Exhibit "A"

Scope of Service

Florida Model Information eXchange System (MIXS)

Submitted to

The Florida Department of Transportation
Research Center
605 Suwannee Street, MS 30
Tallahassee, FL 32399

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Submitted by

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Background Statement

The Florida Department of Transportation has been maintaining several transportation networks and associated databases, such as the FDOT Work Program (WPA), Roads Characteristics Inventory (RCI), Florida Standard Urban Transportation Model Structure (FSUTMS), Efficient Transportation Decision Making (ETDM) and Florida Geographic Data Library (FGDL). On the other hand, local governments of cities and counties and the MPOs, maintain their own transportation networks and associated databases. These separate databases are developed over time to serve their specific applications. However, these databases contain information that can be shared especially for FSUTMS modeling. Different databases are based on diverse data models and reference networks. For example, in state and local managed databases, no uniform transportation network data is used as a reference data model. Some databases rely on linear reference systems, while others do not have linear reference systems. Some include polygon data while others do not. For those which have polygon data, the delineation and size of the polygons vary between databases. The lack of integration among these different sources impedes the efficient flow of information and exchange of variables among the databases and applications thus limiting the full potential for integrated transportation modeling and environmental analysis. In addition, the need for continuous maintenance and updates of data elements (variables) and network features (e.g., road segments, facilities) dictate the need to move towards full GIS integration. There is a research need to develop a methodology and a set of tools for the integration of a host of information sources into a database framework. This process is likely to be a very complex exercise fraught with issues related to data formats, data exchange and flow between systems and platforms, consistency in level of detail, and data updating and maintenance (Transportation Research Board, 1998). Therefore, these databases must be interchangeable, which calls for the creation of a Model Information eXchange System (MIXS).

Objectives and Supporting Tasks

A Model Information eXchange System (MIXS) is a mechanism by which transportation and related data from diverse sources and databases are seamlessly linked, based on common geographic features. The initial goal of MIXS is to serve the data needs of the FSUTMS modeling so that these data can be readily available and easily integrated into the FSUTMS models. The objective of this research is to investigate methods for the development and implementation of MIXS in order to facilitate the information exchange amongst Florida transportation models.

Research Approach

The development of the MIXS requires a common data model. This should include a road feature location model or road segmentation model and an event model. There needs to be a standard means by which to identify the same geographic location among the different databases. The geographic location can be identified as an (x, y) coordinate, or as an offset distance from the origin in a linear referencing system. If the same geographic feature is represented in a different manner in each database, sharing or exchanging data becomes difficult. For example, for the same road segment, one database could use a link-node model, while another database uses a linear reference model. Therefore, the two databases cannot be shared without data conversion or

conflation. In this case, a data model conversion tool needs to be developed before the data can be shared.

There are two basic approaches in developing a MIXS: an exchange system and a conversion system. An exchange system refers to the mechanism that associates data from the various databases based on the same geographic features, such as a road segment. Each database is maintained by each data source agency.

