

## NOTICE TO AIRPORT CONSULTANTS REGARDING A REQUEST FOR LETTERS OF INTEREST

**December 19, 2018  
(Aeronautics Division)**

The Tennessee Department of Transportation (TDOT), Aeronautics Division, an Equal Opportunity/Affirmative Action Employer, seeks to engage the services of architectural, engineering, and planning consultants to prepare and provide a detailed State Aviation System Plan and Economic Impact Study of Tennessee's public-use airport system.

### **Scope of Work**

#### **State Aviation System Plan**

One (1) consultant will be selected to assist the TDOT Aeronautics Division with collecting and analyzing Tennessee's public-use general aviation facilities Statewide. A detailed scope of service is included in Attachment 'A'.

**DBE Requirements:** See Phase II Evaluation

**Compensation Ceiling: To be determined.** In no event shall the maximum contract amount exceed \$2,000,000.00

**Funding Sources:** Tennessee Transportation Equity Fund and FAA State Apportionment.

**Proposed Contract Time:** Three (3) years

**Proposed Contract Payment Type: Fixed Lump SUM**

**Tentative Notice to Proceed Date:** March 28, 2019

### **Technical Requirements**

Applicable Federal and State statutes, regulations, rules, orders, standards, specifications, and policies must be satisfied in the performance of aviation planning and professional engineering services. These may include, but are not limited to, the following:

- Federal Requirements
  - Title 49, USC, subtitle VII et seq
  - 2 CFR
  - 14 CFR
  - 49 CFR
  - FAA Orders and Notices
  - FAA Advisory Circulars
  - FAA Policy and Guidance
- State of Tennessee Requirements
  - TCA Title 42 et seq
  - Tennessee Rule 1680-01-01 et seq
  - TDOT Policy 170-02

### **Submittal Requirements**

Firms may request consideration by submitting a letter of interest (LOI). These may be submitted to:

**Mr. John-Paul Saalwaechter, P.E.**  
**Civil Engineering Manager**  
**607 Hangar Lane**  
**Nashville, TN 37217**

**Or electronically by email to:**  
[john.saalwaechter@tn.gov](mailto:john.saalwaechter@tn.gov)

All letters of interest must be received on or before **4:00 p.m. (Central Time) January 11, 2019**. Please list all state-wide aviation system plans completed as a prime in the last ten (10) years. For additional details regarding these projects, please contact Mr. John-Paul Saalwaechter at (615) 741-0780 or by email at [John.saalwaechter@tn.gov](mailto:John.saalwaechter@tn.gov).

All firms must be pre-qualified or have a completed prequalification form filed with TDOT by the deadline for Letters of Interest. Additional information, including the Prequalification Form (DT-0330, Part 1), and an example letter of interest can be found at: <http://www.tdot.state.tn.us/ConsultantInfo.htm>. Interested firms without internet access may obtain this information by calling Ms. Chris Smotherman at (615)741-4460 or [Christine.Smotherman@tn.gov](mailto:Christine.Smotherman@tn.gov). The letter of interest shall not specifically identify sub-consultant(s), but rather indicate the scope of services anticipated to be completed by any sub-consultants. The sub-consultant shall be one that is prequalified by the TDOT to perform the specific tasks required. A pending prequalification status will be acceptable. **Please include a valid email address and phone number for the point-of-contact.**

**Evaluation Process**

**Phase I Evaluation**

The Department will evaluate the **current prequalification statements** on file for those submitting letters of interest and choose several firms who appear to be viable candidates, from which to invite DT-0330 Part II Form (Contract Specific Qualifications). Please note: New or updated prequalification forms must be received before the deadline for letters of interest. The criteria that will be considered are:

- i. Work experience in the required disciplines: Experience Categories (annual average revenue for last 5 years in relevant Profile Codes (A05, A06)).
- ii. Specialized expertise in the field of aviation state-wide system planning in the past ten (10) years.
- iii. Qualification Type: UNLIMITED.

**Phase II Evaluation**

A DBE Participation Plan, including firm names of DBE participants and/or documented Good Faith Effort will be required during Phase II Evaluation. For firms submitting DT-0330 Part II Form (Contract Specific Qualifications) during Phase II evaluation, the criteria that will be considered are:

<b>Criteria and Relative Weights</b>	
i. Proposed team member expertise (Sections C, D, & E of Part II of the DT-0330 form).	30 %
ii. Relevant project or work experience (Sections F & G of Part II of the DT-0330 form).	30 %
iii. Technical approach (as explained in Section H of Part II of the DT-0330 form).	30 %
iv. Participation of qualified and certified Disadvantaged Business Enterprise (DBE) subconsultants. (A DBE Participation Plan must be conveyed in Section H of Part II of the DT-0330 form).	10 %

Following Phase II evaluation, the three\* firms deemed most qualified by the Consultant Selection Committee (CEC) will be recommended to the Commissioner in alphabetical order for Phase III evaluation.

\* In instances where only two qualified consultants respond with DT-0330 Part II Form (Contract Specific Qualifications), the Department may proceed with evaluation and selection if it is determined that the solicitation did not contain conditions or requirements that arbitrarily limited competition.

