# *Quarterly Progress Report (QPR)*

# *Applications of Enterprise GIS in Transportation*

**Progress Report for Quarter [January 1st, 2024 – March 31st, 2024]**

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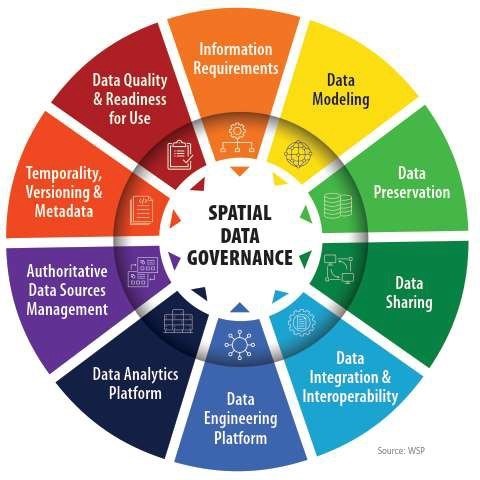
Map

Description automatically generatedWSP Technical Lead: Abhishek Bhargava (abhishek.bhargava@wsp.com)

Background

The Pooled Fund Study (PFS) on Applications of Enterprise GIS in Transportation (AEGIST) was initiated by FHWA in 2018. During Phase 1 of this study a guidebook was developed for transportation agencies in the United States, with the primary objective of documenting guidance on how spatial and linear referenced data should be managed by States. Phase 2 of this PFS was initiated in October 2019. This phase will span over 5 years (October 2019 – September 2024), during which the objectives outlined below would be accomplished.

Objectives

* Establish a standard for managing and governing data in spatial and linear referencing systems at transportation agencies, including but not limited to routes, intersections, interchanges, roundabouts, road segments, roadway characteristics, infrastructure assets, model inventory of roadway elements (MIRE), HPMS data items and ARNOLD road network.
* Develop guidance for States for modeling spatial transportation data, especially linear referencing system (LRS) data. Importing, exporting & conflating road network and roadway characteristics data across DOT LRS and Federal, State and Local data systems.
* Conduct a series of webinars, workshops, peer exchange meetings and provide consulting services to the States participating in the pooled fund to develop national standards in data modeling and management; enhance existing enterprise GIS systems at these agencies.
* Update the AEGIST Guidebook that was prepared in Phase 1 by documenting best practices, patterns and similarities across agencies in managing spatial data using enterprise data systems, including but not limited to Asset Management Systems, Traffic and Safety Systems, Project Planning and Programming Systems, Design and Construction Systems, and GIS and Linear Referencing Systems (LRS).
* Collaborate with States to enhance and develop spatial data management systems, processes, platforms to establish a structured and systematic approach for management of spatial data. This would involve establishing spatial data governance systems, business rules, applications, tools and platforms for:
  + Spatial Data Modeling
  + Spatial Data Integration and Engineering
  + Spatial Data Analytics

Completion Status and Summary

Time Frame: October 1, 2019 to December 30, 2024

Total Time, months: 63

Time Expended, months: 51

Percent Calendar Time Expended: 85%

Percent Complete for Tasks & Sub-Tasks:

|  |  |  |  |
| --- | --- | --- | --- |
| **Base Period: CLIN0001** | | | |
| **Tasks** | **Sub-Tasks** | | **Percent Complete** |
| Task 1: Project Management | 1.  Quarterly Meetings & Technical Tasks Planning | | **100%** |
| 2.  Quarterly Status Reports | |
| Task 2: Technical Services | 1.   Washington **- 100%** | | **100%** |
| 2.   Georgia **- 100%** | |
| 3.   Idaho - **100%** | |
| 4. California - **100%** | |
| 5. Pennsylvania **- 100%** | |
| 6. Ohio - **100%** | |
| Cross-Agency Activities: Guidebook Development - **100%** | |
| Task 3: Workshops, Webinars, Presentations | 1. Webinar 1: Data Governance 2. Workshops: GIS-T 2019 and GIS-T 2021 3. Presentations 2020 and 2021 4. Flyers, Events Site Updates | | **100%** |
| Task 4: Member State Meetings | 1.  Member State Meeting 1 – 2019  2. Member State Meeting 2 – 2020 | | **100%** |
| **HPMS 9.0 Data Architecture: CLIN0005** | | | |
| **Tasks** | **Sub-Tasks** | **Percent-Complete** | |
| Task 5: HPMS 9.0 Recommendations | Road Network Data Architecture  Data Modeling Standards, Use Cases, Topology | **100%** | |
| **Performance Period 1 and 2: CLIN0002 and CLIN0003** | | | |
| **Tasks** | **Sub-Tasks** | | **Percent Complete** |
| Task 1: Project Management | 1.  Quarterly Meetings & Technical Tasks Planning | | **60%** |
| 2.  Quarterly Status Reports | |
| Task 2: Technical Services | 1.   New Mexico – **10%** | | **40%** |
| 2.   Connecticut – **60%** | |
| 3.   Florida – **10%** | |
| 4. North Carolina **– 15%** | |
| 5. Kansas **– 10%** | |
| 6. Tennessee **– 65%** | |
| 7. Massachusetts **– 7%** | |
| 8. North Dakota – **5%** | |
| 9. Arizona – **5%** | |
| Cross-Agency Activities: Guidebook Development **- 0%** | |
| Task 3: Workshops, Webinars, Presentations | 1. Workshops: GIS-T 2022 and GIS-T-2023 2. Presentations 2022 and 2023 3. Flyers, Events Site Updates | | **100%** |
| Task 4: Member State Meetings | 1.  Member State Meeting 1 – 2022  2. Member State Meeting 2 – 2023 | | **100%** |

Work Accomplished This Reporting Period: Jan – March 2024

**Task 1: Project Management**

**Task Objective**: Perform project management activities, which include conducting monthly status meetings, developing quarterly status reports, creating project work plan, managing project resources, schedule, deliverables and communication with all stakeholders.