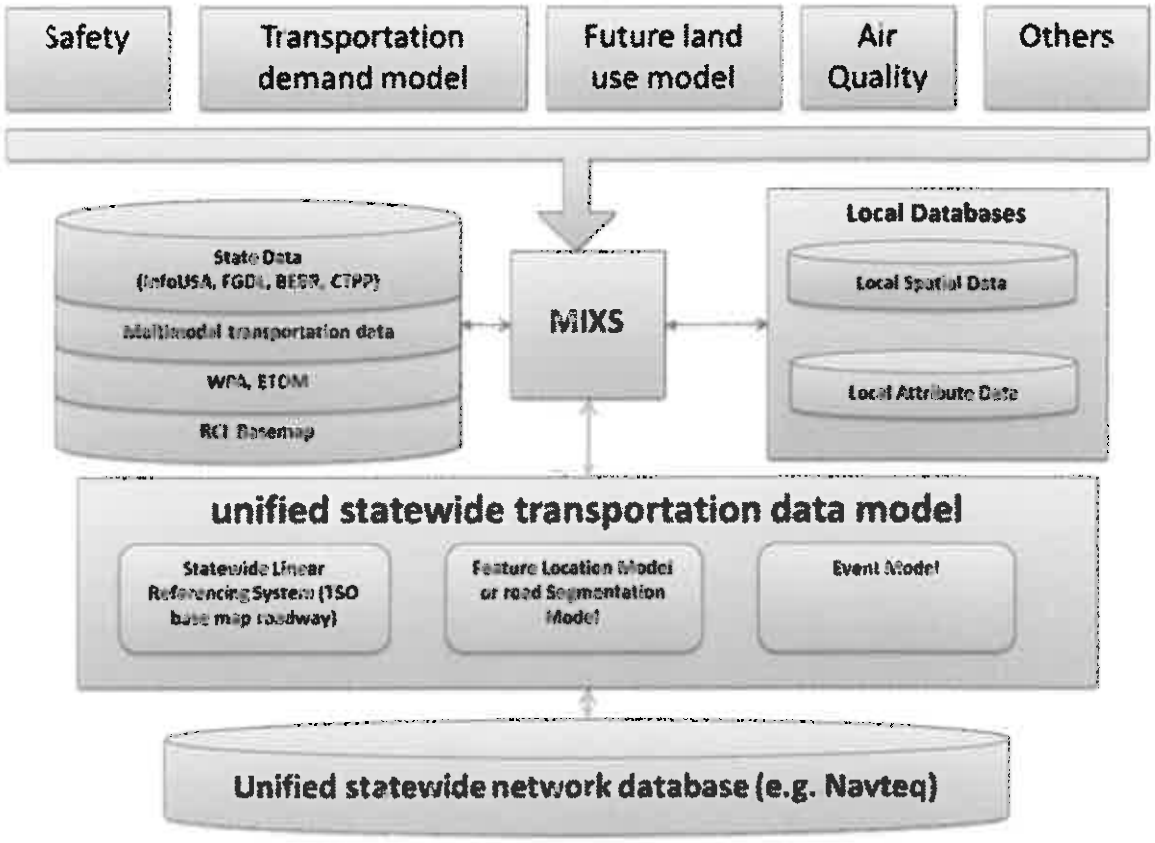

Figure 1. Framework of exchange system

A broad framework for the exchange system can be illustrated in figure 1. Developing a standard data model is the most critical step in this process. FDOT Systems Planning Office has access to the Navteq commercial network database. This can be used as the base network for the unified modeling platform. Therefore, any new data model developed for the MIXS would greatly benefit from using Navteq as the reference network. In addition, the FDOT Safety Office has developed a complete statewide linear referencing system on all roads, both on and off system. For state maintained roads the LRS it is based on the TSO basemap. This statewide linear referencing system could become a base for a unified statewide transportation data model to be applied to the Navteq network database. It is important to note that in the long run one of the main goals of the statewide transportation network data model should be to integrate various planning functions such as safety, transportation demand modeling (i.e., FSUTMS), future land use modeling, air quality modeling and activity-based modeling.

One way to start the development of a statewide transportation network data model is to use or adapt the Safety Office's statewide linear referencing system to the master Navteq database as the common data model. In the future, databases internal to FDOT such as Work Program and RCI that use the FDOT LRS Basemap could be linked. Figure 2 illustrates the relationships between local data and unified basemap. Local data such as event data for safety model are located to base map based on the shared linear referencing system.