### **Phase III Evaluation**

From the list of firms determined by the CEC to be the most highly qualified firms to perform the solicited services, the Commissioner will rank the firms in order of preference for each item.

### **Post Selection**

The TDOT Aeronautics Division will then enter into negotiations with the firm deemed to be most highly qualified based upon the Commissioner's ranking. Before the invitation of cost proposals are made, a mutual understanding of the scope of work and all technical and administrative requirements of each proposed undertaking will be established with the prospective consultant. This may be accomplished by conference, phone, or correspondence as determined to be most appropriate by the Aeronautics Division. Instructions will be given regarding the method of compensation and the documentation needed to justify the proposed compensation.

### **Procurement Schedule**

\*Dates other than LOI submittal deadline are tentative and provided for information only.

- LOI submittal deadline – January 11, 2019 No later Than 4:00 p.m. (Central Time)
- Request for DT-0330 Part II Form (Contract Specific Qualifications) – January 28, 2019\*
- DT-0330 Part II Form (Contract Specific Qualifications) submittal deadline – February 12, 2019\* No later Than 4:00 p.m. (Central Time)
- Final selection - March 8, 2019\*
- Notice to Proceed – March 29, 2019\*

Evaluation proceedings will be conducted within the established guidelines regarding equal employment opportunity and nondiscriminatory action based upon the grounds of race, color, religion, national origin, sex, creed, age, and disability. Interested certified Disadvantaged Business Enterprise (DBE) firms as well as other minority- and/or women-owned firms are encouraged to respond to all advertisements by TDOT. For more information on DBE certification, please contact the Civil Rights Office Small Business Development Program at (615) 741-3681. Details and instructions for DBE certification can be found at the following website:

<http://www.tdot.state.tn.us/civil-rights/smallbusiness/>.

John C. Schroer  
Commissioner

JCS/MF/JPS

# Attachment A - Potential Scope of Services

Aeronautics Division

TDOT

December 14, 2018

The Tennessee Department of Transportation (TDOT) – Aeronautics Division intends to develop a Tennessee State Airport System Plan and Economic Impact Study of Tennessee public-use airports. These studies provide current information to what are valuable resources to TDOT – Aeronautics Division, Tennessee airports, various levels of government, and constituents of the Tennessee aviation system. The current Tennessee State Airport System Plan has not been updated since 2001 and an Economic Impact Study has never been included within a system plan.

The Tennessee State Airport System Plan helps to identify and quantify the state system of public-use airports as well as determining the development and investment needs of the system. Since the completion of the last system plan, there have been changes to the airport role classifications, system-wide capital programming priorities, the Tennessee Transportation Equity Trust Fund (TEF), the Federal Aviation Administration (FAA) Airport Improvement Program (AIP), and the Aeronautics Division grant funding and eligibility requirements. It is the Aeronautics Division's intent to create a comprehensive evaluation of the existing system with an outlook to the future of Tennessee airports.

There has been significant change in state and local economies within Tennessee as the state continues to lead in economic growth. The TDOT – Aeronautics Division is seeking to create an Economic Impact Study for Tennessee's system of airports including air carrier airports. Economic Impact Studies have proven to be an excellent resource for decision makers at all levels of government as well as members of the community to justify the economic benefit and value of their airport.

## General Scope for the Tennessee State Airport System Plan

The Tennessee State Airport System Plan will identify and evaluate the system's needs within the State of Tennessee. The Tennessee aviation system currently includes 79 public use airports, 5 of which provide primary commercial service. The primary goal of the plan is to capture data that supports informed decisions related to planning and development of the Tennessee aviation system. Consistent with the most current FAA Advisory Circular for Airport System Planning, the Study shall include four main elements (below) as well as the economic impact study component.

- System needs identification and inventory.
- System-wide development cost analysis.
- Studies, surveys, and other planning actions to present guidance (recommendations) as to which aeronautical needs should be addressed by the system of airports.
- Provide standards to which the system airports should follow with respect to airport safety, maintenance, and development at non-primary public-use airports.

The selected consulting team may be ask to present data throughout the study effort and provide technical support for their findings made during the course of this study. **This system planning approach, scope and implementation plan shall be in compliance with FAA Advisory Circular 150/5070-7.**

## Tennessee State Airport System Planning Process

Overall, the planning process shall include the following elements:

- Exploration of issues that impact aviation in the study area;
- Inventory of the current system;
- Identification of air transportation needs;
- Forecast of system demand;
- Consideration of alternative airport systems;
- Definition of airport roles and policy strategies;
- Recommendation of system changes, funding strategies, and airport development; and
- Preparation of an implementation plan.

# Attachment A - Potential Scope of Services

Aeronautics Division

TDOT

December 14, 2018

All material must be made available to subsequent study efforts for inclusion in future statewide studies conducted by and coordinated through the TDOT, the Federal Aviation Administration, and other State or Federal transportation agencies. All raw and analyzed data will become the property of TDOT, to be distributed and shared with all parties as they see fit.

An initial meeting will focus on the development of a comprehensive scope of services and defining the efforts, goals, methodology and timeframes necessary to accomplish the work scope, and to determine the final deliverables. The full scope of services MUST be approved by the FAA's Memphis Airport District Office prior to proceeding with any other project tasks or contract execution. The selected consultant will develop their fee and work schedules based on the FAA approved scope/schedule, and consultant's fee will be reviewed by a third party under the normal procedures recommended by the FAA. The general guidelines for the system plan are contained herein.

