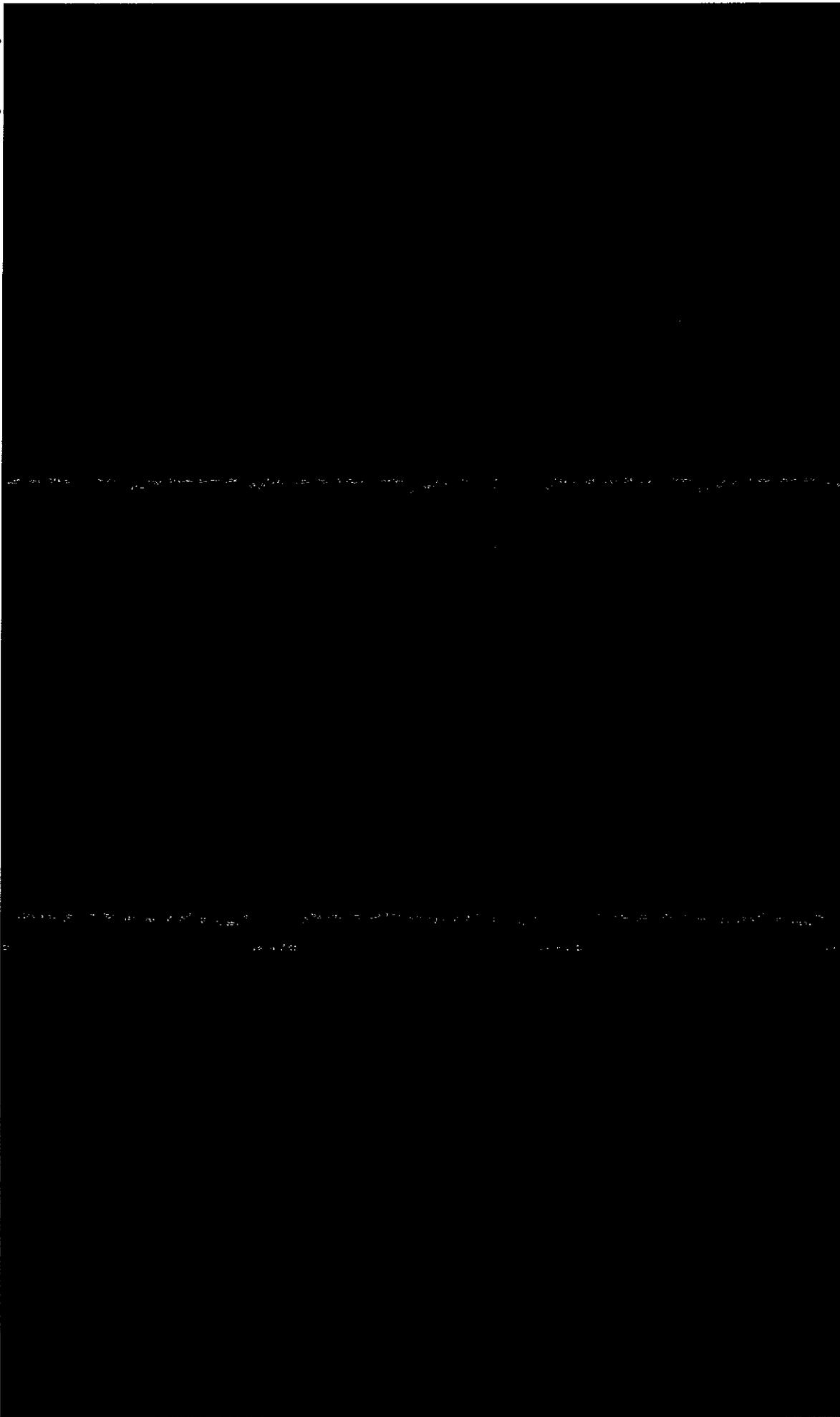
Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project



Section C2--Services Delivery Plan

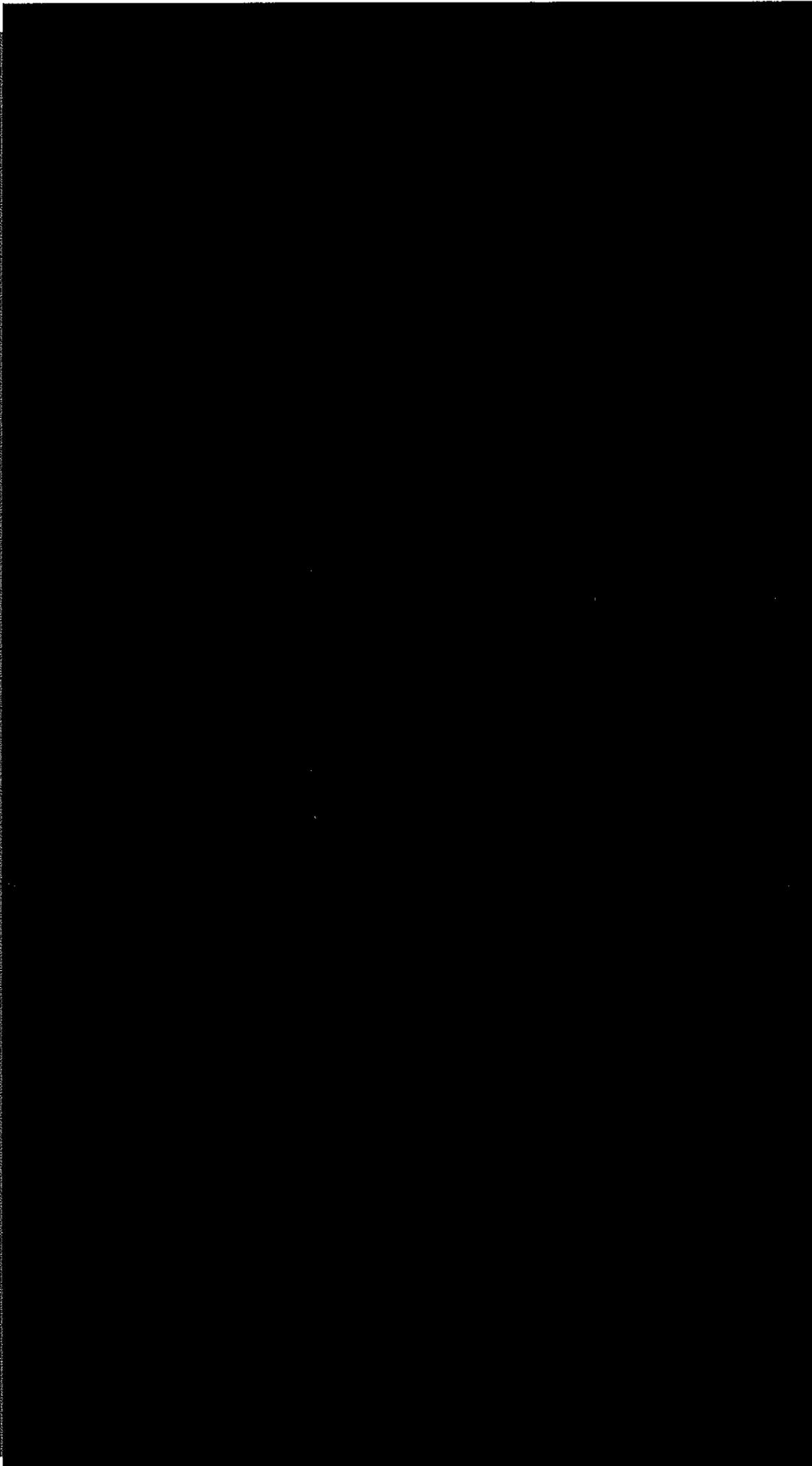
REDACTED
New Rolling Stock for London
Overground Project



Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

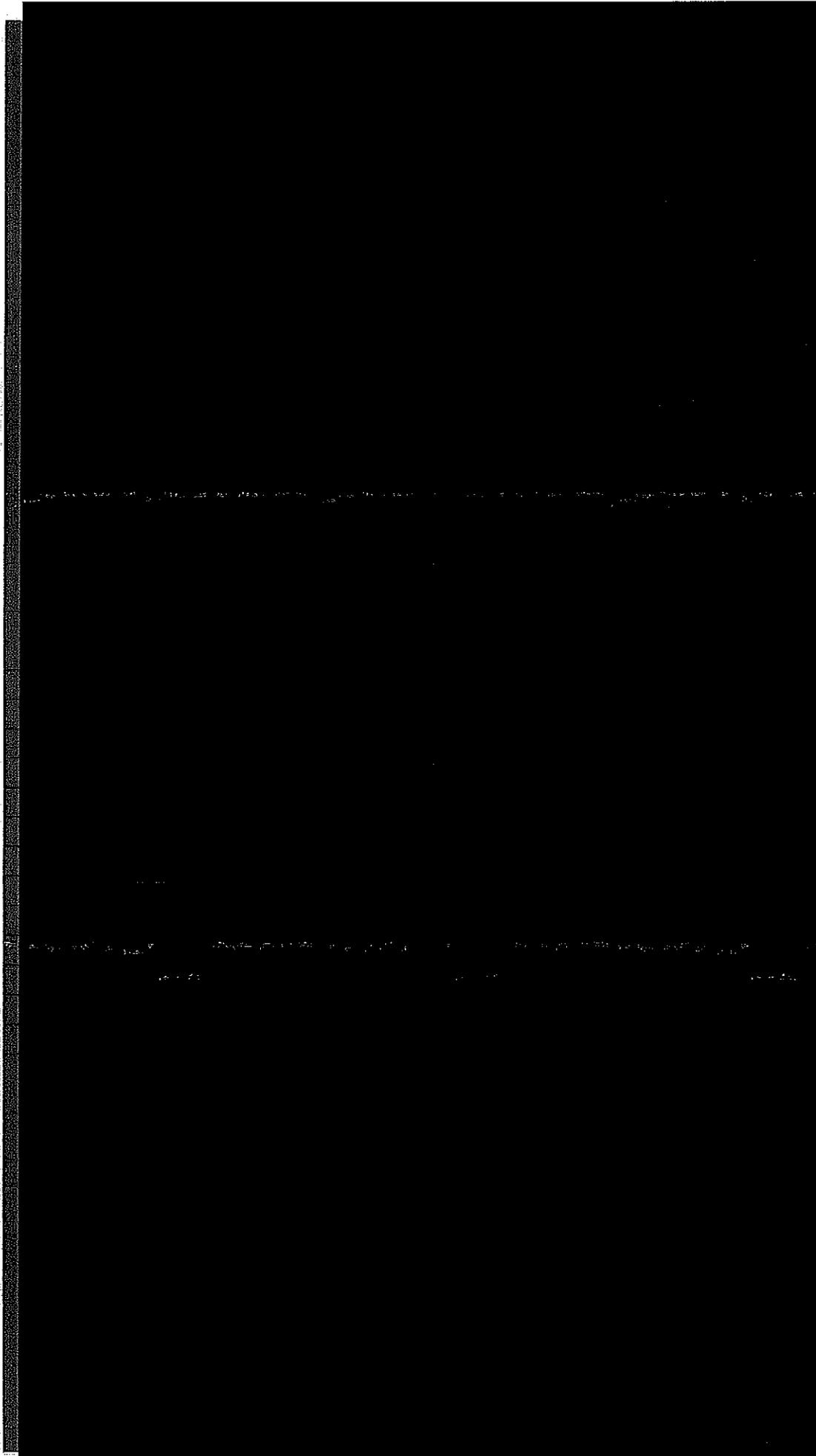
REDACTED
New Rolling Stock for London
Overground Project



Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2

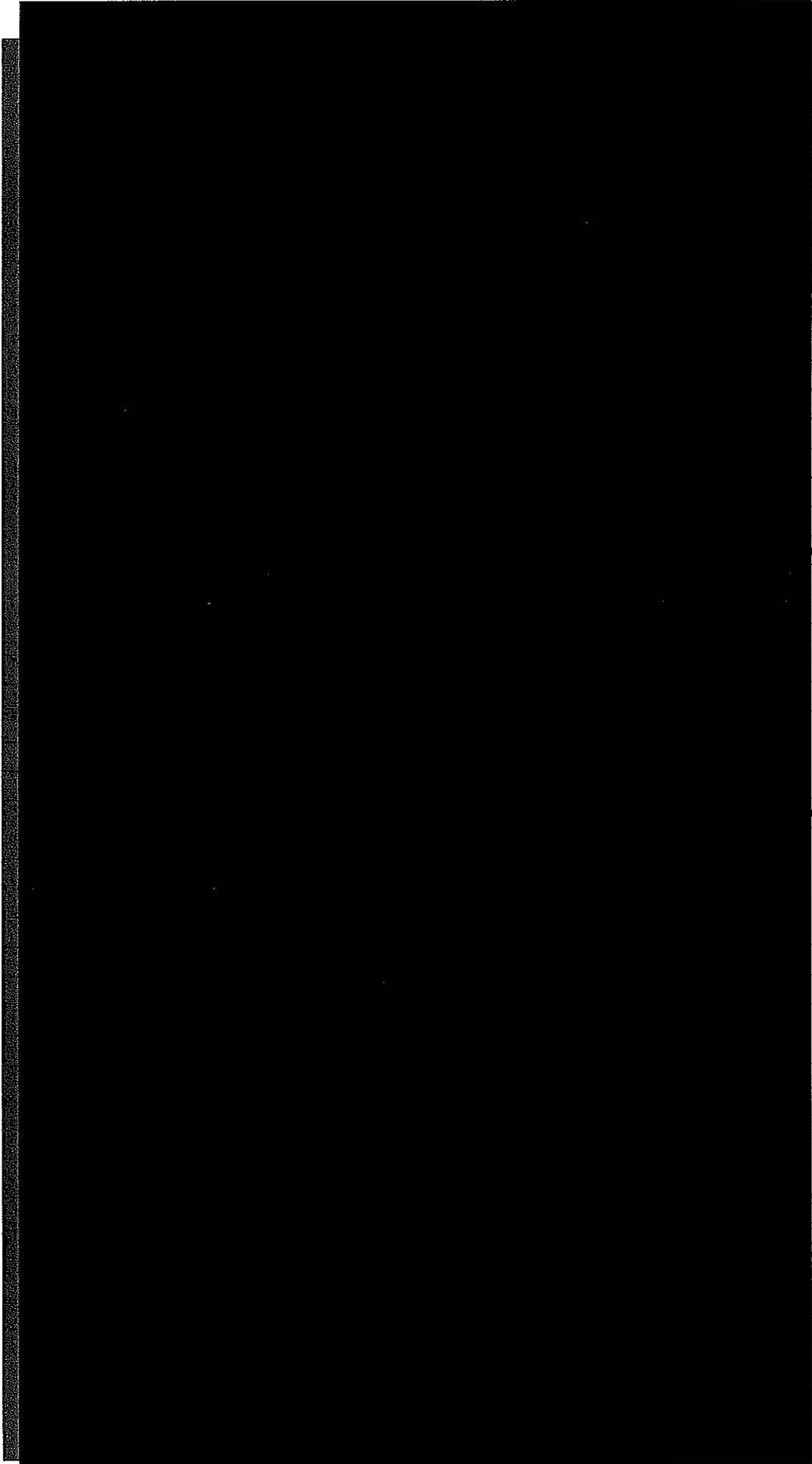
REDACTED
New Rolling Stock for London
Overground Project



Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

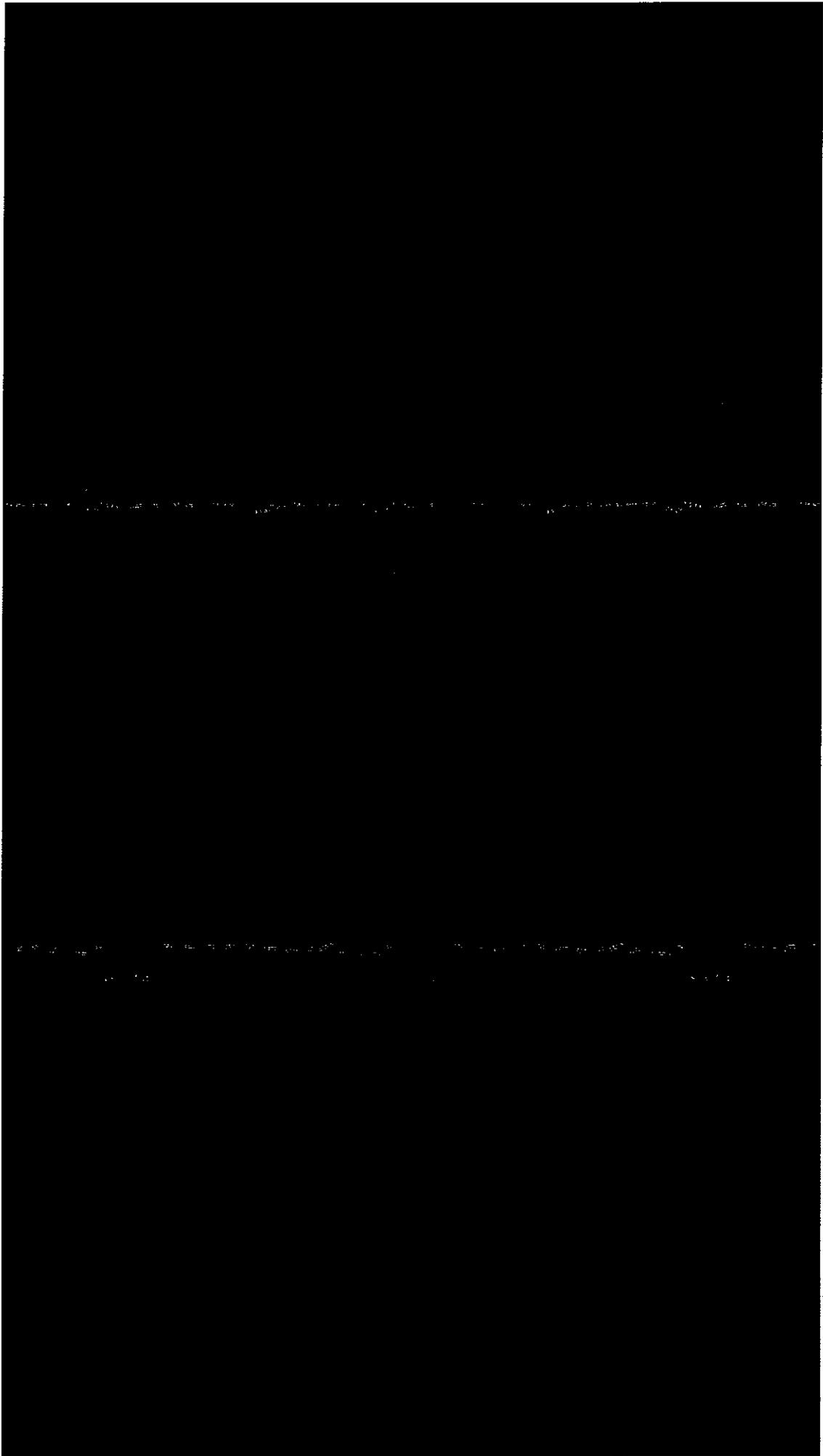
REDACTED
New Rolling Stock for London
Overground Project



Section C2—Services Delivery Plan

Bombardier_PartC2.05--Version 2

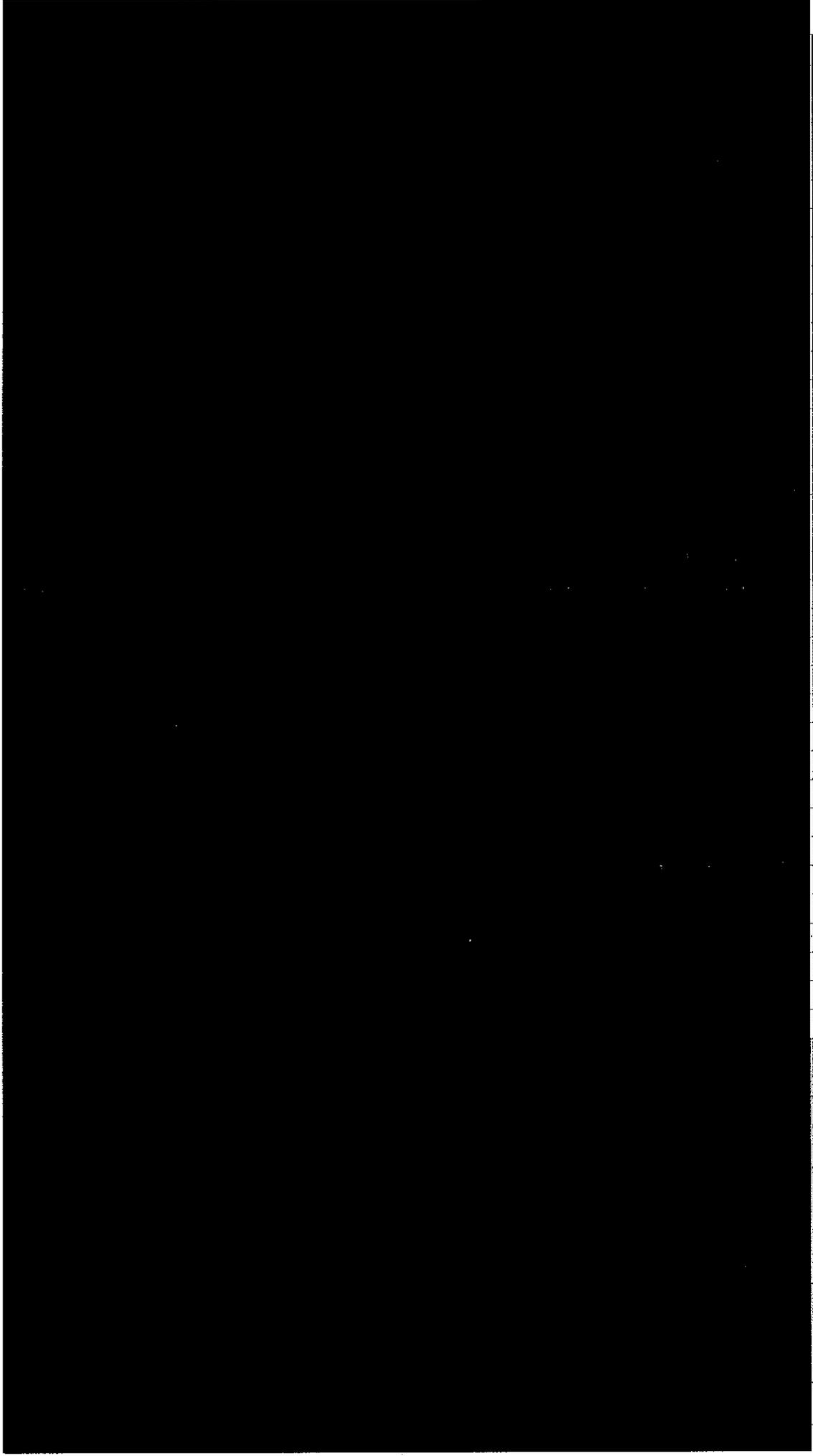
REDACTED
New Rolling Stock for London
Overground Project



Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2

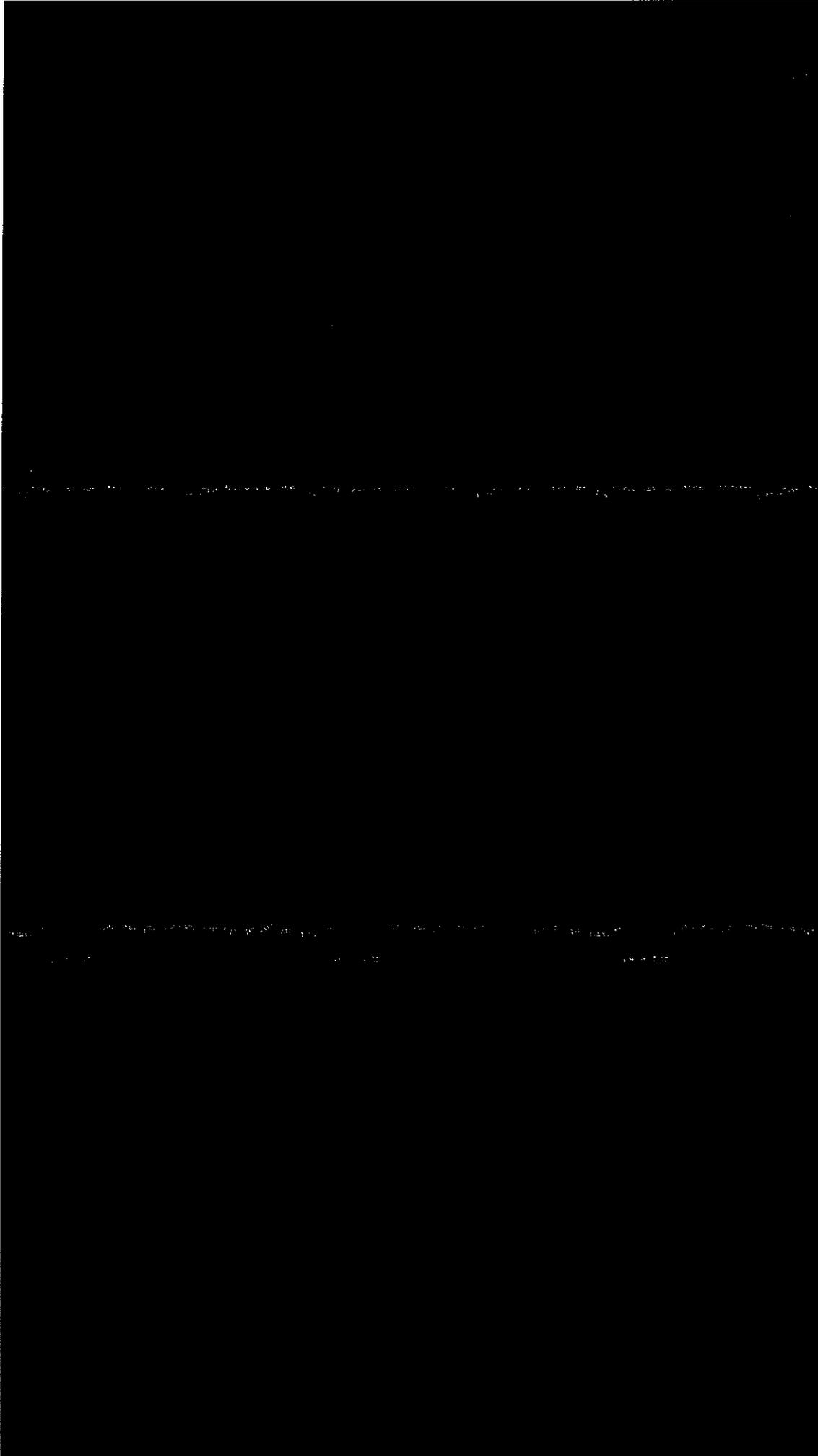
REDACTED
New Rolling Stock for London
Overground Project



Section C2--Services Delivery Plan

Bombardier_PartC2.05 - Version 2

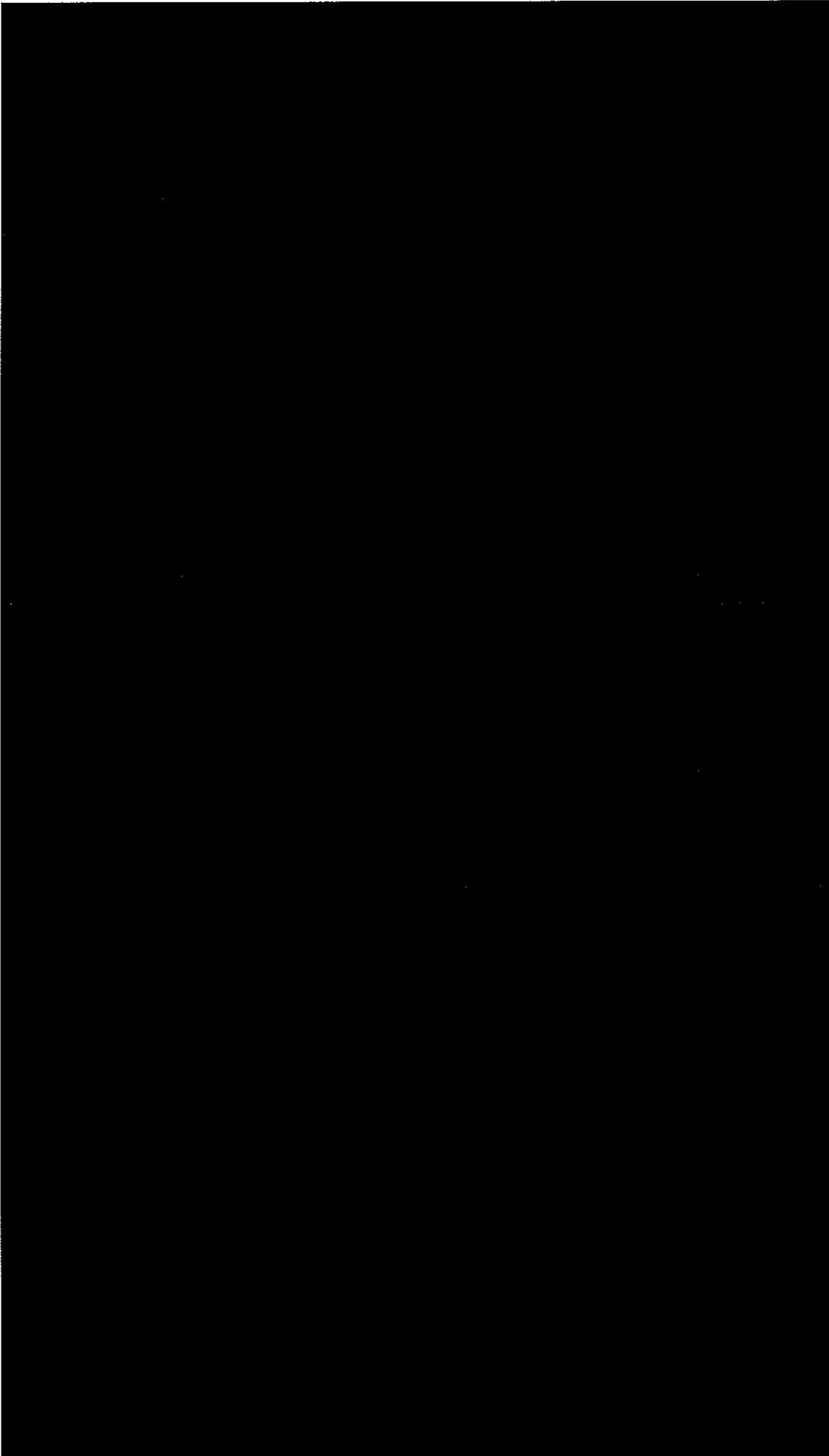
REDACTED
New Rolling Stock for London
Overground Project



Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2

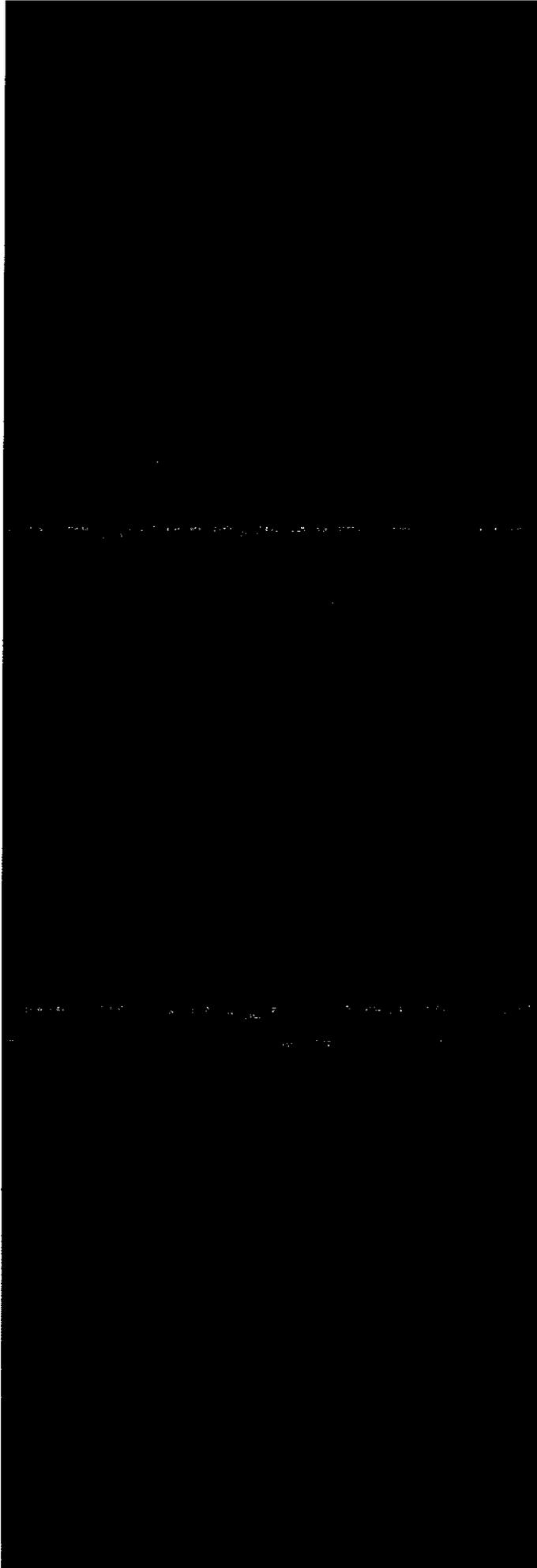
REDACTED
New Rolling Stock for London
Overground Project



Section C2--Services Delivery Plan

Bombardier_PartC2:05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

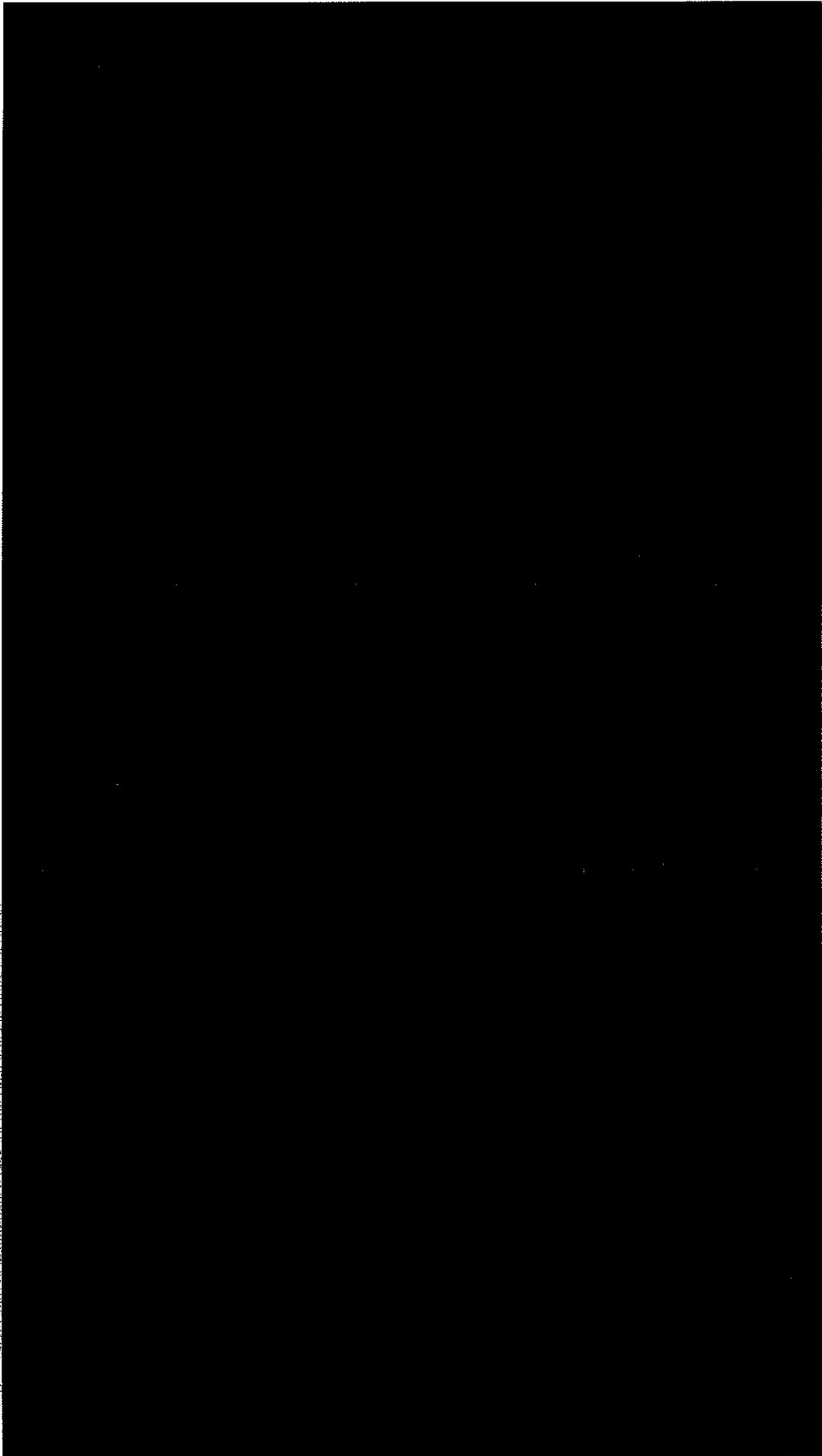


Section C2--Services Delivery Plan

Bombardier_Part C2.05 - Version 2

012 - Start Chart of Materials back for the Dual Metro and Light Rail Factory

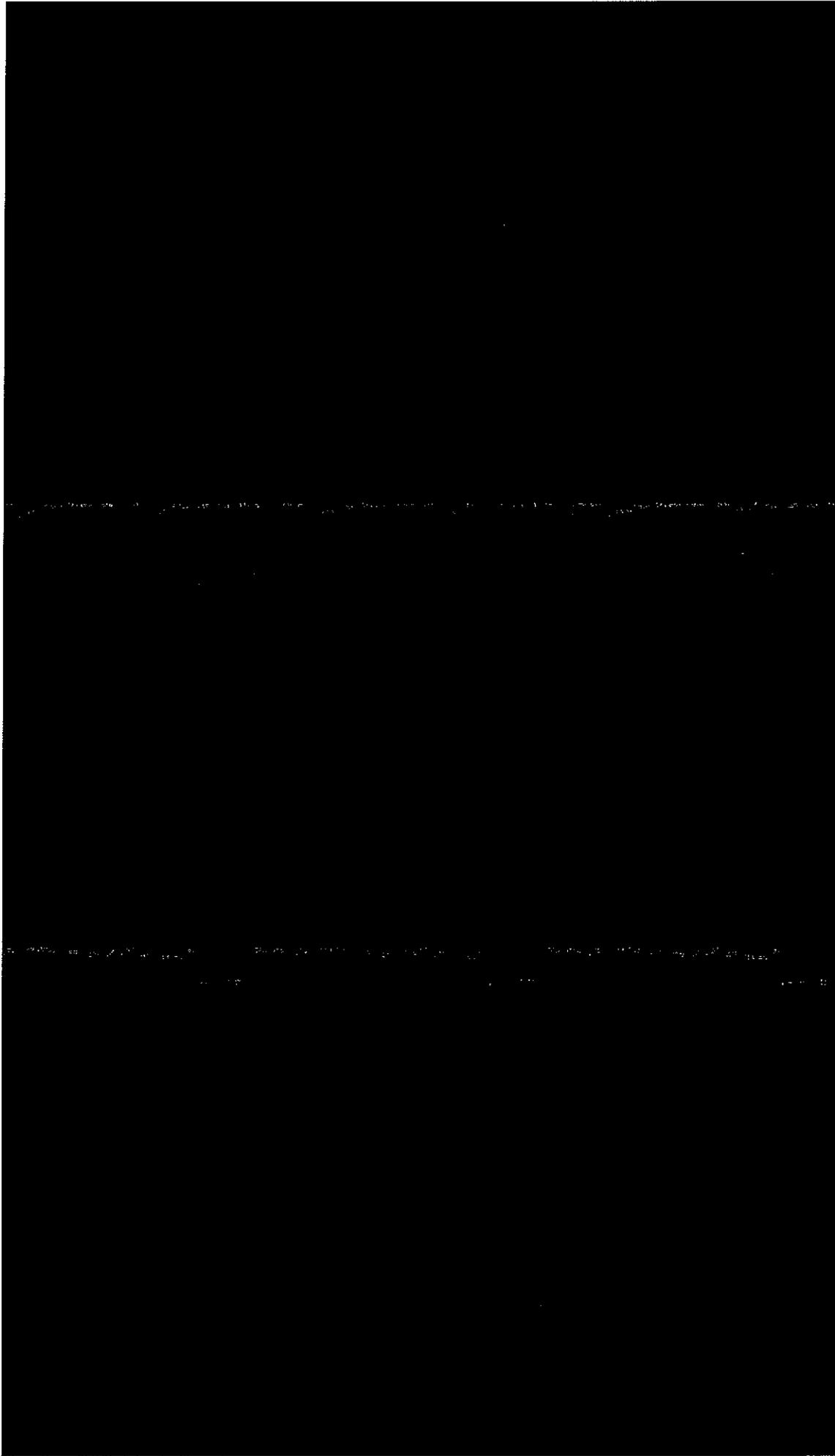
REDACTED
New Rolling Stock for London
Overground Project



Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project



London Overground Rolling Stock
Confidential and Proprietary

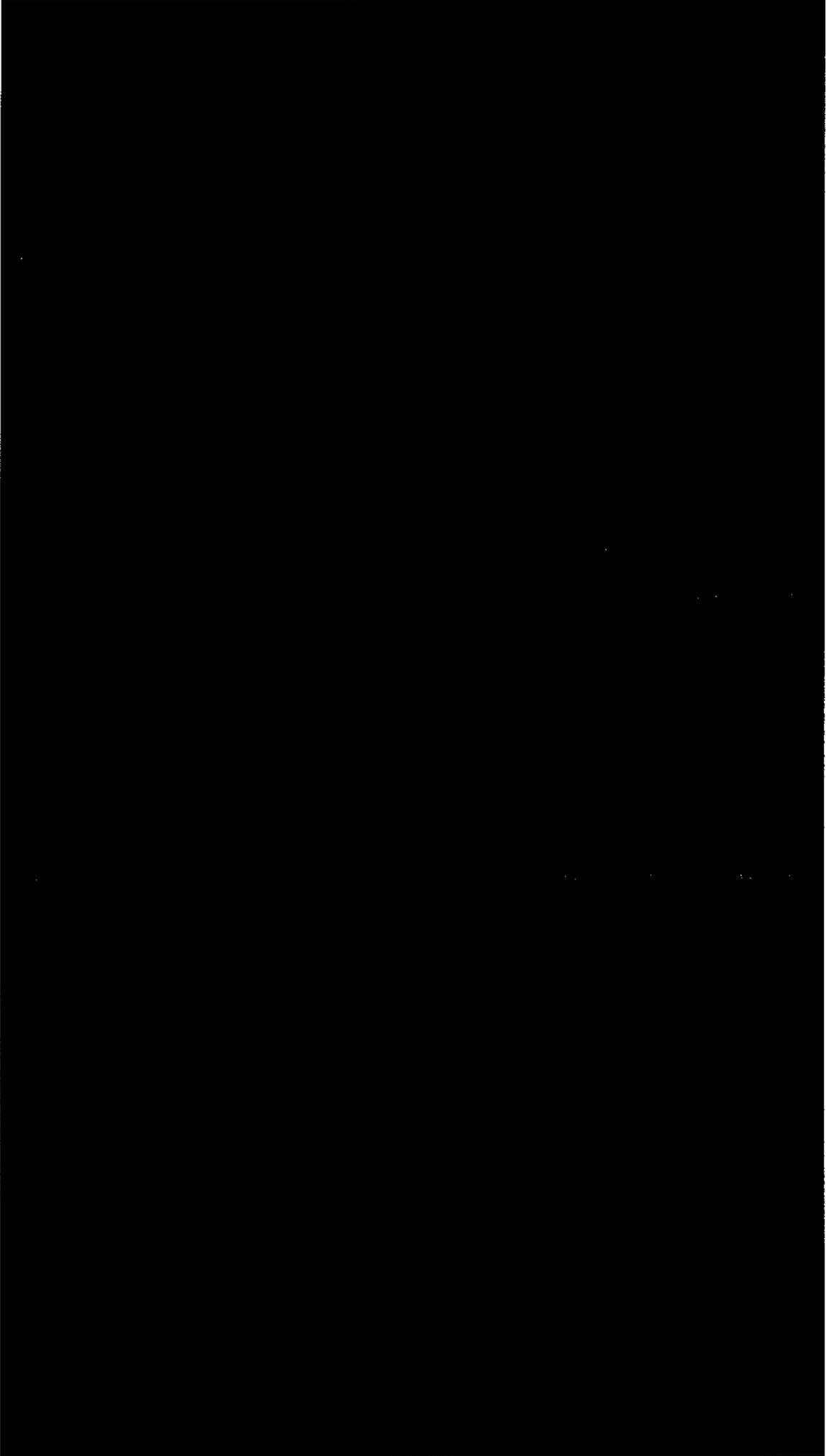
B1/120

BOMBARDIER
the evolution of mobility

Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

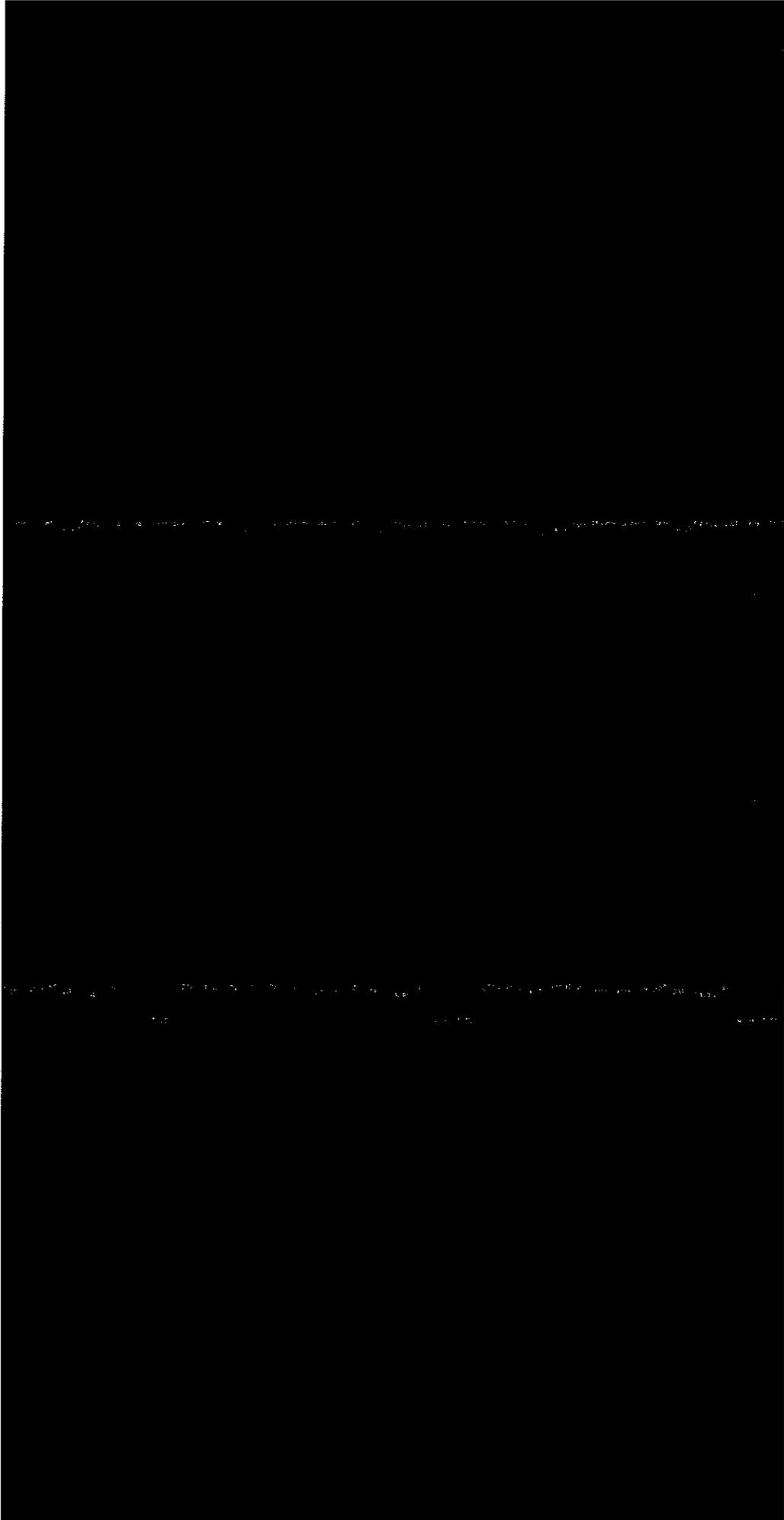
REDACTED
New Rolling Stock for London
Overground Project



Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2

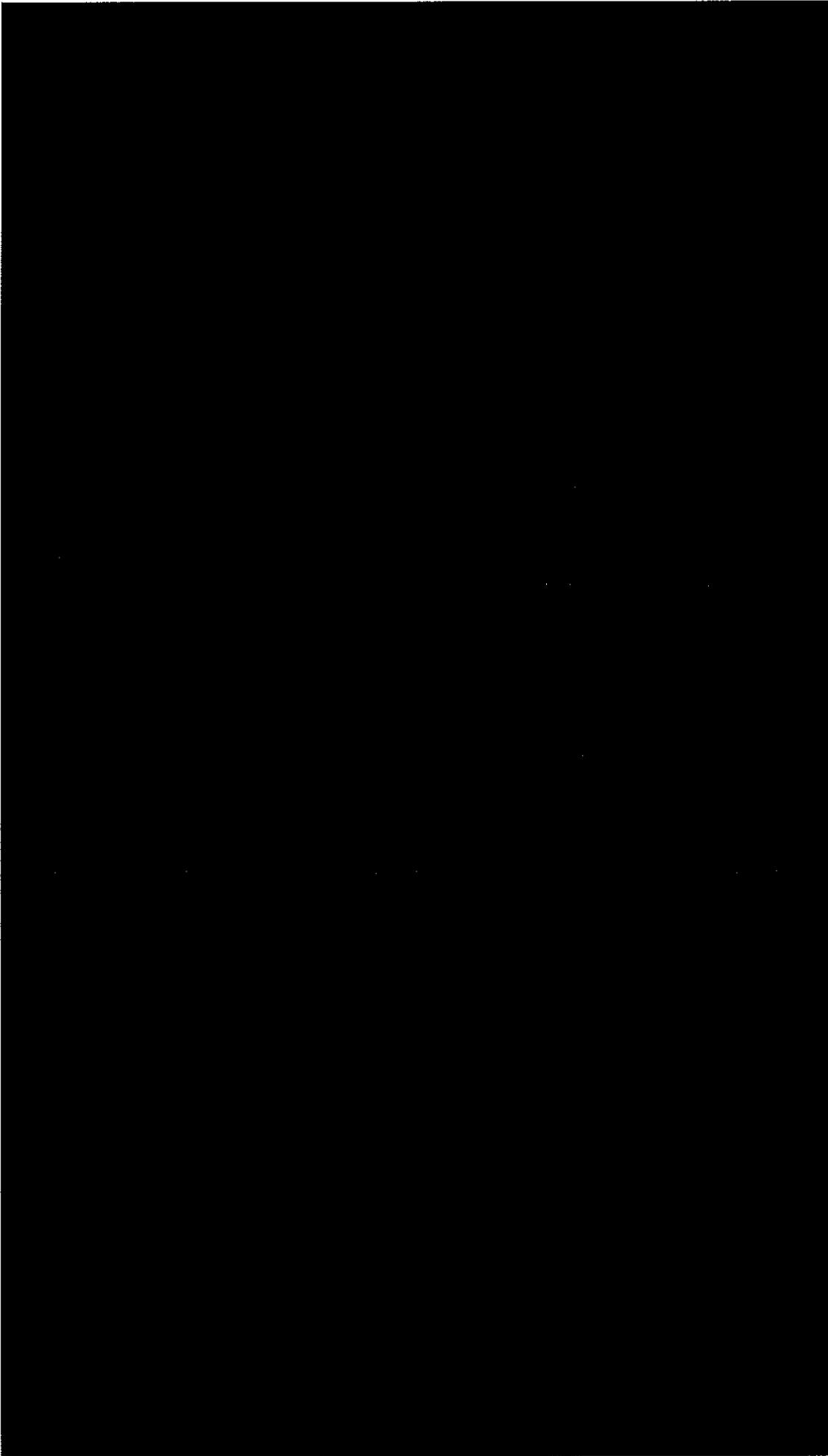
REDACTED
New Rolling Stock for London
Overground Project



Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

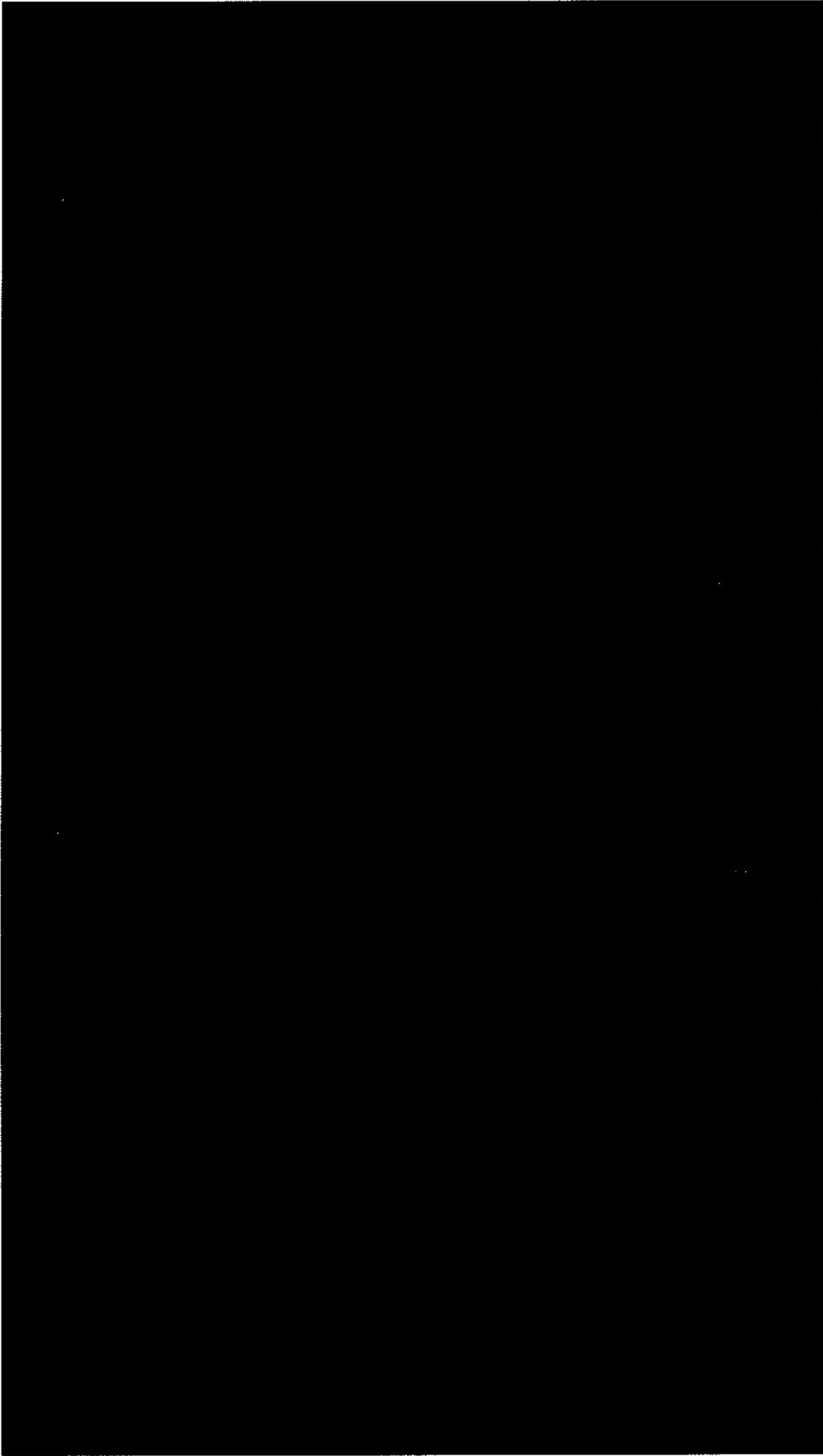


Section C2--Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

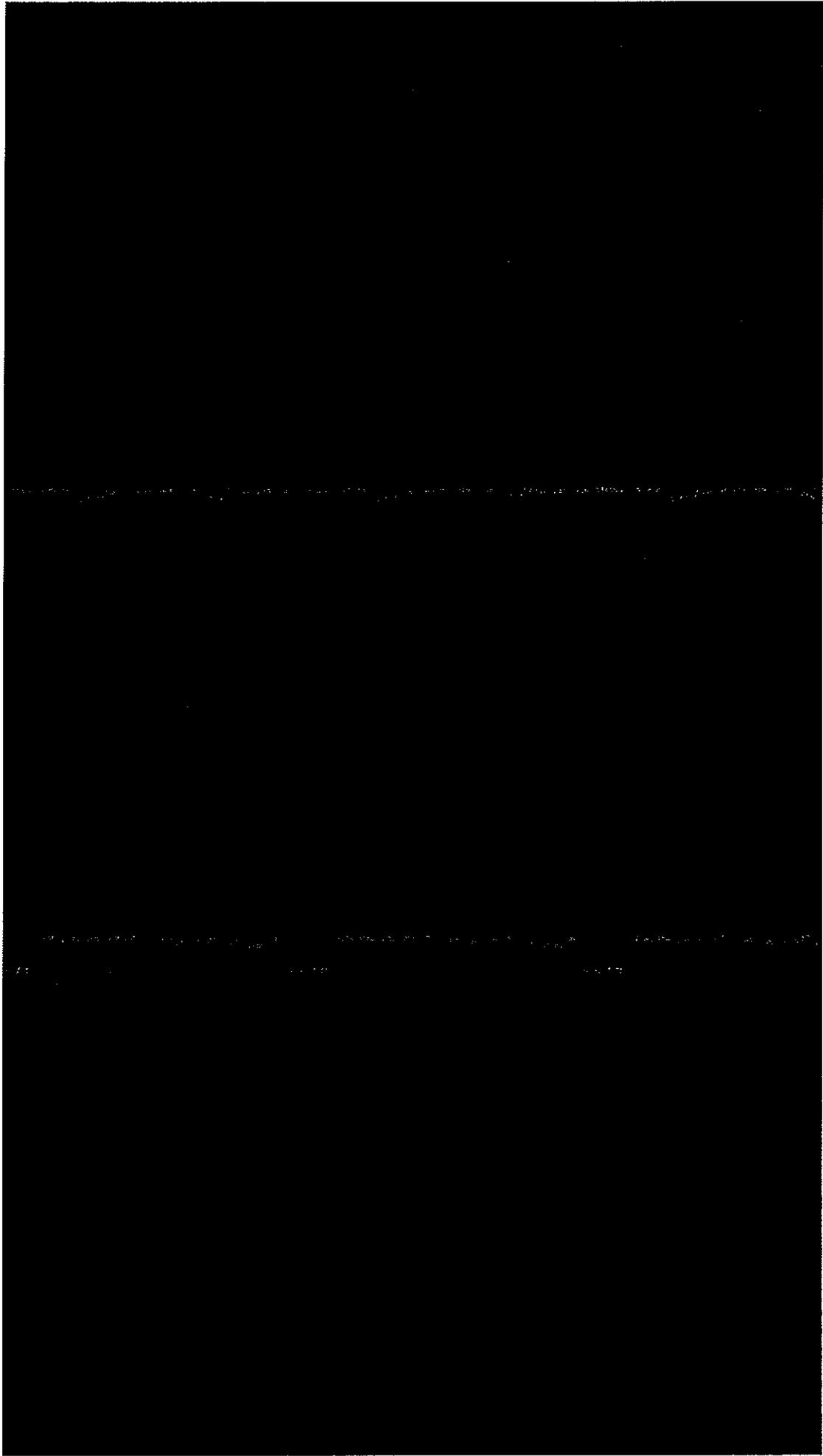




Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

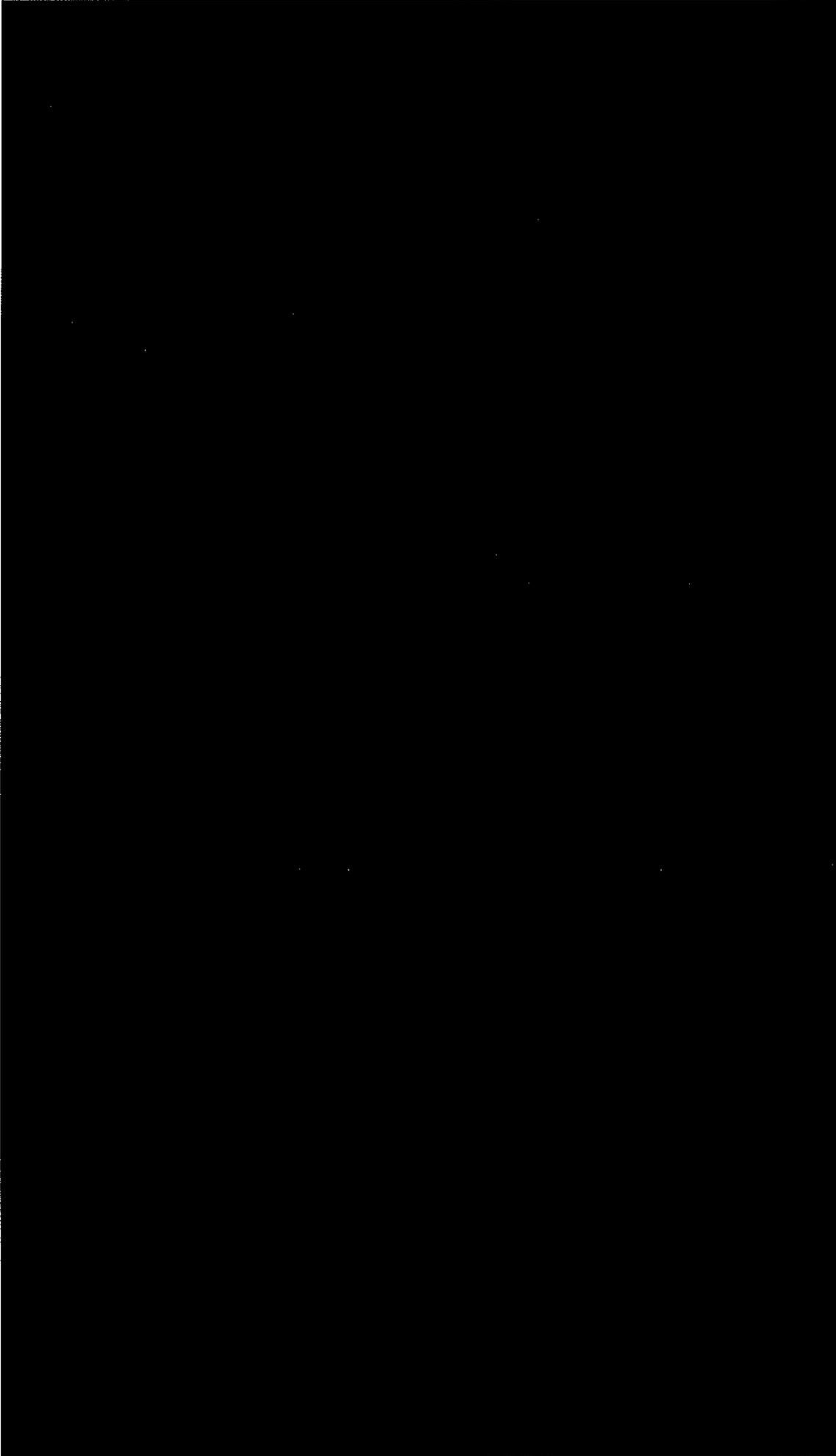


Section C2-Services Delivery Plan

Bombardier_Part C2.05 - Version 2

REDACTED

New Rolling Stock for London
Overground Project

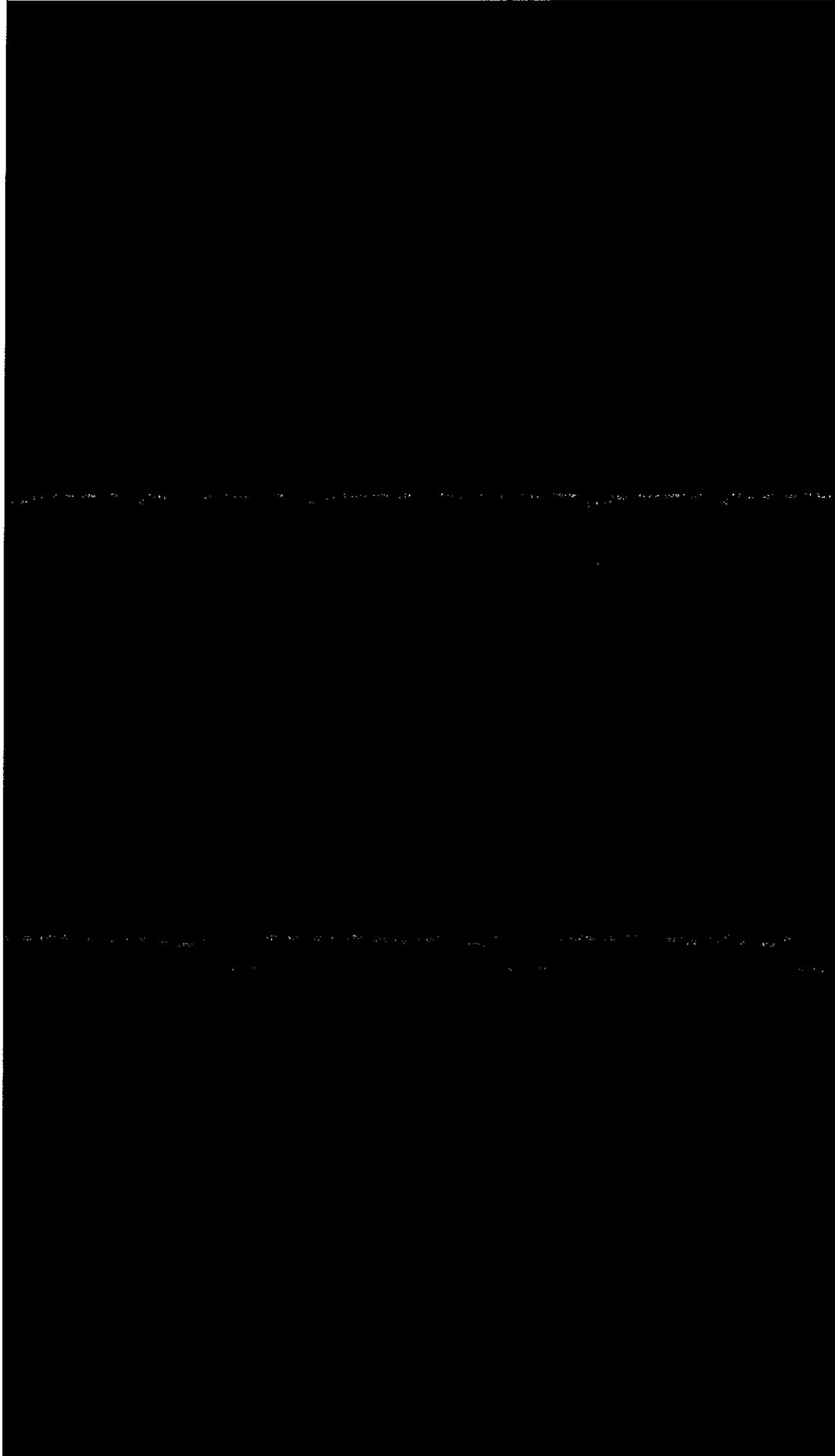


Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

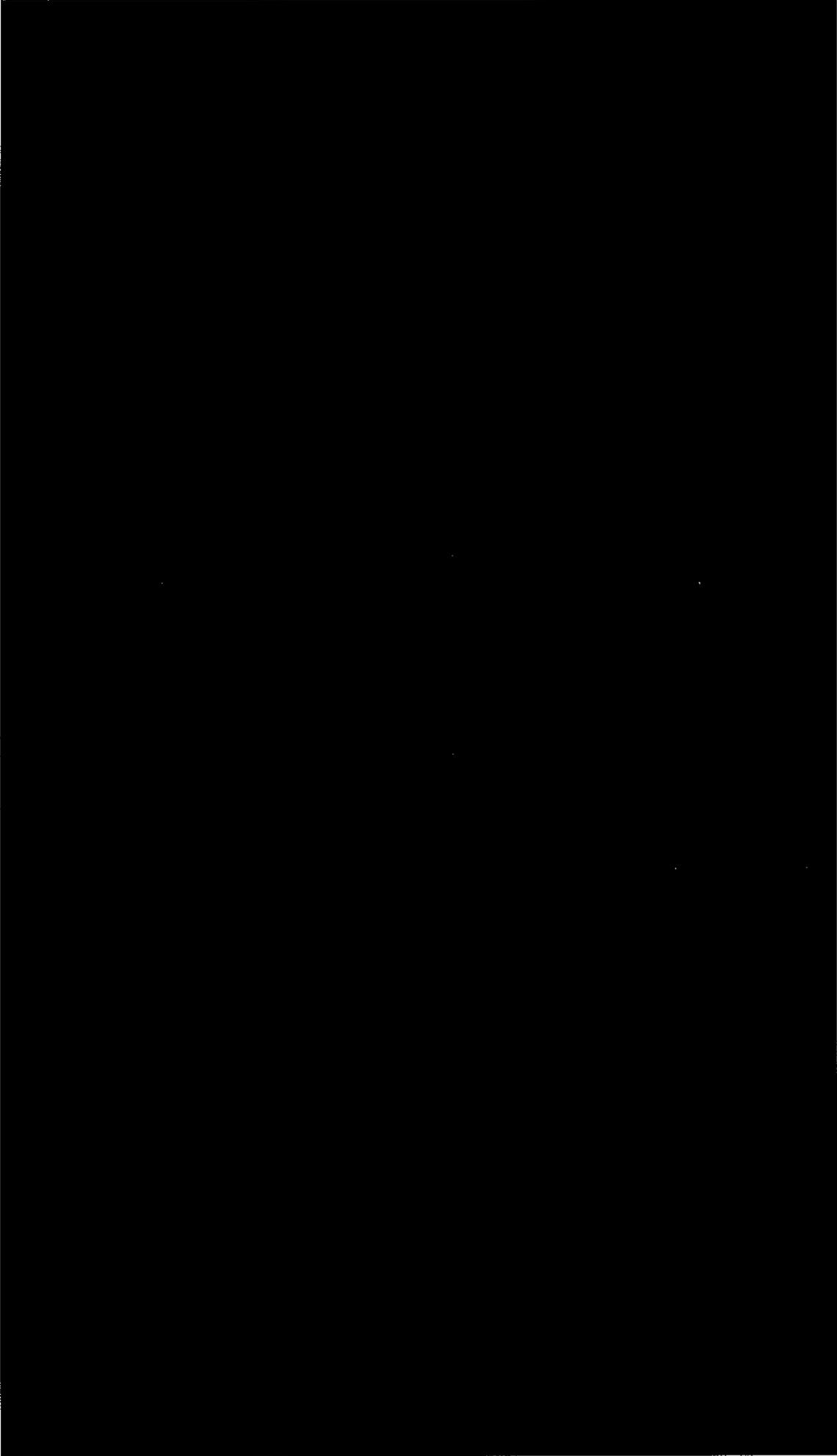
*New Rolling Stock for London
Overground Project*



Section C2-Services Delivery Plan

Bombardier_Part C2.05 - Version 2

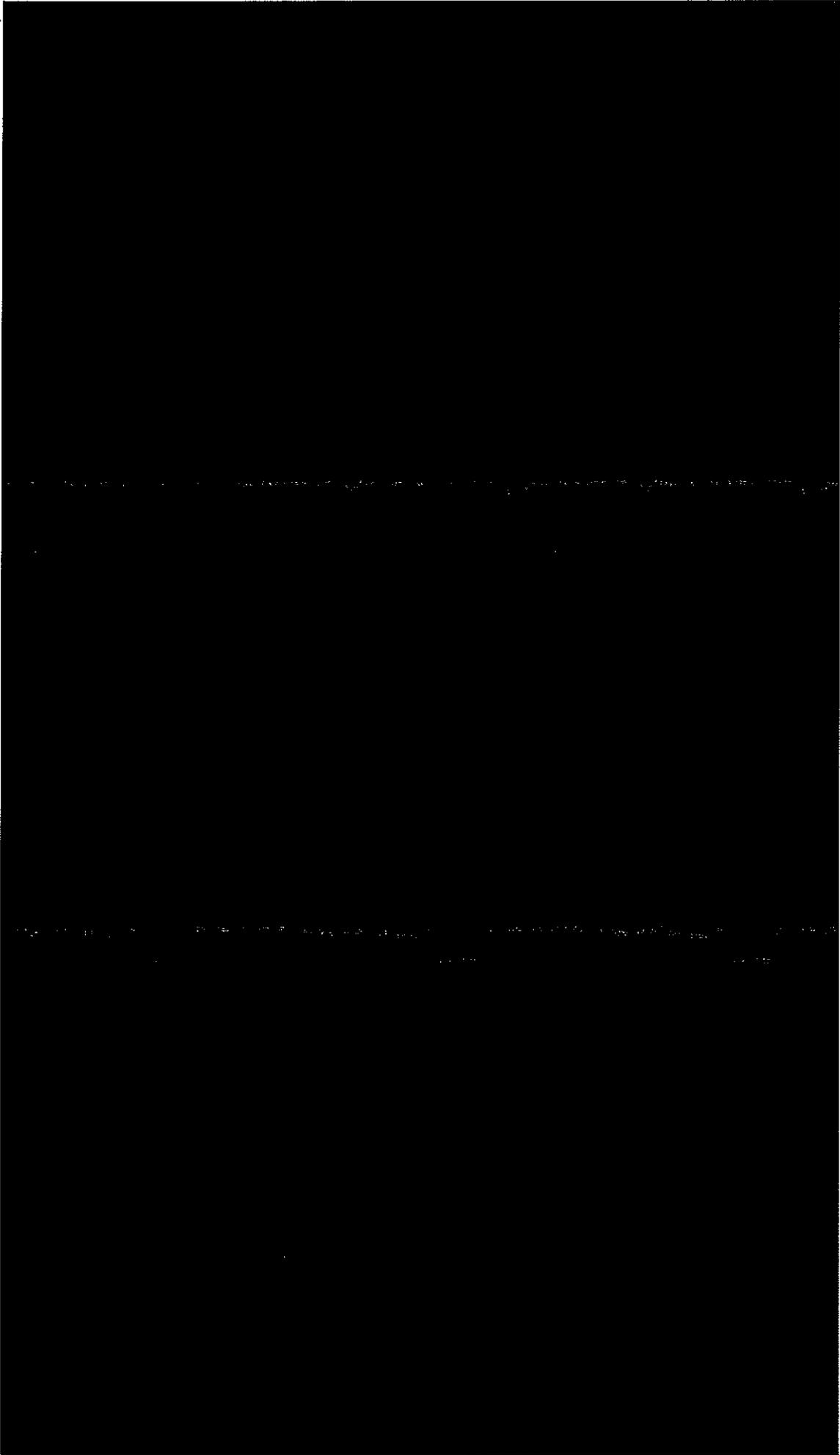
REDACTED
New Rolling Stock for London
Overground Project



Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project



Section C2--Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project



Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project

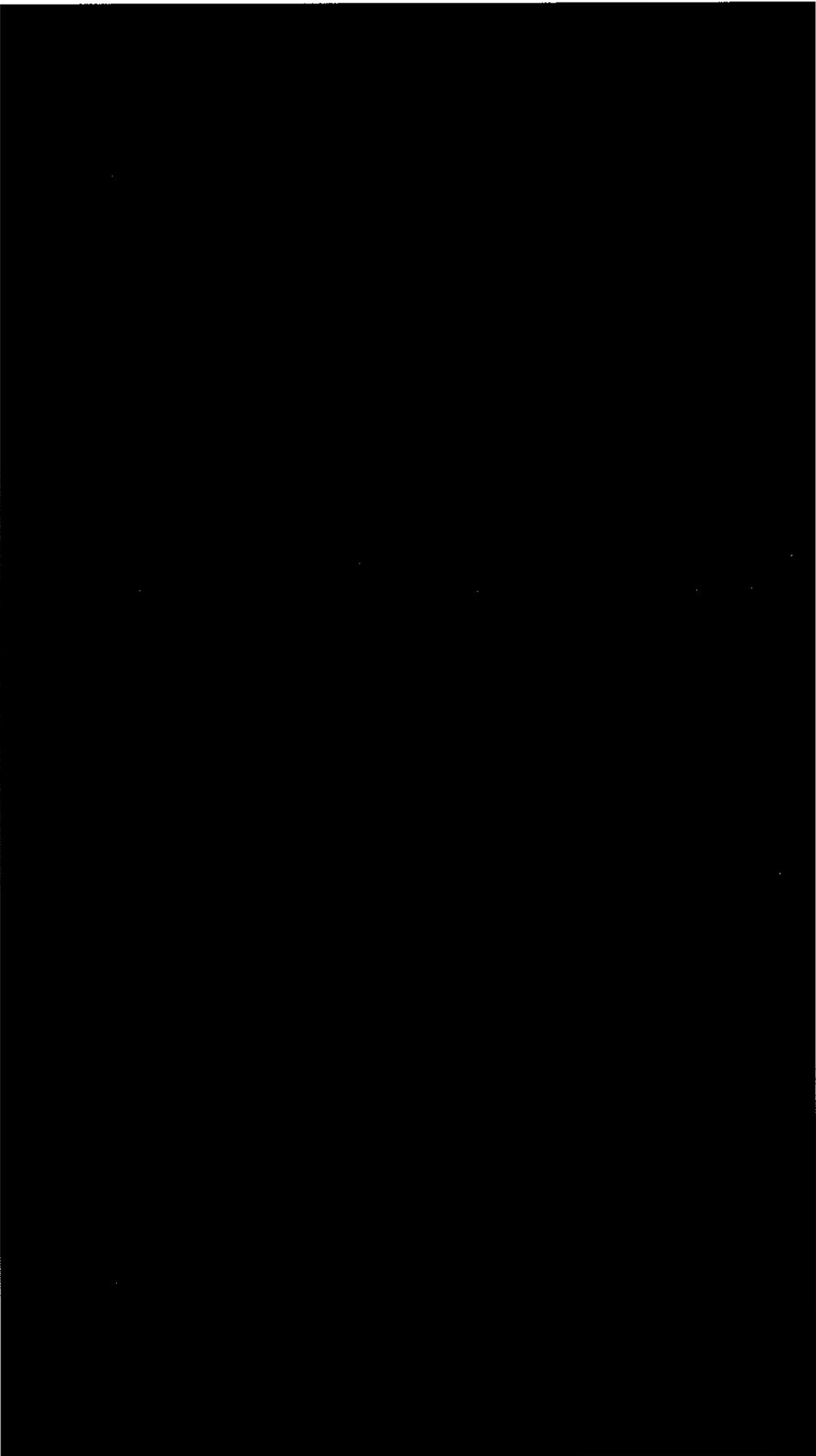


Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

New Rolling Stock for London
Overground Project

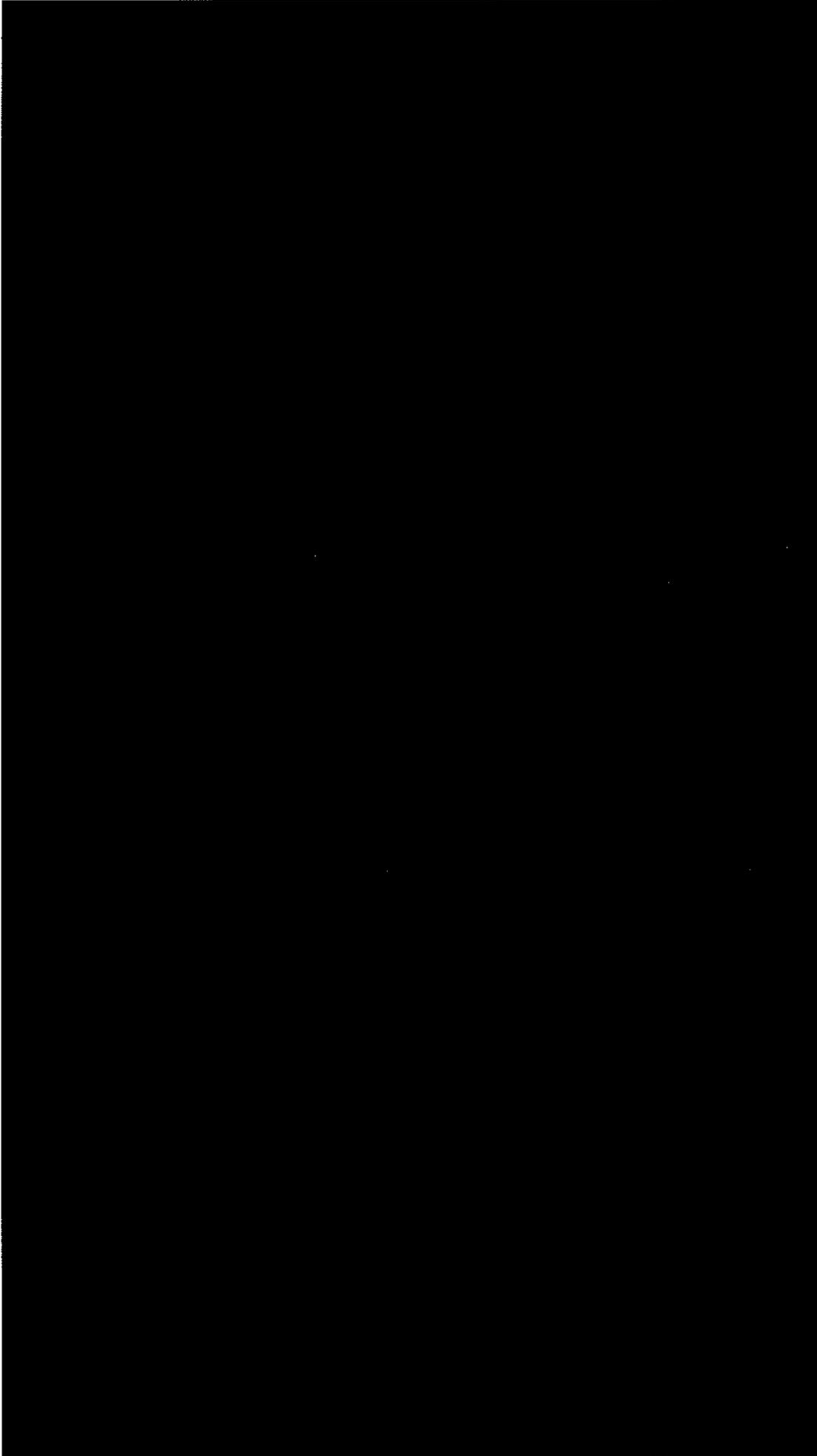


Section C2-Services Delivery Plan

Bombardier_PartC2.05 -Version 2

REDACTED
New Rolling Stock for London
Overground Project

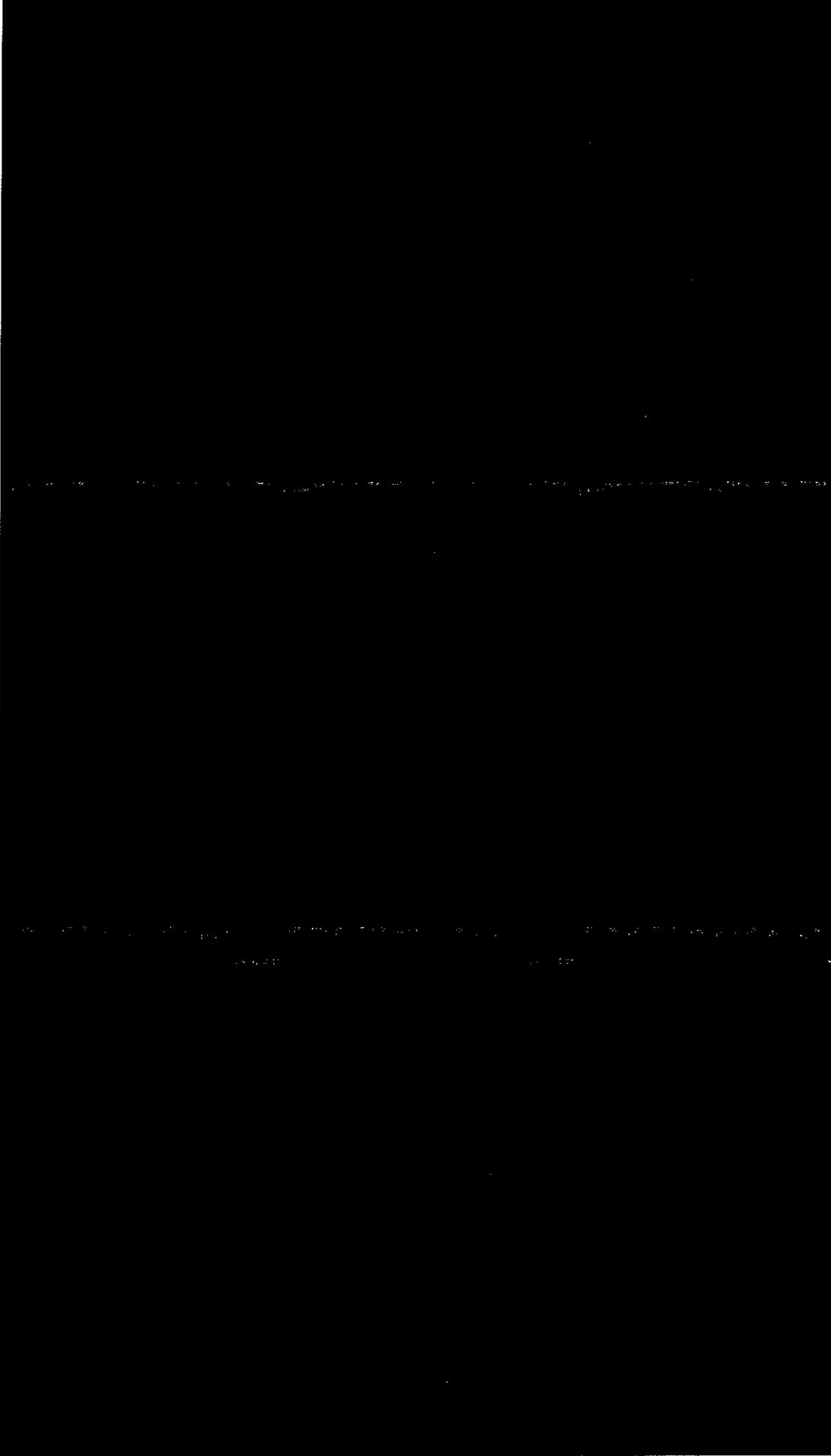




Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

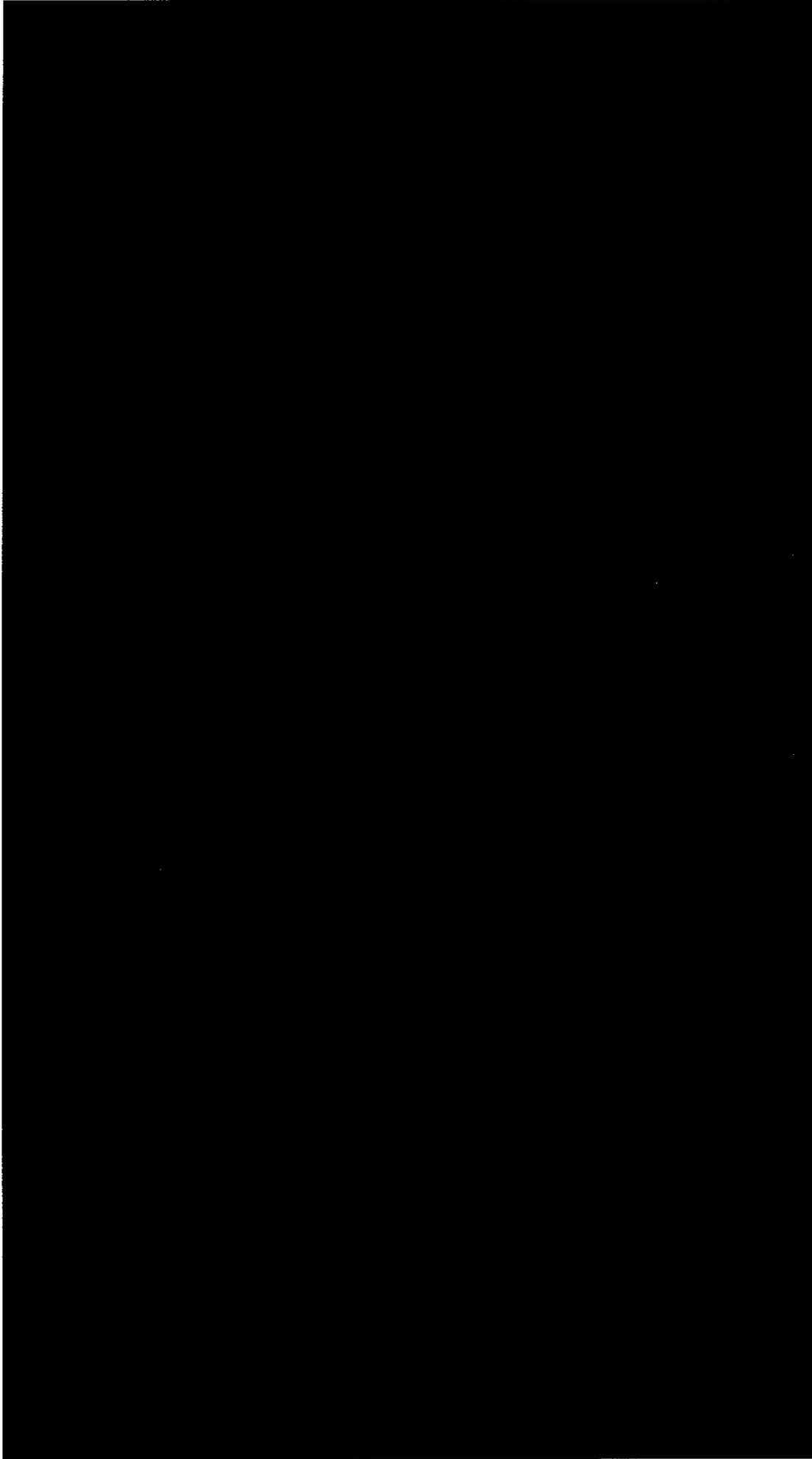
REDACTED
New Rolling Stock for London
Overground Project



Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project



Section C2--Services Delivery Plan

Bombardier_PartC2.05 - Version: 2

REDACTED

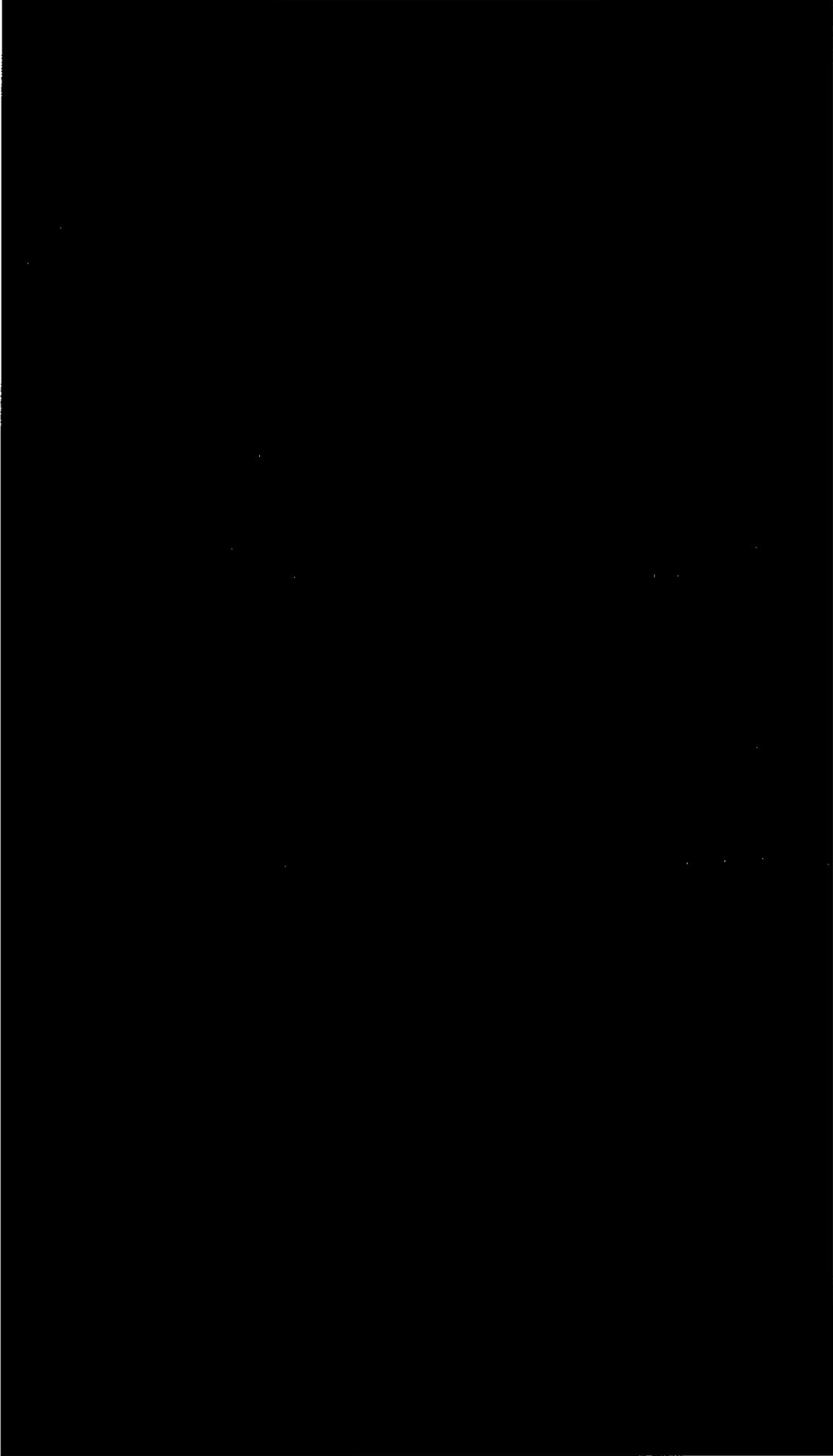
New Rolling Stock for London
Overground Project



Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project



REDACTED

New Rolling Stock for London
Overground Project

Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2



Section C2-Services Delivery Plan

Bombardier_PartC2.05 - Version 2

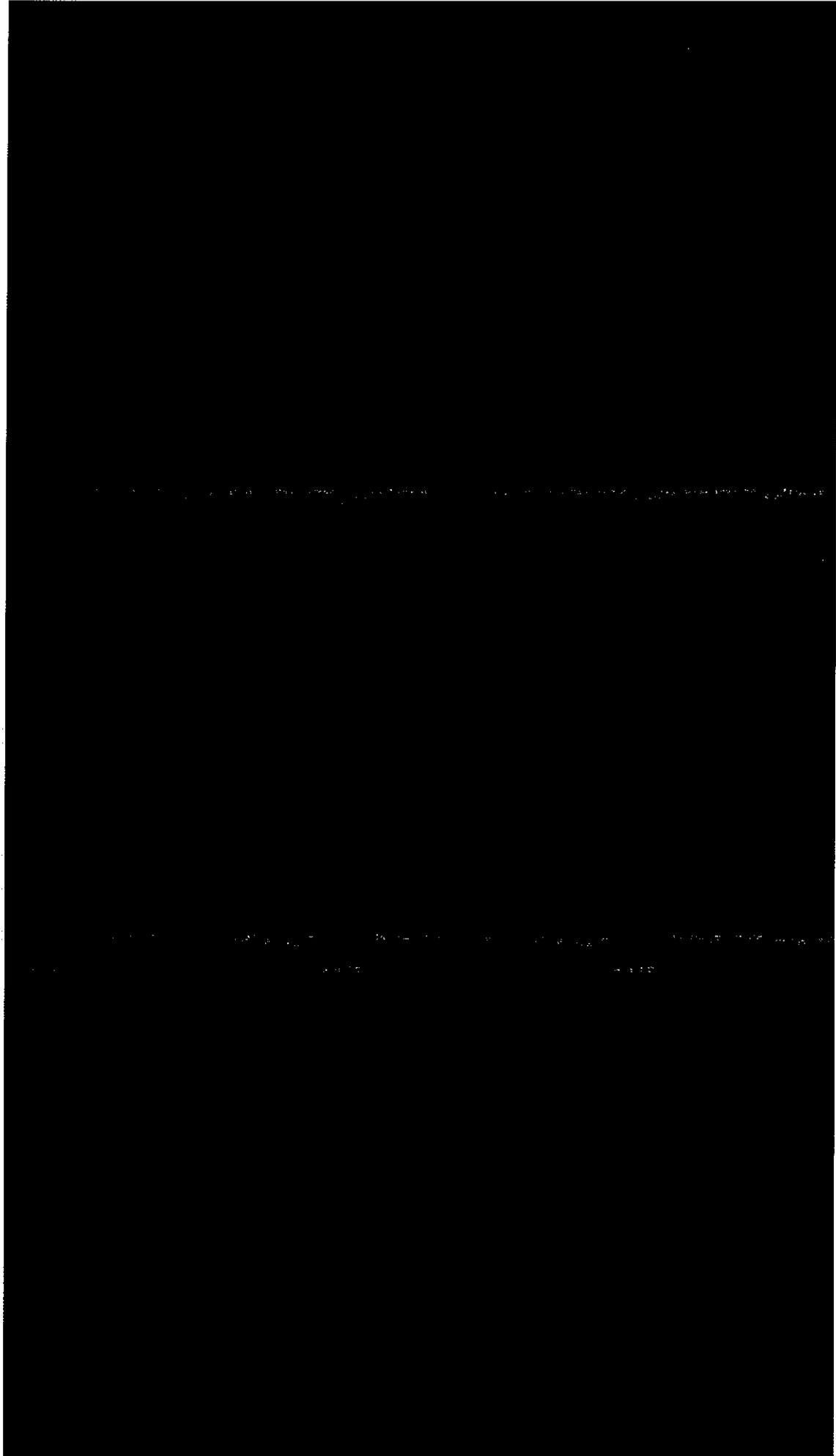
REDACTED
New Rolling Stock for London
Overground Project



Section C2--Services Delivery Plan

Bombardier_PartC2.05 - Version 2

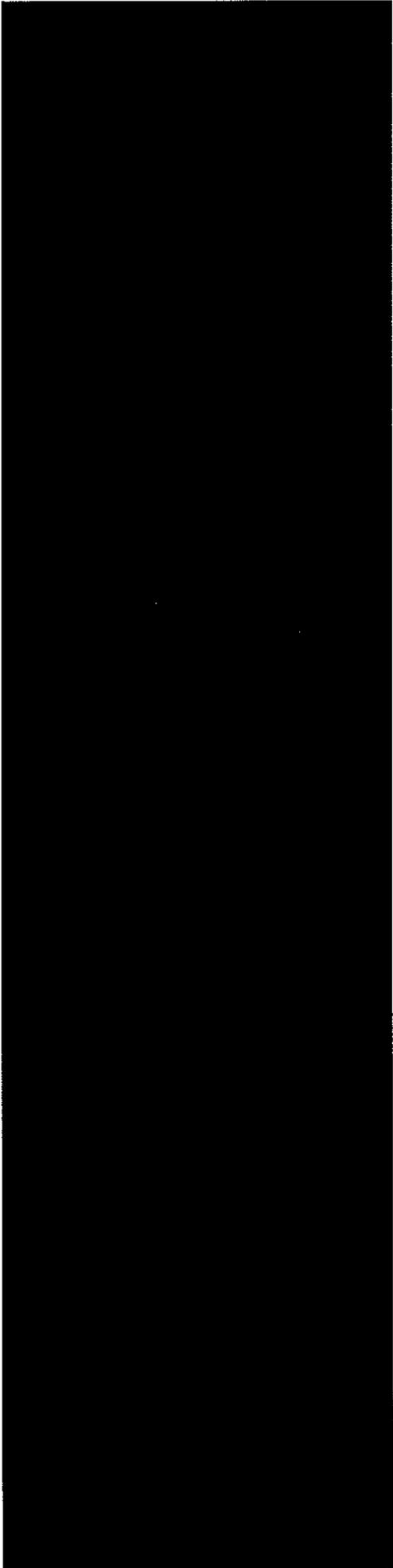
REDACTED
New Rolling Stock for London
Overground Project



Section C2--Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED
New Rolling Stock for London
Overground Project



Section C2–Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

*New Rolling Stock for London
Overground Project*

1

[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]		
[REDACTED] 1 of 6		

[REDACTED]

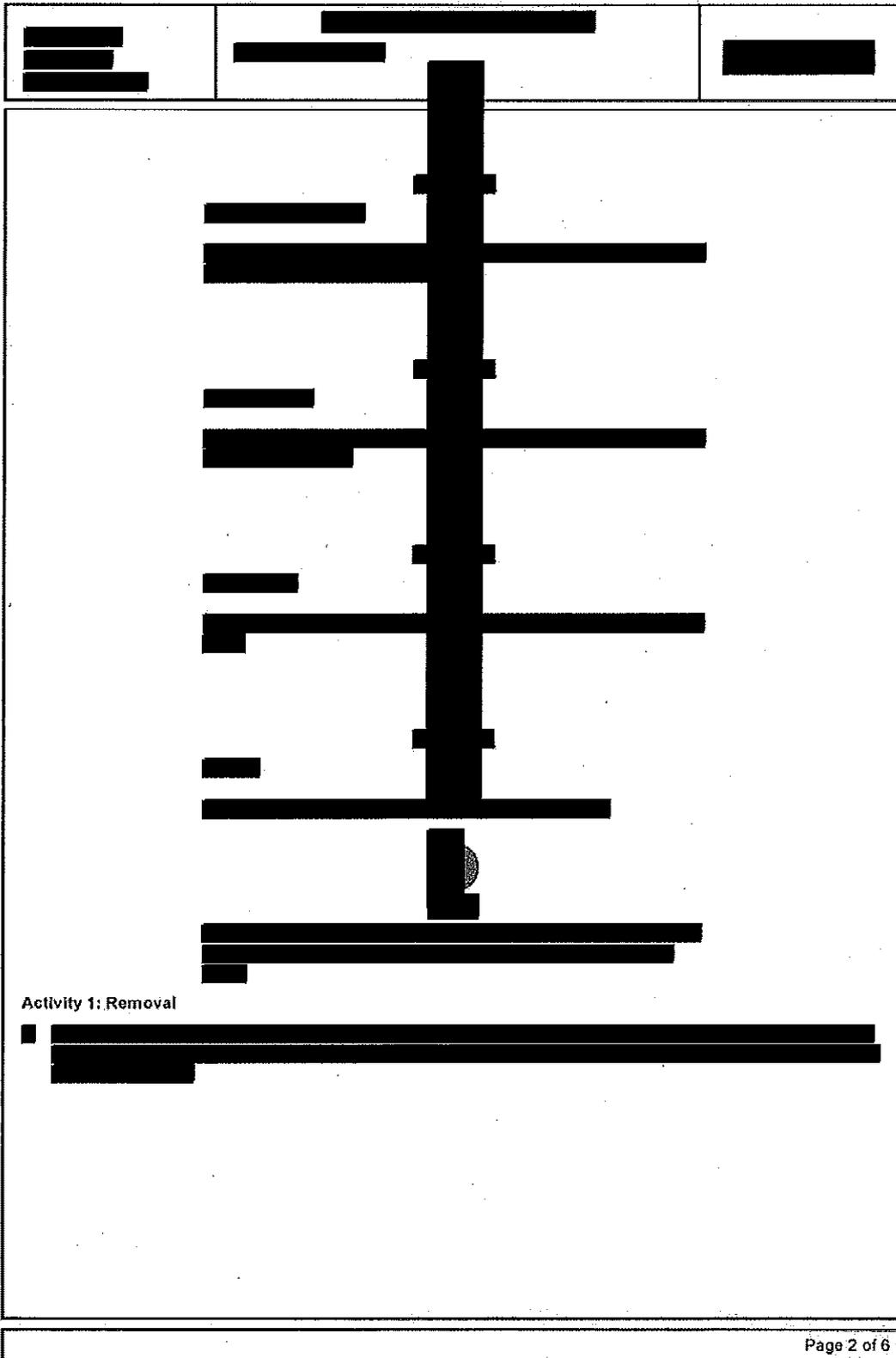
[REDACTED]

Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

*New Rolling Stock for London
Overground Project*



Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

*New Rolling Stock for London
Overground Project*

[REDACTED]	[REDACTED]	BOMBARDIER
<div data-bbox="472 539 1222 1048" style="text-align: center;"></div> <p data-bbox="408 1048 472 1066">BUK4746</p> <p data-bbox="603 1093 1072 1122" style="text-align: center;">[REDACTED]</p> <p data-bbox="336 1137 1334 1279">2 [REDACTED] [REDACTED] [REDACTED] [REDACTED]</p>		
Page 3 of 6		

Section C2—Services Delivery Plan

Bombardier_PartC2.05 - Version 2

REDACTED

New Rolling Stock for London
Overground Project

[REDACTED]	[REDACTED]	BOMBARDIER
------------	------------	-------------------



Figure 2: Warning Horn

5. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

1. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Page 4 of 6

Section C2–Services Delivery Plan

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

Appendix Three – Willesden & Ilford 'A' Maintenance Depot Unit Movement Management Plan

A. Introduction

Bombardier will have in place a Depot Stabling Plan at Willesden Maintenance Depot. The plan will include operating instructions for all DV unit movements required to meet the Train Plan and Exam plan. The Depot Stabling Plan will be developed from the current LOROL Plan in conjunction with the Train Operator, RfL and Network Rail. The Depot Stabling Plan and instructions will form part of the depot commissioning and acceptance handover to ensure all unit movements are safely controlled prior to delivery of the fleet. We will review all Persons in Charge of movements periodically or when required in accordance with the Bombardier procedure for Training & Competence Management.

We will control unit movements through strict adherence to depot operating instructions that define precisely how the Depot Stabling Plan will be undertaken. We will also develop contingency plans during Depot Asset Maintenance based on detailed risk assessments to ensure the depot can maintain RfL's Train Plan.

At Ilford sidings and depot complex (encompassing Bombardier and Greater Anglia Seven Kings Maintenance Buildings and premises, and the yard sidings), the control of unit movements will be achieved by adherence to Greater Anglia's depot operating instructions. All train movements within this complex will be under the strict control of the Yard Controller (Greater Anglia). In conjunction with the NRSLO Train Operator (West Anglia services) will develop contingency plans based on detailed risk assessments to ensure the depot can maintain RfL's Train Plan.

Bombardier will play their part to ensure that the Depot Stabling Plan is managed appropriately and includes all requirements of the (SV units) NRSLO Maintenance, Repair and Train Plan.

Section C2—Services Delivery Plan

REDACTED

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

B. Overview of the Depot Stabling Plan

The principle of the Depot Stabling Plan will be to strictly control all unit movements within the requirements of the Railway Safety Standards Board GE/RT8000 Rule Book and other applicable local procedures.