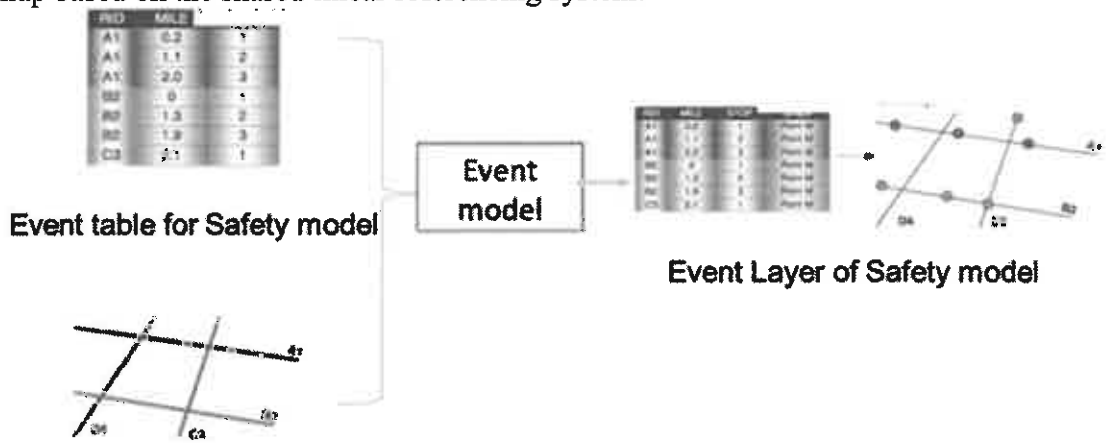

Figure 2. Relationships between local data and Unified Basemap

Next, other local government data could also be linked to the same linear referencing system by associating the local government's unique GIS identifier to segments in the linear referencing system. In this manner the local government could receive data from any of the FDOT databases, or could provide information to the central repository. This method of linking local government data could be tested out first with a few entities to prove the approach works.

The links to local data should be as simple as possible to reduce the amount of work in creating and maintaining the link. One approach would be tabular where some form of unique ID from the local dataset is maintained in a lookup table with the corresponding common data model LRS Roadway and mile point.

Initially, the data would need to be manually extracted, and placed on MIXS as a proof of concept to ensure that the common data model design works. The database connection tools and the road segment connections to facilitate local information exchange and sharing would come later. This staged approach could demonstrate early success and help build consensus within the modeling community that MIXS is valuable.

The "Information Technology – Geographic Information Framework Data Content Standard," originally called Geospatial One Stop Data Content Standard, developed by the Bureau of Transportation Statistics and FHWA is an important data model that could be incorporated in the development of the FDOT MIXS data model.

The advantage of this approach is that the local governmental agencies can maintain and update their data as they usually do. The drawback of this approach is that if the original network data and/or data model is different; a data model conversion or database linkage tool is still needed to

link the data models used in different databases, based a common and standard data model. Special care is needed to maintain the MIXS, because over time, the data in local sources may change. But as long as internal linkage between databases is not changed, there is no need to have constant maintenance and updating of the MIXS.

The other approach, a conversion system, requires the development of a conversion tool to convert current databases into one common data model, and all users access this same database for future data maintenance and updating. The advantage of a conversion system is that once everyone starts to use the same data model or base network data, future updates and maintenance will require minimal effort. The disadvantage is that this initial conversion may be time-consuming, and some of the special features in the original database may be cumbersome to continue in the new data model. In addition, some local agencies may not want to convert their data without substantial help from FDOT in terms of budget and technical support.

To test the feasibility of these two approaches, and to document the issues encountered, it is necessary to run a pilot case study. The pilot case study should focus on developing a standard data model, and provide a prototype system for data exchange and conversion.

For this process to be successful, a local governmental agency must also be selected as a case study. That local agency must have an existing GIS-based transportation data, sufficient database management expertise, and is willing to facilitate the pilot study. Together, the data can be combined and tested so that the feasibility of the statewide MIXS can be evaluated, prototyped and developed.

Research Tasks

The following tasks are anticipated to achieve the research objectives:

1. Develop a unified statewide transportation network data model, based on the statewide linear referencing system from FDOT Safety Office and the "Information Technology – Geographic Information Framework Data Content Standard" that was developed by the Bureau of Transportation Statistics and FHWA of the US DOT. This unified data model should use the Navteq network as a common reference database layer.

2. Develop a conceptual model of MIXS, based on an exchange approach and/or conversion approach. Determine the approach(es) to be tested in the next step.

3. Test the feasibility of MIXS, select a case study area, manually extract and place the data in the MIXS, to make sure the unified statewide transportation network data model and the conceptual MIXS model work.

4. Develop specifications of the database connection/conversion tools to automate the transportation information exchange and sharing process for the next phase implementation.