## Tennessee State Airport System Plan Products

Airport System Planning Products shall include.

- **State Airport System Plan Report**
- **Executive Summary**
- **Policymaker's Primer**

An overview and general scope associated with the elements of the Airport System Plan report include, but are not limited to:

- **Establish a Study Design and Goals**  
Identify the framework, parties involved, organizational arrangements, specific objectives, performance measures, and project schedule. This will include review and update of the long-term vision for Tennessee's aviation system.
- **Inventory of System Condition and Performance**  
The inventory of the system and the airport specific data form the backbone for the system plan update. It is essential that a thorough understanding of activities, facilities, and existing conditions, including secondary socioeconomic data, are derived from the inventory effort. A survey should be developed and implemented to update, expand, and supplement existing inventory data. This will include the use of both FAA and TDOT- Aeronautics Division data. Existing data should be collected from airport layout plans, aerial photography, airport drawings, capital improvement plans, master plans, existing databases, and other sources of secondary information.
- **Explore Aviation Issues & Identify System Needs**  
This study shall include an exploration of issues that impact the state aviation system as well as the needs of the system. The final product of this task should result in the identification, preservation, and enhancement of the state aviation system to meet current and future demand resulting in the establishment of a viable, balanced, and integrated system of airports. This task will include specific areas of concern to the Tennessee aviation system that may require a more in-depth analysis.
- **Forecast of Aviation Activity & System Requirements**  
To maintain and develop an airport system that is responsive to user demand, it is important to have a general understanding of where future growth for the system can most likely be anticipated. It is also important to have estimates of future demand quantified so that impacts on future facilities can adequately be determined. Forecasting will be completed to justify proposed airport development in terms of aviation activity levels and aircraft mix, limited to simple methods and assumptions that establish the demand for aircraft operations, based aircraft, passengers, cargo, and ground access. This forecast will provide stakeholders with a forecast to reference when reviewing individual airport master plan reports. Forecasting the air service and general aviation activity is essential for determining system-wide needs using FAA design criteria. FAA approval of the forecast will be required.

# Attachment A - Potential Scope of Services

- **Review of Environmental Considerations**

Review general land use, noise, air quality, and other environmental studies to consider the impact of airport development on the environment and the protection of airports from incompatible uses in neighboring areas.

- **Analysis of System Alternatives**

This task will document how best to enhance, expand, and maintain the state aviation system to meet its specified vision and goals. As part of this task, projects needed to meet service objectives for airports in each of the functional/role groupings will be finalized.

Facility requirements determination will include analysis of the suitability, possibilities for expansion, and safety deficiencies of existing airports; the general location and need for new airports; and the compatibility of airports with surface access plans and comprehensive planning. This analysis will include a reasonable number of alternative airport systems, including feasibility and sensitivity analysis, contingency plans and the evaluation of safety, efficiency, environmental impacts, energy considerations, and cost.

- **Identify Existing NPIAS Airport Roles/Classes**

Review airport classification system and update as needed including consideration of FAA primary airports and the general aviation airport ASSET 1 & 2 classifications. Considerations will include metropolitan, regional, and rural economies. Airports that are not included in the FAA's National Plan of Integrated Airports System (NPIAS) will be included as a separate task identified in the non-federal section at the end of the system plan general scope.

- **Review of Inter-modal Integration and Airport Access**

Agencies responsible for the development of highways, railroads, and transit can be helpful in improving surface access to an airport for passengers, air cargo operations, and congestion reduction. An early dialogue between aviation interests and surface transportation agencies is vital to ensure that highway and transit improvements are coordinated with airport expansion plans. These parties include the Federal Transit Administration, Federal Highway Administration, Federal Railroad Administration, Tennessee Department of Transportation, private transportation providers, metropolitan planning organizations, and other city and county transportation agencies. An evaluation of aviation needs within the context of multi-modal planning should be undertaken.

- **Develop System-wide Cost Estimate and Implementation Plan**

A cost-effective plan of action should be prepared for 5-, 10-, and 20-year planning horizons. Phasing of individual project elements should be logical. The highest priority projects will be designated as 5-year or short-term airport capital improvements, which can include an immediate action plan. The FAA, state, and local aviation funding limitations should be kept in mind when the plan is prepared. For the 5- to 10-year period, proposed development should be geared to realistic financial capabilities, with the justification based on Tennessee's goals, objectives, policy strategies, and system trends in activity levels. The 10- to 20- year timeframe should focus on a more general assessment of airport development needs. The long-term period provides a less precise estimate of costs than near-term development and is conducted primarily for fiscal planning purposes. All airport development needs should be reported in a consistent manner.

- **System Goals and Performance Measures**

Identification and implementation of performance measures and corresponding benchmarks will be completed with Tennessee's airport system goals in mind. Generally these performance areas should focus on activity, expansion potential, economic state, emergency coverage, and investment. A thorough review of how the system is evaluated is expected and may result in revised performance measurements, resulting in an efficient and effective way to consistently evaluate the system.

