INTELLECTUAL PROPERTY AND COMMERCIALIZATION RIGHTS

This Project shall be considered within the Program (as defined in the Collaboratory SOW). In furtherance of and without limiting the foregoing, the Parties acknowledge and agree that:

 All Intellectual Property that is made, conceived, discovered, developed, or created in the conduct of this Project (that does not constitute Background IP of a Party) shall be Joint Program IP.

 Any Intellectual Property in either Party’s Background IP that is contributed, introduced, or disclosed by the owner of such Background IP (including any enhancement, improvement, or modification of or to such Intellectual Property that is produced, conceived, developed, or derived in connection therewith) shall be outside the scope of this Project and is not being contributed to the Program.

 Without limiting the foregoing, to the extent that any existing product, service, solution, technology, or application of Cox or its affiliates (a “Cox Products”) are made available for use in this Project, such Cox Products (including any enhancements, improvements, modifications, or functionalities made thereto or any data derived therefrom) and any Cox’s Background IP in any of the foregoing

(i) are provided “AS IS” and “AS AVAILABLE” without warranty,

(ii) shall be outside the scope of this Project and (iii) are not being contributed to the Program; and

 Cox will not be accessing, collecting, or processing any FERPA protected data or GDPR protected data in connection with this Project and shall not be subject to any provisions of FERPA or GDPR in its performance hereunder.

PROPOSED POTENTIAL TECHNOLOGY VENDORS TO EVALUATE

 NoTraffic

 Miovision

 Rhythm Engineering

 Flir

 Wavetronics

 Iteris

 ARGOS Vision

 Econolite

 Gridsmart

 Rapidflow - Surtrac

 Kimley Horn – Kadence

 TransCore – ACDSS

VENDOR COLLABORATION APPROACH

 Cox will make introductions to any of the above vendors with an existing relationship

 ASU to conduct outreach to remaining vendors to engage for research (as third party, academic, unbiased researchers)

Cox Connected Environments Collaboratory

SOW 3 Addendum – Traffic Technology Research Evaluation

 ASU to request pilot data from vendors

 ASU to purchase hardware technologies, as needed, through the ASU IT procurement team.

 As needed, Cox can provide support to engage vendors for purpose of research

 [Cox to support Installation and data collection]

AREAS OF EVALUATION

1. Technology evaluation

a. Hardware – detection evaluation (examples to include Specs, Certifications, Hardware tear-down, BOM analysis, component level performance analysis, MTBF, connectivity, etc.)

b. Edge processing evaluation (hardware and software) (examples to include Specs, Certifications, Hardware tear-down, BOM analysis, component level performance analysis, MTBF, etc.)

c. Software – platform evaluation (examples to include Software architecture &amp, code quality, security, performance, maintainable, integration, scalability / recovery, analytics, alerting / monitoring / operations maturity, cloud computing, data, privacy, testing, etc.)

d. Software – intelligence evaluation (examples to include risk and capacity for harm - safeguards, accuracy levels, scalability, frameworks, training data, AI/algorithm analysis, etc.)

e. Privacy and data security

f. Summary evaluation / commentary by vendor (not technology type)

g. Solution installation (examples to include time to install, labor effort, disturbance to traffic, infrastructure requirements, connectivity requirements, etc.)

**2. Performance evaluation**

a. Conduct initial performance studies for future scenario analysis / modeling at scale (examples to include:

reduced stops, reduced delay, reduced travel time, increased average speeds, reduced emissions, reduced fuel consumption, etc.) based on vendor data and secondary data or direct data (if made available from already existing pilots).

b. Conduct initial performance studies for existing data from vendors and for future real-world data analysis (Examples to include reduced stops, reduced delay, reduced travel time, increased average speeds, reduction in accidents, reduction in red light runners, reduction in near misses, etc.)

c. Vendor performance claims

i. Could not be supported

ii. Could be supported anecdotally

iii. Could be supported and validated

3. Economic benefit analysis (ROI)

a. Conduct a complete survey of the claimed costs from vendors (examples to include solution, operating, maintenance, installation costs, replacement costs, product life cycle costs, etc.)

b. Data ownership

c. Conduct an analysis of potential cost savings (examples to include realized cost savings to cities, public

good cost savings – savings indirectly to road users, etc.)

d. Conduct an analysis on potential Revenue (examples to include revenue creation for cities, third party

revenue potential, etc.)

RESEARCH PLAN

Task 1: Literature review and vendor platform purchase and set-up for evaluation

 **Metrics used by city for evaluations (Florida has a systematic way for evaluation)**

 Identifying cities priority requirements

 Study vendor platforms installation requirements

 **Review current state of the research in this domain**

Task 2: evaluate different vendors technologies strength and weakness

 Create a feature base comparison list

 Validate claimed features success rate and feasibility

Cox Connected Environments Collaboratory

SOW 3 Addendum – Traffic Technology Research Evaluation

Task 3: Conduct preparation studies for future real-world performance evaluation.

 **Measure detection and classification accuracy using mean average precision**

 Measure Tracking accuracy using MOTA (Multiple Object Tracking Accuracy) and MOTP (Precision)

 Collect data on different light and visibility conditions.

 Validate system performance based on number of objects in the scene.

Task 4: Scientific white paper drafting and deliver final report/presentation.

PROJECT COMMUNICATION

Dr. Yezhou Yang will provide the overall supervision and coordination of the project. He will also lead the activities for all tasks. Dr. Yang, in the role of Principal Investigator, will also coordinate the project evaluation activities, the development of project reports, and the interactions with the COX2M researchers.

Dr. Mohammad Farhadi will provide expertise in computer vision and deep learning-based AI paradigms. He will lead the activities list in Task 2, 3, 4. Dr. Farhadi, in the role of front-line coordinator, will also interact closely with PI, and coordinate the development of scientific papers/reports/presentations.

ASU team and COX team will have a monthly meeting syncing research progress and adjust evaluation scopes if needed.

Throughout the project, ASU team will be available for giving presentations and publicity at the reasonable request of COX team.

For avoidance of doubt, Cox is not expected to have a team or project lead for this Project.