Roles and responsibilities of team members
Principal Investigator, Dr. Ilir Bejleri will be responsible for leading the research project, providing the vision for the research approach and outcomes, ensuring the fulfillment of all the research tasks, coordinating the efforts of the other team members, sub-contractors, FDOT project manager and other staff, coordinate with the case studies staff as well as oversee the development of progress reports and the final report.

Co-Principal Investigator, Dr. Zhong-Ren Peng will direct and supervise the development of the exchange methodologies, develop the case studies, supervise testing and assist in the development of the final report.

One GIS Geoplan staff member will support the research team with GIS methods and techniques, in particular to support students working on data processing and conversions with GIS data processing expert knowledge.

One Geoplan database architect staff will be responsible to assist in exploring data sharing and exchange protocol, data exchange validation procedures and database structure for the unified model.

One office administrative assistant will assist with administrative tasks of the project.

For student assistants see section below 'Use of Graduate Student(s) and other Research Assistant'.

Sub-contractors
Two sub-contractors will assist this research – URS Corp and CitiLabs. The roles and responsibilities/tasks for each are as follows:

URS Corp
Under the staged process used to develop MIXS step one is to develop a unified statewide transportation network data model, based on the FDOT basemap's statewide Linear Referencing System (LRS). The unified data model should use the commercial network GIS database, Navteq as a common database and have the LRS from the basemap placed on the road network. The data model for the network should include common attributes useful to traffic modeling, such as the number of lanes, location of traffic count locations, and speed limits. In this context the specific tasks for URS are:

- URS will obtain the latest Navteq based GIS database from the FDOT Safety Office and link it to the Turnpike State Model (TSM) GIS database to obtain the attributes necessary for traffic modeling. An automated process will be used to complete this link. URS will then manually review and edit two large primarily urban counties, two primarily rural counties, and two medium sized counties (with a mix of urban and rural characteristics) to remove any errors not discovered in the automated process and confirm the data integrity. The counties are to be selected by FDOT and the Research Principal Investigator. The resulting GIS database will be used to work out the conceptual model of MIXS, as well as test the feasibility of MIXS. The database will also be used in any prototypes developed

during the process. More counties will be linked once the feasibility tests are accomplished and any prototypes are developed.

- URS staff will also coordinate regularly with FDOT, UF investigators, and Citilabs so that all work performed by URS will support the needs of MIXS. This will include attending meetings, teleconferences, webinars and occasional travel

CitiLabs:
The primary responsibility of CitiLabs is to ensure that the research takes into account the geodatabase data structure provided through the Cube software and used by the FSUTMS models. More specifically CitiLabs will:

- Support the research team with the detail knowledge of the ESRI custom network data structure
- Investigate the challenges of integrating the transit network in the exchange system
- Assist in the development of the requirements and technical specification of the automation tools that we be identified through this research.
- Assist in the development of an exchange prototype
- CitiLabs staff will also coordinate regularly with FDOT, UF investigators, and URS Corp so that all work performed by CitiLabs will support the needs of MIXS. This will include attending meetings, teleconferences, webinars and occasional travel.

A copy of the budget estimate from the sub-contractor is attached.

Work not included in this scope of service is not to be performed and will not be subject to compensation by the Department.

Use of Graduate Student(s) and other Research Assistants

The project will require two graduate students to assist the principal investigators with the review of best practices in the literature, data collection, data processing, data conversions, testing of prototypes and assistance with the development of the reports.

Equipment

No equipment is required for this project.

Reimbursement will only occur upon receipt of and only for the amount of the purchasing invoice for the subject equipment.

The university, upon receipt of any purchased equipment, shall forward to the Research Center a copy of the purchase invoice/property description as detailed in Exhibit C – Budget/serial number and receipt. The Department will prepare and forward inventory control label(s), which the university shall have affixed to the property.

Travel

Two trips are anticipated: (a) one day trip to Tallahassee for a working meeting with the FDOT staff to assess the progress of the project and to discuss selection of case studies. This meeting will also include sub-contractors to coordinate specific tasks related to the case studies. This is necessary to ensure proper coordination of several parties participating in this effort and start to develop actual specifications for the prototypes. (b) The second trip will be in Orlando to organize a full day workshop with the selected case studies to assess the proposed process and methodology and discuss the prototypes for each case study. This trip will require an overnight stay for the PI and Co-PI and the two student assistants. This workshop is necessary to validate the proposed MIXS with the selected case studies to ensure practical validity of the methodology and craft proper requirements for the tools that will be used by the actual users of the system.