- **Review of Non-NPIAS airport Roles/Classes**

The TDOT – Aeronautics Division has historically identified several non-NPIAS airports throughout Tennessee as essential to the Tennessee aviation system and the communities they serve. The TDOT – Aeronautics Division also has made significant investment in many of these airports. As part of this planning process, the TDOT – Aeronautics Division intends to review the roles and classes of Non-NPIAS airports, to the extent necessary, to determine their role in the state system of airports and to guide any necessary investments needed.

- **Public Consultation**

Appropriate coordination of study drafts with the aviation public, community organizations, airport sponsors and users, and other interested parties is critical to the successful adoption and implementation of the final planning report. It is important that all affected or potentially affected parties perceive that the process is open, that the opportunity for participation exists, and that the study is designed to consider input from all stakeholders.

- **Policy and Investigation Recommendations**

The airport system plan report may contain recommendations on state, regional, or local policy changes to address the needs of aviation, including new funding mechanisms, land use and zoning guidance, or regulatory changes. The airport system plan should also recommend additional studies, when appropriate, to collect inventory data on runway safety areas, pavement condition, or approach procedures, or to investigate specific problems such as poor air service or inefficient inter-modal connections.

- **Recommended System Changes**

After completion of the system planning effort, TDOT – Aeronautics Division is requesting a review of all airports in relation to the NPIAS. The study should include recommendations for the addition of NPIAS airports, recommendations for the removal/replacement of an existing NPIAS airport, or other recommendations that will improve the system based on data analyzed.

- **Data Management, Evaluation, and Reporting**

It is the desire of the Division to identify and incorporate airport data and system information for tracking and updating in the Division’s Grant Electronic Management System (GEMS) currently in development. GEMS is a cloud data management software that will be used by the Division for grants management, capital improvement plan updates, etc. This functionality may also allow for the continual update to system data and measurements. The Consultant will need to meet TDOT architecture guidelines. See Attachment B.

### **General Scope for the Economic Impact Study (EIS) of Tennessee Airports:**

Along with the request for a Tennessee State Airport System Plan, an Economic Impact Study of Tennessee’s aviation system is also requested. Tennessee airports are an essential component of the communities they serve. While offering an extremely important mode of transportation, airports can greatly influence economic growth and development locally, regionally and statewide. As demands on the public transportation system continue to increase, the benefit and true value of airports as an economic generator must be continually assessed.

The primary purpose of this Economic Impact Study is to identify, quantify, and communicate impacts to the state and local economies resulting from the State of Tennessee’s aviation system; as well as the individual economic impact of commercial service and general aviation airports around the state. The resultant reports and deliverables will:

# Attachment A - Potential Scope of Services

Aeronautics Division

TDOT

December 14, 2018

- 1) Allow the TDOT – Aeronautics Division to make strategic planning and funding decisions to provide better support and infrastructure development projects to spur economic development across the state;
- 2) Aid airports in communicating the value and benefits of their airports to state and local decision makers;
- 3) Provide communities with evidence of the economic benefits their local airport contributes to the community to highlight the continued need for support; and
- 4) Assist in building public support of the aviation industry in Tennessee.

## Economic Impact Study (EIS) Process

The updated calculations for this Study shall be estimated based on fresh data collected from multiple sources including surveys, in-person interviews, and other industry sources. The purpose of using multiple data collection methods is to ensure the data is current and cast in the context of the present-day Tennessee economy. Moreover, the multidimensional data collection effort will provide a quantitative baseline to enable the Study to represent the full contribution of airports to the state and local economies. The data collection effort will focus on factors that impact aviation economic activity and will include outreach to airports, aviation related entities, and business users of aviation.

At the onset of the study, the Consultant will organize a project advisory committee to consist of a broad base of aviation, business, and government interests;

Key elements in the development of the economic impact study shall include:

- **Project Kickoff Meeting**
- **Conduct Surveys and Collect Data for Direct and Indirect Impacts**
- **Estimate Direct and Indirect Impact**
- **Estimate Induced Impacts**
- **Estimate State-wide Annual Economic Impacts**
- **Value Added Business Benefits**
- **Tax Impacts**
- **Qualitative Benefits**
- **Timeline Economic Impact Changes**
- **Documentation and Coordination**

The Consultant must produce:

- 1) Technical Report – Economic Impact
- 2) Individual Airport “Stories” and Economic Impacts Brochures
- 3) Executive Summary – Economic Impact
- 4) Electronic Copy of all data collected and analyzed as part of this Economic Impact update.



## TDOT IT Architecture Guidelines

On-premises Solution – Systems that will be running on state owned hardware and infrastructure

- Operating System – If solution will reside at the state of Tennessee’s data center the approved operating systems are Microsoft Windows Server 2012 R2 or later and Red Hat Enterprise Linux 7.2 or later. For solutions needing to reside at the TDOT TMCs Microsoft Windows Server 2012 R2 or later will be supported.
- Authentication – TDOT uses Microsoft Active Directory for authentication in the environment. Solutions should leverage the existing Microsoft Active Directory for authentication.
- Web Server - TDOT utilizes Microsoft’s Internet Information Services (IIS) for web/application hosting. Solutions with web components should utilize this technology.
- Technology Stack - TDOT prefers ASP.NET MVC/WebAPI framework with C# and JavaScript for any custom written solution. No special client-side installations will be allowed (ie: Flash, ActiveX, or Java).
- Web Browser Support - TDOT’s browser standard is Internet Explorer 11 with emerging support for Edge. All solutions must be fully supported on both browsers.
- Application Communication - Solutions must have or create Web APIs for connectivity between them and other systems that TDOT deems necessary.
- Network Connectivity - Servers in state of Tennessee’s data center do not have access to the internet. Any access to an external connection must be approved and a security exception granted.