**Activities**:

1. Prepared and delivered AEGIST Quarterly Report #18 for the period January – March 2024.
2. Technical services tasks managed for following PFS States: Arizona California, Connecticut, Kansas, North Carolina North Dakota, and Massachusetts. Details provided in the section below on Task 2.

**Task 2: Technical Services**

**Task Objective:** Provide technical services associated to PFS States by completing various agency-specific and cross-agency activities identified in the work plan.

**Activities**:

* **Arizona**

**[Task 2.AZ.1 Route ID Data Architecture]**

* + Approved the DOT for starting technical services activities
  + Provided a list of activities and deliverables that were brainstormed alongside AzDOT
  + Held meeting with Arizona DOT to discuss the issue with spaces in Route IDs and the various solutions that have been considered.
  + Developed scope of technical services to resolve the issues with Route ID spacing. Discussed the need to meet with business units: Safety, Finance, e-STIP, Project Planning, Asset Management,
  + Requested access to AZGEO ArcGIS for access to data on LRS Roads, Assets, Roads Characteristics,
  + Developed work plan, work schedule for delivering technical services to AzDOT.
  + Analyzed TxDOT LRS Route IDs to determine how the Route IDs are setup, when/how spaces are created in the route ids.
  + Developed technical services activities work plan and schedule including key milestone dates. Shared the work plan with Arizona for inputs on business users interview schedule and agenda.
  + Developed geoprocessing tool to access Arizona’s route network data using AzGeo web-services. Downloaded Arizona routes data and analyzed the Route ID field to determine the number of leading spaces, trailing spaces and spaces in the middle of route ID.
  + Requested access from AzDOT to business data that is referenced using LRS routes. Utilized AzGeo to search for project planning, asset management, and other such business datasets that use linear referencing.
  + Coordinated with the ADOTs LRS/GIS team to establish approach to analysis of RouteID Data architecture investigation.
  + Published list of work sessions that will be held with the core team and with the business stakeholders.
  + Communicated with the business stakeholders at ADOT to set expectations about the upcoming kickoff meeting on Route ID Data Architecture project. Business stakeholders in following units were approached: Safety, Project Management, Planning and Programming, Asset Management, Finance, Traffic.
  + Analyzed RouteID data architecture in Arizona DOTs (ADOT) linear referencing system. To accomplish this analysis automated tools were developed to download the ADOT Roads datasets from AzGEO GIS Hub, and to import the LRS Routes into the analysis.
  + Developed draft slide-deck for the kickoff meeting with business stakeholders. In the slide-deck, laid out information about existing Route ID data architecture, issues experienced with existing architecture, envisioned solutions to address the issue and questions that need to be addressed by all business stakeholders.
  + Analyzed RouteID data architecture in Arizona DOTs (ADOT) linear referencing system. To accomplish, this automated tools were developed to download the ADOT Roads datasets from AzGEO GIS Hub, and to import the LRS Routes into the analysis.
  + Alternative RouteIDs were created using geoprocessing tool to present as options to the business groups that will be interviewed during April-May to investigate preferences in RouteID Architecture.
  + Developed draft slide-deck for the kickoff meeting with information on project objectives, goals and desired outcome, business stakeholder interview questions
  + Prepared and researched alternatives for Route Identifiers
  + Investigated ADOTs Route ID to analyze number of spaces in Route ID for different types of routes
  + Conducted the first meeting with Arizona core team to prepare for the AEGIST technical services kickoff meeting with the stakeholders
  + Updated and presented kickoff meeting slide-deck, project objectives, project work plan and project next steps to Arizona’s core team
  + Analyzed Route ID in Arizona DOTs LRS dataset to assess the feasibility of implementation of various alternatives associated with Route ID
  + Presented next steps and assigned action items to core team to continue preparation for Arizona Route ID investigation
  + Published kickoff meeting slide-deck for inputs and comments from core team.
  + Conducted the second meeting with Arizona core team and additional presenters to prepare for AEGIST technical services kickoff meeting with the business stakeholders
  + Coordinated with ADOT to define action items associated with collecting information about how business users use LRS routes for referencing assets, projects,
  + Reviewed issues with leading spaces in Route ID, as reported by FHWA based on stakeholders experience with HPMS and FMIS
  + Developed draft poll questions for technical services kickoff meeting with the stakeholders
  + Scheduled kickoff meeting with ADOT business stakeholders and prepared a plan to have follow-up discussion with each stakeholder group
  + Updated the kickoff meeting deck to add slides associated with how business users utilized LRS Routes and route identification number.
* **California**

**[Task 2.CA.1] California Roads Sharing (CaRS) report**

* + Planned for Phase 4 to form CaRS Working committee
  + Scheduled of Phase 4 Kickoff Meeting with core CaRS team
  + Established roles and responsibilities of resources in 1Spatial, Caltrans, CalOES, Counties for Phase 4 Pilots
  + Outlined CaRS Phase 4 activities, timeline, roles and responsibilities for Caltrans call with 1Spatial
  + Discussed forming the CaRS Working Group with Caltrans and Merced using CGIA or by setting up agreements. Discussed near term, and long term goals with how the CaRS working group would be formalized over a period of time.
  + Architected the ArcGIS Hub configuration plan for sharing of roads data across Caltrans, CalOES and the participating counties in the Phase 4 CaRS Pilot.
  + Organized a technical meeting with stakeholders who would be engaged as setup as “owners of content” in the Hub.
  + Finalized list of counties and agencies who would be approached in Phase 4 (2024) for participating in the CaRS program
  + Discussed roles and responsibilities of 1Spatial and the tasks they would work on during the Phase 4 pilots.
  + ArcGIS Hub deployment investigation was initiated with focus on establishing initiatives, enabling community engagement teams and sharing of county roads data quality assessment results.
  + Followed-up with Merced County and Caltrans on setting up CaRS Working group under California County Information Services Directors Association (CCISDA).
  + Identified other agencies in California that could potentially be engaged with to setup CaRS working group. These include: California Association of Council of Governments (CALCOG), California Geographic Information Association (CGIA).
  + Approached Merced County to assess status of coordination with California County Information Services Directors Association (CCISDA) for establishing the CaRS working group.
  + Completed steps for requesting access to Caltrans systems: ArcGIS Hub premium, 1Integrate.
  + Requested county roads datasets for the identified counties from CalOES.
  + Scheduled a meeting with CCISDA GIS Group Manager to discuss a presentation to showcase CaRS vision, objectives, roadmap, and findings.
  + Developed agenda for the meeting with CCISDA on formation of CaRS working group
  + Coordinated with CalOES and acquired county data sets from for Solano, Marin, Merced, and Fresno
  + Analyzed ArcGIS Hub Premium features and prepared a plan for deployment and use of ArcGIS Hub with Caltrans
  + Developed an action plan for analysis of County data with ArcGIS and 1Spatial for post processing and integration of the data into Caltrans R&Hs
* **Kansas**

