ARLINGTON COUNTY, VIRGINIA
OFFICE OF THE PURCHASING AGENT
2100 CLARENDON BOULEVARD, SUITE 500
ARLINGTON, VA 22201

AGREEMENT NO. 22-DES-RFP-611

THIS AGREEMENT is made, on September 19, 2022, by and between Eleven-x US Incorporated ("Contractor"), 375 Hagey Blvd., Suite 311, Waterloo, ON, N2L 6R5, Canada, a Virginia corporation authorized to do business in the Commonwealth of Virginia, and the County Board of Arlington County, Virginia ("County"). The County and the Contractor, for the consideration hereinafter specified, agree as follows:

1.   CONTRACT DOCUMENTS
The "Contract Documents" consist of:

   This Agreement
   Exhibit A – Scope of Work and Table of Conformance
   Exhibit B – Contract Pricing
   Exhibit C – County Nondisclosure and Data Security Agreement (Contractor and Individual)
   Exhibit D – Contractor COVID-19 Vaccination Certification
   Exhibit E – Contractor COVID-19 Vaccination Quarterly Compliance Certification
   Exhibit F – Project Area Map
   Exhibit G – Eleven-x Service Level Agreement
   Exhibit H – Initial Project Schedule
   Exhibit I – Eleven-x Incident Response Plan

Where the terms and provisions of this Agreement vary from the terms and provisions of the other Contract Documents, the terms and provisions of this Agreement will prevail over the other Contract Documents, and the remaining Contract Documents will be complementary to each other. If there are any conflicts, the most stringent terms or provisions will prevail.

The Contract Documents set forth the entire agreement between the County and the Contractor. The County and the Contractor agree that no representative or agent of either party has made any representation or promise with respect to the parties' agreement that is not contained in the Contract Documents. The Contract Documents may be referred to below as the "Contract" or the "Agreement".

2.   SCOPE OF WORK
The Contractor agrees to perform the services described in the Contract Documents (the "Work"). As detailed in the "Scope of Work" (Exhibit A), the primary purpose of the Work is to provide a performance parking system solution for deployment in commercial corridors. It will be the Contractor's responsibility,

at its sole cost, to provide the specific services set forth in the Contract Documents and sufficient services to fulfill the purposes of the Work. Nothing in the Contract Documents limits the Contractor's responsibility to manage the details and execution of the Work.

3.   PROJECT OFFICER

The performance of the Contractor is subject to the review and approval of the County Project Officer, who will be appointed by the Director of the Arlington County department or agency requesting the Work under this Contract.

4.   CONTRACT TERM

Time is of the essence. The Agreement will commence on ____10/13/2022____ and unless terminated earlier in accordance with the terms of the Agreement continue through September 30, 2025 ("Initial Contract Term"), subject to any modifications to the Contract Documents. The County may, through issuance of a bilateral Notice of Renewal, authorize continuation of the Agreement for not more than four (4) additional 12-month periods, from October 1, 2025 to September 30, 2029 (each a "Subsequent Contract Term"), provided that the Contractor agrees to the contract prices for each such Subsequent Contract Term, failing which, the Agreement will not renew and will terminate at the end of the then current Contract Term. The Initial Contract Term and any Subsequent Contract Term(s) are together the "Contract Term".

5.   CONTRACT AMOUNT

The County will pay the Contractor in accordance with the terms of the Payment section below and of Exhibit B for the Contractor's completion of the Work as required by the Contract Documents. The Contractor will complete the Work for the total amount specified in this section ("Contract Amount").

The County will not compensate the Contractor for any goods or services beyond those included in Exhibit A unless those additional goods or services are covered by a fully executed amendment to this Contract. Additional services will be billed at the rates set forth in Exhibit B unless otherwise agreed by the parties in writing.

6.   CONTRACT PRICE ADJUSTMENTS

The ongoing maintenance and operations annual price will remain firm for the initial ongoing maintenance and operation year (Price Adjustment Date). To request a price adjustment to the ongoing maintenance and operations annual price, the Contractor or the County must submit a written request to the other party not less than 90 days before the Price Adjustment Date. Adjustments to the ongoing maintenance and operations price will not exceed the percentage of change in the U.S. Department of Labor Consumer Price Index, All Items, Unadjusted, Urban Areas ("CPI-U") or five percent (5%), whichever is greater, for the 12 months of statistics available at the time of the Contract's term.

Any ongoing maintenance and operations annual price(s) that result from this provision will become effective the day after the Price Adjustment Date and will be binding for 12 months. The new Price Adjustment Date will be 12 months after the price adjustment.

If the Contractor and the County have not agreed on a requested adjustment by 30 days before the Price Adjustment Date, the County may not renew the Contract, whether or not the County has previously elected to renew the Contract's term.

7.   PAYMENT

The County will pay the Contractor monthly according to the provisions of this section. By the tenth day of each month, the Contractor will submit to the Project Officer an invoice describing the total work done during the preceding month, broken out by task. The Project Officer will either approve the invoice or require corrections. The County will pay the Contractor within forty-five (45) days after receipt of an approved invoice. All payments will be made from the County to the Contractor via ACH.

The invoice must be based on an estimated percentage of the total work under each task that was completed during the month, subject to the Project Officer's acceptance of the work and the estimate. If the Contractor has already been paid 90% of the total amount allocated for any task and work under that task is not complete, the County will pay the remaining amount due for that task only upon completion of the task. The County will not pay more than the amount allocated for any task, regardless of the number of hours spent or the amount of expenses incurred by the Contractor to complete the task.

The number of the County Purchase Order pursuant to which goods or services have been delivered or performed must appear on all invoices.

8.   REIMBURSABLE EXPENSES

The County will not reimburse the Contractor for any expenses under this Contract. The amount in Exhibit B includes all costs and expenses of providing the services described in this Contract.

9.   PAYMENT OF SUBCONTRACTORS

The Contractor is obligated to take one of the two following actions within seven days after receipt of payment by the County for work performed by any subcontractor under this Contract:

   a.   Pay the subcontractor for the proportionate share of the total payment received from the County attributable to the work performed by the subcontractor under this Contract; or

   b.   Notify the County and the subcontractor, in writing, of the Contractor's intention to withhold all or a part of the subcontractor's payment, with the reason for nonpayment.

The Contractor is obligated to pay interest to the subcontractor on all amounts owed by the Contractor to the subcontractor that remain unpaid after seven days following receipt by the Contractor of payment from the County for work performed by the subcontractor under this Contract, except for amounts withheld as allowed in subsection b., above. Unless otherwise provided under the terms of this Contract, interest will accrue at the rate of 1% per month.

The Contractor must include in each of its subcontracts, if any are permitted, a provision requiring each subcontractor to include or otherwise be subject to the same payment and interest requirements with respect to each lower-tier subcontractor.

The Contractor's obligation to pay an interest charge to a subcontractor pursuant to this section may not be construed to be an obligation of the County. A Contract modification may not be made for the purpose of providing reimbursement for such interest charge. A cost reimbursement claim may not include any amount for reimbursement for such interest charge.

10.   NO WAIVER OF RIGHTS

The County's approval or acceptance of or payment for any goods or services under this Contract will not waive any rights or causes of action arising out of the Contract.

11.   NON-APPROPRIATION

All payments by the County to the Contractor pursuant to this Contract are subject to the availability of an annual appropriation for this purpose by the County Board of Arlington County, Virginia ("Board"). In the event that the Board does not appropriate funds for the goods or services provided under this Contract, the County will terminate the Contract, without termination charge or other liability to the County, on the last day of the fiscal year or when the previous appropriation has been spent, whichever event occurs first.

12.   ESTIMATED QUANTITIES/NON-EXCLUSIVITY OF CONTRACTOR

This Contract does not obligate the County to purchase a specific quantity of items or services during the Contract Term. Any quantities that are included in the Contract Documents are the present expectations of the County for the period of the Contract; and the County is under no obligation to buy that or any amount as a result of having provided this estimate or of having had any normal or otherwise measurable requirement in the past. The County may require more goods and/or services than the estimated annual quantities, and any such additional quantities will not give rise to any claim for compensation other than at the unit prices and/or rates in the Contract.

The County does not guarantee that the Contractor will be the exclusive provider of the goods or services covered by this Contract. The items or services covered by this Contract may be or become available under other County contract(s), and the County may determine that it is in its best interest to procure the items or services through those contract(s).

The commercial terms of a Purchase Order issued by the County and accepted by the Contractor (e.g., quantities and prices) will be binding on the parties.

13.   COUNTY PURCHASE ORDER REQUIREMENT

County purchases are authorized only if the County issues a Purchase Order in advance of the transaction, indicating that the ordering County agency has sufficient funds available to pay for the purchase. If the Contractor provides goods or services without a signed County Purchase Order, it does so at its own risk and expense. The County will not be liable for payment for any purchases made by its employees that are not authorized by the County Purchasing Agent.

14.   REPLACEMENT OF PERSONNEL AND SUBCONTRACTORS

The County has the right reasonably to reject staff or subcontractors whom the Contractor assigns to the project. The Contractor must then provide replacement staff or subcontractors satisfactory to the County in a timely manner and at no additional cost to the County. The day-to-day supervision and control of the Contractor's and its subcontractors' employees is the sole responsibility of the Contractor.

The Contractor may not replace key personnel or subcontractors identified in its proposal, including the approved Project Manager, without the County's written approval. The Contractor must submit any request to remove or replace key personnel or subcontractors to the County Project Officer at least 15 calendar days in advance of the proposed action. The request must contain a detailed justification, including identification of the proposed replacement and his or her qualifications.

If the approved Project Manager must be absent for an extended period, the Contractor must provide an interim Project Manager, subject to the County's written approval.

If the approved Project Manager resigns or is terminated by the Contractor, the Contractor will replace the Project Manager with an individual with similar qualifications and experience, subject to the County's written approval.

15.   EMPLOYMENT DISCRIMINATION BY CONTRACTOR PROHIBITED
During the performance of its work pursuant to this Contract:

A. The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, sexual orientation, gender identity, national origin, age, disability or on any other basis prohibited by state law. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

B. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation will be deemed sufficient for meeting the requirements of this section.

C. The Contractor will state in all solicitations or advertisements for employees that it places or causes to be placed that such Contractor is an Equal Opportunity Employer.

D. The Contractor will comply with the provisions of the Americans with Disabilities Act of 1990 ("ADA"), which prohibits discrimination against individuals with disabilities in employment and mandates that disabled individuals be provided access to publicly and privately provided services and activities.

E. The Contractor must include the provisions of the foregoing paragraphs in every subcontract or purchase order of more than $10,000.00 relating to this Contract so that the provisions will be binding upon each subcontractor or vendor.

16.   EMPLOYMENT OF UNAUTHORIZED ALIENS PROHIBITED
In accordance with §2.2-4311.1 of the Code of Virginia, as amended, the Contractor must not during the performance of this Contract knowingly employ an unauthorized alien, as that term is defined in the federal Immigration Reform and Control Act of 1986.

17.   DRUG-FREE WORKPLACE TO BE MAINTAINED BY CONTRACTOR
During the performance of this Contract, the Contractor must: (i) provide a drug-free workplace for its employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Contractor's workplace and specifying the actions that will be taken against employees for violating such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the Contractor that the Contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of more than $10,000.00 relating to this Contract so that the provisions will be binding upon each subcontractor or vendor.

For the purposes of this section, "workplace" means the site(s) for the performance of the work required by this Contract.

18.   SEXUAL HARASSMENT POLICY

If the Contractor employs more than five employees, the Contractor shall (i) provide annual training on the Contractor's sexual harassment policy to all supervisors and employees providing services in the Commonwealth, except such supervisors or employees that are required to complete sexual harassment training provided by the Department of Human Resource Management, and (ii) post the Contractor's sexual harassment policy in (a) a conspicuous public place in each building located in the Commonwealth that the Contractor owns or leases for business purposes and (b) the Contractor's employee handbook.

19.   SAFETY

The Contractor must ensure that it and its employees and subcontractors comply with all applicable local, state and federal policies, regulations and standards relating to safety and health, including the standards of the Virginia Occupational Safety and Health program of the Department of Labor and Industry for General Industry and for the Construction Industry and the applicable Federal Environmental Protection Agency and Virginia Department of Environmental Quality standards.

20.   COVID-19 VACCINATION POLICY FOR CONTRACTORS

Due to the COVID-19 pandemic, the County has taken various steps to protect the welfare, health, safety and comfort of the workforce and public at large. As part of these steps, the County has implemented various requirements with respect to health and safety including policies with respect to social distancing, the use of face-coverings and vaccine mandates. All County Contractors, entering County owned, controlled, or leased facilities or facilities operated by a contractor if the services provided at that location are exclusive to Arlington County Government or contractors with public facing responsibilities must adopt these policies for implementation with their employees and subcontractors working on County contracts.

Contractors are required to obtain and maintain the COVID-19 vaccine status of employees or subcontractors, require any unvaccinated or not fully vaccinated employees to follow a weekly testing protocol established by the Contractor to submit to weekly testing, and provide any accommodations as required by law. Contractor should submit the certification of compliance to the Purchasing Agent at the time of contract execution and within five working days of the end of each quarter (see Exhibits D and E). In addition, all Contractor and subcontractor employees subject to the requirements of this section must also comply with the County COVID-19 masking and social distancing protocols, as signed at each County location.

It is recognized that the COVID-19 pandemic is an ongoing health crisis. As such, requirements with respect to health and safety, including vaccines and face-coverings may change over time. Contractors are expected to adhere to the County requirements as they evolve in response to the crisis.

For questions, the Contractor may email contractorvaccineinfo@arlingtonva.us.

21.   TERMINATION

The County may terminate this Contract at any time as follows: (1) for cause, if, as determined by the County, the Contractor is in breach or default or has failed to perform the Work satisfactorily; or (2) for the convenience of the County.

Upon receipt of a notice of termination, the Contractor must not place any further orders or subcontracts for materials, services or facilities; must terminate all vendors and subcontracts, except as are necessary for the completion of any portion of the Work that the County did not terminate; and must immediately deliver all documents related to the terminated Work to the County.

Any purchases that the Contractor makes after the notice of termination will be the sole responsibility of the Contractor, unless the County has approved the purchases in writing as necessary for completion of any portion of the Work that the County did not terminate.

If any court of competent jurisdiction finds a termination for cause by the County to be improper, then the termination will be deemed a termination for convenience.

A. TERMINATION FOR CAUSE, INCLUDING BREACH AND DEFAULT; CURE
1. Termination for Unsatisfactory Performance. If the County determines that the Contractor has failed to perform satisfactorily, then the County will give the Contractor written notice of such failure(s) and the opportunity to cure them within 15 days or any other period specified by the County ("Cure Period"). If the Contractor fails to cure within the Cure Period, the County may terminate the Contract for failure to provide satisfactory performance by providing written notice with a termination date. The Contractor must submit any request for termination costs, with all supporting documentation, to the County Project Officer within 30 days after the expiration of the Cure Period. The County may accept or reject the request for termination costs, in whole or in part, and may notify the Contractor of its decision within a reasonable time.

   In the event of termination by the County for failure to perform satisfactorily, the Contractor must continue to provide its services as previously scheduled through the termination date, and the County must continue to pay all fees and charges incurred through the termination date.

2. Termination for Breach or Default. If the County terminates the Contract for default or breach of any Contract provision or condition, then the termination will be immediate after notice of termination to the Contractor (unless the County provides for an opportunity to cure), and the Contractor will not be permitted to seek termination costs.

   Upon any termination pursuant to this section, the Contractor will be liable to the County for costs that the County must expend to complete the Work, including costs resulting from any related delays and from unsatisfactory or non-compliant work performed by the Contractor or its subcontractors. The County will deduct such costs from any amount due to the Contractor; or if the County does not owe the Contractor, the Contractor must promptly pay the costs within 15 days of a demand by the County. This section does not limit the County's recovery of any other damages to which it is entitled by law.

   Except as otherwise directed by the County, the Contractor must stop work on the date of receipt the notice of the termination.

B. TERMINATION FOR THE CONVENIENCE OF THE COUNTY
The County may terminate this Contract in whole or in part whenever the Purchasing Agent determines that termination is in the County's best interest. The County will give the

Contractor at least 15 days' notice in writing. The notice must specify the extent to which the Contract is terminated and the effective termination date. The Contractor will be entitled to termination costs, plus any other reasonable amounts that the parties might negotiate; but no amount will be allowed for anticipatory profits.

Except as otherwise directed by the County, the Contractor must stop work on the date of receipt of the notice of the termination.

The Contractor may terminate the Contract effective immediately if the County is in material breach of the Contract and fails to remedy the breach within 15 days of receipt of written notice from the Contractor.

22.   INDEMNIFICATION

The Contractor covenants for itself, its employees and its subcontractors to save, defend, hold harmless and indemnify the County and all of its elected and appointed officials, officers, current and former employees, agents, departments, agencies, boards and commissions (collectively the "County Indemnitees") from and against any and all claims made by third parties for any and all losses, damages, injuries, fines, penalties, costs (including court costs and attorneys' fees), charges, liability, demands or exposure resulting from, arising out of or in any way connected with the Contractor's acts or omissions, including the acts or omissions of its employees and/or subcontractors, in performance or nonperformance of the Contract. This duty to save, defend, hold harmless and indemnify will survive the termination of this Contract. If the Contractor fails or refuses to fulfill its obligations contained in this section, the Contractor must reimburse the County for any and all resulting payments and expenses, including reasonable attorneys' fees. The Contractor must pay such expenses upon demand by the County, and failure to do so may result in the County withholding such amounts from any payments to the Contractor under this Contract.

23.   INTELLECTUAL PROPERTY INDEMNIFICATION

The Contractor warrants that to the best of its knowledge, the services provided under this Contract by the Contractor and its subcontractors do not infringe the intellectual property rights (including, but not limited to, copyright, patent, mask and trademark) of third parties.

If the Contractor or any of its employees or subcontractors uses any design, device, work or material that is covered by patent or copyright, it is understood that the Contract Amount includes all royalties, licensing fees, and any other costs arising from such use in connection with the Work under this Contract.

The Contractor covenants for itself, its employees and its subcontractors to defend, hold harmless, and indemnify the County Indemnitees, as defined above, from and against any and all allegations, claims, actions or proceedings (collectively "Claims") brought by a third party for losses, damages, injuries, fines, penalties, costs (including court costs and attorneys' fees), charges, liability or exposure (collectively "Losses") arising from the infringement of any of such third party's trademarks, copyrights, patents or other intellectual property rights by any Work provided by Contractor or used in the performance of this Contract (each an "IP Claim"),provided that the County gives the Contractor: (i) prompt, detailed written notice of any such Claim, (ii) sole authority to defend or settle such Claim and (iii) cooperation in the defense or settlement of such Claim.

The Contractor will have no liability for Claims to the extent arising from (a) use of a Work in violation of this Agreement or applicable law, or b) modifications to a Work not made by the Contractor.

The indemnity provided by the Contractor for IP Claims, as defined above, sets forth the Contractor's entre liability and the County's sole and exclusive remedies for those IP Claims.

This duty to save, defend, hold harmless and indemnify will survive the termination of this Contract. If the Contractor fails or refuses to fulfill its obligations contained in this section, the Contractor must reimburse the County for any and all resulting payments and expenses, including reasonable attorneys' fees. The Contractor must pay such expenses upon demand by the County, and failure to do so may result in the County withholding such amounts from any payments to the Contractor under this Contract.

24.   LIMITATIONS OF LIABILITY
Except for claims of personal injury, death or intellectual property indemnification, no party, its employees or its suppliers or subcontractors will be liable for: (a) any indirect, special, consequential, incidental or punitive damages, including, but not limited to, loss of profit or revenues or loss of use of the products, services, or any other deliverables; or (b) any loss or damage in excess of the amount paid or payable by the County to the Contractor under this Contract for the product, services, or other deliverables which gives rise to the claim.

25.   OWNERSHIP OF WORK PRODUCT
This Contract does not confer on the Contractor any ownership rights or rights to use or disclose the County's data or inputs provided by the County to the Contractor ("County Materials").