Hosted Solution – Commonly referred to as the cloud, these solutions will be on hardware and infrastructure not owned or managed by TDOT or the state of Tennessee

- Authentication – TDOT uses Microsoft Active Directory for authentication in the environment. Solutions should leverage the state of Tennessee’s Active Directory Federation Services (ADFS) 3.0 to federate with the existing Microsoft Active Directory for authentication.
- Application Communication - Solutions must have or create Web APIs for connectivity between them and other systems that TDOT deems necessary.
- Security Requirements - Solutions will be reviewed and based on information needed to be stored will be required to be up to FedRAMP High Baseline compliant.
- Data Portability – TDOT is the ultimate owner of all data uploaded to and/or created within any hosted solution. The vendor will port that data in its entirety to common technical standards upon request from TDOT.

### Data Guidelines

- Database - All the applications should be able to work with Oracle backend database and certified to run on the most current major release of 64-bit Oracle enterprise RAC database.
- Database Connectivity - Oracle's connection methods such as LDAP, TNSNAMES should be utilized for connecting from the applications to the database.
- Database Privileges - The applications should be able to function with normal user privileges, no elevated privileges will be given to the application schemas.
- Metadata - All the applications/solutions delivered should be accompanied by the data dictionary and data model (This also applies to Hosted Solutions).
- TDOT does not support the following
  - Any Oracle middleware products such a WebLogic.
  - Any Microsoft Access Frontend/backend based solutions
  - Custom database connection configurations that require the server names, ports and database names to be stored in the application configurations are not allowed.
  - The schema names, passwords and database names should be configurable and have the ability to be encrypted. Hardcoding for these parameters are not accepted.
  - Applications should not execute any Data Definition Language (DDL) statements with the exception of Global temporary tables.

### Data Security Guidelines

# Attachment B – TDOT IT Architecture Guidelines

Aeronautics Division

TDOT

December 19, 2018

- We recommend to follow the guidelines specified in 'NIST Special Publication 800-171' (<http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-171.pdf>) for the unclassified data.
- Any PII data that is stored within the database should adhere to the 'NIST Special Publication 800-122' standard (<http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-122.pdf>).

## Geospatial Guidelines

- Geospatial Data Web Services - All geospatial data web services must be made available in Open Geospatial Consortium (OGC) standards. Often the data services listed below are available in conjunction with a proprietary type of service. The use of a proprietary service type is acceptable as long as it offers the required standard service type inherently as part of the service. Both services occur from a single point and read the same data. The three most common standards are referenced below.

Reference:

<http://www.opengeospatial.org/standards>

- Web Map Service (WMS) - This OGC standard is for accessing map images from a spatial dataset(s). The images can be returned as JPG, PNG, etc. and displayed in a browser. This is basically a static picture of dynamic data. This type of service great for a visual reference layer, but it cannot be used for analysis or editing.
  - Web Map Tile Service (WMTS) - This OGC standard is for accessing cached tile images from spatial datasets. Unlike WMS, images retrieved from the service are from a static cache. This service type generally has better performance than WMS.
  - Web Feature Service (WFS) - This is an Open Geospatial Consortium (OGC) standard for accessing the data records from a spatial dataset(s). This service allows for access to features for query, creation, update and deletion. This service is capable of be utilized for spatial analysis.
- Geospatial Basemaps - All applications containing a mapping element developed or purchased for use by TDOT will be compatible with the following formats: Web Map Tile Service (WMTS) and ESRI ArcGIS Tiled Map Service.
  - Geospatial Data Formats - Enterprise Geodatabase (Oracle SDO\_GEOMETRY) - All spatial data stored in the Enterprise Geodatabase will be stored in Oracle SDO (Spatial Data Object) Geometry. This enables the use of Oracle Spatial tools and utilities at the database level. The format is also vendor neutral allowing it to be utilized by various GIS and data manipulation software.

Reference:

<https://docs.oracle.com/database/121/SPATL/toc.htm>

- Data Deliverables - ESRI File Geodatabase is a single user proprietary geodatabase format created by ESRI. Data in this format is normally imported into the Oracle Enterprise Geodatabase. Any data that is not able to be imported for some reason is made available in this format on a shared file server.

Reference:

<http://desktop.arcgis.com/en/arcmap/10.3/manage-data/geodatabases/what-is-a-geodatabase.htm>

## Security Guidelines

### **Transportation Equity Act 1998 (TEA-21)**

Congress passed the Transportation Equity Act for the 21st Century (TEA-21) to address the need to begin to work toward regionally integrated transportation systems. In January 2001, FHWA published a rule (ITS Architecture and Standards) and FTA published a companion policy to implement section 5206(e) of TEA-21. This Rule/Policy seeks to foster regional integration by requiring that all ITS projects funded from the Highway Trust Fund be in conformance with the National ITS Architecture and appropriate standards. "Conformance with the National ITS Architecture" is defined in the final Rule/Policy as using the National ITS Architecture to develop a

## Attachment B – TDOT IT Architecture Guidelines

Aeronautics Division

TDOT

December 19, 2018

---

“regional ITS architecture” that would be tailored to address the local situation and ITS investment needs, and the subsequent adherence of ITS projects to the regional ITS architecture. See Appendix A.

