

**IT Professional Technical Services  
Master Contract Program  
# 902TS  
Statement of Work (SOW)  
For Technology Services Issued by**

**Minnesota Department of Transportation (Mn/DOT)**

**Project Title:** Outdoor Advertising Permit Geographic Information Systems

**Required Service Category:** Geographic Information Systems (GIS)

**In addition, your firm must be approved in at least one of the following service categories:**

Database – Oracle  
Database Design / Architect  
Project Management  
Analyst – Business  
Desktop – Application (Design & Development)

**1.0 Business Need**

1.1 Mn/DOT's Office of Technical Support has decided to develop and implement a system for use in locating and managing information on outdoor advertising signs. By state and federal law, Mn/DOT is required to regulate outdoor advertising within 660 feet of roadways. The enforcement of outdoor advertising regulations and management of an inventory of outdoor advertising signs is now done manually and so, is a labor intensive process. Mn/DOT currently manages permits for approximately 5,100 outdoor advertising signs. Today, managing the outdoor advertising sign inventories requires extensive vehicle travel and constant calibration of location equipment, knowledge of local and county comprehensive zoning, scenic byway and expressway designation, location of parkland, schools, churches, right of way, and municipal boundaries over a large geographic area. The primary goal of this project is to save staff time and expenses needed to administer permits.

1.2 The business and functional needs for this SOW include:

- 1.2.1 Conformance with State and Federal agreements for carrying out national policy relative to control of outdoor advertising in areas adjacent to the national highway system of interstate and defense and the highways.
- 1.2.2 Federal code of regulation 23 CFR requires that Commissioner of Transportation effectively control advertising devices along Federal and State highways or risk losing up to 30% in federal highway funds.
- 1.2.3 Minnesota Statute 173 requires that the Commissioner of Transportation effectively control advertising devices along state highways.
- 1.2.4 Minnesota Rule 8810 requires that the Commissioner of Transportation effectively control advertising devices along state highways.
- 1.2.5 Mn/DOT is required by the Federal Highway Administration (FHWA) to effectively control outdoor advertising devices within 660 feet of state and federal highways.
- 1.2.6 All outdoor advertising sign location work is now completed manually.
- 1.2.7 The Outdoor Advertising Permits Report and Tracking (OAPRT) System is used to maintain an inventory of outdoor advertising signs and their permits.
- 1.2.8 Currently managing outdoor advertising sign inventories require travel over large geographic areas and frequent calibration of location equipment.

- 1.2.9 Mn/DOT currently manages permits for approximately 5,100 outdoor advertising signs.
  - 1.2.10 Due to staff shortages and increasing workload demands sign technicians have less time to dedicate to the effective control of outdoor advertising signs.
  - 1.2.11 If no action is taken, outdoor advertising sign inventory data will decline in accuracy and quality, and Mn/DOT could lose Federal funding and face costly litigation.
  - 1.2.12 Support Mn/DOT's Key Focus area of Making Mn/DOT Operate Better – Strengthen Program and Finance Integrity.
  - 1.2.13 Support Mn/DOT's strategic vision of Safety – Promote and maintain a safe, reliable and modern transportation system.
- 1.3 The Office of Technical Support and Mn/DOT permit staff currently use the OAPRT System to manage information on outdoor advertising sign permits. This is a desktop Personal Computer (PC), Java web-based application with an Oracle database. It is not used in the field and does not include features to enable the use of global positioning system (GPS) to locate outdoor advertising signs. ArchWing Innovations developed OAPRT and currently maintains the system.
- 1.4 Business Case
- 1.4.1 Desired solution objectives for this project include:
    - 1.4.1.1 Save staff time and expenses needed to administer sign permits
    - 1.4.1.2 Reduce employee mileage used in administering sign permits
    - 1.4.1.3 Reduce the time needed for FHWA review of advertising sign inventory
    - 1.4.1.4 Reduce the time needed to issue a permit for a new sign
    - 1.4.1.5 Increase advertising sign permit revenue
    - 1.4.1.6 Reduce the cost of court cases for sign permit litigation
    - 1.4.1.7 Improve the quality of the outdoor advertising sign data
    - 1.4.1.8 Improve the safety of the technicians performing field work for outdoor advertising sign permits
    - 1.4.1.9 Improve the accuracy of outdoor advertising sign location data
    - 1.4.1.10 Increase communication between Mn/DOT and the FHWA
    - 1.4.1.11 Make it easier to locate missing, incorrect or illegal signs
    - 1.4.1.12 Improve the efficiency of the permitting process
    - 1.4.1.13 Provide timely and improved communication with the general public and sign owners
  - 1.4.2 The focus of this project is to develop an application to aid in the location of outdoor advertising signs and management of sign data.
  - 1.4.3 The project stakeholders include Mn/DOT's Engineering Services Division Director, Office of Technical Support, District Maintenance Permit Office staff, Office of Information & Technology Services, Commissioner of Transportation, Office of Land Management, District Area Maintenance Engineers, FHWA, Minnesota Office of Attorney General, and the Outdoor Sign Advertising Industry.
  - 1.4.4 The following constraints have been identified for this project:
    - 1.4.4.1 The system must operate on the laptops, desktop PC's, and GPS equipment.
    - 1.4.4.2 The system must conform to Mn/DOT Enterprise GIS standards.
    - 1.4.4.3 The project will need to accommodate ongoing vendor maintenance of the OAPRT system.
  - 1.4.5 This statement of work is for the development of a GIS application that could be used in the office and field, by Mn/DOT employees throughout the State of Minnesota.