All County Materials are the property of the County and must be provided or returned to the County upon completion, termination, or cancellation of this Contract. The Contractor will not use or allow others to use the County Materials for any purpose other than performance of this Contract without the written consent of the County.

The County Materials are confidential, and the Contractor may neither release the County Materials nor share their contents. The Contractor will refer all inquiries regarding the status of any County Materials or the Work to the Project Officer or to his or her designee. At the County's request, the Contractor will deliver all County Materials, including hard copies of electronic files, to the Project Officer and will destroy all electronic files.

The Contractor must include the provisions of this section as part of any contract or agreement related to this Contract into which it enters with subcontractors or other third parties. The provisions of this section will survive any termination or cancellation of this Contract.

The Contractor retains ownership of all intellectual property and proprietary rights in the Contractor's technology incorporated into the Work provided to the County, together with any and all improvements, modifications and/or enhancements developed or created during performance of this Contract.

26.   DATA SECURITY AND PROTECTION
The Contractor will hold County Information, as defined below, in the strictest confidence and will comply with all applicable County security and network resources policies, as well as all local, state and federal laws and regulatory requirements concerning data privacy and security. The Contractor must develop, implement, maintain, continually monitor and use appropriate administrative, technical and physical security measures to control access to and to preserve the confidentiality, privacy, integrity and availability of all electronically maintained or transmitted information received from or created or maintained on behalf of the County. For purposes of this provision, and as more fully described in this

Contract and in the County's Non-Disclosure and Data Security Agreement (NDA), "County Information" includes, but is not limited to, electronic information; documents; data; images; financial records; personally identifiable information; personal health information (PHI); personnel, educational, voting, registration, tax and assessment records; information related to public safety; County networked resources; and County databases, software and security measures that are created, maintained, transmitted or accessed to perform the Work under this Contract.

(a) **County's Non-Disclosure and Data Security Agreement**. The Contractor and its Designees (Contractor Designees shall include, but shall not be limited to, all Contractor-controlled agents or subcontractors working on-site at County facilities or otherwise performing any work under this Contract) must sign the NDA (Exhibit C) before performing any work or obtaining or permitting access to County networked resources, application systems or databases. The Contractor will make copies of the signed NDAs available to the County Project Officer upon request.

(b) **Use of Data**. The Contractor will ensure against any unauthorized use, distribution or disclosure of or access to County Information and County networked resources by itself or its Designees. Use of County Information other than as specifically outlined in the Contract Documents is strictly prohibited. The Contractor will be solely responsible for any unauthorized use, reuse, distribution, transmission, manipulation, copying, modification, access to or disclosure of County Information and for any non-compliance with this provision by itself or by its Designees.

(c) **Data Protection**. The Contractor will protect the County's Information according to standards established by federal law and Commonwealth of Virginia statutes including but not limited to the Government Data Collection and Dissemination Practices Act, Chapter 38 of Title 2.2 of the Code of Virginia (§ 2.2-3800 and 2.2-3803), Administration of systems including personal information; Internet privacy policy; exceptions, Code of Virginia, § 2.2-3803, and the Virginia Freedom of Information Act § 2.2-3700, et seq., and will adhere to industry best practices including the National Institute of Standards and Technology (NIST) SP 800-53 Security and Privacy Controls for Information Systems and Organizations and the Payment Card Industry Data Security Standard (PCI DSS), as applicable, and no less rigorously than it protects its own data and proprietary or confidential information. The Contractor must provide to the County a copy of its data security policy and procedures for securing County Information and a copy of its disaster recovery plan(s). If requested by the County, the Contractor must also provide annually the results of an internal Information Security Risk Assessment provided by an outside firm.

(d) **Security Requirements**. The Contractor must maintain the most up-to-date anti-virus programs, industry-accepted firewalls and other protections on its systems and networking equipment. The Contractor certifies that all systems and networking equipment that support, interact with or store County Information meet the above standards and industry best practices for physical, network and system security requirements. Devices (laptops, mobile phones, printers, copiers, fax machines, or similar) that store County Data utilize encryption. The County's Chief Information Security Officer or designee must approve any deviation from these standards. The downloading of County information onto devices, other portable storage media or services such as personal e-mail, Dropbox etc. is prohibited without the written authorization of the County's Chief Information Security Officer or designee.

(e) **Conclusion of Contract**. Within 30 days after the termination, cancellation, expiration or other conclusion of the Contract, the Contractor must, at no cost to the County, return all County Information to the County in a format defined by the County Project Officer. The County may request that the Information be destroyed. The Contractor is responsible for ensuring the return and/or destruction of all Information that is in the possession of its subcontractors or agents. The Contractor must certify completion of this task in writing to the County Project Officer.

(f) **Notification of Security Incidents**. The Contractor must notify the County Chief Information Officer and County Project Officer within 24 hours of the discovery of any intended or unintended access to or use or disclosure of County Information.

(g) **Subcontractors**. If subcontractors are permitted under this Contract, the requirements of this entire section must be incorporated into any agreement between the Contractor and the subcontractor. If the subcontractor will have access to County Information, each subcontractor must provide to the Contractor a copy of its data security policy and procedures for securing County Information and a copy of its disaster recovery plan(s).

Subject to the County's obligations under the Virginia Freedom of Information Act and any other legal obligations of a party, the obligations of confidentiality contained in the Contract, including the provisions of the Non-Disclosure and Data Security Agreement at Exhibit C, should be read as mutual and reciprocal, such that each party's Confidential Information shall be kept in confidence by the other party.

## 27.	ETHICS IN PUBLIC CONTRACTING

This Contract incorporates by reference Article 9 of the Arlington County Purchasing Resolution, as well as all state and federal laws related to ethics, conflicts of interest or bribery, including the State and Local Government Conflict of Interests Act (Code of Virginia § 2.2-3100 et seq.), the Virginia Governmental Frauds Act (Code of Virginia § 18.2-498.1 et seq.) and Articles 2 and 3 of Chapter 10 of Title 18.2 of the Code of Virginia, as amended (§ 18.2-438 et seq.). The Contractor certifies that its proposal was made without collusion or fraud; that it has not offered or received any kickbacks or inducements from any other offeror, supplier, manufacturer or subcontractor; and that it has not conferred on any public employee having official responsibility for this procurement any payment, loan, subscription, advance, deposit of money, services or anything of more than nominal value, present or promised, unless consideration of substantially equal or greater value was exchanged.

## 28.	COUNTY EMPLOYEES

No Arlington County employee may share in any part of this Contract or receive any benefit from the Contract that is not available to the general public.

## 29.	FORCE MAJEURE

Neither party will be held responsible for failure to perform the duties and responsibilities imposed by this Contract if such failure is due to a fire, riot, rebellion, natural disaster, war, act of terrorism or act of God that is beyond the control of the party and that makes performance impossible or illegal, unless otherwise specified in the Contract, provided that the affected party gives notice to the other party as soon as practicable after the force majeure event, including reasonable detail and the expected duration of the event's effect on the party.

30.   AUTHORITY TO TRANSACT BUSINESS

The Contractor must, pursuant to Code of Virginia § 2.2-4311.2, be and remain authorized to transact business in the Commonwealth of Virginia during the entire term of this Contract. Otherwise, the Contract is voidable at the sole option of and with no expense to the County.

31.   RELATION TO COUNTY

The Contractor is an independent contractor, and neither the Contractor nor its employees or subcontractors will be considered employees, servants or agents of the County. The County will not be responsible for any negligence or other wrongdoing by the Contractor or its employees, servants or agents. The County will not withhold payments to the Contractor for any federal or state unemployment taxes, federal or state income taxes or Social Security tax or for any other benefits. The County will not provide to the Contractor any insurance coverage or other benefits, including workers' compensation.

32.   ANTITRUST

The Contractor conveys, sells, assigns and transfers to the County all rights, title and interest in and to all causes of action under state or federal antitrust laws that the Contractor may have relating to this Contract.

33.   REPORT STANDARDS

The Contractor must submit all written reports required by this Contract for advance review in a format approved by the Project Officer. Reports must be accurate and grammatically correct and should not contain spelling errors. The Contractor will bear the cost of correcting grammatical or spelling errors and inaccurate report data and of other revisions that are required to bring the report(s) into compliance with this section.

34.   AUDIT

The Contractor must retain all books, records and other documents related to this Contract for at least five years, or such period of time required by the County's funding partner(s), if any, whichever is greater, after the final payment and must allow the County or its authorized agents to examine the documents during this period and during the Contract Term. The Contractor must provide any requested documents to the County for examination within 15 days of the request, at the Contractor's expense. Should the County's examination reveal any overcharging by the Contractor, the Contractor must, within 30 days of County's request, reimburse the County for the overcharges and for the reasonable costs of the County's examination, including, but not limited to, the services of external audit firm and attorney's fees; or the County may deduct the overcharges and examination costs from any amount that the County owes to the Contractor. If the Contractor wishes to destroy or dispose of any records related to this Contract (including confidential records to which the County does not have ready access) within five years after the final payment, or such period of time required by the County's funding partner(s), if any, whichever is greater, the Contractor must give the County at least 30 days' notice and must not dispose of the documents if the County objects.

The Purchasing Agent may require the Contractor to demonstrate that it has the necessary facilities, ability, and financial resources to comply with the Contract and furnish the service, material or goods specified herein in a satisfactory manner at any time during the term of this Contract.

35.   ASSIGNMENT

The Contractor may not assign, transfer, convey or otherwise dispose of any award or any of its rights, obligations or interests under this Contract without the prior written consent of the County.

36.   **AMENDMENTS**

This Contract may not be modified except by written amendment executed by persons duly authorized to bind the Contractor and the County.

37.   **ARLINGTON COUNTY PURCHASING RESOLUTION AND COUNTY POLICIES**

Nothing in this Contract waives any provision of the Arlington County Purchasing Resolution, which is incorporated herein by reference, or any applicable County policy.

38.   **DISPUTE RESOLUTION**

All disputes arising under this Agreement or concerning its interpretation, whether involving law or fact and including but not limited to claims for additional work, compensation or time, and all claims for alleged breach of contract must be submitted in writing to the Project Officer as soon as the basis for the claim arises. In accordance with the Arlington County Purchasing Resolution, claims denied by the Project Officer may be submitted to the County Manager in writing no later than 60 days after the final payment. The time limit for a final written decision by the County Manager is 30 days. Procedures concerning contractual claims, disputes, administrative appeals and protests are contained in the Arlington County Purchasing Resolution. The Contractor must continue to work as scheduled pending a decision of the Project Officer, County Manager, County Board or a court of law.

39.   **APPLICABLE LAW, FORUM, VENUE AND JURISDICTION**

This Contract is governed in all respects by the laws of the Commonwealth of Virginia; and the jurisdiction, forum and venue for any litigation concerning the Contract or the Work is in the Circuit Court for Arlington County, Virginia, and in no other court.

40.   **ARBITRATION**

No claim arising under or related to this Contract may be subject to arbitration.

41.   **NONEXCLUSIVITY OF REMEDIES**

All remedies available to the County under this Contract are cumulative, and no remedy will be exclusive of any other at law or in equity.

42.   **NO WAIVER**

The failure to exercise a right provided for in this Contract will not be a subsequent waiver of the same right or of any other right.

43.   **SEVERABILITY**

The sections, paragraphs, clauses, sentences, and phrases of this Contract are severable; and if any section, paragraph, clause, sentence or phrase of this Contract is declared invalid by a court of competent jurisdiction, the rest of the Contract will remain in effect.

44.   **ATTORNEY'S FEES**

In the event that the County prevails in any legal action or proceeding brought by the County to enforce any provision of this Contract, the Contractor will pay the County's reasonable attorney's fees and expenses.

45.   **SURVIVAL OF TERMS**

In addition to any statement that a specific term or paragraph survives the expiration or termination of this Contract, the following sections also survive: INDEMNIFICATION; INTELLECTUAL PROPERTY

INDEMNIFICATION; RELATION TO COUNTY; OWNERSHIP OF WORK PRODUCT; AUDIT; DISPUTE RESOLUTION; APPLICABLE LAW AND JURISDICTION; ATTORNEY'S FEES, AND DATA SECURITY AND PROTECTION.

46. **HEADINGS**

The section headings in this Contract are inserted only for convenience and do not affect the substance of the Contract or limit the sections' scope.

47. **AMBIGUITIES**

The parties and their counsel have participated fully in the drafting of this Agreement; and any rule that ambiguities are to be resolved against the drafting party does not apply. The language in this Agreement is to be interpreted as to its plain meaning and not strictly for or against any party.

48. **NOTICES**

Unless otherwise provided in writing, all legal notices and other communications required by this Contract are deemed to have been given when either (a) delivered in person; (b) delivered by an agent, such as a delivery service; or (c) deposited in the United States mail, postage prepaid, certified or registered and addressed as follows:

> **TO THE CONTRACTOR**:
> Ryan Hickey, COO
> Eleven-x Incorporated
> 375 Hagey Blvd, Unit 311
> Waterloo, ON N2L 6R5
> Phone: +1 519-998-6164
> Email: ryan.hickey@eleven-x.com

> **TO THE COUNTY**:
> Melissa E. B. McMahon, Project Officer
> Arlington County, Virginia
> Department of Environmental Services – TE&O
> 2100 Clarendon Boulevard, Suite 900
> Arlington, Virginia 22201
> Phone: (703) 228-0651
> Email: mmcmahon@arlingtonva.us

> AND

> Dr. Sharon T. Lewis, LL.M, MPS, VCO, CPPB
> Purchasing Agent
> Arlington County, Virginia
> 2100 Clarendon Boulevard, Suite 500
> Arlington, Virginia 22201
> Phone: (703) 228-3294
> Email: slewis1@arlingtonva.us

TO COUNTY MANAGER'S OFFICE (FOR PROJECT CLAIMS):
Mark Schwartz, County Manager
Arlington County, Virginia
2100 Clarendon Boulevard, Suite 318
Arlington, Virginia 22201

49.   ARLINGTON COUNTY BUSINESS LICENSES
The Contractor must comply with the provisions of Chapter 11 ("Licenses") of the Arlington County Code, if applicable. For information on the provisions of that Chapter and its applicability to this Contract, the Contractor must contact the Arlington County Business License Division, Office of the Commissioner of the Revenue, 2100 Clarendon Blvd., Suite 200, Arlington, Virginia, 22201, telephone number (703) 228-3060, or e-mail business@arlingtonva.us.

50.   NON-DISCRIMINATION NOTICE
Arlington County does not discriminate against faith-based organizations.

51.   LIMITED ENGLISH PROFICIENCY
The Contractor must comply with Executive Order 13166, Title VI of the Civil Rights Act of 1964 and make reasonable efforts to ensure that as part of the services that it provides, adequate communication services, including interpretation and translation, are available to persons who have limited English proficiency. If such services are not included in the Contract's scope of work and pricing, the Contractor will use a County-contracted service provider, and the County will pay the fees.

52.   ACCESSIBILITY OF WEB SITE
If any work performed under this Contract results in the design, development or maintenance of or responsibility for the content or format of any County web sites or for the County's presence on third-party web sites, the Contractor must perform such work in compliance with ADA.

53.   ADA COMPLIANCE
The Contractor is solely responsible for its compliance with the ADA and must defend and hold the County harmless from any expense or liability arising from the Contractor's non-compliance. The Contractor also must respond promptly to and cooperate fully with all inquiries from the U.S. Department of Labor.

The Contractor's responsibilities related to ADA compliance include, but are not limited to, the following:
a.   Access to Programs, Services and Facilities: The Contractor must ensure that its programs, services and facilities are accessible to persons with disabilities. If a particular facility or program is not accessible, the Contractor must provide equivalent services in an accessible alternate location or manner.

b.   Effective Communication: Upon request, the Contractor, must provide appropriate communication aids and services so that qualified persons with disabilities can participate equally in the Contractor's programs, services and activities. Communication aids and services can include, but are not limited to, qualified sign language interpreters, Braille documents and other means of facilitating communications with people who have speech, hearing or vision impairments.

c.   Modifications to Policies and Procedures: The Contractor must modify its policies and procedures as necessary to ensure that people with disabilities have an equal opportunity to

enjoy the Contractor's programs, services and activities. For example, individuals' service animals must be allowed in the Contractor's offices or facilities, even if pets are generally prohibited.

d. <u>No Extra Charges</u>: The Contractor may not charge a person with a disability or any group of individuals with disabilities to cover the cost of providing aids or services or of reasonable modifications to policies and procedures.

54.   INSURANCE REQUIREMENTS

Before beginning work under the Contract or any extension, the Contractor must provide to the County Purchasing Agent a Certificate of Insurance indicating that the Contractor has in force at a minimum the coverage below. The Contractor must maintain this coverage until the completion of the Contract or as otherwise stated in the Contract Documents. All required insurance coverage must be acquired from insurers that are authorized to do business in the Commonwealth of Virginia, with a rating of "A-" or better and a financial size of "Class VII" or better in the latest edition of the A.M. Best Co. Guides.

a. <u>Workers Compensation</u> - Virginia statutory workers compensation (W/C) coverage, including Virginia benefits and employer's liability with limits of $500,000/500,000/500,000. The County will not accept W/C coverage issued by the Injured Worker's Insurance Fund, Towson, MD.

b. <u>Commercial General Liability</u> - $1,000,000 per occurrence, with $2,000,000 annual aggregate covering all premises and operations and including personal injury, completed operations, contractual liability, independent contractors, and products liability. The general aggregate limit must apply to this Contract. Evidence of contractual liability coverage must be typed on the certificate.

c. <u>Business Automobile Liability</u> - $1,000,000 combined single-limit (owned, non-owned and hired).

d. <u>Umbrella/Excess Liability</u> - $1,000,000 Injury, Property Damage, and Personal Injury.

e. <u>Cyber Insurance </u>- $3,000,000 per occurrence/aggregate.

f. <u>Crime Insurance</u> - $1,000,000 per occurrence<u>.</u>

g. <u>Additional Insured</u> – The County and its officers, elected and appointed officials, employees and agents must be listed as additional insureds on all policies except workers compensation and automotive and professional liability; and the additional insured endorsement must be typed on the certificate.

h. <u>Cancellation</u> - If there is a material change or reduction in or cancellation of any of the above coverages during the Contract Term, the Contractor must notify the Purchasing Agent immediately and must, with no lapse in coverage, obtain replacement coverage that is consistent with the terms of this Contract. Not having the required insurance throughout the Contract Term is grounds for termination of the Contract.

i. <u>Claims-Made Coverage</u> - Any "claims made" policy must remain in force, or the Contractor must obtain an extended reporting endorsement, until the applicable statute of limitations for any claims has expired.

j. <u>Contract Identification</u> - All insurance certificates must state this Contract's number and title.

The Contractor must disclose to the County the amount of any deductible or self-insurance component of any of the required policies. With the County's approval, the Contractor may satisfy its obligations under this section by self-insurance for all or any part of the insurance required, provided that the Contractor can demonstrate sufficient financial capacity. In order to do so, the Contractor must provide the County with its most recent actuarial report and a copy of its self-insurance resolution.

The County may request additional information to determine if the Contractor has the financial capacity to meet its obligations under a deductible and may require a lower deductible; that funds equal to the deductible be placed in escrow; a certificate of self-insurance; collateral; or another mechanism to guarantee the amount of the deductible and ensure protection for the County.

The County's acceptance or approval of any insurance will not relieve the Contractor from any liability or obligation imposed by the Contract Documents.

The Contractor is responsible for the Work and for all materials, tools, equipment, appliances and property used in connection with the Work. The Contractor assumes all risks for direct and indirect damage or injury to the property used or persons employed in connection with the Work and for of all damage or injury to any person or property, wherever located, resulting from any action, omission, commission or operation under the Contract or in connection in any way whatsoever with the Work. The Contractor's insurance shall be the primary non-contributory insurance for any work performed under this Contract.

The Contractor is as fully responsible to the County for the acts and omissions of its subcontractors and of persons employed by them as it is for acts and omissions of persons whom the Contractor employs directly.

WITNESS these signatures:

THE COUNTY BOARD OF ARLINGTON
COUNTY, VIRGINIA

ELEVEN-X US INCORPORATED

AUTHORIZED
SIGNATURE: _Dr. Sharon T. Lewis_
89B86B1AD301462...