### **Federal Highway Administration (FHWA) ITS Architecture Guidance**

This document is a guide for transportation professionals who are involved in the development, use, or maintenance of regional ITS architectures. The document describes a process for creating a regional ITS architecture with supporting examples of each architecture product. In its discussion of the uses of the regional ITS architecture, the document presents an approach for mainstreaming ITS into the transportation planning and project development processes.

### **Federal Automated Vehicle Policy ITS**

United States Department of Transportation, National Highway Traffic Safety Administration (NHTSA) has placed a Federal policy concerning automated Vehicles and Intelligent Traffic Systems. For the last 50 years, the U.S. Department of Transportation (DOT) has been committed to saving lives and improving safety and efficiency in every way Americans move—by planes, trains, automobiles, bicycles, foot, and more. DOT, through the National Highway Traffic Safety Administration (NHTSA), has carried out that mission on U.S. roadways in part by consistently embracing new technologies that make driving, riding, biking, and walking safer. Twentieth century automobile technologies (such as seat belts, air bags, child seats, and antilock brakes)—developed in the private sector and brought to the nation’s driving public through NHTSA’s safety programs and regulatory authority—are responsible for saving hundreds of thousands of lives. Today, the automobile industry is on the cusp of a technological transformation that holds promise to catalyze an unprecedented advance in safety on U.S. roads and highways. The development of advanced automated vehicle safety technologies, including fully self-driving cars, may prove to be the greatest personal transportation revolution since the popularization of the personal automobile nearly a century ago.

### **SSL Secured Socket Layer**

The SSL VPN feature (also known as WebVPN) provides support, in Cisco IOS software, for remote user access to enterprise networks from anywhere on the Internet. Remote access is provided through a Secure Socket Layer- (SSL-) enabled SSL VPN gateway. The SSL VPN gateway allows remote users to establish a secure Virtual Private Network (VPN) tunnel using a web browser. This feature provides a comprehensive solution that allows easy access to a broad range of web resources and web-enabled applications using native HTTP over SSL (HTTPS) browser support. SSL VPN delivers three modes of SSL VPN access: clientless, thin-client, and full-tunnel client support. Note The Cisco AnyConnect VPN Client is introduced in Cisco IOS Release 12.4(15)T. This feature is the next-generation SSL VPN Client. If you are using Cisco software before Cisco IOS Release 12.4(15)T, you should be using SSL VPN Client and see GUI for the SSL VPN Client when you are web browsing. However, if you are using Cisco software Release 12.4(15)T or later, you should be using Cisco AnyConnect VPN Client and see GUI for Cisco AnyConnect VPN Client when you are web browsing.

### **Strong authentication, message privacy, and integrity**

TLS/SSL can help to secure transmitted data using encryption. TLS/SSL also authenticates servers and, optionally, authenticates clients to prove the identities of parties engaged in secure communication. It also provides data integrity through an integrity check value. In addition to protecting against data disclosure, the TLS/SSL security protocol can be used to help protect against masquerade attacks, man-in-the-middle or bucket brigade attacks, rollback attacks, and replay attacks.

### **FISMA Compliance**

The Federal Information Security Management Act of 2002, known as FISMA, is typically thought to apply only to government organizations. However, contractors and vendors that provide services to, manage systems on behalf of, or maintain close relationships with a government agency may be held to similar standards. This includes States that receive Federal funding. Staying on the right side of FISMA auditors is a matter of common sense and solid security best practices.

Commonsense steps TDOT will take to prepare for a FISMA audit.

## Attachment B – TDOT IT Architecture Guidelines

Aeronautics Division

TDOT

December 19, 2018

1. FISMA's original purpose is to provide a comprehensive framework for ensuring the effectiveness of information security controls.
2. Must complete annual risk assessments.
3. Appoint computer and data security managers, technicians, and officers.
4. Implement a written plan and a budget.
5. Embrace reporting. FISMA requires annual reporting for government agencies.
6. System and data monitoring is mandatory.
8. Establish vulnerability and penetration test controls and be able to prove TDOT did so.
  - Thoroughly evaluate the controls;
  - Retain evidence of evaluation and findings; and
  - Implement a process to remediate findings.
9. Establish a product approval list (Certificate of Networthiness (CoN)) for hardware and software security compliance of Computer Systems. TDOT Active ITS Standards and Guidelines for FISMA Compliance:
  - FIPS -Federal Information Processing Standards
  - FIPS 199 –Standards for Security Categorization
  - FIPS 200 –Minimum Security Requirements
  - NITS 800 Special Publications
    - SP 800-18 –Guide for System Security Plan development
    - SP 800-30–Guide for Conducting Risk Assessments
    - SP 800-34 –Guide for Contingency Plan development
    - SP 800-37–Guide for Applying the Risk Management Framework
    - SP 800-39–Managing Information Security Risk
    - SP 800-53/53A–Security controls catalog/assessment procedures
    - SP 800-60 –Mapping Information Types to Security Categories
    - SP 800-128 –Security-focused Configuration Management
    - SP 800-137 –Information Security Continuous Monitoring