**[Task 2.KS.1: Intersection Data Model]**

* + Utilized the script created for generating Nodes, Intersections and Node-Routes Measures table, to generate these features and tables for Kansas. Updated script to ensure that these features can be generated for Kansas.
  + Developed script to download road network data from Kansas DOTs online geospatial web portal using APIs.
  + Developed slide-deck for review of intersection modeling tools, issues and next steps for discussion with Kansas.
* **North Carolina**

**[Task 2.NC.2] LRS Data Governance**

* + Periodically reviewed the Data Governance System to remove redundancies and unnecessary columns
  + Continued development of “How To Guide” that encompasses the entire Data Governance System through the following updates:
    - Integrating performance architecture governance, business architecture governance, data architecture governance, and applications architecture governance
    - Utilized the Consolidated Reference Model to structure LRS Data Catalog section within the “How To Guide”
  + Refining tabs and fields in the LRS Data Catalog
  + Created a data dictionary to track tables and fields contained within Data Governance System
  + Intersection Data Dictionary and Data Management System development
  + Review of ISO Standards for documentation of use cases, information requirements, data assets catalog and data objects
  + Mapped NCDOT road characteristics from data dependency matrix to improve LRS Data Catalog
  + Information about the business domain, data users and data owners were added for the data assets in the LRS Data Catalog
  + Data assets that were no longer necessary were flagged for removal from the LRS Data Catalog.
  + Data assets were created under “roadway characteristics inventory” and “analysis segments”.
  + Business domains catalog was updated to add additional business units
  + Use patterns mapping to data assets was updated.
  + Worked on refining the data catalog in the data governance system by removing non-data related assets and reassigning to corresponding business domains where appropriate.
  + Aligned data assets with business domains, and relevant systems and applications based on the NCDOT data dependency matrix.
  + Defined business domain based on data asset, rather than from user story which preserves business domain based on the employee, rather than the data users/suppliers. Set up fields within data catalog to map data users versus data suppliers.
  + Updated “Business Domains catalog” to ensure that data assets supplied by each business unit and data assets used by each business unit can be seen in the catalog. Also updated the catalog to capture information about the parent business domain for each domain in the catalog.
  + Updated “Data Catalog” to track information about data stewards, data owners, business domains that supply and use the data. Flagged data items in the catalog that are not data assets so that they can be removed from the catalog or can be broken down further.
  + Developed automated tools for review and analysis of the data in the data catalog, business use patterns catalog, business domains mapping to data assets in the data catalog, and, for NCDOT data dictionary
  + Created options for NCDOT to deploy and use the data governance system including options for integrating the data in the data governance system with ArcGIS Enterprise suite and automatically create data dictionary and data asset updates.
  + Differentiated between bottom up (user-story-defined) and top down (business-domain-defined) data assets by distinguishing between Desired Data Assets and Data Assets Supplied and Data Assets Used. These fields were made consistent through the data governance model to enable NCDOT to identify where improvements can be made within the data governance system.
  + Identified need for the role of a user to be preserved instead of name. Began process of applying this change to the data governance system.
  + Populated Business Domain Suppliers and Users of data assets based on NCDOT data dependency matrix and data asset list information.
  + Continued to refine data asset list and de-link user-stories where applicable.
  + Business domains catalog was updated and organization chart hierarchy reports were created using the updated information in the catalog
  + Data catalog was updated to clean up data assets in the catalog and flag roadway characteristics inventory segments and analysis segments
  + Built interface between Airtable Data Governance Catalogs and ArcGIS, Tableau reporting systems to demonstrate how data governance system reporting can be performed and where data governance system data can be stored
  + Investigations on choice of data governance system tools – Airtable, Informatica, etc. Discussed pros/cons of each tool
  + Updated data catalog by adding information about sources-of-truth used for each of the data assets in the catalog
  + Started identifying existing and planned data management and governance tasks and discussed how they would be mapped to data assets
  + Developed action items for NCDOT to: (1) update the sources of truth for each of the data assets (2) continue to identify the planned/envisioned tasks for the data assets
  + Developed a tool for downloading and adding data from Airtable into a relational database
  + Data Assets catalog was updated to add information about the data assets, the applications that are used to create the data asset and the application that are used to process and deliver the asset to enterprise data warehouse
  + Use Patterns catalog was updated and any use patterns that do not map to the right data asset were edited.
  + Object types and properties catalogs were discussed with NCDOT and AEGIST shared information on how to update the data assets information across data assets catalog and these governance system elements
  + Updated data catalog, use patterns catalog and applications catalog by adding/removing/editing information about the data assets, use cases/patterns and software applications/tools
  + Developed script for automatically generating LRS data dictionary with object types and properties in ArcGIS Pro and exporting data into a table in the geodatabase or in an excel file.
  + Reviewed progress of data governance system deployment tasks, and laid out the plan for next steps to wrap up NCDOT technical services by end of May.
  + Reviewed data governance framework and application communication diagram with NCDOT to lay out how these were covered with the data governance system, and how information corresponding to the elements in the governance framework was added to the data governance system.
  + Provided AEGIST Applications communication diagram presentation template to NCDOT for addition of software systems, applications and tools
* **North Dakota**