NAME: Dr. Sharon T. Lewis
_____

TITLE: Purchasing Agent
_____

DATE: 10/13/2022
_____

AUTHORIZED
SIGNATURE: _Ryan Hickey_
5D117363A823473...

NAME: Ryan Hickey
_____

TITLE: COO
_____

DATE: 9/22/2022
_____

EXHIBIT A
SCOPE OF WORK

As detailed below, the Contractor shall provide all equipment, installation, software, hardware, infrastructure such as network, security, training, shipping, transportation, and services, including but not limited to public engagement about and education on the system. The Contractor will be responsible for reviewing and understanding IIM-OD-21-02 Systems Engineering and Architecture Compliance Rule 940 and ensuring the project satisfies Federal Highway Administration (FHWA) Rule 940 requirements, including coordinating and provision of information to VDOT at direction of Arlington County.

The project is intended to be conducted on metered blocks in the County's two Metrorail corridors (Rosslyn-Ballston and Pentagon City/Crystal City; see Exhibit F: Project Area Map), as well as in three County-owned, off-street parking facilities within those corridors that are regulated using parking meters. The County, at its sole discretion, may reduce the geographic scope of the proposed project. Most meters and related spaces in the two Metrorail corridors are in County-owned right-of-way, but in agreement with VDOT, the County owns and maintains parking meters on some segments of VDOT-owned roadway.

The project area contains 611 active, metered block faces with:
1. 4,563 metered parking spaces, including:
    a. 292 parking spaces served by single-space meters (including 129 ADA-accessible meters), currently provided by IPS Group (https://www.ipsgroupinc.com/; models M3 and M5)
    b. 180 parking spaces served by 90 single-space meters where two meters share one pole, including 19 spaces served by 15 ADA-accessible meters in this configuration, currently provided by IPS Group (models M3 and M5)
    c. 4,091 parking spaces served by 608 multi-space meters (including 36 tour bus parking spaces served by 10 multi-space meters) currently provided by Flowbird/Cale (https://www.flowbird.group/smartcity/us/; models CWT, CWT-S4-Touch Stealth, and MP104). All multi-space meters are currently configured for pay-and-display; spaces are not demarcated or "striped." Space count is calculated using a 20-foot length for each space.
2. 641 pay-by-phone zones serve these 4,563 spaces. Pay-by-phone service is currently provided by ParkMobile (https://parkmobile.io/). The number of pay-by-phone zones does not match the number of block faces because some zones extend beyond one physical block face while some blocks contain multiple zones to serve separately spaces reserved for drivers holding disabled license plates and placards.

The project area contains three off-street, paid-parking facilities regulated by parking meters at the following locations:

1. 177 spaces, including 8 ADA-accessible spaces, at the County-owned Courthouse Plaza surface parking lot (located at the Corner of N Courthouse Road and 15th Street N).
2. 180 spaces, including 8 ADA-accessible spaces, at the County-owned Long Bridge Park parking lot (located at Long Bridge Drive northeast of 6th St S).
3. 38 spaces, including 1 ADA-accessible space, at the County-owned Virginia Highlands Park (located at S Hayes St between 18th St S and 15th St S).

Within the project area, most meters are currently enforced between the hours of 8 AM and 8 PM, Monday through Saturday, except County holidays. All metered spaces currently have time limits during

the hours of restriction, which vary between 30 minutes, 1 hour, 2 hours, 3 hours, 4 hours, and 12 hours. All meters in the project area are currently set to $1.50 per hour or $1.75 per hour. Current rates may not exceed $1.75 per hour at meters with time limits of 4 hours or less, and they may not exceed $1.50 at meters with 12-hour time limits.

Holders of Department of Motor Vehicles (DMV)-issued disabled placards and license plates may park for twice the length of the posted time limit at standard meters, though holders of these placards and license plates still must pay the posted parking rate.

The hourly rate for tour bus spaces is currently $3 per hour, and payment at tour bus spaces is required 24 hours per day, 7 days per week. Time limits for tour-bus meters vary; some allow for short-term parking up to 2 or 3 hours during daytime hours with no overnight time limit; others allow for 2-hour parking 24 hours per day, 7 days per week; and others have no time limit.

The Contractor will be responsible for:

1. **Project Management, Communication, and Coordination**
   The Contractor shall:

   a. designate a Project Manager who will be the Contractor's primary contact for the County. This individual will be responsible for the performance and deliverables of this section, the Contractor team's general internal coordination, and ensuring that the Contractor team responds to County and evaluation contractor questions and requests in a timely manner.

   b. participate in a project kick-off meeting, propose to the County an appropriate schedule of recurring routine project update meetings, and attend quarterly interdepartmental meetings, as well as other meetings that the County or Contractor deems necessary in order to complete the work.

   c. create and maintain a detailed plan for the project over the project term that includes management of scope, cost, quality, resources, communications, and risk. The detailed plan should describe:

      - the tasks and sub-tasks to be completed,
      - the entity responsible for each sub-task,
      - the time period over which each sub-task is to be completed,
      - the budget allocated to each sub-task, and
      - any other elements that the County or Contractor believes are necessary to describe how, when, and by whom the work and project will be completed.

   d. prepare project plans that outline the key milestones and deliverables to design, provide, install, and operate the hardware and software systems and sub-systems. These plans shall include both initial installation, programming, and testing and operations over the project period.

   e. use a County-hosted Microsoft SharePoint site, Teams site, or successor as the method for transmitting digital deliverables, the main repository for project documents, and the

place for other file transfers with the County. The Contractor will obtain the accounts or login credentials necessary for all project staff to be able to access this site. The Contractor will produce and share digital files in formats mutually agreed to by the County and the Contractor.

The Contractor's project management, reporting, and invoicing procedures shall meet the requirements of the Virginia Department of Transportation Locally Administered Projects program, both current and as amended.

The Contractor shall utilize Exhibit H, Initial Project Schedule, as a starting point for reference and refinement during the execution of Task 1.

Project Management, Communication, and Coordination Deliverables
- A project management plan frequently updated to reflect any changes to the project.
- Timely communication with the County and evaluation contractor.
- Notes taken from all project meetings, including issues or items discussed and decisions made, or guidance given, by the County.
- Monthly Progress Reports that accompany each monthly invoice, which should describe the progress made, note any project issues and provide status of project schedule.
- Timely communication with the evaluation contractor.

2. **Public Engagement**
   The Contractor should:
   a. use its experience and innovation to create, in collaboration with the County, a plan for engaging the public throughout the project. This engagement plan must follow the guidance set out in the County's Six-Step Public Engagement Guide for Capital Projects and any public engagement documents or policies developed before work begins.

   The engagement plan should meet the following goals:
   - Engagement practices are equitable and inclusive.
   - Equity and inclusion lenses are used in the analysis of and report on public feedback.
   - System planning incorporates public input as appropriate.
   - Members of the public understand why the County is implementing the Intelligent Transportation System (ITS) and the system's intended benefits and burdens, as well as who is impacted by the system.
   - Members of the public have a basic understanding of the hardware and software that make up the ITS, as well as a basic understanding of how parking rates are set.
   - Members of the public see the rate-setting process as fair and transparent.
   - Parkers understand how to access information from the traveler-information system.
   - Parkers understand where and when variable pricing will begin and when the traveler-information system will be available.
   - Parkers understand how to pay for parking in a zone with performance parking.

- The County understands how the public perceives performance parking, as well as the public's satisfaction with performance parking as implemented in Arlington over time.
- Developers of third-party trip-planning/traveler-information software are aware of the ITS's traveler-information system and input from such developers is integrated in the system planning as appropriate.

b. In creating the engagement plan, refer to the timeline(s) developed in the System Planning and Design task so that engagement is timed with design, hardware and software installation, testing, and deployment in such a way that the public is properly informed of project progress and public understanding of the project is maximized.

The County anticipates the public engagement plan will need to segment stakeholders into the following, broad groups:

- Parkers, or those who park at paid, on-street spaces in the project area.
- Owners, employees, and managers of businesses or organizations that operate along block faces where the ITS is to be installed, including, but not limited to, freight, delivery, and ride-hailing companies.
- Residents of the County who do not utilize paid parking in the project area, but who are interested in County transportation policy and projects or who may benefit indirectly from the project.
- Developers of trip-planning/traveler-information applications and software.

c. use its experience and innovation to identify other stakeholder groups and/or further segment the groups identified above, as necessary.

The engagement plan should describe:
- the drafting, revision, and overall role of written materials, visual materials or graphics, and sound recordings or video recordings throughout the duration of the project and in languages that the County and Contractor deem appropriate for the intended audiences, including—at a minimum—English and Spanish.

- the need for and provision of any goods, equipment, software, and services not otherwise readily available to the County for the purpose of supporting events (in-person or virtual) or other elements of the engagement plan.

d. provide knowledgeable staff to present technical information to and answer questions from the County Board and County Advisory Commissions, to augment County staff hosting events (in-person or virtual) and to support various elements of the engagement plan as needed.

An acceptable solution should offer simultaneous or consecutive interpretation services in the languages that the County and the Contractor deem appropriate at any events (in-person or virtual) hosted as part of the engagement plan and translation into English of any written and transcribed oral comments or questions received from the public in other languages.

Public Engagement Deliverables
- A written public engagement plan that describes the strategies that the County and the Contractor will employ to meet the public-engagement goals listed above. The plan should include:
  - o Schedules for deploying the public-engagement strategies with reference to schedules for other tasks.
  - o Descriptions of how the plan's strategies will maximize engagement with traditionally hard-to-reach groups, including, but not limited to, those with low incomes, those with limited English proficiency, and those who identify as belonging to ethnic and racial minorities.
  - o Descriptions of which party (the County or the Contractor) will be responsible for carrying out each element of the engagement plan.
- All text, video, photos, sound recordings, illustrations, and other materials to support the project including in presentations to Advisory Commissions, the County Board, and other members of the public, at the time of creation. The Contractor will provide this content in a mutually agreed upon, digital format so that the County may edit and re-use this content.
- All notes and summaries of events held as part of the engagement plan, including, but not limited to, comments and questions received from the public.
- Support with content design and review for informational page(s) that may be hosted on the County website.

3. System Planning and Design
The system design shall meet or exceed the minimum system requirements described in the Attachment A - Table of Conformance.

The Contractor should:
a. identify and understand all existing systems, sub-systems, and data sets provided by the County and other County vendors with which the ITS will interface. The Contractor will be responsible for validating existing data sets. If the Contractor finds any existing systems, sub-systems, and data sets are not suitable for integration with the ITS in their current form, the Contractor will identify or develop solutions for making these systems, sub-systems, and data sets suitable for integration or propose alternative systems, sub-systems, and data sets.

   The system design should include any sub-systems or steps taken to secure and protect the ITS and any County data generated by the ITS.

b. prepare high-level and detailed system designs for County acceptance and approval, to include, but not be limited to, such elements as business rules, system architecture, software modules, user interfaces, system interfaces, and data inputs.

   The system design shall include the pricing structure, pricing rules or logic, and method or programming for calculating parking rates based on the parking-occupancy/vacancy data set.

c. consult with the County stakeholders throughout system planning and design to ensure that the Contractor's plans and designs meet the needs of these stakeholders while also achieving the overall project goals and staying within the overall project budget. The Contractor should conduct any interviews, focus groups, workshops, or other forms of communication necessary

to understand County Government stakeholders' needs and requirements by phone, online, or in person at County facilities, as appropriate.

d. consult with the County stakeholders and the evaluation contractor during this task to ensure that the Contractor's plans and designs will result in a system that generates the data necessary to evaluate the program's outcomes using the metrics determined by the County and the evaluation contractor with input from the Contractor. The Contractor should ensure that the plans and designs will result in a system that generates these data in a format and level of detail, granularity, or disaggregation necessary for the evaluation contractor and the County to perform and report on the evaluation.

The traveler-information-system design will incorporate input from third-party trip-planning/traveler-information software developers as the County and Contractor decide is appropriate.

The system design should incorporate public input as the County and Contractor decide is appropriate.

e. collaborate with the County to develop a set of performance metrics that the system will meet or exceed. These performance metrics are for the ITS itself and should not be confused with the metrics used to measure the program's outcomes as discussed above. These performance metrics will include, but will not be limited to:

1. Uptime for each of the hardware and software elements of the ITS
2. Accuracy of the real-time feed of parking-occupancy/vacancy data as validated by other data-collection methods included in the system design process, County, staff input, or other validation method specified by the County
3. Latency/timeliness of data in the occupancy/vacancy data feed
4. The volume of transactions and requests that the ITS can process at one time

f. assess the benefits and burdens of the proposed system on the community and how those benefits and burdens might vary between racial and income groups. Wherever possible, the Contractor will include strategies designed to eliminate, reduce, and prevent disparities, as well as concrete, specific mitigation actions for situations where disparities cannot be eliminated, prevented, or reduced. The Contractor will also recommend mitigation actions outside of the scope of the ITS for the County to consider separately.

The Contractor will work with the County to understand the County's current authority to charge for parking as governed by Section 14.2, Subdivision D, of the Arlington County Code. The Contractor will assist the County in identifying any revisions to the County Code necessary to implement the proposed ITS. If the County finds that these revisions are not possible under the authority granted to the County by the Commonwealth of Virginia or if the County Board does not approve the County Code changes necessary to implement the proposed ITS, then the Contractor will revise the design in such a way that the County Code changes necessary to implement the revised design are possible under the authority granted to the County by the Commonwealth of Virginia and such that the County Board will approve these changes.

The County will provide the Contractor the necessary information, assistance, and resources for the following items

- Line painting requirements
- Help with selecting sites for Gateway installations
- Help with selecting sites for dynamic messaging display installations
- Roadwork schedules
- Towing and traffic control procedures
- Messaging to citizens and notification of closures

System Planning and Design Deliverables

- The Contractor shall provide written descriptions of the project plans and detailed system design for County and VDOT review, revision, and acceptance before the Contractor begins provision, delivery, installation, operation, and maintenance of the ITS.
  - The Contractor shall document system features considered but not incorporated into the final system plans or design due to cost and schedule constraints or limits in currently available technology so that the County may consider incorporating these features into the system at a future date. Documenting project plans shall include, but not be limited to:
    - Concept of operations plan
    - Business rules document
    - High-level design document
    - System validation plan, to include performance metrics, validation frequency, roles and responsibilities, and consequences if performance metrics are not met
    - One or more system requirements documents, including, but not limited to, a requirements traceability matrix or matrices
    - System acceptance plan
    - Detailed design document
    - Software/hardware development plans
    - Supporting documentation, such as training manuals, user manuals, maintenance manuals, etc.
    - A combination of these types of documents, technical memoranda, or similar, if they meet the goals of this task
- The Contractor shall prepare these descriptions using language that both stakeholders with general knowledge of curb management and technical stakeholders—such as sub-contractors—can understand.
- The Contractor shall prepare these written descriptions in such a way that the reader can understand how detailed technical requirements and specifications follow from overall project goals and intended outcomes, stakeholder requirements, and public input.
- The Contractor shall include in these written descriptions, as appropriate for each document type, detailed timelines for the plans' tasks and sub-tasks.
- The Contractor shall update these plans as changes require so that the plans remain accurate in describing what is to be installed and operated and how the work will be undertaken.
- The Contractor shall prepare a stand-alone document that describes how the system will generate the data required for the evaluation contractor and County to measure program outcomes.

- The Contractor shall prepare a stand-alone Equity document that:
  - o describes how the system eliminates, reduces, and prevents disparities between racial and income groups.
  - o describes specific measures incorporated into the ITS that will mitigate disparities.
  - o recommends policies, procedures, and/or programs that the County could implement—outside of the scope of this project and the ITS—to mitigate disparities that cannot be eliminated, prevented, or reduced through the project.

4. **Provide, Install, and Maintain ITS Hardware**
The Contractor shall:

a. provide an end-to-end solution inclusive of permits, equipment, power, and network, with additional details provided in bullets below.

b. provide, install and test all equipment that is part of the ITS. The Contractor will be responsible for the hardware installation, coordination with other vendors, and other activities as necessary to integrate the County's parking-payment and enforcement systems, including but not limited to:
   - i. Line painting of individual parking spaces based on an agreed specification from the County.
   - ii. Installation of eleven-x parking sensors in each stall using the inground installation method by which a hole is cored in the center of the stall and the sensor epoxied into the hole.
   - iii. Gateway installation on appropriate infrastructure to support communication with the sensors. Preferred locations are County assets such as buildings and streetlights.

c. provide, install and test up to 10 dynamic messaging displays that notify drivers in real-time about parking availability, along with the associated parking rates.

d. be responsible for (re-)installing decals and stickers necessary to communicate to parkers the adjustments to meter rates.

e. be responsible, during the project period, for all emergency and regular maintenance, replacement, and repair to equipment installed as part of the ITS. The Contractor will coordinate this work with designated County personnel to ensure optimal working order of the ITS.

f. coordinate with the relevant County teams and departments, as well as other County vendors, on all installation and maintenance work, especially work that requires touching, altering or accessing County assets and systems.

g. be responsible for obtaining and paying for any and all permits or inspections necessary for installing any hardware required by the County-approved system plan.

h. prepare any maintenance of traffic plans required to conduct installation work and provide the goods, services, and personnel necessary to implement those maintenance of traffic plans.

i. coordinate with the County and the County's parking-enforcement, as well as parking-payment and other hardware vendors, to retrofit, replace, and/or reprogram enforcement, payment, and other hardware, as necessary, so that any activities relying on those systems may continue without interruption as a result of ITS hardware installation and maintenance.

j. coordinate with the County to ensure that all equipment installation, removal, and modification is entered or catalogued in the County's Cartegraph or successor asset-management system during the development period so that the County may keep an accurate, up-to-date inventory of the system's assets. The County may provide access to the asset-management system and require the Contractor to enter or catalogue equipment installation, removal, and modification.

k. be responsible for updating security patching associated with all hardware within one day of release for critical patches (Common Vulnerabilities and Exposures (CVE) scores higher than 8.0), within three days for patches of high level (CVE score in the 6-8 range), within one month for medium and low level (CVE score of 4-6 and 4-1, respectively), or not required if, upon approval of written justification for why patching is not being resolved, for low levels. Information on CVE is referenced at https://nvd.nist.gov.

l. be responsible for (re-)moving or re-installing equipment if the County decides to re-allocate curb space to a use other than paid parking on a block face that is part of the project.

m. be responsible for coordinating with the County in order to minimize damage to ITS equipment as a result of paving, pavement-marking, and other activities. The Contractor shall repair or replace ITS equipment damaged or destroyed by paving, pavement-marking, and other activities. The Contractor is not responsible for the removal and disposal of existing parking sensors that are destroyed as part of a repaving or roadway construction process.

n. not be responsible for meter coin collection; rather the Contractor will work with the County's Parking Meter team to ensure that the Contractor's work does not violate County policies and procedures for collecting and securing coins.

Upon installation, all hardware, equipment, decals, signs, markers, pavement markings, or other physical assets placed as part of the project will become the property of the County. The Contractor's obligations for installing, (re-)moving, repairing, or otherwise altering the physical assets placed as part of the project will not limit the County's ability to install, move, repair, or otherwise alter the physical assets placed as part of the project nor limit the County's ability to install, move, repair, or otherwise alter other physical assets in the project area.

Provide, Install, and Maintain ITS Hardware Deliverables
- installation of all equipment described in the system plans and designs necessary to support the ITS.

- a regularly updated and maintained register of all hardware, its purpose, detailed versioning, installation date, and expected lifespan, and other attributes required to maintain optimal working order of the ITS in the County's Cartegraph or successor asset-management system.
- tracking sheet of any repair, replacement, or alteration to the hardware necessary to meet a set of performance metrics determined during System Planning and Design.
- decals and stickers used to communicate about the performance parking program, which are to be updated on a periodic basis as determined in the System Planning and Design phase.