The Maintenance Depot plan(s) will be robust yet flexible and will provide details for:

- Driving units within the depot boundary
- Propelling units on the depot
- Depot Stabling Plan
- Depot shunting operation arrangements
- Depot control base and communications
- Depot head-shunt movements
- Movement of part units and individual vehicles

Train movements will be undertaken under the control of the Shunter/Driver.

Prior to the DV fleet introduction at Willesden Depot, and in partnership with both the Operator's and Network Rail's Operations Managers, we will identify the most efficient way for both parties to plan unit arrivals and departures. This plan will ensure that arrivals and departures at Willesden Maintenance Depot have a seamless throughput every day.

Occasionally, units may have to enter the depot from other than their booked route. The Person in Charge of the depot and Network Rail's signalmen will remain in close communication during these movements so that all parties are aware of any temporary disruption to the Depot Stabling Plan. At Ilford, train movements and communications with Network Rail are dealt with the Operator's Yard Coordinator (Greater Anglia).

At Willesden we will agree with Network Rail a communications protocol between our Person in Charge and their signaller based on the proven process we use at our Central Rivers depot. This protocol may include as required:

- A direct dial telephone line to and from the Signalling Centre
- A direct BT telephone line to Network Rail's Signalling centre
- A depot telephone exchange line
- A mobile phone carried at all times by the Person in Charge

Across all of our fleet-maintenance projects, our depot operations philosophy is always based on six key principles:

1. Maximise the availability of units
2. Maximise the availability of depot assets
3. Work efficiently and productively
4. Use clear and well-communicated processes and procedures
5. Keep all personnel (both staff and visitors) as safe as possible
6. Make train movements around our sites as safe as possible

Our depot operations philosophy feeds directly into our Depot Berthing Plan which will be comprised of a suite of processes and procedures that will guide the operations of all functions at Willesden Maintenance. These processes and procedures will control unit movements around the depot and to and from Network Rail controlled infrastructure.

To keep the depot running safely and efficiently and consistently deliver the Train Plan, Exam

Section C2–Services Delivery Plan

REDACTED

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

Plan and Depot Asset exam plan we will periodically review our entire depot operating procedures.

We will have a Person in Charge 24/7 who will have sole control of all unit movements within the depot boundary.

All movement inside the Maintenance Depot will be protected by the depot protection system, and the Person in Charge will liaise with the Designated Person (DP) responsible for maintenance activities within the Maintenance Depot prior to authoring units to proceed into and out of the Maintenance Depot

The Person in Charge will be the only post holder permitted to issue train movement instructions within the depot boundary limits. These instructions will include the permitted speeds for unit movements along with:

- units moving from the stabling sidings, and out onto the running lines.
- * Units arriving into Willesden Maintenance Depot from Network Rail-controlled infrastructure, and through the automated visual inspection system (AVIS), train wash plants and into the stabling sidings, where each step of the process will be fully controlled by the Person in Charge. The Person in Charge will pass instructions for unit movements by radio, telephone or face to face. To make unit operations as safe as possible we will operate a strict communications protocol that will require all instructions to be relayed by the Person in Charge. The Operator's driver or Bombardier competent person will strictly adhere to the Person in Charge's instructions whilst moving the unit.

Following the completion of each instruction, the person responsible for the movement of the unit will report back to the Person in Charge to confirm that they have completed the unit movement.

The Person in Charge will record all unit movements, giving details of the units concerned and the person responsible for each movement (Operator's driver or a Bombardier competent person, certificated in accordance with the competence management system).



Section C2–Services Delivery Plan

REDACTED

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

C. Process to meet the Depot Operating Philosophy and Fleet Maintenance Capacity

This section describes how we will organise and develop robust procedures that underpin our depot operating philosophy. It takes into account the following points:

- Delivery of units
- Driving trains within the depot boundary
- Propelling units on the depot
- Depot Stabling Plan
- Exit and entry points
- Depot shunting operations
- Depot control desk and communication
- Depot Head Shunt movements
- Train Plan
- Exam Plan

C1 Delivery of new DV units

Delivery of new DV units to Willesden Maintenance Depot during the fleet delivery phase will be undertaken by a freight operating company (FOC). During the operational service competent Operator's drivers will drive all trains arriving and departing. In both cases it will be the responsibility of the Operator (acting in accordance with their safety certification) to deliver the trains to the depot on time and safely in accordance with their policies and procedures.

The Person in Charge will be in communication with the FOC to ensure new units can be delivered onto Willesden Maintenance Depot without interrupting the Train Plan of units already in operational passenger service. The Person in Charge will have visibility of the arrival paths planned by the FOC in Web Gemini, which is Network Rail's system for controlling train paths throughout the UK. Once the FOC has arrived at the depot boundary, the Person in Charge will communicate with Network Rail signaller to arrange for the new unit to proceed onto Willesden Maintenance Depot.

C2 Driving units within the depot boundary

The Operator's drivers will drive the units from Network Rail's infrastructure (Arrival/departure road within the depot boundary). From the arrival points, authority to proceed and instructions will be strictly under the control of the Person in Charge.

Movements will be made through the carriage washing machine and automatic visual inspection (AVIS) equipment as required, under the control and authority of the Person in Charge.

C2.1. Competency assessed technicians to drive units within Willesden Maintenance Depot

We will have maintenance technicians trained and competent to drive units under the strict control of the Person in Charge to/from the stabling sidings to the Maintenance Building.

Bombardier has used this approach New Cross Gate, Crofton and Central Rivers, where our maintenance technicians are competency assessed to undertake all train movements within the depot.

Our Training and Competency Manager will competence assess all Technicians authorised to move units on a rolling training and competency programme.

Section C2–Services Delivery Plan

REDACTED

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

C3 Propelling units on the depot

Propelling units will be prohibited from the depot except under exceptional circumstances such as:

- For the reforming of fixed-formation units
- When a leading cab is disabled
- To deliver units to Willesden Maintenance Depot by means of a locomotive and the use of a barrier vehicle
- Inserting vehicles, when converting reduced length units to full length units

C4 Depot Stabling Plan

To achieve the Train Plan we will reduce unnecessary shunt moves around Willesden Maintenance Depot by implementing a daily Depot Stabling Plan (DSP), which details how we will marshal and berth trains within the Servicing and Stabling roads.

The **Person in Charge** on duty during the day shift will produce the DSP and agree it with the Planning Manager and Maintenance Control before communicating it to all stakeholders.

To maximise the safe and efficient throughput for all arrivals and departures over the upcoming day the DSP will consider:

- The Exam Plan
- The Train Plan
- The Facility Asset Maintenance Plan
- The Operator's requirements.

The DSP will be a daily plan of normal operation for the night Person in Charge to follow and includes:

- Diagram numbers
- Head codes
- Arrival times at the boundary between Network Rail infrastructure and the depot, based on diagram information
- The depot line of arrival
- The number of the Servicing and Stabling road on which the unit will berth
- The additional shunting moves of units to the Maintenance Depot
- The reason for shunt moves (such as examination, heavy exterior clean, maintenance at the wheel lathe)

In addition to maximising efficiency and depot throughput, having a DSP will minimise the amount of conflicting unit moves during the intense nightly peak of train arrivals. This will allow the depot to maximise the productivity of the cleaning teams by carrying out cleaning in a planned and efficient manner.

C5 Exit and entry point

During normal operation the Stabling sidings will be the exit and entry point for the Operator's drivers in accordance with the Preparation, Presentation and Hand-Back procedures.

However, there will be occasions where the Person in Charge will require the Operator's driver to deliver a unit to the Maintenance Depot.

C6 Depot shunting operations

We will carry out all depot shunting operations in accordance with GE/RT8000 Rule Book, and the processes of Bombardier's Safety, Quality and Competence Management systems.

Section C2—Services Delivery Plan

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

C7 Depot control desk and communications

The Person in Charge will act as the single point of contact for all depot movements (an arrangement we have used for over 15 years at our Central Rivers depot). The designated control facility desk will include:

- A direct phone line to the Network Rail signaller
- A depot layout diagram indicating the real-time position and status of all units and other rail vehicles on the depot
- A depot radio system suitable for communicating operation movement instructions

C8 Depot head shunt movements

Under normal operation the Stabling roads will be the entry and exit point for the Operator's drivers. Unit moves to the Maintenance Building will require a depot shunt move.

The Depot Stabling Plan will show that all units requiring shunting to the Maintenance Building will be stabled in Stabling roads. By adopting this approach the Person in Charge will minimise the impact of conflicting moves.

When units need to access the Maintenance Depot the Person in Charge will authorise the move and arrange for the route(s) to be set for the move taking place. **The Person in Charge will authorise the moves to take place. The Designated Person (D.P.) will ensure the safe condition for the move into the Maintenance Building.**

To move units from the Maintenance Building to the stabling sidings the process is reversed. Fixed signals involved in train movements to/from the Head Shunt must be obeyed. Authorisation of the Signaller will need to be obtained to ensure that a conflicting move will not occur.

C9 The Exam Plan

The Planning Manager will manage the exam requirements within their maintenance cycle.

To maximise the maintenance window available overnight, the Planning Manager will instruct the Production Manager and/or Team Leader as to which diagrams to use so that the units requiring planned maintenance that evening will arrive early at the depot.

The Senior Production Manager and/or Team leader will liaise with the Operator's Route Control over which units are planned to depart and arrive on which diagrams (maintenance diagrams). This will enable us to maximise the downtime a unit has in the Maintenance Depot.

C10 The Train Plan

Bombardier will ensure that the correct number of units will be available each day in accordance with the NRSLO Train Plan. To do this, the Person in Charge will review the Operator's daily Train Plan requirements and the Exam Plan to identify how we will organise each nightly arrival on the stabling roads. This will enable the cleaning staff to efficiently manage their process flow for train cleaning in accordance with the overall plan for morning departures to meet the train plan.

C11 Depot Incident Register

We will have a Depot Incident Register (DIR) for Willesden Maintenance Depot. The purpose of the DIR will be to investigate:

- Train movements being made that are in excess of the speed limit for the depot
- Unauthorised unit moves
- Near misses
- Unit derailments
- Train collisions

Section C2—Services Delivery Plan

REDACTED

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

The Person in Charge will instigate a DIR following an event and will investigate with the HSE Business Partner to understand the circumstances of an event/incident. A review of the process and procedures to ascertain if they have been followed, and take appropriate action to ensure lesson are learned from the event/incident.

Section C2—Services Delivery Plan

REDACTED

New Rolling Stock for London
Overground Project

Bombardier_PartC2.05 - Version 2

D. Integration with Depot Infrastructure Systems

D1 Depot Asset Management Plan

The Depot Asset Management Plan will detail when we will carry out maintenance activities on critical plant and equipment, such as:

- Railway infrastructure including track and Overhead Line Equipment (OHLE)
- Buildings and Plant
- Site works and sundries

The Facility Manager will maintain this plan and ensure the Person in Charge has access to it and is informed of any changes. This will allow the Person in Charge to work out the potential impact of these maintenance activities on the depot's operational throughput and develop any necessary contingency plans.

The Depot Asset Register(s) will include the following critical plant and equipment, as a minimum:

- Depot Personnel Protection Equipment
- Remote inspection system for train exterior
- Train equipment automatic inspection system
- Train wheel noise monitoring system
- Sand replenishment facility
- Train safety system testing facility in stabling area
- Train washing machines
- Battery shunter for movement of units within defined limits
- Cranes
- Train lifting equipment

D2 Degraded working

It may be necessary to undertake unit movements when either the depot infrastructure or a unit is in a degraded state of operation. To cover these situations we will use the following processes from the depot operating instructions:

D2.1. Infrastructure degraded-state process

This process will cover defects for defined service critical components, for example those listed below:

- **Fishplates:** if one fishplate of a pair is cracked or broken movements may continue over the affected line, but the fishplate must be changed at the earliest opportunity. If both fishplates are defective all movements over the line must cease.
- **Rails:** no movements will be permitted over a broken rail until it is inspected and repaired or replaced.
- **Points:** we will not permit movements over defective points in a facing direction until detection is indicated or the affected points have been inspected and secured in the right position.

Section C2—Services Delivery Plan

REDACTED

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

D2.2. Train degraded-state process

This process will cover defects defined in GE/RT8000 Rule Book section TW5 and any applicable local procedures, for example those items listed below:

- **Speedometer:** if the speedometer is defective unit movements will be carried out slowly so that they are definitely below the depot speed limits.
- **Driver's seat:** if the seat is defective movements will only be undertaken if the fault does not affect the driver's ability to see clearly whilst sitting and controlling the train.
- **Defective or isolated DSD:** if the DSD is defective movement will be conducted using a second driver in the leading cab.
- **Loss of service brake:** if the service brake is defective we will haul or propel the unit using the depot shunting tug.
- **Warning Horn:** if the warning horn is defective movements will be carried out at slow speed.
- **Marker or tail lights:** if lights are defective we will use portable lights.
- **Driving cab windscreen:** if the windscreen is defective movements will only be undertaken if the driver can see clearly whilst controlling the train.
- **Power brake controller:** movements will be from an alternative cab. Propelling moves will need authorisation from the duty Shift Production Manager.

D3 Depot Personnel Protection System (DPPS)

To keep depot personnel safe the maintenance buildings at each of the Maintenance Depots will have depot protection on all roads. All unit moves to and from the maintenance buildings will be under the strict control of the Person in Charge. Units will wait at the 'stop and await instruction' notices for each road. A trained and competent Designated Person (DP) will operate the depot protection system and ensure that all train movements are carried out safely:

The arrangements will include physical protection from unauthorised train movements, protection from electrocution and falls from height when working on the roof of vehicles, and electrical safety isolations.

Section C2–Services Delivery Plan

REDACTED

*New Rolling Stock for London
Overground Project*

Bombardier_PartC2.05 - Version 2

E. Integrated Processes with Network Rail

Bombardier will apply existing processes and procedures for integration with Network Rail's processes for controlling movements off and onto Willesden Maintenance Depot at the depot boundary.

Integration with Network Rail means clear and efficient communications between Network Rail, the Operator, Bombardier's maintenance planner and between the Person in Charge and the Network Rail Signalling Centre. The following section describes how we will organise and develop robust procedures to integrate with Network Rail

We will have a direct dial line to the Network Rail signalling centre allowing a consistent line of communication between the Person in Charge and the Network Rail Signaller. Once contact has been made, as precaution an agreed identification protocol is followed to ensure the correct depot and signalling centre are connected.

E1 Common language

Critical to safe working and integration is the use of a common language, having an established clear understanding between the Person in Charge and the Network Rail signalling centre, for example communications regarding the units will always refer to using the Network Rail assigned 'head code' for the service a unit is allocated to operate.

Bombardier's staff will all receive training in operational communication protocols as part of their basic training. For those who use it as part of their duties it will form part of the periodic competence reassessment testing. This will also include radio communication protocol for those who will use the system.

E2 Operating system

We will require the Operator to provide access to (via the Web) their unit allocation and mileage system to allow our Person in Charge to use the same operating systems as the Operator and Network Rail. This is used to track the trains, enabling us to react to any changes in expected arrival and departure times on and off the depots.

At Central Rivers access to Web Gemini is provided to Bombardier by the Train Operators. This provides additional information and provides visibility of:

- * Actual arrival times of units approaching the depot
- * Historical information of unit allocation where units have been stabled each night
- * Detailed plan of unit movements, and allocation to previous diagrams
- * Station stopping pattern and journey
- * Access to the train manager information

This will enable us to have a much clearer picture of the current and historic status of unit diagram allocations protect the Exam Plan by ensuring units are allocated to the correct Train Plan diagram.