**[Task 2.ND.1: Road Data Extraction from Imagery]**

* + Investigated extraction of roads data from satellite imagery using Deep Learning Techniques.
  + Downloaded satellite imagery (open source) and labelled satellite images
  + Acquired access to the Lidar data for the State and developed the FTP Interface tool to download the lidar data and store in the AWS cloud for analysis
  + Loaded lidar data tiles in the GIS environment along with North Dakota’s Road Network to investigate how the lidar data can be used with deep learning to extract information about roads
  + Investigated various Artificial Intelligence - Deep Learning techniques for analysis of Lidar data, labelling data and training model for road network data modeling
  + Developed a tool to access and download lidar data for the State of North Dakota automatically from the FTP directory and create a data dictionary of the las file specifications, size, coordinates, etc.
  + Analyzed las files for the McKenzie County to determined it the point cloud data is classified or not.
  + Developed algorithm and tool for classifying the lidar data downloaded from FTP directory using the roads LRS geometry. Classification was done for ASPRS class code 11, road surface
  + Discussed project scope and approach along with expected deliverables and timeline for completion
  + Prepared cloud-based, scalable lidar data analysis platform for processing of Lidar data and extraction of roads information from it
  + Investigated alternative approaches to label lidar point cloud data so that the labelled dataset can be used in deep learning process
  + Developed mosaic data model using lidar las point cloud data files and investigated how the metadata information about the point cloud in the model
* **Massachusetts**

**[Task 2.MA.1] Interchange Data Modeling**

* + Developed tool to extend, trim and snap routes for ramps, interstates, and US Roads so that their intersection can be used to generate the nodes at Interchanges.
  + Developed tool to find intersection points of ramp and interstate routes, and, intersection points of ramp and US roads, while ensuring that the route ID of ramps, interstates and US roads are also joined and shown as an attribute of the intersection point.
  + Investigated Massachusetts Data Portal to identify the road inventory feature services that could be used as input in the tools above for generating interchange nodes.
  + Developed script to generate the “Node Route Measures” table, using the LRS routes and Nodes feature classes. This table would store information about the measure values associated with each Node that is referenced using each of the routes on which the node exists.
  + Prepared geoprocessing tool package in ArcGIS pro for creating Nodes, Road Elements and Node Route Measures from LRS routes using ArcGIS Pro analysis tools.
  + Reviewed data in Massachusetts LRS geodatabase associated with LRS Intersections and how they are generated using “Create Intersections” and “Generate Intersections” tools in ArcGIS Location Referencing Toolset.
  + Investigated gaps in LRS Intersections data generated in ArcGIS Pro, comparing the ArcGIS Pro data model and intersections data engineering rules with AEGIST recommendations
  + Updated geoprocessing tool for calculation of Nodes and Road Elements using the Routes LRS feature class.
  + Updated script to generate the “Node Route Measures” table. Added code to ensure that information about all routes that meet at an intersection is captured in the node route measures table.
  + Developed a script for clustering nodes associated with the same intersection and interchange using “proximity” and tested the proximity values that can be used to cluster nodes at each intersection
* **All States: AEGIST Guidebook**
  + Documented details in the Intersection modeling chapter for each of the administration levels for interchange, traffic circle, at-grade intersections. Described intersection type, intersection geometry and how they are used in combination to establish the different types of intersections.
  + Updated the enterprise road network data publication model graphic to help visualize what data should be published as an API to all stakeholders (internal and external) on the enterprise data collaboration platform. Developed detailed description of the data publication framework for the chapter on road network data management and governance.

**Task 3: Marketing and Communication**

**Task Objective:** Webinars and Workshops will be held, and Articles will be presented in conferences and other industry forums to communicate information about the activities of the project, especially the technical work products developed as part of the project.

**Activities**

1. **Task 3.2.x: Workshops and Presentations** 
   * **AEGIST Meeting of the Pooled Fund States**
     + Updated Chapter 2 – Road Network Data Modeling, section on Road network data publication
     + Reviewed National Road Network documents and report to identify key take-aways and recommendations and align AEGIST guidebook recommendations with the National Road Network findings and data model (particularly, match points and connectors)
     + Updated Chapter 2 – Road Network Data Modeling, sections on Nodes, Match Points, Connectors, Road Segments
   * **GIST-T Workshop**