### AntiVirus Policy

TDOT Cyber Security recognizes that every endpoint is a launch pad for a cyber-attack. TDOT security recommends Symantec Endpoint Protection version 12.1 or higher (STS State Approved). Symantec multi-layered endpoint protection provides everything from file reputation and behavioral analysis to advanced machine learning. All computers connected to the Tennessee Active ITS network and TDOT domain must have anti-virus to ensure effective virus detection and prevention. All computers must have standard, supported anti-virus software installed and scheduled to run at regular intervals. In addition, the anti-virus software and the virus pattern files must be kept up-to-date (files not updated that are 5 days old will be ISE-ed if plugged in to the network). Virus-infected computers must be removed from the network and placed in a quarantined VLAN until they are verified as virus-free.

Approved anti-virus Software:

- McAfee – Industry Rated 4.9 out of 5.0
- Symantec – Industry Rating 4.7 out of 5.0
- Bitdefender – Industry Rated 4.6 out of 5.0
- AVG – Industry Rated 4.5 out of 5.0
- Kaspersky – Industry Rated 4.5 out of 5.0

### Cellular Communication via Verizon Network

The networks run by cellular providers are not being used just for cell phones anymore. Today's 3G and 4G networks also provide wireless connections for laptops and even desktop systems via GSM or CDMA modems, cards and built-in chips, or by connecting to a mobile hotspot device such as the MiFi. Included in these capabilities is tethering. End users tether their computer to a cell phone to use its Internet connection, either via a USB cable or "mobile hotspot" capabilities built into the phone. Cellular users access the network via radio signals between their devices and the cellular towers. This wireless network is also connected to the core network, which is a wired network. The wired core network connects to the Public Switched Telephone Network (PSTN) for making voice calls to landlines. The core network also connects to the Internet, using protocol gateways and multiprotocol mobility managers, for sending data to and receiving data from other data networks. The core network uses service nodes, which are servers, to store data such as subscriber information. Wireless communications are inherently more difficult to secure than wired transmissions. When signals go through the

## Attachment B – TDOT IT Architecture Guidelines

airwaves, it's easier to intercept wireless connections because one does not have to physically tap into a line. Anyone with a transmitter/receiver can capture the signals. Since it's difficult or impossible to prevent the interception of the signals, the key to securing a wireless network is encrypting those signals so that they will be useless to any unauthorized party who does intercept them. Attacks can travel from the Internet through the gateways and infiltrate the core network. These include DoS attacks and SMS (text) spam. Because it is connected to the Internet through the core network, the PSTN's security cannot be assured, either. The PSTN was designed as a closed network and so did not include security mechanisms designed to protect from the types of threats that can come in from the Internet.

TDOT Active ITS Security best practices on a cellular networks:

- Each provider has its own security policies regarding physical security of the servers and remote access to those servers. When selecting a service provider, ask and review provider security policies with qualified security personnel.
- use strong cipher keys to encrypt the signals. Two way authentication is used to prevent the use of cloned cellular devices. 3G networks are still vulnerable to Denial of Service (DoS) attacks. Before selecting product, determine if strong encryption is provided.
- MAPSec (Mobile Application Part Security) protocol provides security for the application layer protocol that is used for exchanging information that is specific to a subscriber and authentication information.
- IPSec is also used on the core network to protect communications in transit between service nodes. However, use of MAPSec and IPSec is optional and up to the service provider.
- Make sure the SS7 protocols are not used. SS7 uses plaintext and excludes authentication.
- Does the cellular device provide event and security logging to include reports.

Here are some standard precautions to take with cellular devices:

- Ensure that your 3G/4G device – whether a USB modem, a MiFi device, a card or a smart phone – has all available updates installed to address vulnerabilities in the firmware or software.
- Have a firewall installed and properly configured on the host device to include anti-virus and antimalware software installed and turned on.
- Always use strong passwords or multi factor authentication .
- Must enable logging and alerting.
- For the wi-fi part of the connection, enable WPA2 encryption.
- On a mobile hotspot device such as the MiFi or Sprint's Overdrive, disable SSID broadcasting and disable the DHCP server.
- When using a mobile hotspot device or the mobile hotspot function your phone, which allows for multiple computers to use the 3G or 4G connection, monitor the hotspot software to be sure only devices you know about are connected.
- If the device allows you to set a maximum number of users, set this to 1 if you are going to be the only one connecting to the device.
- Change the default administrative passwords on your 3G/4G devices.
- If your 3G/4G device supports MAC filtering, enable it and create a whitelist of the physical addresses of devices (such as your laptop) that you want to be able to use the 3G/4G network, and block all others.

Not surprisingly, the steps that an end-user needs to take when connected to a cellular network are much the same as best practices on any other network. The key here is that when you use a cellular Internet connection, you're subject to the same threats – malware, viruses, DoS attacks, intrusions – as with any other Internet connection. There are also vulnerabilities specific to the devices; for example, there were reports that the GPS on the 3G MiFi mobile hotspot could be enabled without the user's knowledge if you happen to visit the wrong malicious web site. The latest version of the MiFi, made for Verizon's LTE network, comes with the GPS chip deactivated.