5. **Develop, Install and Maintain ITS Software**

The Contractor shall:

a. provide, develop, program, patch, test, deploy, and maintain all software that is part of the ITS.

b. develop a consolidated dashboard experience as defined in the System Design and Planning phase.

c. develop a mechanism to push price updates to the meter vendors either automatically or by publishing the information in formats such as csv, xlsx, etc.

d. modify or re-program the ITS software, as necessary, to improve the software's ability to meet the project's goals based on experience gained in field testing, deployment, changes observed in the parking occupancy/vacancy data set following rate changes, and in order to fulfill requests from the County.

e. coordinate with the County and the County's parking-enforcement, parking-payment, and other software vendors to retrofit, replace, and/or reprogram enforcement, payment, and other software, as necessary, so that payment, enforcement, and other activities that rely on those software systems may continue without interruption throughout ITS software installation, programming, updating, patching, and other maintenance.

f. troubleshoot, re-program, update, and patch software and coordinate with the County and all other County vendors to ensure that the ITS software is able to transmit to and receive data from relevant systems and sub-systems owned and maintained by the County and other County vendors.

Administration of patching and updates of servers must include, but will not be limited to:
1. active research and monitoring of patches impacting all servers and software relied upon by the System
2. testing before deployment of any patches or update installations
3. debugging and troubleshooting any issues related to patching and updates of servers.

Develop, Install, and Maintain ITS Software Deliverables
- All computer code, interfaces, hosting, and other services necessary to provide a County-approved ITS that meets the minimum system requirements described above and in the Table of Conformance, as well as any further requirements identified as part of the System Planning and Design task.

- Tracking sheet of any repair, reprogramming, patching, or updating to the computer code necessary for proper functioning, as defined by a set of performance metrics determined during System Planning and Design; for improving the software's ability to meet the project's goals based on experience gained in field-testing, deployment, changes observed in the parking occupancy/vacancy data set following rate changes; and for fulfilling requests from the County.
- Recommendation on parking-meter rates for individual block faces and different times of day based on the parking-occupancy/vacancy data set at a frequency determined with the County, either as defined during the System Planning and Design task or updated as necessary.
- Transmission of any parking-meter-rate changes to the relevant payment and enforcement equipment and software systems.

6. **Develop Public-Facing Parking Guidance Application**

The County may, at its option, engage the Contractor to expand Tasks 3. System Planning and Design and 5. Develop, Install, and Maintain ITS Software to include the development, operation, and maintenance of a public- or consumer-facing software application or mobile-friendly web site that conveys information from the traveler information system in a way that helps parkers understand their options for parking on the street in the project area.

The County may require that the Contractor work with Arlington County DTS to incorporate this functionality into an Arlington County application, such as My Arlington, or the County may require that the Contractor develop this functionality as a stand-alone application. The County may elect to host the application on its own systems or require that the Contractor host the application over the duration of the project.

As part of Task 3, the Contractor shall work with the County to identify the factors that will inform the County's decision whether to engage the Contractor on this task. The Contractor will work with the County to identify the point(s) in the project schedule at which the County must decide whether to engage the Contractor on this task to prevent delays to the overall project schedule.

Develop Public-Facing Parking Guidance Application Deliverables

All computer codes, interfaces, and services necessary to provide a functional customer-facing software application or functionality in a County-developed software application that accurately describes parking-meter rates as well as real-time or near-real-time parking occupancy/vacancy by block face.

7. **Transition Planning**

The Contractor shall provide a written description of the recommended transition plan using innovation and its expertise to determine the best way to document this plan. The plan would include, but is not limited to a:

a. budget spreadsheet in Excel format that will allow the County to re-estimate annual operating and maintenance capital budgets using different cost assumptions.

b. estimation of annual operating and maintenance budgets for the ITS deployed as part of the project. If the Contractor offers multiple scenarios for who carries out different tasks and

subtasks, then the Contractor will provide annual operating and maintenance capital budget estimates for each scenario.

c.   updated version of the document generated during System Planning and Design that describes system features considered but not incorporated into the final system plans or design.

d.   documentation of the tasks and sub-tasks needed to operate and maintain the system as implemented, including recommendations as to which parties should be responsible for each task and sub-task. The plan will identify specific County departments or bureaus suitable to carry out tasks and sub-tasks as well as contractors suitable to carry out tasks and sub-tasks should the County decide not to carry them out. The plan should not identify specific firms or organizations to carry out tasks and sub-tasks but should instead identify types of firms or organizations.

e.   description of the tasks and sub-tasks required to expand the system to new service areas and to incorporate different kinds of curb uses.

f.   standard-operating-procedure documents and business rules.

g.   installation diagram templates and standard design details for use by the County.

Transition Planning Deliverables
The Contractor shall develop and provide data models, software documentation, standard operating procedures, user manuals, any other documents, and training necessary to allow County staff and others to operate and maintain the ITS, including:
- API documentation
  - o   Purpose/overview of functionality
  - o   URL parameters (e.g., URL file format, query method, request and response parameter field names, type, length, description)
  - o   Request parameter code
  - o   Response parameter code
  - o   Error codes
- Data Models
  - o   Data sources
  - o   Relationship between data sources
  - o   Data tables and content
  - o   Relationship between data tables
- User Manuals and Standard Operating Procedures
  - o   Stakeholder differentiated
  - o   Overview of system functions and features
  - o   How to guide (explain how user navigates, operates, manipulates, monitors, and/or maintains systems/devices)

- Training
  - Stakeholder differentiated
  - Approach/Type (on-site/in-field, in-person/remote; small group/individual)
  - Duration/Schedules
  - Materials (e.g., descriptions, screenshots, summarized information, videos, tips and recommended usage guideline)
  - Test Plan (completion check, practice sessions)

Tasks 1 through 7 (above) are to be completed as part of the initial development period; Task 8 would be completed at the County's option as part of the operations and maintenance period.

8. **On-Going Maintenance and Operation of the ITS Hardware and Software**
   The Contractor shall:
   a. be responsible for maintenance and operational aspects and related deliverables outlined in Tasks 4, 5 and 6 of this scope

   b. be responsible for sensor installation and line painting in the event of routine repaving or construction.

   c. be responsible for the replacement of defective sensors, including the removal and disposal of existing sensors followed by the installation of new sensors. The defective sensors may be submitted to the Contractor's return material authorization (RMA) process and may be covered under warranty.

   d. modify, replace, re-program, test, update, enhance, and expand the ITS hardware and software, as necessary, to:
      1. improve the hardware's and software's ability to meet the project's goals based on experience gained in field testing, deployment, changes observed in the parking occupancy/vacancy data set after rate changes.
      2. expand and enhance the ITS to include additional functions and features, including, but not limited to:
         i) Performance-based or dynamic management of other curb uses, such as loading/unloading zones, passenger pick-up/drop-off zones, taxi stands, parking areas or "corrals" for shared-mobility devices.
         ii) Incorporating parking occupancy data from off-street parking facilities operated by the County and others.
         iii) Provide enforcement functionality or supportive services ("enforcement module"), as described in the cost proposal).
         iv) Integrating with additional dynamic messaging signs.

   e. If an equipment or software manufacturer or vendor (including the Contractor itself) discontinues producing, selling, or supporting equipment or software that is part of the ITS, the Contractor shall recommend replacement equipment or software for County approval. Upon County approval, the Contractor shall remove or uninstall the equipment or software that is no longer available or supported and then provide, install, and integrate the replacement equipment or software.

Once the project is underway, the County may separately negotiate prices for goods and services falling under sections d and e above as necessary, if not already called out in Exhibit B Contract Pricing. The County may elect to engage the Contractor on some or all the sub-tasks described in this task.

Basic Functions
Table of Conformance

1				
1.1	The ITS will create a real-time or near-real-time feed of parking-occupancy and vacancy data in a cost-effective fashion. To create the occupancy/vacancy data feed, the ITS will process data inputs from the ITS hardware and other sources.	X		The ITS creates a real-time feed of parking and occupancy data in a cost effective manner using eleven-x SPS-X Stall Sensors. Each parking stall will be individually montiored in real-time, 24/7 for parking status
1.2	The County is aware that other projects of this type have used a combination of field data collection on block faces with paid parking, meter-transaction and pay-by-cell-transaction data, samples of parking occupancy/vacancy data collected through other means, parking-citation data, and so on. The Contractor must use the best available sources of data to develop the ITS, and must consider and minimize the near-and long-term burden of managing selected data sources as inputs to the system.	X		The occupancy and vacancy data feeds are fully automated through the eleven-x sensors and ITS technology which require no field data collection on block faces for a minimum of the next (10) years. In addition, stall occupancy is much more accurate then transaction data alone, which is not representative of the actual utilization of spaces due to various factors such as technical issues, users not paying, or leaving earlier than paid time.
1.3	The feed of parking-occupancy/vacancy will be the primary input for two computing sub-systems:			
1.3.1	A system that will provide traveler information to the public that presents simplified information on current parking occupancy/vacancy and prices on each block face with on-street parking.	X		As parking rates are updated at the meter and payment application level, this information is automatically sent to a public facing platform for visualization and to assist drivers in making informed decisions. This dashboard is available through a web browser and will require no login or app to download. The Curb Viewer tool is a dynamic map-based visualization tool that allows municipalities to easily navigate and view their existing curbside regulations in a user-friendly interface. Both municipal staff and the general public can view any regulations that apply along any curb segment along with other key information such as the price of parking, maximum duration, and what time the restriction will change. The Solution also includes dynamic digital signage which is installed on -street to ensure parking occupancy and vacancy information, along with the associated rates are provided to drivers who do not use smartphones.
1.3.1.1	The system will publish a publicly available real-time or near-real-time data feed that third-party software developers will be able to incorporate into trip-planning and guidance applications, through an application programming interface (API) or other County-approved protocol. Required for the approved protocol is a data format schema and detailed documentation for use by potential app developers.	X		The one of the strengths of the SaaS systems proposed is that it is easy to provide data to third party systems. At this stage, there are three obvious options that could be pursed; Use existing APIs provided by our systems, provide the data through the Arlington Open Data API, or create custom API. The proposed systems provide wide area of APIs. The eleven-x system API provides real-time occupancy data generated by our sensors through existing APIs. The Curbside system provide APIs provide information on the pricing and occupancy. All APIs are fully documented and can be distributed. The County would control access to these APIs through the dashboard and grant access to the desired 3rd party developers by issuing them API tokens. Arlington has an Open Data API. Real-time time or historical data could be provided through this existing system. Open data has the benefits of driving innovation as well as providing inclusive and equitable access to data. (https://docs.data.arlingtonva.us/resources/#api). Access to the data would be openly advertised on the site. For this project, the Curb Rules API will be used solely for passing real time parking supply, demand, and rate information between CurbIQ, eleven-x sensors, the dynamic pricing engine, and the third-party payment providers. However, it is not limited to only disseminating this kind of data. Any information about the curbside, including searching by specific regulation, address, or curb block, can be set up using the many customizable queries of Curb Rules API. Disseminating Data to Third Party Developers In addition to the payment providers and pricing engine, there may be existing County software or third parties that want to access the most up to date parking information. Our Curb Rules API provides a solution to this by letting users query the latest parking information on location, time and regulation parameters. This API can easily be set up and configured based on the County's requirements. Lastly, through the engage activities, third party developers may provide information on custom API or data delivery mechanisms. At the County's discretion, these could be developed as part of the program. In the proposed state, the Performance Parking Solution system will publish a publicly available real-time or near-real-time data feed that third-party software developers will be able to incorporate into trip-planning and guidance applications, through an application programming interface (API). Required for the approved protocol is a data format schema and detailed documentation for use by potential app developers.
1.3.1.2	Provide real-time, or near-real-time, publicly available information on current parking availability and pricing through a map interface on the County's website in both English and Spanish.	X		The performance parking solution consortium includes this ability and has completed similar services in the past. An example of a real time web based parking map with availability can be seen here: www.oakvilleparking.eleven-x.com
1.3.2	A "pricing engine" defined as a combination of BI software, County personnel, and Smarking consulting that will periodically recommend parking-meter rates for individual block faces and different times of day based on occupancy/vacancy data.	X		Smarking - Business Intelligence will provide rate and occupancy analytics that can be used to provide pricing recommendations based on times of day and occupancy/vacancy data. This will have some human analytics element
1.3.2.1	The engine will be programmed to seek an equilibrium set of prices where parking occupancy/vacancy on each block face reaches a pre-determined occupancy/vacancy target or target range to be used in the periodic pricing recommendation	X		Smarking - Dynamic pricing is not practical at this time because people can't plan for this. Smarking does have a machine learning based algorithm called Automated Yield Management that seeks equilibrium set of prices, although it is not currently integrated with IPS, Flowbird, or ParkMobile. Smarking BI can provide demand based pricing analytics and can set up occupancy targets to provide automatic alerts when a certain occupancy/vacancy threshold is reached
1.3.2.2	Blocks with occupancy/vacancy below the target or target range over a reference period will have rates decreased, while blocks with occupancy/vacancy above the target or target range over the same reference period will have rates increased.	X		Smarking - Business Intelligence will identify these target ranges over the time period; the rate change will have to be made at the Vendor Parking system (IPS, Flowbird, ParkMobile) level. Smarking BI can provide demand based pricing analytics and can set up occupancy targets to provide automatic alerts when a certain occupancy/vacancy threshold is reached
1.3.2.3	The pricing engine will periodically recommend parking-meter rates for individual block faces and different times of day based on the parking-occupancy/vacancy data set.	X		Smarking - a dedicated account manager will be assigned to Arlington County and provide quarterly business reviews and rate recommendations
1.3.2.4	The Contractor will work with the County to determine the frequency with which new parking-meter-rate recommendations are made as part of the System Planning and Design task.	X		Smarking - a dedicated account manager will be assigned to Arlington County and provide quarterly business reviews and rate recommendations
1.3.2.5	The pricing engine will be built so that it can recommend different sets of parking-meter rates for standard parking spaces, spaces reserved for those with disabled plates or placards, spaces reserved for tour buses, and other classes of parking spaces as determined during system planning.	X		As the occupancy and vacancy data feeds are based on individual SPS-X stall sensors, which are capable of idnefitying between standard parking spaces, reserved spaces or other classes of parking including accessible stalls. The performacne parking and business intelligence tool will be able to take in all the unique identifiers captured from the stall sensor data, in addition to the payment data from Flowbird, and ParkMobile .
1.3.2.6	The ITS will be capable of automatically transmitting the recommended rates to the County's meters, pay-by-cell service, and in-vehicle parking regulator service as a batch or in such a way that individual meters, pay-by-cell zones, and parking-regulator zones need not be programmed individually. However, the system will be developed and deployed such that the County, the Contractor, and others with necessary permissions may program rates for individual meters, pay-by-cell zones, and parking-regulator zones, or otherwise override the recommended rates from the ITS.	X		Automated Dissemination of Parking Rate Data: To streamline the process of passing on updated parking rate data, regardless of whether it is through published Curb Manager changes or directly from the pricing engine, CurbIQ's Curb Rules API will be used. Curb Rules API, based off the Curb Data Specification (CDS) standard by Open Mobility Foundation, which CurbIQ is part of the working group for, is an API that is used to disseminate both supply and demand curbside information to third parties, such as payment apps and smart meters. Although typically set up as a pull API, where mobility providers query for the latest curbside information based on location and time inputs, Curb Rules API can also be configured as a push API to automatically send updated curbside information (such as parking rates) to mobility providers as soon as they come into effect. CDS is used as the underlying specification for Curb Rules API as it is quickly becoming the emerging industry standard for sharing curbside and parking information; it provides a simple structure with clear queries to disseminate relevant parking data. The team will likely set up a customized query for Curb Rules API that specifically shares parking rate data, but this will ultimately be decided during the System Planning and Design stage when talking with parking payment and meter companies. Automatied updates of rates to ITS equipment in the field is dependant on the existing equipment to have connectivity and software that will accept remote updates. Updated pricing can be published in CSV, spreadsheet or other formats.
1.3.3	The County may, at its option, engage the Contractor to develop a public or consumer-facing software application or mobile-friendly web site that conveys information from the traveler information system in a way that helps parkers understand their options for parking on street in the project area.	X		As parking rates are updated at the meter and payment application level, this information is automatically sent to a public facing platform for visualization and to assist drivers in making informed decisions. IBI Group will utilize their Curb Viewer Tool developed under their suite of solutions for CurbIQTM. Public Facing Curb Viewer Display: The Curb Viewer tool is a dynamic map-based visualization tool that allows municipalities to easily navigate and view their existing curbside regulations in a user-friendly interface. Both municipal staff and the general public can view any regulations that apply along any curb segment along with other key information such as the price of parking, maximum duration, and what time the restriction will change. Information is not limited to the curbside – transportation infrastructure, assets, and mobility options can also be displayed. There is also a version of the Curb Viewer tool for the general public called Public Facing Curb Viewer, which simplifies restrictions and the user interface for a more seamless public experience and can be accessed by users at no cost to them, through a variety of web browsers on mobiles, tablets, and desktops. Curb Viewer and Public Facing Curb Viewer also have the built-in capability to ingest and display real time data such as parking availability from parking sensors or occupancy information from payment companies.
1.3.3.1	The application or mobile-friendly site shall be available to users in English and Spanish.	X		Web based application that is accessible using any device with Internet access - mobile, tablet, and desktop, available in both English and Spanish
1.3.3.2	The application or mobile site will include features that assist the parker in understanding and navigating to available on street parking while including features that minimize distraction for someone operating a motor vehicle. This may include the use of audio guidance or descriptions of parking availability and pricing in English and Spanish and other best practices in guidance software design, such as providing accessibility for those with limited visual or auditory senses	X		Establishing complete accessibilty requirements will be part of the project requirements from the beginning and be reflecting the project deliverables.

1.3.3.3	The County will be able, at it's discretion, either to require that the Contractor work with Arlington County DTS to incorporate this functionality into an Arlington County application, such as My Arlington, or to require that the Contractor develop this functionality as a stand-alone application.	X			The Cloud solution and flexible APIs allow for intregration of data into other systems including MyArlington.

Technology
Table of Conformance

Item #	Technology	C	N	A	T	Comments
2						
2.1	The County has a strong preference for cloud-hosted solutions; the County is willing to consider cloud-hosted solutions managed by the Contractor or the County.	X				The Performance Parking Solution is fully cloud hoste. All Software components of the solution are delivered through at Software as a Service model, where no hosting is required by the County. Dashboards for occupancy and vacancy feeds, along with business intelligence and Public Facing Curb Viewer are web-based platforms and can be accessed on any internet browser on both desktop and mobile devices. Credentials will be given to County Staff to access the administrative tools while Public Facing Curb Viewer will not require any credentials to access.
2.2	The ITS must be designed and deployed in such a way that members of the public have confidence that rates are set in a fair manner using reasonably accurate data.	X				Rate analysis can be analyzed and then visualized in a number of different ways to ensure rates are set in a fair manner: Timeframe, price tier breakdown, rate/transaction, Parker Segmentation, Payment method, etc. The County and team will use input received from the public to influence the design, installation, testing, and operations project tasks. We anticipate that there will be communication and updates to the community throughout the project, but that there will be 3-4 phases of focused efforts to share information and gather community input. Following each engagement phase, the team will work with the County to summarize feedback received, including considerations related to equity and inclusion (e.g., examining responses from different demographic groups to identify trends that may not appear when looking at the full set of input) and will identify recommendations for using public input to modify the approach, as needed, for discussion with the County. It will be important to provide a public-facing summary of input received as well as information about how/if input is being used to adjust the approach.
2.3	The ITS must be designed and deployed in such a way that members of the public have confidence that their privacy is protected and that the County cannot track system users. To that end, the County will not consider proposed systems that include the use of ubiquitous cameras for on-going data collection. The County will consider systems that include limited use of fixed or mobile cameras for the purposes of collecting data samples that can be used to validate or compare with data from other sources.	X				The foundation of the Performance Parking Solution is accurate data creation by means of stall-based smart parking sensors that boast longevity, reliability, and extreme accuracy. The sensors instantly transmit occupancy data without any personal information being collected to a County-owned LoRaWAN Network managed by eleven-x, and data stored securely in cloud servers. eleven-x has performed these services for 8 years, delivering carrier-grade connectivity without compromising privacy. The data aggregation is also done in such a way to protect the privacy of the parking services users. All of the anonymous parking transaction data is aggregated onto a secured and proprietary platform that remains in compliance with all applicable current and amended Payment Card Industry Data Security Standard ("PCI DSS") security requirements. The parking transaction data is encrypted and then transferred onto servers hosted in the cloud. The data stored on the servers only contains entry/exit ticket information and transaction amounts, and does not contain any customer personal information (e.g. name, credit card number). This is a unique feature of the Smarking tool, and it is customized to work with the data gathering systems that The County of Arlington currently uses in its parking operations program.
2.4	The system plan and design will incorporate, include, interface, or otherwise be able to function with the County's parking-payment and parking-enforcement equipment, systems, and services.	X				The Performance Parking Solution consortium has developed integrations with 50+ parking data vendors, uses the latest tech stack and API available to Arlington and 3rd parties with Arlington's expressed permission, The solution has live integrations with IPS, Flowbird, and ParkMobile as default.
2.5	The system plan and design will ensure that a failure, error, or other issue that prevents the normal functioning of the ITS will not lead to failure, error, or other issue that prevents the normal functioning of the County's parking-enforcement, parking-payment, and other systems incorporated, included, interfaced, or otherwise functioning with the ITS.	X				All aspects of the system will be implemented such that the operational components (ie payment and enforcement) retain their independence and operate regardless of the state of the ITS.