* Finalized and published abstract and presenters list
* Started preparation of the GIS-T workshop presentation deck
* Intersection data modeling slides created for GIS-T workshop
* Executive summary notes created for key messages on intersection modeling at GIS-T
* Shared intersection modeling slide-deck and executive summary notes with FHWA Office of Safety to prepare them for presentation and key messages to be delivered at GIS-T
* Developed draft slide-deck for intersection data modeling part of the workshop. Added slides for types of intersections that would be modeled, and the specific geospatial representation guidelines for the following intersection features – nodes, intersection/junction, intersection leg (approach and departure segment), intersection polygon and MIRE road segments.
* Developed draft slide-deck for road network data modeling part of the workshop. Added slides for different administration levels for routes – network gaps, divided-undivided highways, digitization direction, route identification, centerline geometry modeling, measure calibration. Added slides to show road characteristics data and how it can be managed as segments.
* Prepared schedule for discussions and preparation for the GIS-T workshop.
* Drafted slide-deck was published to the GIS-T workshop presenters to engage with the presenters and start preparation on the workshop delivery. The slide-deck was prepared as draft to allow for updates based on inputs and feedback from presenters.
* Created poll to schedule workshop preparation meetings with presenters. Reached out to presenters to ask for availability and to conduct review of the draft slide-deck ahead of the meeting.
* Released summary of intersection modeling key findings from the meeting of the states to FHWA Office of Safety, so as to help prepare for the GIS-T workshop and deliver key messages on intersection modeling with MIRE alignment.
* Posted a doodle poll so that the presenters can indicate their availability during the period Feb 26 – March 22 for reviewing/editing the draft slide-deck and the key messages associated with Road Network Data Modeling and Intersection Modeling.
* Published key findings from the meeting of the AEGIST States in September 2023 to presenters of the GIS-T workshop to enable them to present these findings at the GIS-T workshop and hold interactive discussions with the peer States.
* Updated GIS-T workshop deck to document the LRS Administration Levels and the configuration of the LRS at each level.
* Developed handouts and mentimeter polls for the GIS-T workshop.
* Scheduled a meeting with GIS-T presenters to review and edit draft slide deck for GIS-T Workshop
* Held the first preparation meeting with GIS-T workshop presenters to discuss the GIS-T workshop slide-deck, key messages, questions, and polling.
* Updated GIS-T workshop deck as per comments from GIS-T presenters
* Held the second preparation meeting with GIS-T workshop presenters to discuss the GIS-T workshop slide-deck, key messages, questions, and polling
* Developed Mentimeter polls for GIS-T workshop. Coded poll for each of the administration levels associated with route network, centerline, divided-undivided highway modeling, network gaps, intersections, etc. for GIS-T participants to be able to provide feedback on the AEGIST recommended administration levels
* Researched ISO-19148 standard for use of following terms and definitions: referent, route, road element, road segment, linear referencing method, intersection
* Prepared a run of the show script for workshop presenters to share information about how the workshop could be conducted.
* Research Median U-Turn and Restricted Crossing U-Turn (RCUT) intersections and added images to the GIS-T slidedeck to demonstrate similarities and differences associated with each.
* Updated workshop slides associated with traffic circles and at-grade intersection administration levels.
* Conducted a workshop final preparation meeting with the presenters and facilitators to ensure that the team is ready for delivery of the workshop and all the presentation material is well understood
* Finalized presentation slide deck, participant handouts, Mentimeter poll for GIS-T Conference
* Assembled final physical participant handouts for use at GIS-T Conference