All travel shall be in accordance with Section 112.061, Florida Statutes. FDOT employees may not travel on research contracts.

Deliverables

The deliverables are as follows:

a. Progress Reports – These reports will be submitted based on requirements indicated under 'Progress Reports' section below.
b. Draft Final Report: - This report will be submitted based on specifications under 'Draft Final Reports' section below.
c. Final Report: This report will be submitted based on specifications under 'Final Report' section below. The final report will include, a conceptual model of MIXS, a case study results, and a specifications of database connection/conversion tools for the next phase
d. A statewide transportation network data model for FSUTMS

Project Kickoff Meeting

A kick-off meeting will be scheduled to occur within the first 30 days of the project effective start date. It is anticipated that the kick-off meeting will be via teleconference or video conference. In attendance there will be the FDOT project manager, the principal investigator and the two sub-contractors. The FDOT Research Center staff will be advised of the meeting and given the option to attend. The purpose of the meeting will be to review and discuss the project's tasks, schedule, milestones, deliverables, reporting requirements, and deployment plan. A summary of the kick-off meeting will be included in the first progress report.

Progress Reports The university will submit quarterly progress reports to the Research Center. The first report will cover the activity that occurred in the 90 days following the issuance of the task work order.

Reports should be submitted within 30 days of the end of the reporting period. Progress reports will be sent in MS Word to Sandra Bell, sandra.bell@dot.state.fl.us .

Progress reports will include the following information:

1. Contract number, task work order number, and title
2. Work performed during the period being reported
3. Work to be performed in the following period
4. Anticipated modifications (i.e., to funding, schedule, or scope). This section is for reporting/informational purposes, not for officially requesting an amendment.

   Note: It is understood that to request an amendment to a contract, University will provide the project manager with the appropriate information (i.e., what is being requested with justification) in the required format. If the project manager concurs with the request, he/she shall forward it with his/her approval and commentary, as appropriate, to the Research Center for administrative review and processing (pending available funds, etc.)

5. A progress schedule updated to reflect activities for the period being reported.

It is understood that failure to submit progress reports in a timely manner may result in termination of the work order.

Draft Final Reports The Draft Final Report will be submitted 90 days prior to the end date of the task work order. The draft final report will be submitted to Sandra Bell, sandra.bell@dot.state.fl.us. It will be edited for technical accuracy, grammar, clarity, organization, and format prior to submission to the Department for technical approval. It is understood that The Research Center expects contractors to be able to provide well-written, high-quality reports that address the objectives defined by the scope of service. Draft final reports will be prepared in accordance with the "Guidelines for Preparing Draft Final and Final Reports" posted at http://www.dot.state.fl.us/research%2Dcenter/Program_Information/Guidelines%20for%20Preparing%20a%20Final%20Report%2012-07.pdf. This document provides information on all report requirements, including format, the technical report documentation form, disclaimer language, and so forth.

Final Reports Once the draft final report has been approved, the university will prepare the final report. The university will deliver a minimum eight (8) copies on CD or DVD – seven (7) CDs should contain the final report in PDF format, one (1) CD should contain the final report in PDF format, MS Word format and a Summary of the Final Report.

The CD/DVDs will be labeled in a professional manner and include at a minimum the contract number, task work order number, project title and date.

The final report is due no later than the end date of the task work order and will be delivered to the following address:

The Florida Department of Transportation
Research Center, MS 30
605 Suwannee Street
Tallahassee, FL 32399-0450

Project Closeout Meeting

A closeout meeting shall be conducted to review project performance, the deployment plan, and next steps. Attendees shall include, as a minimum, the project manager, the principal investigator, and the Research Center performance coordinator. This meeting is to occur prior to the expiration of the contract and subsequent to the approval of the draft final report (i.e., it should be scheduled for sometime during the final 30 days of the project).

Project Schedule

See attached.

Budget Sheet

See attached.

Contact Information

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