Data and Reporting
Table of Conformance

3					
3.1	Whenever possible, the ITS will use open-source data specifications. Examples of such specifications include, but are not limited to, those published by the Alliance for Parking Data Standards (https://www.allianceforparkingdatastandards.org/) and SharedStreets (https://sharedstreets.io/).	X			The performance parking solution intendes to streamline the process of passing on updated parking rate data, regardless of whether it is through published Curb Manager changes or directly from the pricing engine, CurbIQ's Curb Rules API will be used. Curb Rules API, based off the Curb Data Specification (CDS) standard by Open Mobility Foundation, which CurbIQ is part of the working group for, is an API that is used to disseminate both supply and demand curbside information to third parties, such as payment apps and smart meters.
3.2	The County will retain full rights to the data generated by the ITS, including, but not limited to, the parking-occupancy/vacancy data set and the Contractor agrees not to commercialize, sell, or distribute the data to other parties without the County's approval.	X			At eleven-x, we take the customer ownership of data very seriously and that will be reflected in the implemenation of the system. The County's ownership of all data both consumed and generated will be respected throughout the system.
3.3	The ITS must be able to generate, both in real-time or near-real-time and historical, standard and user-defined custom reports that summarize, compare, and present:	X			
3.3.1	Inputs to the occupancy/vacancy data set, such as sensor-derived data, parking payment-data and parking-enforcement data, as applicable	X			Occupancy and Vacancy Data Feed creation: eleven-x, using industry leading stall-based sensors, managed IoT network services, and full-featured data & analytics platform
3.3.2	Occupancy/vacancy and pricing data over user-selected periods of time, including the calculation steps taken to generate the occupancy/vacancy data set from input data sets	X			The system will provide real-time monitoring for each parking facility under analysis, projection of future demand, and analytics of the operations in varied time frames. Analytics include and are not limited to Occupancy Analysis broken down by Occupancy, transactions, and revenue over time; average occupancy; year-over-year analysis; Duration Analysis, any much more. Calculations are done by centralizing all parking data, standardizing the data across the different data streams, and then hosting the data in Smarking's Data Warehouse on AWS
3.3.3	For each of the block faces in the project area, the data analyzed, business rules followed, and calculations made to arrive at recommended parking rates for each of the block faces in the project area	X			The Performance Parking Solution includes the ability to create transparent strategy which incorporates user definded key performance indicators. One example of this with the Smarking Business Intelligence tool is we are able to apply the Donald Shoup theory, look at occupancy rates over a period of time, and make pricing recommendations at the Block Face level. We can do this immediately, as we will have historical parking data from the moment of implementation.
3.3.4	ITS hardware and software uptime/downtime, including any sensors and meter equipment	X			Sensors and gateways are constantly monitored by eleven-x Operations and reports and uptime/downtime reports will provide on an agreed upon schedule. The Cloud systems are also monitored and availability and performance metrics can also be provided including API response time and loading data.
3.3.5	Other key performance indicators, such as parking duration and turnover	X			Included with the Performance Parking Solution is the Real Time Stall Occupancy Dashboard by eleven-x. The easily accessible web-based application includes data visualization for real-time stall availability and detailed historical usage. Arlington County Administrative Staff have unprecedented visibility into real-time and historical stall occupancy, turnover, duration of stays, and the ability to set alerts for enforcement personnel to create efficiencies in enforcement.
3.3.6	Any other data necessary to monitor the system against performance measures defined during the System Planning task execution	X			During the initial planning and definition, the data sets that will be required for the continuous improvement component of the ITS architecture will be defined and generated as part of the project role out.
3.3.7	Any other data deemed necessary by the County and the evaluation contractor to measure the program's outcomes as described in the Introduction that can be reasonably produced by the ITS	X			All such data needs to identified during the plannind and definition phases.
3.4	The ITS must be designed and deployed in such a way that all data generated may be easily extracted in a format approved by the County.	X			With the Performance Parking Solution, access to the data is provided through an underlying API available to the county of Arlington. The Restful API is capable of communicating parking data (occupancy, revenues, durations) in a time series format and processed transaction-level data. The API can be leveraged to communicate metrics/data into internal and external business systems – including but not limited to business intelligence applications, websites, mobile apps, etc.

Operational Flexibility
Table of Conformance

Item#	Operational Flexibility	C	N	A	T	Comments
4						
4.1	The ITS must be designed and deployed with flexibility such that the County will maintain the ability to temporarily and permanently relocate meters, change on-street parking regulations, and re-allocate curb space in the project area at minimal cost.	X				Installation per stall can be completed in less than (20) minutes, ensuring parking availability remaining a priority during deployment
4.2	The ITS must be designed and deployed with flexibility such that street paving and marking activities undertaken by the County or others may continue in the project area at minimal cost.	X				Sensors are assigned to each stall so modification to a stall may impact a sensor. There are a number of options provided for dealing changes in the stall or road surface incuding removal and replacement. Replacement is supported throught the installation App and the change would automatically be reflected in the system. Documentation and guideance will be provided. Strategies to ensure that County departments coordinate these changes will be part of the project planning.
4.3	The ITS must be designed and deployed so that the same hardware and software can be installed and integrated into the existing ITS to incorporate on-street parking in areas of the County outside of the project area with minimal effort.	X				SPS-X Parking Sensors are quickly & easily deployed without the expense of running wires through conduit and are simply commissioned using the eleven-x smartphone app.
4.4	The ITS must be designed and deployed so that it can incorporate the hardware and software necessary to deliver performance-based or dynamic management of other curb uses, such as loading/unloading zones, passenger pick-up/drop-off zones, taxi stands, parking areas or "corrals" for shared-mobility devices, etc.	X				The Performance Parking Solution has been designed to include a number of tools for additioani curb management. Please see examples below: Curb Converter
Curb Converter is a highly automated end-to-end curb regulation digitization process that enables the CurbIQ Team to quickly collect curbside regulations for municipalities. The process is composed of three collection modules: Open Data Automation, for existing curbside datasets; augmented mobile mapping, for lower-density areas; and Curb-Level Surveying, for the densest urban areas.

•Open Data Automation can take any existing curbside data, and automatically convert it into a curb regulation inventory. The only requirements are that the curbside data has some type of geo reference and outlines what type of curbside asset or regulation it is. Because this process is dependent on the inputted data, the associated attributes generated are limited to what is available in the existing data.
•Augmented Mobile Mapping takes advantage of advanced image processing and machine learning techniques developed by IBI Group to automatically extract curb regulation data from images taken in a moving vehicle. Our mobile mapping software then seamlessly converts regulation into a curb inventory. Because this process involves a moving vehicle in the curb lane, this process focuses on collecting curbside signage data such as Parking, No Parking, No Stopping, and Special Designation signage. It does not capture painted curb, or asset data such as fire hydrants and parking meters.
•Curb-Level Surveying uses open source measurement and capture tools (SharedStreets' CurbWheel and Esri's Field Maps App) to collect curb regulation data with very high positional precision. IBI Group's processing scripts then automatically convert collected data and imagery into a curbside inventory. Because this data collection occurs right at the curbside, any and all curbside attributes can be collected. This includes signage data mentioned above, but also additional curbside assets such as painted curbs, bike racks, traffic poles, or curb cuts.

Together, these modules enable IBI Group to collect curb regulation data and convert it to a standardized inventory faster and in a more cost-effective manner than other curb regulation surveyors. These methods have also been validated through past projects as well as a pilot completed in Los Angeles with Urban Movement Labs. Curb Converter has also been recognized in the FHWA Curbside Inventory Report by ITE (2021) as a viable curbside data collection process. The data format used by CurbIQ is CurbLR, a standard created by SharedStreets, but can easily be adapted to any open standard as required. CurbIQ is also part of the Curb Data Specification (CDS) working group and is planning to adopt this standard once it is further refined and formally released.

Within the scope of this project all paid parking spaces and associated information will be converted into an industry standard (either CDS or CurbLR depending on the County's preference) to be hosted on the CurbIQ platform. This paid parking is only one aspect of the curbside however. Curb Converter processes can be used to collect all information at the curbside to generate a complete digital curb inventory. This would then allow Staff to make the most use of CurbIQ's other curbside management tools, discussed below.

Curb Manager
The Curb Manager tool lets cities manage and customize their curbside easily and efficiently by adding, removing, or modifying any curbside regulations through a simple, visual, and dynamic user interface. This tool can be used to make permanent changes, for example adding a 'No Parking' regulation to a busy segment during peak periods or changing a 'Free Parking' segment to 'Accessible', as well as regulations for temporary conditions, such as a road closure for a special event or dedicated pick-up and drop-off to assist with economic recovery related to the COVID-19. This is all managed |
| 4.5 | The ITS must be designed and deployed so that it can incorporate parking occupancy data from off-street parking facilities operated by the County and others. | X | | | | The business intelligence tool from Smarking included in the performance parking solution is able to incorporate both on street and off street parking data and does so in 2,500+ locations across North America |
| 4.6 | The ITS must be designed and deployed so that it can integrate with dynamic messaging signs. | X | | | | The Performance Parking Solution from eleven-x includes dynamic messaging signs which notify drivers in real time about parking availability in the area, along with the associated parking rates. The Dynamic Messaging signs are included to minimize congestion, double-parking, and traffic hazards by guiding drivers to the most convenient available space within the shortest possible search time. Physical signage also ensures drivers who may not have access to a smartphone or app are equally informed about available parking and associated rates. Integration of digital signage into the Performance Parking Solution provides accurate parking guidance to drivers trying to navigate stressful parking areas and high demand block faces. Outcomes of the integrated signage include the reduction of traffic congestion and emissions, and they can also lead to increased payment compliance though the perception of value-added service.

The real-time occupancy and vacancy data feed from the SPS-X stall sensors allows Arlington County to display parking availability in several digitally categorized zones. These zones can include specific streets, block faces or areas of the county where parking availability is to be highlighted. Deployment of the Dynamic Messaging display will be completed in collaboration with the County, where a review will be completed of block faces with high demand and block faces with high vacancy being analyzed for parking availability and demand trends. This collaborative process includes identifying where the signage is placed and how the stalls are zoned, this work is key in identifying crucial points in a driver's journey and placing digital signs at major decision points.

The dynamic messaging signage can also include digital displays for highlighting specialty stalls such as accessible only parking or EV charging stalls, along with the block face details. Multimedia digital displays can not only direct traffic, based on occupancy and revenue objectives but also can include branding and marketing initiatives for local merchants. Another common integration is the using the digital signage for awareness campaigns for road works or special events. |

EXHIBIT B
CONTRACT PRICING

Project Management, Internal Communications, and Coordination Costs Summary

Cost Item Number	Cost Item Description (e.g. staff, etc.)	Unit Cost (e.g. rate, etc.)	Units (e.g. hours, etc.)	Total Cost
A	*Group of Items Name*			
1	GT Deputy PM (assumes 2 days/week for 1 year)	$ 315.00	832.00	$ 262,080.00
2	eleven-x (2 hours/week for 1 year)	$ 200.00	104.00	$ 20,800.00
3	RHI (spread across project)	$ 200.00	150.00	$ 30,000.00
4	Smarking (kickoff/planning)	$ 287.00	18.00	$ 5,166.00
5	IBI (blended rate for local PM and system folks)	$ 190.00	54.00	$ 10,260.00
6	Zack Urban	$ 230.00	24.00	$ 5,520.00
7		$ -	-	$ -
			subtotals	$ 333,826.00
TOTAL	Please ensure the total cost proposal for this task is reflected in the orange box in Column F (add manually).			$ 333,826.00

Public Engagement Costs Summary

Cost Item Number	Cost Item Description (e.g. staff, etc.)	Unit Cost (e.g. rate, etc.)	Units (e.g. hours, etc.)	Total Cost
A	*Engagement Implementation (RHI)*			
1	Phase 1 - System Design Community Outreach and Engagement (first six months)	$ 47,748.00	1.00	$ 47,748.00
2	Phase 2 - System Installation Outreach and Engagement (second six months)	$ 40,526.00	1.00	$ 40,526.00
3	Phase 3 - System Year 2 Outreach and Engagement	$ 40,526.00	1.00	$ 40,526.00
4	Phase 4 - System Year 3 Outreach and Engagement	$ 40,526.00	1.00	$ 40,526.00
5	Expenses (engagement phases) - Printing, Travel, Spanish translation, engagement partner (NeoNiche) attendance at pop-up events	$ 28,750.00	4.00	$ 115,000.00
			subtotals	$ 284,326.00
B	*Engagement Implementation (non-RHI)*			
1	Zack Urban	$ 230.00	39.00	$ 8,970.00
2	IBI (blended rate for local PM and system folks)	$ 190.00	41.00	$ 7,790.00
3	eleven-x	$ 200.00	25.00	$ 5,000.00
			subtotals	$ 21,760.00
TOTAL	Please ensure the total cost proposal for this task is reflected in the orange box in Column F (add manually)			$ 306,086.00

System Planning and Design Costs Summary

Cost Item Number	Cost Item Description (e.g. staff, etc.)	Unit Cost (e.g. rate, etc.)	Units (e.g. hours, etc.)	Total Cost
A	*Group of Items Name*			
1	eleven-x and subs	$ 122,984.00	1.00	$ 122,984.00
		subtotals		$ 122,984.00
B	*Group of Items Name*			
		subtotals		$ -
TOTAL	Please ensure the total cost proposal for this task is reflected in the orange box in Column F (add manually).			$ 122,984.00

Provide, Install and Maintain ITS Hardware Costs Summary

Cost Item Number	Cost Item Description (e.g. staff, etc.)	Unit Cost (e.g. rate, etc.)	Units (e.g. hours, items, etc.)	Total Cost	Annual Software Costs Associated with Calibration Years 2 and 3
A	*Equipment*				
1	SPS-X in-ground parking sensors	$ 99.00	4,958.00	$ 490,842.00	$ -
2	Extended 10-year Warranty for SPS-X sesnors	$ 34.00	4,958.00	$ 168,572.00	$ -
3	LoRaWAN Gateways	$ 1,185.00	30.00	$ 35,550.00	$ -
4	Digital Signage	$ 15,755.00	10.00	$ 157,550.00	$ -
5		$ -	-	$ -	$ -
6		$ -	-	$ -	$ -
7		$ -	-	$ -	$ -
		subtotals		$ 852,514.00	$ -
B	*Installation*				
1	Sensor installation	$ 138.00	4,958.00	$ 684,204.00	$ -
2	Line painting	$ 13.00	4,091.00	$ 53,183.00	$ -
3	Gateway installation	$ 6,383.00	30.00	$ 191,490.00	$ -
4	Sticker/decal installation (unit cost is per price change) for every 3-months for 2 year period	$ 7,000.00	8.00	$ 56,000.00	$ -
		subtotals		$ 984,877.00	$ -
C	*Contingency*				
1	Contingency on the entire project	$ 500,000.00	$ 1.00	$ 500,000.00	$ -
		subtotals		$ 500,000.00	$ -
TOTAL	Please ensure the total cost proposal for this task is reflected in the orange box in Column F (add manually)			$ 2,337,391.00	

Develop, Install and Maintain ITS Software Costs Summary

Cost Item Number	Cost Item Description (e.g. staff, etc.)	Unit Cost (e.g. rate, etc.)	Units (e.g. hours, items, etc.)	Total Cost	Annual Software Costs Associated with Calibration Years 2 and 3
A	*eleven-x Software*				
1	Setup, integrations, support, training, etc	$ 200.00	840.00	$ 168,000.00	$ -
2	Managed IoT Network Service (per gateway annual fee)	$ 1,380.00	30.00	$ -	$ 41,400.00
3	Digital Signage Connectivity (per sign annual fee)	$ 1,800.00	10.00	$ -	$ 18,000.00
4	Application Software Subscription (per sensor annual fee)	$ 30.00	4,958.00	$ -	$ 148,740.00
5	Digital Signage Module (per sensor annual fee)	$ 15.00	4,958.00	$ -	$ 74,370.00
6	eleven-x and CurbIQ dashboard consolidation	$ 200.00	240.00	$ 48,000.00	$ -
			subtotals	$ 216,000.00	$ 282,510.00
B	*Smarking Software*				
1	Setup and integration of IPS, Flowbird/Cale, ParkMobile, and eleven-x occupancy data	$ 58,842.00	1.00	$ 58,842.00	$ -
2	Software Subscription for all parking stalls and payment methods (annual fee)	$ 120,805.00	1.00	$ -	$ 120,805.00
			subtotals	$ 58,842.00	$ 120,805.00
C	*IBI Software*				
1	CurbIQ setup and integrations	$ 26,881.00	1.00	$ 26,881.00	$ -
2	CurbIQ Software Subscription (annual fee)	$ 78,000.00	1.00	$ -	$ 78,000.00
3	CurbIQ and eleven-x dashbaord consolidation	$ 17,250.00	1.00	$ 17,250.00	$ -
			subtotals	$ 44,131.00	$ 78,000.00
				$ 318,973.00	$ 481,315.00
TOTAL	Please ensure the total cost proposal for this task is reflected in the orange box in Column F (add manually).			$ 1,281,603.00	

Public-Facing Parking Guidance Application Costs Summary

Cost Item Number	Cost Item Description (e.g. staff, etc.)	Unit Cost (e.g. rate, etc.)	Units (e.g. hours, items, etc.)	Total Cost	Annual Software Costs Associated with Calibration Years 2 and 3
A	*Group of Items Name*				
1	Public facing dashboard setup and integrations	17,250.00	1.00	$ 17,250.00	$ -
2	Public Facing Website Software Subscription (annual fee)	15,015.00	1.00	$ -	$ 15,015.00
			subtotals	$ 17,250.00	$ 15,015.00
TOTAL	Please ensure the total cost proposal for this task is reflected in the orange box in Column F (add manually).			$ 47,280.00	

Transition Planning Costs Summary

Cost Item Number	Cost Item Description (e.g. staff, etc.)	Unit Cost (e.g. rate, etc.)	Units (e.g. hours, etc.)	Total Cost
A	*Group of Items Name*			
1	eleven-x and subs - training, documentation, etc.	$ 80,114.00	1.00	$ 80,114.00
TOTAL	Please ensure the total cost proposal for this task is reflected in the orange box in Column F (add manually).			$ 80,114.00