**Complete List of AEGIST Deliverables**

**Note:** Deliverables on which work is complete (in green) and work is in progress (in light yellow).

| Task | D# | Deliverable Name | Due Date | Status |
| --- | --- | --- | --- | --- |
| Task 1\* | 1.1.0 | Kick-off Meeting | 10/30/19 | Completed. |
| Task 1\* | 1.2.0 | Work Plan Version 1: Cross-Agency Tasks, Deliverables & Schedule | 4/30/20 | Completed. Submitted to FHWA and PFS States. |
| Task 1\* | 1.3.1 | Quarterly Progress Report - 1 (incl. 3 monthly reports and quarterly meetings) | 12/31/19 | Completed. Submitted to FHWA. Email sent to PFS States. |
| Task 1\* | 1.3.2 | Quarterly Progress Report - 2 (incl. 3 monthly reports and quarterly meetings) | 3/31/20 | Completed. Submitted to FHWA.  Email sent to PFS States. |
| Task 1\* | 1.3.3 | Quarterly Progress Report - 3 (incl. 3 monthly reports and quarterly meetings) | 6/30/20 | MPR for April, May, June published.  QPR-3 (April-June) published. |
| Task 1\* | 1.3.4 | Quarterly Progress Report - 4 (incl. 3 monthly reports and quarterly meetings) | 9/30/20 | MPR for July and August prepared. QPR-4 Prepared. |
| Task 1\* | 1.3.5 | Quarterly Progress Report - 5 (incl. quarterly meetings) | 12/31/20 | QPR-5 report prepared. QTR meeting held in Dec 2020 |
| Task 1\* | 1.3.6 | Quarterly Progress Report - 6: Jan-Apr 2021 (incl. quarterly meet) | 4/31/21 | QPR-6 prepared. QTR Meeting (Mar 2021) |
| Task 1\* | 1.3.7 | Quarterly Progress Report - 7: May-July 2021 (incl. quarterly meet) | 7/30/21 | QPR-7 Completed and Submitted.  Quarterly meeting held. |
| Task 1\*\* | 1.3.8 | Quarterly Progress Report - 8: Aug-Sept 2021 (incl. quarterly meet) | 9/30/21 | QPR-8 Completed and Submitted.  Quarterly meeting held. |
| Task 1\*\* | 1.3.9 | Quarterly Progress Report - 9: Oct-Dec 2021 (incl. quarterly meet) | 12/30/21 | QPR-9 Completed and Submitted.  Quarterly meeting held. |
| Task 1\*\* | 1.3.10 | Quarterly Progress Report - 10: Jan-Mar 2022 (incl. quarterly meet) | 3/31/22 | QPR-10 Completed and Submitted.  Quarterly meeting held. |
| Task 1\*\* | 1.3.11 | Quarterly Progress Report - 11: Apr-Jun 2022 (incl. quarterly meet) | 6/30/22 | QPR-11 Completed and Submitted.  Quarterly meeting to be held in July 2022. |
| Task 2\* | 2.1 | TASK 2 Technical Services (incl. Work Plan v1.1 with State Tasks) - MONTH 8 - MAY 2020 | 5/30/20 | Work Plan v1.1 has Caltrans Tasks.  May 29th PFS States Presentation. |
| Task 2\* | 2.2 | TASK 2 Technical Services (incl. Work Plan v1.2 with State Tasks) - MONTH 9 - JUN 2020 | 6/30/20 | Work Plan v1.2 has CA, GA, ID Tasks.  June 16th PFS States Presentation. |
| Task 2\* | 2.3 | TASK 2 Base Period Technical Services (incl. Work Plan v1.3 with State Tasks) - MONTH 10 - JUL 2020 | 7/30/20 | Work Plan v1.3 with ID Task updates. Weekly work planning with Idaho. |
| Task 2\* | 2.4 | TASK 2 Technical Services (incl. Work Plan v1.4 with State Tasks) - MONTH 11 - AUG 2020 | 8/30/20 | Work Plan v1.4. Tasks 2.1, 2.2, 2.ID.1 |
| Task 2\* | 2.5 | TASK 2 Technical Services (incl. Work Plan v1.5 with State Tasks) - MONTH 12 - SEP 2020 | 9/30/20 | Work Plan v1.5 with ID Task updates.  Tasks 2.1, 2.2, 2.ID.2 and 2.ID.3 |
| Task 2\* | 2.6 | TASK 2 Technical Services - MONTH 13 - OCT 2020 | 10/30/20 | Work plan activities at ID, TN, CA and Tasks 2.1 and 2.2. |
| Task 2\* | 2.7 | TASK 2 Technical Services - MONTH 14 - NOV 2020 | 11/30/20 | Work plan activities at ID, TN, CA and Tasks 2.1 and 2.2. |
| Task 2\* | 2.8 | TASK 2 Technical Services (incl. Work Plan v1.6 with State Tasks) - MONTH 15 - DEC 2020 | 12/30/20 | Work Plan v1.6 with updates for ID, CT, TN and CA. Continued Tasks 2.1 and 2.2 |
| Task 2\* | 2.9 | TASK 2 Technical Services - MONTH 16 - JAN 2021 | 1/20/21 | Technical Services to ID, TN, CA, PA, CT, OH and Cross-agency Tasks 2.1 & 2.2. |
| Task 2\* | 2.10 | TASK 2 Technical Services - MONTH 17 - FEB 2021 | 2/28/21 | Technical Services to ID, TN, CA, PA, CT, OH and Cross-agency Tasks 2.1 & 2.2. |
| Task 2\* | 2.11 | TASK 2 Technical Services - MONTH 18 - MAR 2021 | 3/20/21 | Technical Services to ID, TN, CA, PA, CT, OH and Cross-agency Tasks 2.1 & 2.2. |
| Task 2\* | 2.12 | TASK 2 Technical Services - MONTH 19 - APR 2021 | 4/30/21 | Technical Services to ID, TN, CA, PA, CT, OH and Cross-agency Tasks 2.1 & 2.2. |
| Task 2\* | 2.13 | TASK 2 Technical Services - MONTH 20 - MAY 2021 | 5/30/21 | Technical services to PFS States and for Cross-agency Tasks 2.1 & 2.2. |
| Task 2\* | 2.14 | TASK 2 Technical Services - MONTH 21 - JUN 2021 | 6/30/21 | Technical services to PFS States and for Cross-agency Tasks 2.1 & 2.2. |
| Task 2\* | 2.15 | TASK 2 Technical Services - MONTH 22 - JUL 2021 | 7/30/21 | Technical services to PFS States and for Cross-agency Tasks 2.1 & 2.2. |
| Task 2\* | 2.16.1 | TASK 2 Technical Services - MONTH 23 - AUG 2021 | 8/30/21 | Technical Services to 8 States as listed in the quarterly report. |
| Task 2\*\* | 2.16.2 | TASK 2 Technical Services - MONTH 23 - AUG 2021 | 8/30/21 | Technical Services to NC and KS, with FL, NM requirements considered as well. |
| Task 2\* | 2.17.1 | TASK 2 Technical Services - MONTH 24 - SEP 2021 | 9/30/21 | Technical Services to 6 Base Period States as listed in the quarterly report. |
| Task 2\*\* | 2.17.2 | TASK 2 Technical Services - MONTH 24 - SEP 2021 | 9/30/21 | Technical Services to NC and KS, with FL, NM requirements considered as well. |
| Task 2\* | 2.18.1 | TASK 2 Technical Services - MONTH 25 - OCT 2021 | 10/30/21 | Technical Services to ID, PA, CA and OH. |
| Task 2\*\* | 2.18.2 | TASK 2 Technical Services - MONTH 25 - OCT 2021 | 10/30/21 | Technical Services to NC and KS, with FL, NM requirements considered as well. |