It's also important for network admins to recognize the possibility that corporate users can pop a 3G or 4G card or modem into their laptops and access the Internet through a cellular network, bypassing corporate gateways, while also connected to the internal network over Ethernet. This can pose a threat to the internal network, since the user can visit web sites or run protocols or applications that would be blocked by the corporate firewalls.

## Appendix A

### SEC. 5206. Public Law 105-178 NATIONAL ARCHITECTURE AND STANDARDS.

#### (a) IN GENERAL.—

(1) DEVELOPMENT, IMPLEMENTATION, AND MAINTENANCE.—Consistent with section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note; 110 Stat. 783), the Secretary shall develop, implement, and maintain a national architecture and supporting standards and protocols to promote the widespread use and evaluation of intelligent transportation system technology as a component of the surface transportation systems of the United States.

(2) INTEROPERABILITY AND EFFICIENCY.—To the maximum extent practicable, the national architecture shall promote interoperability among, and efficiency of, intelligent transportation system technologies implemented throughout the United States.

(3) USE OF STANDARDS DEVELOPMENT ORGANIZATIONS.—In carrying out this section, the Secretary may use the services of such standards development organizations as the Secretary determines to be appropriate.

(b) REPORT ON CRITICAL STANDARDS.—Not later than June 1, 1999, the Secretary shall submit a report to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure and the Committee on Science of the House of Representatives identifying which standards are critical to ensuring national interoperability or critical to the development of other standards and specifying the status of the development of each standard identified.

#### (c) PROVISIONAL STANDARDS.—

(1) IN GENERAL.—If the Secretary finds that the development or balloting of an intelligent transportation system standard jeopardizes the timely achievement of the objectives identified in subsection (a), the Secretary may establish a provisional standard after consultation with affected parties, and using, to the extent practicable, the work product of appropriate standards development organizations.

(2) CRITICAL STANDARDS.—If a standard identified as critical in the report under subsection (b) is not adopted and published by the appropriate standards development organization by January 1, 2001, the Secretary shall establish a provisional standard after consultation with affected parties, and using, to the extent practicable, the work product of appropriate standards development organizations.

(3) PERIOD OF EFFECTIVENESS.—A provisional standard established under paragraph (1) or (2) shall be published in the Federal Register and remain in effect until the appropriate standards development organization adopts and publishes a standard.

#### (d) WAIVER OF REQUIREMENT TO ESTABLISH PROVISIONAL STANDARD.—

(1) IN GENERAL.—The Secretary may waive the requirement under subsection (c)(2) to establish a provisional standard if the Secretary determines that additional time would be productive or that establishment of a provisional standard would be counterproductive to achieving the timely achievement of the objectives identified in subsection (a).

(2) NOTICE.—The Secretary shall publish in the Federal Register a notice describing each standard for which a waiver of the provisional standard requirement has been granted, the reasons for and effects of granting the waiver, and an estimate as to when the standard is expected to be adopted through a process consistent with section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note; 110 Stat. 783).

(3) WITHDRAWAL OF WAIVER.—At any time the Secretary may withdraw a waiver granted under paragraph (1). Upon such withdrawal, the Secretary shall publish in the Federal Register a notice describing each standard for which a waiver has been withdrawn and the reasons for withdrawing the waiver.

#### (e) CONFORMITY WITH NATIONAL ARCHITECTURE.—

(1) IN GENERAL.—Except as provided in paragraphs (2) and (3), the Secretary shall ensure that intelligent transportation system projects carried out using funds made available from the Highway Trust Fund, including funds made available under this subtitle to deploy Intelligent transportation system technologies, conform to the national architecture, applicable standards or provisional standards, and protocols developed under subsection (a).

(2) SECRETARY'S DISCRETION.—The Secretary may authorize exceptions to paragraph (1) for—

(A) projects designed to achieve specific research objectives outlined in the National ITS Program Plan under section 5205 or the Surface Transportation Research and Development Strategic Plan developed under section 508 of title 23, United States Code; or

(B) the upgrade or expansion of an intelligent transportation system in existence on the date of enactment of this subtitle, if the Secretary determines that the upgrade or expansion—

(i) would not adversely affect the goals or purposes of this subtitle;

(ii) is carried out before the end of the useful life of such system; and

## Attachment B – TDOT IT Architecture Guidelines

Aeronautics Division

TDOT

December 19, 2018

---

(iii) is cost-effective as compared to alternatives that would meet the conformity requirement of paragraph(1).

(3) EXCEPTIONS.—Paragraph (1) shall not apply to funds used for operation or maintenance of an intelligent transportation system in existence on the date of enactment of this subtitle.

(f) SPECTRUM.—The Federal Communications Commission shall consider, in consultation with the Secretary, spectrum needs for the operation of intelligent transportation systems, including spectrum for the dedicated short-range vehicle-to-wayside wireless standard. Not later than January 1, 2000, the Federal Communications Commission shall have completed a rulemaking considering the allocation of spectrum for intelligent transportation systems.