Ongoing Maintenance and Operations Costs Summary

System Lifecycle	# years (Please indicate here the total number of years the system/technology will be functional. If individual components have different lifecycles, please provide notes to that effect with each assumed annual maintenance cost line.)				
Cost Item Number	**Cost Item Description (e.g. staff, etc.)**		**Annual Unit Cost (e.g. rate, etc.)**	**Units (e.g. hours, etc.)**	**Annual Maintenance Cost**
A	*eleven-x services*				
1	Managed IoT Network Service (per gateway fee) 10 years		$ 1,380.00	30.00	$ 41,400.00
2	Digital Signage Connectivity (per sign fee) 10 years		$ 1,800.00	10.00	$ 18,000.00
3	Application Software Subscription (per sensor fee) 10 years		$ 30.00	4,958.00	$ 148,740.00
4	Digital Signage Module (per sensor fee) 10 years		$ 15.00	4,958.00	$ 74,370.00
5	Enforcement Module (per sensor fee) 10 years		$ 24.00	-	$ -
6	Smarking Software Subscription (project fee) 10 years		$ 120,805.00	1.00	$ 120,805.00
7	IBI CurbIQ Software Subscription (project fee) 10 years		$ 78,000.00	1.00	$ 78,000.00
8	IBI Public Facing Website Software Subscription (project fee) 10 years		$ 15,015.00	1.00	$ 15,015.00
			subtotals		$ 496,330.00
B	*Replacement and System Expansion*				
1	Sensor, Warranty, Installation and Line Painting, Per 1 Parking Stall		1,662.50	1	
2	Sensor, Warranty, Installation and Line Painting, Per 10 Parking Stalls		529.75	10	
3	Sensor, Warranty, Installation and Line Painting, Per 100 Parking Stalls		285.38	100	
4	Sensor, Warranty, Installation and Line Painting, Per 1000 Parking Stalls		277.61	1000	
5	eleven-x Software Subscription, Digital Signage and Enforcement Modules, Per Addtional (1000) Stalls		$ 69,000.00	1.00	
6	Smarking Software Subscription Per Additional (1000) Stalls		$ 24,360.00	1.00	
7	IBI CurbIQ Software Subscription and Public Facing Website Subcription Per Additional (1000) Stalls		$ 17,250.00	1.00	
8	Sensor replacement costs of 25% of the install base (assumption without knowing repaving plans)		$ 279.00	1,240.00	$ 345,960.00
9	Sticker/decal installation (unit cost is supply and installation per price change or application)		$ 7,000.00	4.00	$ 28,000.00
			subtotals		$ 373,960.00
	Please provide an annual total				
			Annual Total		$ 870,290.00

Payment Schedule

Payment Number	Description	Payment Milestone	Total
1-12	Project Year 1: Preliminary Installation Monthly payments for work completed in previous month (assumes 12 months as per proposed schedule)	By the tenth day of each month, the Contractor will submit to the Project Officer an invoice describing the total work done during the preceding month, broken out by task.	Approximately $3.5M spread over 12 months
13	Annual recurring subscription starts, Project Year 2: Data Collection and Model Calibration Includes Public Engagement	Pilot Operations Begins for data collection and model calibration	$565,606
14	Annual recurring subscription, Project Year 3: Data Collection, Model Calibration, and Project Delivery Includes Public Engagement	1st Anniversary of Pilot Operations Begins	$565,606
15	Annual recurring subscription, O&M Year 1	Transition System to the County	$496,330
16	Annual recurring subscription, O&M Year 2	1st Anniversary of Transition System to the County	$496,330
17	Annual recurring subscription, O&M Year 3	2nd Anniversary of Transition System to the County	$496,330

18	Annual recurring subscription, O&M Year 4	3rd Anniversary of Transition System to the County	$496,330

Warranty:

a) The hardware replacement cost not covered under warranty will be fixed to $99 for the contract term.
b) A Detailed breakdown of the costing for full sensor replacement with line painting and without line painting:

Cost items (per sensor)	Qnty 1	Qnty 10	Qnty 100	Qnty 1000
Line painting	$868.25	$92.00	$14.38	$6.61
New SPS-X Sensor Hardware*	$99.00	$99.00	$99.00	$99.00
Sensor Warranty	$34.00	$34.00	$34.00	$34.00
Sensor Installation	$661.25	$304.75	$138.00	$138.00
Repaving Scenario Replacement	$1,662.50	$529.75	$285.38	$277.61
Placement Scenario Without Line Painting	$794.25	$437.75	$271.00	$271.00

*Replacement of defective sensors will have the cost covered as per the extended warranty described below.

Eleven-X hereby warrants that the SPS-X Hardware shall operate in accordance with its Documentation for twelve (12) months from the date of delivery to the County (the "Warranty Period"). During the Warranty Period, eleven-x shall repair or replace, at its option, any Hardware that fails to operate in accordance with its Documentation. In order to obtain the benefit of this warranty, the County must provide notice to eleven-x using the support contact information provided by eleven-x, obtain a return authorization number from eleven-x and ship the Hardware to eleven-x along with this return material authorization ("RMA") number. If eleven-x determines that the defect is the result of something for which eleven-x excludes responsibility under its Documentation for such Hardware, then eleven-x will notify the County of this determination and the County may request eleven-x to repair the hardware on a time and materials basis. This section sets out the County's sole remedy, and eleven-x's sole obligations and liabilities for a breach of the warranty.

Eleven-X included their 10-year extended warranty that extends the standard one-year warranty as follows:

Year in service	1-5	6	7	8	9	10
Sensor list price covered under warranty	100%	80%	60%	40%	20%	5%

Replacement costs for the sensor hardware is stated as a percentage of the published list price at that time of replacement. Does not include sensor installation and any other services. For example, for a warranty claim made in year 9, assuming the then-current list price was $100, the County would receive a 20% ($20) discount to the list price.

EXHIBIT C
NONDISCLOSURE AND DATA SECURITY AGREEMENT
(CONTRACTOR)

The undersigned, an authorized agent of the Contractor and on behalf of Eleven-x US Incorporated ("Contractor"), hereby agrees that the Contractor will hold County-provided information, documents, data, images, records and the like confidential and secure and protect them against loss, misuse, alteration, destruction or disclosure. This includes, but is not limited to, the information of the County, its employees, contractors, residents, clients, patients, taxpayers and property as well as information that the County shares with the Contractor for testing, support, conversion or other services provided under Arlington County Agreement No. 22-DES-RFP-611 (the "Project" or "Main Agreement") or that may be accessed through other County-owned or -controlled databases (all of the above collectively referred to as "County Information" or "Information").

In addition to the DATA SECURITY obligations set in the County Agreement, the Contractor agrees that it will maintain the privacy and security of County Information, control and limit internal access and authorization for access to such Information and not divulge or allow or facilitate access to County Information for any purpose or by anyone unless expressly authorized. This includes, but is not limited to, any County Information that in any manner describes, locates or indexes anything about an individual, including, but not limited to, his/her ("his") Personal Health Information, treatment, disability, services eligibility, services provided, investigations, real or personal property holdings and his education, financial transactions, medical history, ancestry, religion, political ideology, criminal or employment record, social security number, tax status or payments, date of birth, address, phone number or anything that affords a basis for inferring personal characteristics, such as finger and voice prints, photographs, or things done by or to such individual, or the record of his presence, registration, or membership in an organization or activity, or admission to an institution.

Contractor also agrees that it will not directly or indirectly use or facilitate the use or dissemination of County information (whether intentionally or by inadvertence, negligence or omission and whether verbally, electronically, through paper transmission or otherwise) for any purpose other than that directly associated with its work under the Project. The Contractor acknowledges that any unauthorized use, dissemination or disclosure of County Information is prohibited and may also constitute a violation of Virginia or federal laws, subjecting it or its employees to civil and/or criminal penalties.

Contractor agrees that it will not divulge or otherwise facilitate the disclosure, dissemination or access to or by any unauthorized person, for any purpose, of any Information obtained directly, or indirectly, as a result of its work on the Project. The Contractor shall coordinate closely with the County Project Officer to ensure that its authorization to its employees or approved subcontractors is appropriate and tightly controlled and that such person/s also maintain the security and privacy of County Information and the integrity of County-networked resources.

Contractor agrees to take strict security measures to ensure that County Information is kept secure; is properly stored in accordance with industry best practices, and if stored is encrypted; and is otherwise protected from retrieval or access by unauthorized persons or for unauthorized purposes. Any device or media on which County Information is stored, even temporarily, will have strict encryption, security, and access control. Any County Information that is accessible will not leave Contractor's work site or the County's physical facility, if the Contractor is working onsite, without written authorization of the County

Project Officer. If remote access or other media storage is authorized, the Contractor is responsible for the security of such storage device or paper files.

Contractor will ensure that any laptops, PDAs, netbooks, tablets, thumb drives or other media storage devices, as approved by the County and connected to the County network, are secure and free of all computer viruses, and running the latest version of an industry-standard virus protection program. The Contractor will ensure that all user accounts and passwords used by its employees or subcontractors are robust, protected and not shared. The Contractor will not download any County Information except as agreed to by the parties and then only onto a County-approved device. The Contractor understands that downloading onto a personally owned device or service, such as personal e-mail, Dropbox, etc., is prohibited.

Contractor agrees that it will notify the County Project Officer immediately upon discovery or becoming aware or suspicious of any unauthorized disclosure of County Information, security breach, hacking or other breach of this agreement, the County's or Contractor's security policies, or any other breach of Project protocols concerning data security or County Information. The Contractor will fully cooperate with the County to regain possession of any Information and to prevent its further disclosure, use or dissemination. The Contractor also agrees to promptly notify others of a suspected or actual breach if requested.

The Contractor agrees that all duties and obligations enumerated in this Agreement also extend to its employees, agents or subcontractors who are given access to County information. Breach of any of the above conditions by Contractor's employees, agents or subcontractors shall be treated as a breach by the Contractor. The Contractor agrees that it shall take all reasonable measures to ensure that its employees, agents and subcontractors are aware of and abide by the terms and conditions of this agreement and related data security provisions in the Main Agreement.

It is the intent of this *NonDisclosure and Data Security Agreement* to ensure that the Contractor has the highest level of administrative safeguards, information security, disaster recovery and other best practices in place to ensure confidentiality, protection, privacy and security of County information and County-networked resources and to ensure compliance with all applicable local, state and federal laws or regulatory requirements. Therefore, to the extent that this *NonDisclosure and Data Security Agreement* conflicts with the Main Agreement or with any applicable local, state, or federal law, regulation or provision, the more stringent requirement, law, regulation or provision controls.

At the conclusion of the Project, the Contractor agrees to return all County Information to the County Project Officer. These obligations remain in full force and effect throughout the Project and shall survive any termination of the Main Agreement.

Authorized Signature: ___DocuSigned by:___
Ryan Hickey
5D117363A823473...

Printed Name and Title: Ryan Hickey   COO

Date: 9/22/2022

NONDISCLOSURE AND DATA SECURITY AGREEMENT
(INDIVIDUAL)

I, the undersigned, agree that I will hold County-provided information, documents, data, images, records and the like confidential and secure and protect it against loss, misuse, alteration, destruction or disclosure. This includes, but is not limited to, the information of the County, its employees, contractors, residents, clients, patients, taxpayers, and property as well as information that the County shares with my employer or prime contractor for testing, support, conversion or the provision of other services under Arlington County Agreement No. 22-DES-RFP-611 (the "Project" or "Main Agreement") or which may be accessed through County-owned or -controlled databases (all of the above collectively referred to as "County Information" or "Information").

I agree that I will maintain the privacy and security of County Information and will not divulge or allow or facilitate access to County Information for any purpose or by anyone unless expressly authorized to do so by the County Project Officer. This includes, but is not limited to, any County Information that in any manner describes, locates or indexes anything about an individual including, but not limited to, his/her ("his") Personal Health Information, treatment, disability, services eligibility, services provided, investigations, real or personal property holdings, education, financial transactions, medical history, ancestry, religion, political ideology, criminal or employment record, social security number, tax status or payments, date of birth, or that otherwise affords a basis for inferring personal characteristics, such as finger and voice prints, photographs, or things done by or to such individual, or the record of his presence, registration, or membership in an organization or activity, or admission to an institution.

I agree that I will not directly or indirectly use or facilitate the use or dissemination of information (whether intentionally or by inadvertence, negligence or omission and whether verbally, electronically, through paper transmission or otherwise) for any purpose other than that directly authorized and associated with my designated duties on the Project. I understand and agree that any unauthorized use, dissemination or disclosure of County Information is prohibited and may also constitute a violation of Virginia or federal law/s, subjecting me and/or my employer to civil and/or criminal penalties.

I also agree that I will not divulge or otherwise facilitate the disclosure, dissemination or access to or by any unauthorized person for any purpose of the Information obtained directly, or indirectly, as a result of my work on the Project. I agree to view, retrieve or access County Information only to the extent concomitant with my assigned duties on the Project and only in accordance with the County's and my employer's access and security policies or protocols.

I agree that I will take strict security measures to ensure that County Information is kept secure; is properly stored in accordance with industry best practices, and if stored is encrypted; and is otherwise protected from retrieval or access by unauthorized persons or for unauthorized purposes. I will also ensure that any device or media on which County Information is stored, even temporarily, will have strict encryption, security, and access control and that I will not remove, facilitate the removal of or cause any Information to be removed from my employer's worksite or the County's physical facility without written authorization of the County Project Officer. If so authorized, I understand that I am responsible for the security of the electronic equipment or paper files on which the Information is stored and agree to promptly return such Information upon request.

I will not use any devices, laptops, PDAs, netbooks, tablets, thumb drives or other media storage devices ("Device") during my work on the Project without pre-approval. I will ensure that any Device connected

to the County network is free of all computer viruses and running the latest version of an industry-standard virus protection program. I will also ensure that my user account and password, if any, is robust, protected and not shared. I will not download any County Information except as authorized by the County Project Officer and then only onto a County-approved Device. I understand that downloading onto a personally owned Device or service, such as personal e-mail, Dropbox etc., is prohibited.

I agree that I will notify the County Project Officer immediately upon discovery or becoming aware or suspicious of any unauthorized disclosure of County Information, security breach, hacking or other breach of this agreement, the County's or Contractor's security policies, or any other breach of Project protocols concerning data security or County Information. I will fully cooperate with the County to help regain possession of any County Information and to prevent its further disclosure, use or dissemination.

It is the intent of this *NonDisclosure and Data Security Agreement* to ensure that the highest level of administrative safeguards, information security, and other best practices are in place to ensure confidentiality, protection, privacy and security of County Information and County-networked resources and to ensure compliance with all applicable local, state and federal laws or regulatory requirements. Therefore, to the extent that this *Nondisclosure and Data Security Agreement* conflicts with the underlying Main Agreement or any local, state or federal law, regulation or provision, the more stringent requirement, law, regulation or provision controls.

Upon completion or termination of my work on the Project, I agree to return all County Information to the County Project Officer. I understand that this agreement remains in full force and effect throughout my work on the Project and shall survive my reassignment from the Project, termination of the above referenced Project or my departure from my current employer.

Signed: _____

Printed Name: _____

Date: _____

Witnessed:

Contractor's Project Manager: _____

Printed Name: _____

Date: _____

TO BE COMPLETED PRIOR TO BEGINNING WORK ON THE PROJECT

EXHIBIT E

CONTRACTOR COVID-19 VACCINATION QUARTERLY COMPLIANCE CERTIFICATION

By Email: Please complete the report below and return it to: <u>contractorvaccineinfo@arlingtonva.us</u>.

☐ I hereby certify that all _____ (Contractor Name) employees and subcontractors working on Contract No. 22-DES-RFP-611 are fully vaccinated against COVID-19, or being tested on a weekly basis, or are exempt pursuant to a valid reasonable accommodation under state or federal law.

Please do not include any of your employees' medical documentation, including vaccination records or test results.

Date: _____

Signature: _____

Printed Name and Title: _____

Company Name: _____

Company Address: _____

Potential ITS Infrastructure Construction Locations

Performance Parking Deployment in Commercial Corridors

POTOMAC RIVER

Project Parameters

—— Potential Location for ITS Infrastructure Construction

Metrorail Corridor

Arlington County

Potomac River

0   0.5   1   2
Miles
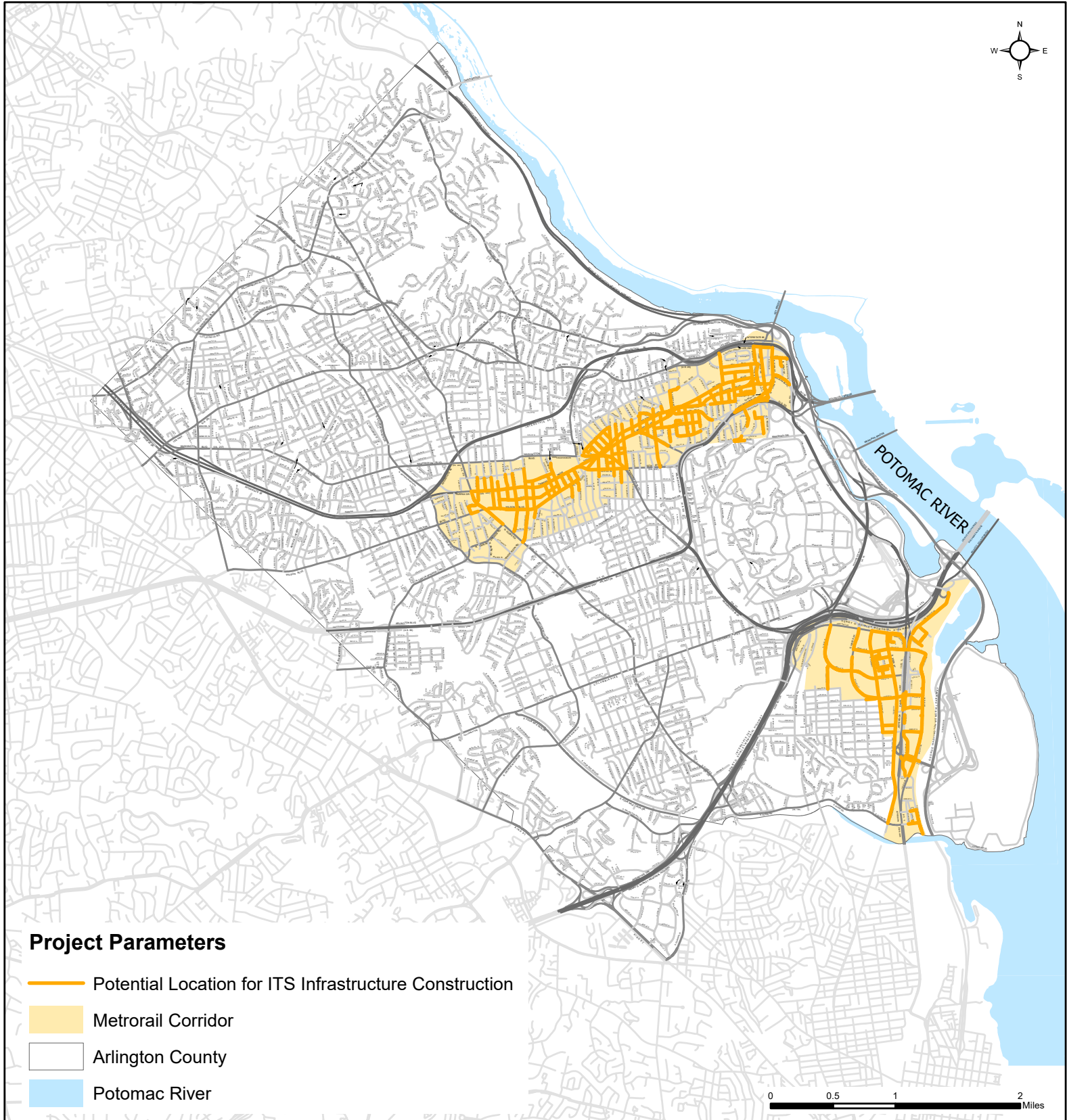
The geographic data layers produced by the Arlington County GIS Mapping Center are provided as a public resource. The County makes no warranties, expressed or implied, concerning the accuracy, completeness, or suitability of this data, and it should not be construed or used as a legal description. Every reasonable effort is made to ensure the accuracy and completeness of the data.

All geographic data provided herein are copyrighted Arlington County, Virginia unless otherwise noted.

Pursuant to Section 54.1-402 of the Code of Virginia, any determination of topography or contours, or any depiction of physical improvements, property lines or boundaries is for general information only and shall not be used for the design, modification, or construction of improvements to real property or for flood plain determination.