| Task 2\* | 2.19.1 | TASK 2 Technical Services - MONTH 26 - NOV 2021 | 11/30/21 | Technical Services to ID, PA, CA, NC, KS and OH, as summarized in this report. |
| Task 2\*\* | 2.19.2 | TASK 2 Technical Services - MONTH 26 - NOV 2021 | 11/30/21 | Technical Services to NC and KS, with FL, NM requirements considered as well. |
| Task 2\* | 2.20.1 | TASK 2 Technical Services - MONTH 27 - DEC2021 | 12/30/21 | Technical Services to ID, PA, CA, NC, KS and OH, as summarized in this report. |
| Task 2\*\* | 2.20.2 | TASK 2 Technical Services - MONTH 27 - DEC2021 | 12/30/21 | Technical Services to NC and KS, with FL, NM requirements considered as well. |
| Task 2 | 2.21.1 | TASK 2 Technical Services - MONTH 28 - JAN2022 | 1/30/22 | Technical Services to PFS States in Base Period as listed in QTR Report #10. |
| Task 2\*\* | 2.21.2 | TASK 2 Technical Services - MONTH 28 - JAN2022 | 1/30/22 | Technical Services to NC and KS, with FL, NM requirements considered as well. |
| Task 2 | 2.22.1 | TASK 2 Technical Services - MONTH 29 - FEB2022 | 2/30/22 | Technical Services to PFS States in Base Period as listed in QTR Report #10. |
| Task 2\*\* | 2.22.2 | TASK 2 Technical Services - MONTH 29 - FEB2022 | 2/30/22 | Technical Services to NC and KS, with FL, NM requirements considered as well. |
| Task 2 | 2.23.1 | TASK 2 Technical Services - MONTH 30 - MAR 2022 | 3/30/22 | Technical Services to PFS States in Base Period as listed in QTR Report #10. |
| Task 2\*\* | 2.23.2 | TASK 2 Technical Services - MONTH 30 - MAR 2022 | 3/30/22 | Technical Services to NC and KS, with FL, NM requirements considered as well. |
| Task 2 | 2.24.1 | TASK 2 Technical Services - MONTH 31 - APR 2022 | 4/30/22 | Technical Services to PFS States in Base Period as listed in QTR Report #11. |
| Task 2\*\* | 2.24.2 | TASK 2 Technical Services - MONTH 31 - APR 2022 | 4/30/22 | Technical Services to NC and KS, with FL, NM requirements considered as well. |
| Task 2 | 2.25.1 | TASK 2 Technical Services - MONTH 32 - MAY 2022 | 5/30/22 | Technical Services to PFS States in Base Period as listed in QTR Report #11. |
| Task 2\*\* | 2.25.2 | TASK 2 Technical Services - MONTH 32 - MAY 2022 | 5/30/22 | Technical Services to NC and KS, with FL, NM requirements considered as well. |
| Task 2 | 2.26.1 | TASK 2 Technical Services - MONTH 33 - JUN 2022 | 6/30/22 | Technical Services to ID, TN, CA, PA |
| Task 2\*\* | 2.26.2 | TASK 2 Technical Services - MONTH 33 - JUN 2022 | 6/30/22 | Technical Services to NC, KS, GA, WA, NM, MA |
| Task 2 | 2.27.1 | TASK 2 Technical Services - MONTH 34 – JUL 2022 | 7/30/22 | Technical Services to ID, TN, CA, PA |
| Task 2\*\* | 2.27.2 | TASK 2 Technical Services - MONTH 34 – JUL 2022 | 7/30/22 | Technical Services to NC, KS, GA, WA, NM, MA |
| Task 2 | 2.28.1 | TASK 2 Technical Services - MONTH 35 – AUG 2022 | 8/30/22 | Technical Services to ID, TN, CA, PA |
| Task 2\*\* | 2.28.2 | TASK 2 Technical Services - MONTH 35 – AUG 2022 | 8/30/22 | Technical Services to NC, KS, GA, WA, NM, MA |
| Task 2 | 2.29.1 | TASK 2 Technical Services - MONTH 36 - SEPT 2022 | 9/30/22 | Technical Services to ID, TN, CA, PA |
| Task 2\*\* | 2.29.2 | TASK 2 Technical Services - MONTH 35 – AUG 2022 | 8/30/22 | Technical Services to NC, KS, GA, WA, NM, MA |
| Task 2 | 2.30 | TASK 2 Technical Services - MONTH 37 - OCT 2022 | 10/30/22 | Technical Services to ID, TN, CA, PA |
| Task 2\*\* | 2.30 | TASK 2 Technical Services - MONTH 37 - OCT 2022 | 10/30/22 | Technical Services to NC, KS, GA, WA, MA |
| Task 2 | 2.31 | TASK 2 Technical Services - MONTH 38 - NOV 2022 | 11/30/22 | Technical Services to ID, TN, CA, PA |
| Task 2\*\* | 2.31 | TASK 2 Technical Services - MONTH 38 - NOV 2022 | 11/30/22 | Technical Services to NC, KS, GA, WA, MA |
| Task 2 | 2.32 | TASK 2 Technical Services - MONTH 39 - DEC 2022 | 12/30/22 | Technical Services to ID, TN, CA, PA |
| Task 2\*\* | 2.32 | TASK 2 Technical Services - MONTH 39 - DEC 2022 | 12/30/22 | Technical Services to NC, KS, GA, WA, MA |
| Task 2 | 2.33 | TASK 2 Technical Services - MONTH 40 - JAN 2023 | 1/30/23 | Provided technical services to States listed in this report. |
| Task 2\*\* | 2.33 | TASK 2 Technical Services - MONTH 40 - JAN 2023 | 1/30/23 | Provided technical services to States listed in this report. |
| Task 2 | 2.34 | TASK 2 Technical Services - MONTH 41 - FEB 2023 | 2/30/23 | Provided technical services to States listed in this report. |
| Task 2\*\* | 2.34 | TASK 2 Technical Services - MONTH 41 - FEB 2023 | 2/30/23 | Provided technical services to States listed in this report. |
| Task 2 | 2.35 | TASK 2 Technical Services - MONTH 42 - MAR 2023 | 3/30/23 | Provided technical services to States listed in this report. |
| Task 2\*\* | 2.35 | TASK 2 Technical Services - MONTH 42 - MAR 2023 | 3/30/23 | Provided technical services to States listed in this report. |
| Task 2 | 2.36 | TASK 2 Technical Services - MONTH 43 - APR 2023 | 4/30/23 | Provided technical services to Ohio, Washington, Georgia, California, |
| Task 2\*\* | 2.36 | TASK 2 Technical Services - MONTH 43 - APR 2023 | 4/30/23 | Provided technical services work for Connecticut and North Carolina. |
| Task 2 | 2.37 | TASK 2 Technical Services - MONTH 44 - MAY 2023 | 5/30/23 | Provided technical services to Ohio, Washington, Georgia, California, |
| Task 2\*\* | 2.37 | TASK 2 Technical Services - MONTH 44 - MAY 2023 | 5/30/23 | Provided technical services work for Connecticut and North Carolina. |
| Task 2 | 2.38 | TASK 2 Technical Services - MONTH 45 - JUNE 2023 | 6/30/23 | Provided technical services to Ohio, Washington, Georgia, California, |
| Task 2\*\* | 2.38 | TASK 2 Technical Services - MONTH 45 - JUNE 2023 | 6/30/23 | Provided technical services work for Connecticut and North Carolina. |