EXHIBIT G
ELEVEN-X SERVICE LEVEL AGREEMENT

This Service Level Agreement ("**SLA**") is Exhibit G to Agreement No. 22-DES-RFP-611 ("**Agreement**") between Eleven-X US Incorporated ("**Eleven-X**") and the County Board of Arlington County, Virginia ("**County**") and applies to the Network(s) (including the Network Services) provided by Eleven-X Inc. to the County.

1.   **DEFINITIONS**

"Commercially reasonable efforts" means, with respect to the efforts to be expended by a party pertaining to a particular objective, the reasonable, diligent, and good faith efforts to accomplish such objective in an active and ongoing manner as a similarly situated entity within the industry would use to accomplish a similar objective under similar circumstances, exercising reasonable business judgment and not requiring a party to expend any funds or assume liabilities other than expenditures and liabilities that are reasonable in nature and amount in the context of the transactions contemplated.

"**Component**" means the Network equipment and Gateways.

"**Downtime**" means a Network is not available or does not provide adequate functionality to track and locate assets.

"**Emergency Downtime**" means those times where Eleven-x becomes aware of a vulnerability which, based on a risk assessment of the vulnerability, eleven-x requires immediate remediation, and, as a result, a Network will be temporarily unavailable while the vulnerability is addressed.

"**End User**" means the County's employees, contractors, customers, or other end users of the Network.

"**Excessive Service Level Failure**" means Network Availability below 90% in any one Quarterly Measurement Period (216 hrs.).

"**Failure**" or "**Defect**" is a defect in the materials or workmanship of a Component, any deviation of a Component from the applicable specifications, or any failure of a Component to fully function at a Severity Level 1-3 issue.

"**Gateway**" means a router equipped with a LoRa concentrator that has been approved by eleven-x for use on the Network.

"**Incident**" means a County-reported Defect to eleven-x resulting in the creation of a ticket in eleven-x's ticketing system.

"**Network**" means the eleven-x LoRaWAN network described in Exhibit A to the Agreement.

"**Network Services**" means the data and services provided by eleven-x that allow sensorss operating on the Network to transport data to over the Network.

"**On Time Incidents**" refer to Response, Restore and Resolve times that meet or exceed the Response, Restore and Resolve targets as defined in Section 0 below.

"**Qualifying Outage**" with respect to Components, is an outage that: 1) results in a loss or degradation of service to an End User and 2) is directly attributable to a Failure of the Components without any contributory negligence from other third-party products. Qualifying Outages do not include scheduled outages to perform routine maintenance or upgrades.

"**Quarterly Measurement Period**" is a period of three (3) consecutive months (i.e., a quarter) for measurement of some metrics. The four Quarterly Measurement Periods per calendar year are set as follows: January 1 – March 31; April 1 – June 30; July 1 – September 30 and October 1 – December 31.

"**Response**" refers to a percentage of On Time Incidents in which eleven-x responds within pre-established response targets as defined under Section 0 below. A Response commences with the creation of an Incident record (e.g., Helpdesk ticket) and ends when eleven-x notifies the County that the problem has been received and is being addressed.

"**Restore**" is a percentage of On Time Incidents in which eleven-x responds within pre-established target restore times as defined under Section 0 below. A Restore commences with the creation of an Incident record (e.g., Helpdesk ticket) and ends when eleven-x has provided a workaround/temporary fix that corrects a Defect and restores a Network to a satisfactory/useable level of functionality, with minimal inconvenience and impact to the County's and the applicable End User's business operations.

"**Resolve**" is a percentage of On Time Incidents in which eleven-x responds within pre-established target restore times as defined under Section 0 below. A Resolve commences with the creation of an Incident record (e.g., Helpdesk ticket) and ends when eleven-x has provided a permanent fix/solution to the problem. For hardware Defects, the solution is typically a replacement part. For software Defects, the solution is typically the next release that incorporates the bug fix/update.

"**Scheduled Downtime**" means those times between 12:00 AM (ET) and 6:00 AM (ET) or when eleven-x notifies the County of periods of Downtime at least five (5) business days prior to the commencement of such Downtime.

"**Severity Levels**":

Severity Level 1 – Critical	An occurrence in which a Network is down, a major function is unavailable, a critical interface has failed, or the County's and/or the applicable End User's ability to generate revenue is impacted.
Severity Level 2 – Major	Any problem that seriously affects Network operation, maintenance and administration or is important to Customer's and/or the applicable End User's success such that a timely resolution is needed; however, such problems do not have an impending effect on availability of a Network or the County's or the applicable End User's revenue. Severity Level 2 cases include data corruption, connectivity problems, error messages or unacceptable performance.

Severity Level 3 – Minor	Issues that do not significantly impair the functioning of a Network and do not significantly affect services to the County's or the applicable End User's operations.

"**TAC**" or "**Technical Assistance Center**" means eleven-x's network operations center Support Services organization.

"**Third Party Components**" refers to software, middleware, hardware, equipment and facilities (including Third Party Products) not purchased from eleven-x or otherwise provided by eleven-x and used by the County or the applicable End User in connection with the Network.

2.   RESPONSIBILITIES OF ELEVEN-X

2.1   eleven-x shall use reasonable efforts to fulfill the following responsibilities under this SLA:

(a)   eleven-x shall use commercially reasonable efforts to meet the performance requirements during any Quarterly Measurement Period.

(b)   eleven-x shall provide a single point of contact to establish key operational and data collection and reporting processes between eleven-x and the County.

(c)   eleven-x shall provide *monthly* metrics, if requested by the County, in addition to any requirements to provide *quarterly* metrics.

(d)   Quarterly eleven-x SLA performance meetings will be held between eleven-x and the County. In addition to the remedies set forth herein, action plans will be provided by eleven-x for out-of-compliance metrics.

(e)   If requested by the County, eleven-x shall validate or authenticate any data provided to the County. eleven-x shall also provide any additional detail or more accurate data if requested by the County. Planned maintenance work notices – Method of Procedure or MOP – (including relating to modifications) must contain details of the work to be conducted, the potential impact of the work on a Network, date and time for the work and how long the work is estimated to complete.

(f)   eleven-x must communicate to the County in writing (email acceptable) at least five (5) business days in advance of any requirement to conduct any modifications on a Network that will affect Availability (as defined in Section 0 below).

(g)   eleven-x will communicate in writing (email acceptable) to the County's support contact at least seventy-two (72) hours in advance of any requirement to conduct planned non-emergency maintenance work on a Network.

3.   ADDITIONAL RESPONSIBILITIES OF ELEVEN-X AND CUSTOMER

3.1   Additional responsibilities under this SLA are as follows:

(a)   The County shall initially determine the Severity Levels under this eleven-x SLA for the applicable ticket created by the County subject to adjustment by eleven-x.

(b)   The County shall follow all procedures for eleven-x TAC access.

(c)   During the Agreement Term, and subject to any applicable provisions and the County's policies and procedures, eleven-x shall establish and maintain, at no cost to the County, a secure portal allowing the County access to the Components solely for the purpose of providing the services described in this eleven-x SLA, and/or the Agreement. Any GUI or interface software required for the County to access equipment will be provided at no cost to the County. The activation and de-activation of this access point shall be initiated and controlled by eleven-x personnel only. eleven-x shall restrict access to the secure

port; unrestricted access must be authorized by eleven-x in writing. eleven-x shall allow the County access to the Components via a secure access point, when available, to conduct remote diagnostic and resolution procedures.

4. **SERVICE LEVEL OBJECTIVES**

4.1 **Helpdesk/TAC Case Priority: Response, Restore, and Resolve Performance Objectives**. Following each Quarterly Measurement Period, eleven-x and Customer will review the Incidents for each Case Priority: Response, Restore, and Resolve during that period across Severity Levels 1-3. eleven-x and the County will calculate the On Time Incidents' percentage targets for each Case Priority performance objective by Service Tier, defined under Section 0.

4.2 **Availability Performance Measurement**. Following each Quarterly Measurement Period, eleven-x and the County will review and calculate the "**Support Availability**" or "**Availability**" (defined as the performance standards and availability of support specifications provided in Section 0 below) during that Quarterly Measurement Period and calculate the aggregate Availability targets. If in respect of any Quarterly Measurement Period there is an Excessive Service Level Failure the County will have the right to terminate the applicable Agreement (or any portion thereof) by giving eleven-x written notice thereof (effective as of the date written in such notice) within ninety (90) days following the County's receipt of the report identifying such Excessive Service Level Failure.

4.3 **Service Level Objectives by Service Class Tier**.

Service Class Tier	Business Necessary
eleven-x Helpdesk	9am to 5pm EST on business days.

Case Priority Response, Restore, and Resolve Performance Objectives			
Severity Level	**Remedy Type**	**Comliance Target**	**Time to Completion**
Severity Level 1 (Critical)	Response	100%	15 min
	Restoration	100%	2 hrs**
	Resolution	100%	30 days
Severity Level 2 (Major)	Response	95%	30 min
	Restoration	95%	4 hrs**
	Resolution	95%	30 days
Severity Level 3 (Minor)	Response	95%	60 min
	Restoration	95%	N/A

	Resolution	95%	180 days
Availability Performance Objective			
Support Availability/Uptime			99.99% (13.14 min/qtr.)
Gateway Availability (Supplied by eleven-x)			99% (1,314 min/qtr.)
Network Availability			99.99% (13.14 min/qtr.)
API Availability			99.99% (13.14 min/qtr.)

**other than issues caused by the hardware or which require hardware replacement (excluding the Products), which eleven-x shall remedy on a reasonable commercial efforts basis.

4.4 **Service Level Credits**. In addition to the County's rights under Section 0 above, if in any Quarterly Measurement Period eleven-x fails to achieve the Network Availability Performance Objective set forth in Section 0 above, the County will be entitled to a credit (a "**Service Level Credit**") equal to the annual fees payable under the parties' Agreement divided by four and multiplied by five percent (5%). Within thirty (30) days following the end of each Quarterly Measurement Period, eleven-x will provide the County with a written report setting out the Network Availability in such completed Quarterly Measurement Period. Eleven-x will include with such report the amount of Network Downtime and the Service Level Credit, if any, in respect of such Quarterly Measurement Period. Any Service Level Credits will be deducted from the annual fee payable upon renewal of the parties' Agreement, provided that, if the parties' Agreement is not renewed and is terminated at the end of the current term, eleven-x will pay to the County the total amount of the Service Level Credits in respect of the current term within thirty (30) days following the effective termination date of the parties' Agreement. Except as set forth herein, Service Level Credits may not be exchanged for, or converted to, monetary amounts.

4.5 **Disaster Recovery**. eleven-x's disaster recovery plan ("DRP") shall provide, at a minimum, that (a) the core functions of a Network will come back online and be available within twenty-four (24) hours after the declaration of a disaster (as defined in the DRP); and (b) a Network will be fully functional and operating in accordance with this eleven-x SLA within five (5) days after a declaration of a disaster.

4.6 **No Default Under Agreement**. The County acknowledges and agrees that each Network is provided on a "commercially reasonable efforts" basis, and in no event shall eleven-x's failure to meet a service level objective be considered a breach or default of the Agreement.

5.   EXCLUSIONS/LIMITATIONS

5.1   eleven-x shall not be liable for a Network not achieving the performance objectives if the outage is due in whole or in part to any of the following causes:

(a)   Failure of hardware, software, underlying transport network, access circuits, cabling, or any other component(s) not provided by eleven-x;

(b)   Lack of interoperability between a Network and any Third Party Components, provided that this exclusion shall not pertain to any products that eleven-x's Components are required to interoperate with in order for eleven-x's Components to operate with the County's or the applicable End User's systems;

(c)   Any act or omission of the County or third parties that has a deleterious effect on the operation of a Network where such act or omission is inconsistent with the published specifications, eleven-x's best practices, or the best practices of a responsible purchaser in the industry and where such act or omission contributes to or is a cause of the service level failures (for the avoidance of doubt eleven-x shall still be responsible for its acts or omissions);

(d)   Any period of Downtime, including Emergency Downtime and Scheduled Downtime, to perform routine or emergency maintenance or upgrades;

(e)   The County's failure to implement eleven-x recommended fixes;

(f)   The existence of a Force Majeure Event (as defined in the parties' Agreement);

(g)   The County's failure to contact eleven-x through its published process;

(h)   Documented delays resulting from the County's failure to timely respond to troubleshooting requests or other reasonable requests from eleven-x; or

(i)   If there are fewer than ten (10) Severity Level 2 and/or 3 Incidents in a Quarterly Measurement Period, then eleven-x and the County agree that there will be no performance measurements during that Quarterly Measurement Period.

ID	Task Name	Start	Finish	Duration
1	Signed Contract	2022-08-01	2022-08-01	0w
2	Project kick-off meeting	2022-08-01	2022-08-12	2w
3	Develop and Approve Engagement Plan	2022-08-15	2022-09-09	4w
4	Engagement activities in phases of focused effort	2022-09-12	2023-06-16	40w
5	Confirmation on number of gateways and their locations	2022-08-15	2022-09-23	6w
6	Procure LoRaWAN gateways	2022-09-26	2022-11-04	6w
7	Planning and approving stall locations and markings	2022-08-15	2022-10-07	8w
8	Procure parking sensors	2022-10-10	2022-12-09	9w
9	Location scoping and requirements approval for digital signage	2022-08-15	2022-11-04	12w
10	Develop project plan with all stakeholders	2022-08-15	2022-11-04	12w
11	Develop system design	2022-08-15	2022-11-04	12w
12	Approving System Design	2022-11-07	2022-11-18	2w
13	System design and Planning Complete	2022-11-21	2022-11-21	0w
14	Obtain ROW permits for demarcation	2022-10-10	2022-11-04	4w
15	Demarcate all stalls with line painting	2022-11-21	2022-12-23	5w
16	Obtain SoW and approvals for each gateway installation sites	2022-09-26	2022-11-04	6w
17	Obtain necessary permit for gateway installation	2022-11-07	2022-12-02	4w
18	Install gateways according to network design	2022-12-05	2023-01-13	6w
19	Obtain ROW permits for parking sensor installation	2022-10-10	2022-11-04	4w
20	Install sensors into designated stalls to 50% complete	2022-12-26	2023-02-17	8w
21	Internal Go Live	2023-02-20	2023-02-20	0w
22	Install sensors into designated stalls to 90% complete	2023-02-20	2023-03-31	6w
23	Substantial Completion	2023-04-03	2023-04-03	0w
24	Install remaining 10% of sensors	2023-04-03	2023-04-14	2w
25	Design and manufacturing of digital signage	2022-11-07	2023-01-27	12w
26	Obtain permits for digital signage	2022-11-07	2022-12-02	4w
27	Installation of digital signage	2023-01-30	2023-03-24	8w
28	Software customizations, configuration, and data integrations	2022-11-21	2023-05-19	26w
29	Integrate components into a fully working system	2023-05-22	2023-06-23	5w
30	Testing and validation complete	2023-06-26	2023-08-25	9w
31	Pilot Begins	2023-08-28	2023-08-28	0w
32	Testing of the Performance Parking System	2023-08-28	2025-08-25	104.2w
33	Transition system to the County	2025-08-26	2025-08-26	0w
34	Ongoing Maintenance and Operations	2025-08-26	2029-08-24	208.8w

eleven-x Incident Response Plan

Versioning

Version	Date	Description	Author	Reviewer
0.1	2020/09/15	First Draft	Alex Krueger	Alan Sung
0.2	2021/01/05	Heavy restructuring and rewriting	Alex Krueger	Alan Sung
0.9	2021/03/29	Release Candidate	Alex Krueger	Alan Sung
0.91	2021/03/31	Update to Report Template	Alex Krueger	
0.95	2022/01/10	Merger with Disaster Recovery Plan	Alex Krueger	
0.99	2022/03/31	Release Candidate	Alex Krueger	Fraser Gibbs
1.0	2022/04/08	Release	Alex Krueger	

Incident Response Plan

Purpose

This document is to outline eleven-x's response plan to any incidents that occur in the course of running the LoRaWAN server.

Definitions

Incident	Any event that impacts the confidentiality, integrity or availability of any eleven-x service.
Disaster	Destruction of the facilities or infrastructure supporting the eleven-x LoRaWAN network, or a major hardware or software failure causing unavailability of the network e.g., Catastrophic storms, Fires, Floods, Cyberattacks and Ransomware, Terrorism, etc.
Fault	An unintended incident caused by hardware or software failure.
Attack	A deliberately triggered incident, or attempt to do so, by an attacker.
Precursor	Signs that an incident may be impending.
Indicator	Sign that an incident has occurred or is occurring
Solution	The complete collection of LoRaWAN components whose joint operation addresses a specific customer need.
Components	Any element of a solution – LoRaWAN devices and gateways, the network servers, application servers, and any backend systems.
Failover	The ability to switch between redundantly available network connections or servers in case of a failure of one of them.
Site	A collection of hardware in a given geographic area, including LoRa devices and gateways. This will vary in terms of area, but will broadly be defined as a single gateway and its covered devices. This can include multiple gateways if redundant coverage is planned.

Incident Response Team

Membership

eleven-x is a small organization and cannot sustain an incident response team with 24/7 availability. As such, the Incident Response Team will broadly consist of team leads with an in-depth knowledge of specific components of the eleven-x network. The team members and their respective responsibilities are outlined below

Chief Technology Officer, Manager of R&D

- Declaration of Disaster
- Resource allocation, task delegation
- Team notification and assembly
- Deployment expertise
- Vendor and expense approval
- Installer Coordination
- Disaster Assessment and Remediation Strategy and Implementation
- Disaster readiness documentation maintenance and review
- Disaster triage

Network Operations Developer

- Network Health Monitoring
- Upstream notification of possible disaster
- Network Infrastructure Subject Matter Expert
- Task delegation to network team members
- Establishing secure channels for communication with remote equipment
- Maintenance of backups and redeployment infrastructure
- Disaster readiness documentation authorship, maintenance and review
- Disaster Recovery Readiness Drills
- Rebuilding network infrastructure
- Data restoration from backups

R&D Team Leads (as applicable)

There are multiple teams focusing on specific areas of the eleven-x LoRaWAN network, LoRa hardware and customer facing applications. Team leads will be tasked with disaster recovery as it pertains to their specific areas of expertise.

- Subject Matter Expertise for their respective areas of responsibility
- Task delegation to team members
- Maintenance and authorship of documentation pertaining to disaster recovery in their respective areas of responsibility
- Cross training other Team Leads for emergency preparedness

Office Administrator

- Logging of disaster recovery discussion for post-incident analysis and documentation
- Customer and Vendor communication and coordination

- Logistics, shipping and receiving
- Additional support with non-technical tasks

Sales Engineer (if applicable)

If the disaster specifically affects customer sites, the sales engineer responsible for a given customer deployment has valuable insight into the customer's goals, requirements, and site information that can be useful in triage and issue debugging. As such, sales engineers may be pulled into the disaster recovery to fill the following roles, if necessary.

- Customer communication, if required
- Deployment and Site Subject Matter Expert
- Triage support

Installation Personnel

eleven-x uses multiple deployment strategies depending on the customer agreement for a given deployment. As such, installation personnel can include

- eleven-x staff
- Customers
- Network Installation Contractors

The personnel responsible for a given deployment are also responsible for on-site support of the deployment. Additional on-site support responsibilities are to be established as part of the sales agreement. eleven-x staff will provide remote support to any customers or installation contractors handling an issue.

Communication

Email

eleven-x managed email shall be the primary form of notification of incidents, help requests from/to team members, and interface with customers.

Notification Contacts

eleven-x will maintain a mailing list (network.emergency@eleven-x.com) to notify the incident response team and any administrators capable of handling the emergency. Additional points of contact are as follows:

Network Administrator Mailing List	Network.administrator@eleven-x.com
Alex Krueger	Alex.Krueger@eleven-x.com
Chuan Li	Chuan.Li@eleven-x.com
Alan Sung	Alan.Sung@eleven-x.com
Fraser Gibbs	Fraser.Gibbs@eleven-x.com

Teleconference Software

Teleconference meetings can be scheduled over email, if email communication is insufficient or ineffective.