| Task 2 | 2.39 | TASK 2 Technical Services - MONTH 46 - JULY 2023 | 7/30/23 | Provided technical services to Ohio, Washington, Georgia, California, |
| Task 2\*\* | 2.39 | TASK 2 Technical Services - MONTH 46 - JULY 2023 | 7/30/23 | Provided technical services work for Connecticut and North Carolina. |
| Task 2 | 2.40 | TASK 2 Technical Services - MONTH 47 - AUG 2023 | 8/30/23 | Provided technical services to Ohio, Washington, Georgia, California, |
| Task 2\*\* | 2.40 | TASK 2 Technical Services - MONTH 47 - AUG 2023 | 8/30/23 | Provided technical services work for Connecticut and North Carolina. |
| Task 2 | 2.41 | TASK 2 Technical Services - MONTH 48 - SEPT 2023 | 9/30/23 | Provided technical services to Ohio, Washington, Georgia, California, |
| Task 2\*\* | 2.42 | TASK 2 Technical Services - MONTH 48 - SEPT 2023 | 9/30/23 | Provided technical services work for Connecticut and North Carolina. |
| Task 2 | 2.43 | TASK 2 Technical Services – MONTH 49 – OCT 2023 | 10/30/23 | Provided technical services work for North Carolina, California, North Dakota, Massachusetts. Developed intersection model for Kansas, New Mexico and Florida. |
| Task 2 | 2.44 | TASK 2 Technical Services – MONTH 50 – NOV 2023 | 10/30/23 | Provided technical services work for North Carolina, California, North Dakota, Massachusetts. Developed intersection model for Kansas, New Mexico and Florida. |
| Task 2 | 2.45 | TASK 2 Technical Services – MONTH 51 – DEC 2023 | 10/30/23 | Provided technical services work for North Carolina, California, North Dakota, Massachusetts. Developed intersection model for Kansas, New Mexico and Florida. |
| Task 2 | 2.46 | TASK 2 Technical Services – MONTH 52 – JAN 2024 | 1/31/24 | Provided technical services work for North Carolina, California, Arizona, Kansas, North Dakota, Massachusetts. |
| Task 2 | 2.47 | TASK 2 Technical Services – MONTH 53 – FEB 2024 | 2/29/24 | Provided technical services work for North Carolina, California, Arizona, Kansas, North Dakota, Massachusetts. |
| Task 2 | 2.48 | TASK 2 Technical Services – MONTH 54 – MAR 2024 | 3/31/24 | Provided technical services work for North Carolina, California, Arizona, Kansas, North Dakota, Massachusetts. |
| Task 3\*\* | 3.1.1 | **Article 1**: Road Network Publication Data Model with Topology, Temporality, Routable Network Rule | 5/30/21 | No longer in scope. Information prepared for this article to be merged in Guidebook. |
| Task 3\*\* | 3.1.2 | **Article 2:** Enterprise GIS Application for Spatial Safety Performance Functions Calibration and HSM-based Safety Analysis | 5/30/22 | No longer in scope. Information prepared for this article to be merged in Guidebook. |
| Task 3\*\* | 3.1.3 | **Article 3:** Engineering, processing and integrating spatial Traffic and Safety Data using Cloud | 12/30/22 | No longer in scope. Information prepared for this article to be merged in Guidebook. |
| Task 3\*\* | 3.1.4 | **Article 4:** Enterprise GIS Application forModeling and Conflating Federal Lands Management Agency, DOT LRS and Local Agency Roads data | 12/30/23 | No longer in scope. Information prepared for this article to be merged in Guidebook. |
| Task 3\*\* | 3.1.5 | **Article 5:** LRS Administration Levels and Maturity Mode | 9/30/24 | No longer in scope. Information prepared for this article to be merged in Guidebook. |
| Task 3 | 3.2.1 | Workshop 1 - GIS-T 2021 | 4/30/21 | GIS-T Workshop 2021 Delivered |
| Task 3\* | 3.2.2 | AEGIST Presentations (2020) | 12/30/20 | **Following Presentations Delivered:**  NY (Apr); TRF (Aug); KS (Jun); National Roads Symposium (Sep); Esri RHUG (Oct), AEGIST Modeling & Standards (Dec). |
| Task 3\*\* | 3.2.3 | Workshop 2 – GIS-T 2022 | 5/30/22 | Delivered Workshop in April 2022. |
| Task 3\* | 3.2.4 | AEGIST Presentations (2021) | 12/30/21 | Completed delivery of following 2021 Presentations:   1. USDOT Presentation on April 2nd. 2. Presentations to new PFS States: WV, DC 3. Provided AEGIST Overview to Colorado.Presentation at NaTMEC on Jun 23rd. FHWA NRN Presentation on Aug 31st. 4. Presentation Slides for FHWA Safety Group on AEGIST-MIRE activities. 5. FLMA Presentation on Nov 9th. |
| Task 3\*\* | 3.2.5 | AEGIST Presentations (2022) | 12/30/22 | Following presentations have been delivered in 2022, as of this quarter:   1. TRB AEGIST Update at AED40 Committee Meetings 2. USDOT Mobility Plan Business Group Update (Feb 1st) 3. AASHTO GIS-T Conference – AEGIST Updates (April 21st) 4. Presentation for Gloria Shepherd 5. Spatial Data Governance presentation to NC, TN, ID, PA (April 1st, 2022) 6. RDIP Conference in Rhode Island (April. 2022) 7. NaTMEC 2022 in June, 2022 8. CTPP Conference in June, 2022 9. RDIP Conference in West Virginia (June 2022) 10. IHEEP Conference Presentation Preparation (Sept 2022) |
| Task 3 | 3.2.6 | GIS-T Workshop 2023 | 4/10/23 | Workshop on April 11th, 2023. Georgia and Arizona teams presented their data supply chain processes. |
| Task 3 | 3.3.1 | Webinar 1: Data Governance | 2/11/21 | Webinar delivered on Feb 11th, 2021 |
| Task 4 | 4.1.0 | Peer-Exchange 1 - 2019 | 12/30/19 | Completed. |
| Task 4 | 4.2.0 | Peer-Exchange 2 - 2020 | 12/30/20 | Aug 25th-26th Peer Exchange Conducted. |
| Task 4 | 4.3.0 | Peer-Exchange 3 – 2022 | 08/30/22 | Conducted Santa Fe Peer Exchange Meeting |
| Task 5 | 5.0 | HPMS 9.0 Remodeling Report/Article Database Design | 5/30/21 | Delivered report on Road Network Publication Data Model for FHWA and PFS States Review completed between July-Sept. Comments Addressed.  Coordinate with FHWA to determine next Steps on publication to be determined. |

\* Tasks in Base/Original Period (CLIN 0001)

\*\*Tasks in Performance Period 1 and 2 (CLIN 0002 and CLIN0003)