Virtual Incident Response Team Room

The eleven-x Incident Response Team will maintain a dedicated Incident Response channel on the teleconferencing platform in general use by eleven-x. This will be the virtual meeting place for ongoing communication between team members.

Designated War Room

A conference room intended for 5 or more occupants shall be designated as a physical meeting place to handle any incident. During an incident, the Incident Response Team will have priority access to this room. The Virtual Incident Response Team Room should still be used for communication with remote team members, as well as the creation of an incident communications log. The Virtual Incident Response Team Room should therefore be used to keep minutes of ongoing verbal communication.

Emergency Contact

Outside emails may ONLY be used to communicate the existence of an incident and the need for the recipient to check their work emails.

A list of team members' home phone numbers shall be available to all team members for emergency notification. Such calls shall be limited to directing the team members to open the relevant email and Virtual Room.

Incident Response Plan

Preparation

Hardware Resources

eleven-x employees are furnished with a laptop for their typical tasks. Such laptops shall be configured to execute any task Incident response team members may require, so that they can assist with an incident remotely. Team members should take their laptops home after working in the office so that they can respond to incidents outside of office hours.

Monitoring Services

eleven-x shall use monitoring services as outlined in the Server Monitoring Policy. In addition to providing a dashboard that provides an instantaneous overview of system health, the monitoring services shall be configured to notify the Incident Response Team by email of any suspected incidents.

Backups

Backups of data and services will be kept and regularly updated in compliance with the backup policy. As such, there will be multiple fallback points for data, and the backups will be tested regularly to ensure their viability in an emergency.

Automated Deployment

eleven-x shall use monitoring services as outlined in the Server Monitoring Policy. In addition to providing a dashboard that provides an instantaneous overview of system health, the monitoring services shall be configured to notify the Incident Response Team by email of any suspected incidents.

Hardware Inventory

eleven-x employees are furnished with a laptop for their typical tasks. Such laptops shall be configured to execute any task Incident response team members may require, so that they can assist with an incident remotely. Team members should take their laptops home after working in the office so that they can respond to incidents outside of office hours.

Vendor Contacts

An internal vendor list is to be maintained by the Office Administrator so that new hardware can be ordered in a timely member if required.

Knowledgebase

Wiki

An R&D wiki is to be maintained that provides a knowledgebase of eleven-x systems, their administration, construction, and known issues. This wiki is accessible to the Incident Response Team.

Vendor Documentation

The R&D Team will maintain a digitally searchable library of documentation. This includes products developed both in-house and by third parties. This will consist of user guides, specification sheets, and troubleshooting guides. These can be used to aid in resolving issues, and the digital searchability will help expedite this process in an emergency

Playbooks

Playbooks (Outline in appendix A) are human-executable scripts that provide known solutions to recognized issues. Their application can vary specificity, (anything from "investigating potential causes of data delivery delays to application" to "Resolving Error 54 following update to firmware version 2.3.1"), but they provide the Incident Response Team with a framework to handle incidents. Playbooks should be generated as part of the testing and quality assurance of network components, as well as generated during post-incident activity.

Playbook Library

A searchable repository of playbooks is to be made available to the Incident Response Team, and references to playbooks should be made in the wiki, when appropriate. Relevant pieces of the Virtual Incident Response Team Room log should be used to construct playbooks. Compounding issues, red herrings and potential missteps should be noted in the relevant playbooks when necessary.

Cross Training

Incident Response Team members shall be sufficiently familiar with all components of the network to make simple fixes in the event that a specific team member is unable to respond. This cross training shall consist of monthly 60-minute meetings where team members will each present a new incident playbook specific to their area of expertise. If there are no new playbooks to present, the meeting should be used to review previously visited playbooks.

Vulnerability Analysis

Vulnerability Analysis shall be conducted in accordance with the Vulnerability Analysis Policy to proactively identify and mitigate potential incidents.

Detection and Analysis

Monitoring Services

Automated health checks of system metrics, logs, intrusion detection state, and service availability shall be used to generate dashboards and emergency notifications, as outlined in the Server Monitoring Policy. Available information should provide a bird's-eye view of server health and service availability, as well as establish a baseline for normal behaviour. Metrics, logs and services monitored, as well as relevant thresholds may be reconfigured as a result of Post-Incident Activity. Periodic spot checks of the system dashboards must be undertaken (at least daily). Generated notifications remain the primary form detection for the Incident Response Team, so it is crucial that they be adequately set.

News Services

Weather and news services will notify of potential incidents, and the Incident Response Team can investigate whether or not it has impacted the LoRaWAN network.

User Notification

A user may notify a member of the Incident Response Team of a suspected incident. If this occurs, Post-Incident Activity MUST identify a means of automatically detecting such an incident in the future.

Logs

eleven-x devices and servers will keep logs as follows:

- LoRaWAN devices and gateways will keep whatever system logs can be kept by the limited disk space. If possible, 30 days of logs will be kept.
- Network Server activity Trace Logs will be kept for 6 weeks before rotation
- Server logs will be kept for 6 weeks before rotation.

Analysis

Once the incident response team is made aware of a potential incident, analysis will need to be done and it will depend on the nature of the incident's manifestation. Ideally, automated notification will provide a good first step for where attention should be directed.

At a high level, system health dashboards are to be used to rapidly identify the components most likely to be at fault, as well as the scope of the impact. Once the faulty components and the scope have been identified, logs and system health checks can be used to gain more insight into the root cause of the incident.

If the alarm is genuine, an incident is declared. Otherwise, the alarm is recognized as false. Persistent, recurring false alarms do constitute an incident of their own requiring updates to the monitoring system.

Documentation

The virtual war room log from the analysis will be used during Post-Incident Activity to help generate new playbooks, and incident reports. If the physical war room is used, minutes should be taken to ensure a trail of the investigation exists.

Customer Communication

Once analysis has been completed and an incident has been declared, affected customers and potentially affected customers are to be notified of the incident. The following information is to be communicated:

- Date
- Symptoms observed
- Whether or not an investigation is ongoing
- Expected customer impact
- Required customer action
- Expected timeline to resolution

Incident Remediation

Containment Strategy

If appropriate for the nature of the incident, affected components may be isolated from the rest of the LoRaWAN solution until a remedy can be implemented. LoRaWAN devices may have their registration terminated, gateways may have their authentication revoked, and servers may be disconnected from any networks in order to contain an attack. Remediation in these cases should proceed over console connections if possible.

Containment may not be required, but unless the nature of the incident is immediately apparent and is known to be non-malicious, precautionary isolation should be done until analysis has been completed.

Containment will result in at least some degradation of service to customers and so details of an emergency outage and expected effects must be communicated to customers as soon as possible.

Eradication

Once a root cause has been established and contained, any changes to the component should be immediately purged. Depending on the nature of the incident, the simplest means to achieve this may be to restore from backup.

- Compromised accounts will be disabled until keys and passwords have been changed
- Compromised LoRaWAN devices should have their firmware reset to a factory state and be reregistered with a new key
- Compromised LoRaWAN gateways shall be factory reset and reauthorized using new keys
- Compromised servers shall be cleared of any new files, as indicated by an intrusion detection scan.
  - Sufficiently damaged servers (to be determined by the Incident Response Team at the time of the incident) shall be rebuilt using the established automated server deployment process.
- Malicious transactions are to be rolled back on compromised databases
  - Sufficiently damaged databases (to be determined by the Incident Response Team at the time of the incident), shall be rebuilt from backup. Note that rolling back the database will result in a loss of device payloads and this must be communicated to affected customers.

Recovery

Once that the team has verified that things are working as expected. Customers should be notified of the fixed solution.

Post-Incident Activity

Post-Incident Meeting

Following the recovery of the system, within 24 hours, a Post-Incident Meeting must be held with the team members who participated in the incident response in order to complete an incident report (appendix B). Other members are encouraged to attend as they may have some additional insight to contribute. If there are any changes that need to be made for preparedness or new playbooks to create, those activities should be identified and delegated to team members during the meeting.

The meeting should answer the following questions:

- What was the nature of the incident?
- How could the incident have been prevented?
- What precursors should have been visible sooner? What specific signs could be used to specifically identify this type of incident in the future?
- Has full functionality been restored? Are there any remaining workarounds in place that need to be properly repaired?
- Are there system design changes that need to be made? Does any software need patching?
- Is there a software change that needs to be pushed to other solution components to prevent further incidents? Hardware replacement?

Customer Communication

Once the report has been generated, notify affected customers of the incident, its cause, resolution and expected impacts. The Incident report is to be made available to them. A 30-minute meeting may be scheduled to discuss the incident, if necessary.

Points of Failure

There are various points of failure as outlined in the identified network vulnerabilities document. There are disaster preparedness and recovery steps to be taken.

LoRaWAN Network

Devices and gateways

Preparedness

- Ensure the devices meet security standards as outlined in the LoRaWAN specification, and that vulnerabilities identified in Vulnerability Analysis have been adequately addressed.
- A supply of devices/gateways on hand with the relevant installation personnel ready to be deployed as replacements
- Troubleshooting documentation
- Point of contact with hardware vendors and the LoRa device Subject Matter Expert

Recovery

1. Follow troubleshooting steps as outlined in device/gateway documentation
2. Replace the device/gateway, if necessary
3. Order more hardware from the hardware vendors, as appropriate

Backhaul Infrastructure

Ethernet/WiFi Network
Preparedness

- A supply of ethernet cables on hand for the installation personnel
- A supply of WiFi antennas on hand for the installation personnel
- A supply of replacement networking hardware up to a site's demarcation point for the installation personnel
  - Includes switches, routers, firewalls and access points
  - **NOTE**: It may be unreasonably expensive to guarantee access to spare enterprise grade networking hardware. Consumer grade hardware may be used on a temporary basis while awaiting replacement hardware, provided it is adequately secured and guarantees sufficient throughput for the site.
- Troubleshooting documentation of all hardware up to the demarcation point
- Point of contact with each site's ISP

Recovery

1. Debug networking issues to identify the source of the issue
   a. Follow troubleshooting documentation
   b. Start with the gateway(s), moving up to the demarcation point
   c. If the issue appears to be with the site's ISP, an urgent support ticket is to be opened with the ISP.
2. Replace defective networking hardware, as appropriate.
   a. If necessary, use a temporary replacement while awaiting new hardware.

Cellular Network

Preparedness

- A supply of replacement SIM cards on hand for the installation personnel
  - If possible, and geographically appropriate, multi-operator SIMs are to be used
- A supply of temporary hardline networking hardware
- Access to a network downtime identification tool
  - Useful to help distinguish between hardware issues with gateways and cellular network issues
- Point of contact with each site's cellular network provider
- Gateway troubleshooting documentation

Recovery

1. If the outage was discovered by disconnected gateways, first treat the outage as a gateway issue, this will help ensure the cellular network is, in fact, the problem.
2. Reset the network connection using the cellular provider's tools
   a. Not always an option, but this is supported by eleven-x's preferred MVNO
   b. This may re-establish network connectivity
3. Using another cellular enabled device, attempt to validate that the defective SIM card can be used to establish a network connection. Roam to a new network, if appropriate.
   a. If the new device can establish a network connection, verify that the gateway stays down when the SIM is reinserted
   b. If the gateway stays down, the issue is likely to be with the gateway. Replace the gateway and investigate separately.
4. If possible, swap SIM cards with those of another operator
   a. If the gateway runs on the new operator's cellular connection, the issue is very likely with the cellular provider
5. If the issue is determined to be a cellular network provider issue, open a support ticket with the network operator

Network Server

Preparedness

- Redundant, load balanced servers with failover configuration
- Regularly scheduled backups, in accordance with the backup policy
  - As per the backup policy, regular validation of backups should be performed to ensure their sanity
- Troubleshooting documentation
- Point of contact with the software vendor
  - Ensure the software vendor has an automated redeployment strategy in place
    - Currently using Ansible

Recovery

1. Follow troubleshooting steps in documentation

      a.   If this restores service, then stop here
2. In the event that a database or server is lost, backups will be used to restore service availability.
3. In the event that restoring from backup fails to adequately restore service availability, the software vendor must be contacted to redeploy servers using the automated deployment strategy
      a.   Data should then be restored from backups, if possible.
4. In the event that redeployment in the same availability zone is impossible, an alternative Canadian availability zone is to be used.
5. In the event that redeployment with the current web services vendor is impossible, a new web services provider is to be used
      a.   This will lead to extended downtime as the infrastructure is replicated on the new provider, and customers should be notified when this happens, and when it is resolved.

Application Services

Applications

Preparedness

- Troubleshooting documentation
- Regularly scheduled backups, in accordance with the backup policy
  - As per the backup policy, regular validation of backups should be performed to ensure their sanity
- Contact with the Application Subject Matter Expert

Recovery

1. Follow Troubleshooting documentation
   - a. If this restores service, then stop here
2. If documented troubleshooting fails to resolve the issue, the Application Subject Matter Expert is to be contacted for additional investigation.
3. If the Application Subject Matter Expert is unable to resolve the issue, then the issue is to be treated as an issue with the application servers.

Application Servers

Preparedness

- Troubleshooting documentation
- Regularly scheduled backups, in accordance with the backup policy
  - As per the backup policy, regular validation of backups should be performed to ensure their sanity
- Network Operations Subject Matter Expert
- An automated redeployment strategy
  - This strategy should be regularly validated as though it were backup validation
  - Currently using Ansible

Recovery

1. Follow Troubleshooting documentation
   - a. If this restores service, then stop here

2. In the event that a database or server is lost, backups will be used to restore service availability.
3. In the event that restoring from backup fails to adequately restore service availability, the automated deployment strategy should be used to reconstruct the application servers
   a. Data should then be restored from backups, if possible.
4. In the event that redeployment in the same availability zone is impossible, an alternative Canadian availability zone is to be used.
5. In the event that redeployment with the current web services vendor is impossible, a new web services provider is to be used
   a. This will lead to extended downtime as the infrastructure is replicated on the new provider, and customers should be notified when this happens, and when it is resolved.

eleven-x Infrastructure

Office/Headquarters

eleven-x's operations are largely cloud-based, and thus customer data, the LoRaWAN network and development efforts are mostly insulated from disasters affecting the office. There are, however, some tools and services that run out of the office and they must be handled in compliance with this policy.

Preparedness

- Encryption of drives with important data
  - Customer Data
  - LoRaWAN network data
  - Personally identifying information of staff and customers
- Regular, onsite, encrypted backups of employee drives
- Regular, offsite, encrypted backups of production drives with cryptographically validated user authentication
- Regular, offsite, encrypted backups of production servers with cryptographically validated user authentication
- Automated redeployment strategies for servers stored offsite with cryptographically validated user authentication
  - Currently using Ansible with git for version control
- Documentation of available servers
- Storage of plaintext encryption keys in a locked safe

Recovery

- In the event that a team member's computer is destroyed, pertinent data can be restored from an onsite backup
- In the event that servers in the office are destroyed, data can be restored from an offsite backup. The services can be rebuilt using the automated redeployment strategies
- Compromise of an employee's computer, or a shared server, will result in the immediate change for all passwords pertaining to that employee or server's role.
- Compromise of the plaintext encryption key database will require immediate rotation of all keys

Inventory Storage
Preparedness

- An up-to-date inventory of hardware
    - Regular (monthly) inventory reconciliations
- Restricted access to the inventory room
- Tracking of which devices have been authorized to work with the eleven-x network

Recovery

- If inventory is damaged, it will need to be repaired or replaced, as appropriate
- If inventory is stolen, a list of stolen devices is to be generated
    - The eleven-x network will be monitored for stolen hardware
    - Shared keys stored on stolen devices are to be immediately rotated

Cloud Services

The bulk of eleven-x's operational data will be stored in cloud services so as to facilitate distributed work. Additionally, cloud services offer the benefit of providing backups and data resilience transparently to end users. These services include but are not limited to

- Virtual office suites
- Email
- Virtual conferencing software
- Version control tools
- issue tracking
- Wikis
- Operational documentation

Preparedness

- Services are only to be used if they meet sufficient security requirements
    - User accounts MUST meet account and password policy
    - Data resiliency and availability MUST be guaranteed to a high degree of certainty
    - Underlying datacenters MUST meet ISO 27001
- Mission Critical Data MUST have onsite backups in the eleven-x office on encrypted media. These include
    - Customer contracts
    - Operational policies
    - Source code
    - Design documents

Recovery

- Most incident recovery should be handled by the service provider transparently to eleven-x
- If a web service is rendered inoperable, mission critical data can be recovered from local backup so that operations may continue, while migration to a new service is undertaken

Appendix A – Playbook Template

Meaningful Playbook Name

Describe the issue at a high level – the specific problem and the impacted component or service

Signs and Symptoms

The set of behaviours and symptoms found to be associated with the incident.

- Deviations in metrics from normal behaviour.
- Actual outcome as a difference from expected outcome
- Specific log messages
- Unexpected service states

Root Cause Analysis

Identify the expected root cause, and how to specifically confirm that.

Containment Strategy?

Does this playbook require containment of the affected component? If so, describe how to do so here.

Remediation Strategy

1. Establish a set of steps to follow
   a. If a step is successful, it can be verified like this
   b. If a step is unsuccessful, try this alternative step
   c. If a step cannot be executed successfully, then go to the Rollback Strategy
2. This is the next step to run
   a. This is how to confirm that the step was successfully executed
   b. If this is unsuccessful, go to the Rollback Strategy
3. Eradication of filesystem changes should be made here
   a. This should confirm that the filesystem has been cleaned

Rollback Strategy

1. Identify the required backup file/firmware version/etc.
2. Do whatever steps are required for deployment

Validation

A set of conditions that confirm the working order of the affected component
- Service state
- Server availability
- Device communicability
- Device accuracy

Appendix B – Incident Report Template

Date of report generation

eleven-x Incident Report

Description of the incident

Outline the incident

- When did the incident occur?
- What was the nature of the incident?
- What was the remediation of the incident?

Impact

- What is the scope of the impact of the incident?
- What services were unavailable?

Affected Data

- What data was accessed?
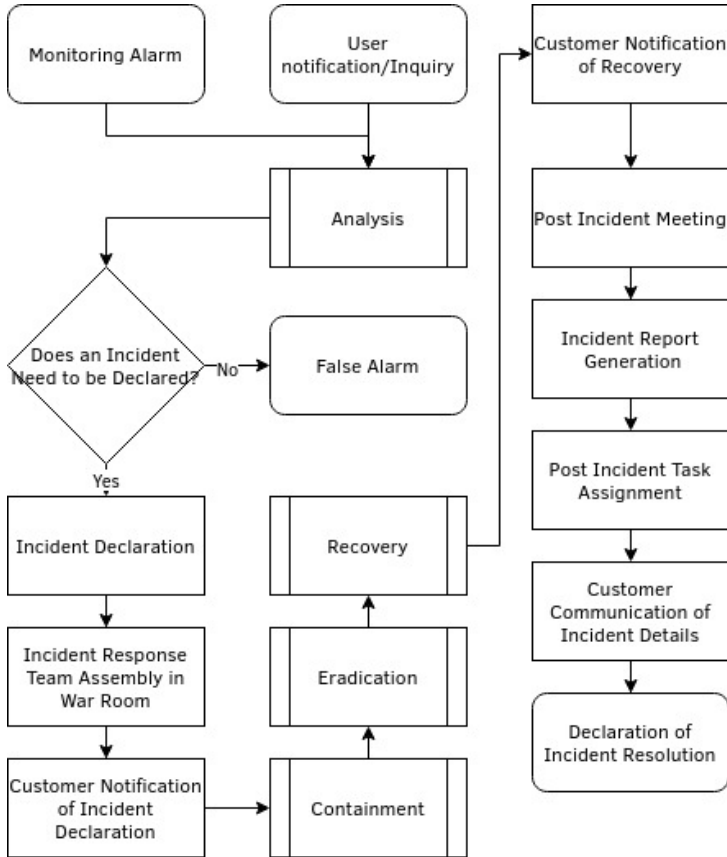- What data was lost?

Customer Actions

What actions does a customer need to take to restore the solution to working order?

eleven-x Actions

What mitigating actions are being taken to prevent the recurrence of the incident?

Appendix C – Incident Response Flowchart

Appendix D – Disaster Recovery Flowchart