1.5 Responder Required Work Location – The Selected Responder is not required to perform all contract work on site at Mn/DOT. However, the Selected Responder’s project team must be available to meet with Mn/DOT on site with 48 hours notice.

## **2.0 Project Duties and Deliverables**

2.1 Desired system features:

- 2.1.1 Use Case Diagrams (Exhibit A)
- 2.1.2 Use Case Documents (Exhibit B)
  - 2.1.2.1 Create OA Feature Selection Set For Export and Perform Export – UC-01
  - 2.1.2.2 Establish Realtime Differential Correction – UC-02
  - 2.1.2.3 Find and Navigate to OA Feature – UC-03
  - 2.1.2.4 Add Non-Permitted Sign – UC-04
  - 2.1.2.5 Export Updated Field Data to Desktop PC – UC-05
  - 2.1.2.6 Edit OA Feature – UC-06
  - 2.1.2.7 Use TISUS/ RLC Transportation Information System User Services – Route Length Convert – UC-11
  - 2.1.2.8 Import Location From Range Finder – UC-12
  - 2.1.2.9 Login – UC-15
  - 2.1.2.10 Determine Euclidian Distance To Any Feature – UC-17
  - 2.1.2.11 Record Multiple Points For a Sign – UC-18
- 2.1.3 Supplemental Requirements (Exhibit C)
- 2.1.4 High Level Data Model (Exhibit D)
- 2.1.5 Technical Development Architecture Guide P1281 GIS Mapping for Outdoor Advertising (Exhibit E)
- 2.1.6 Glossary (Exhibit F)
- 2.1.7 OAPRT Data Model (Exhibit G)

2.2 The Selected Responder will complete the following project duties:

- 2.2.1 Follow all technical specifications and processes identified in this SOW
- 2.2.2 Due to the requirements, assign one or more person(s) to satisfy SOW.
- 2.2.3 Maintain sufficient resources (staff) to stay on schedule and support change management incidents. Change management staff should be available for potential meetings with Mn/DOT staff.
- 2.2.4 Provide training and knowledge transfer to key Mn/DOT staff as specified in this SOW.
- 2.2.5 Adhere to Mn/DOT’s testing and acceptance criteria.
- 2.2.6 Report all work plans and completed requirements to the Mn/DOT Project Manager.
- 2.2.7 Perform unit, integration, regression, and system testing.
- 2.2.8 Thoroughly test and track all defects using JIRA.
- 2.2.9 Provide a one year warranty against defects, and correct any defects found within the warranty period.
- 2.2.10 Adhere to Mn/DOT’s Project Documentation.
- 2.2.11 Upon contract award, submit a best practice work plan/schedule, and estimated durations to complete each deliverable. (See Section 2 for the list of deliverables.) In-depth discussion of work plans will occur at contract negotiations.

2.3 The Selected Responder will provide the project deliverables detailed in this section. All deliverables are subject to Mn/DOT approval.

- 2.3.1 Project Management
  - 2.3.1.1 Provide a written detailed project plan that identifies project resources and a detailed project schedule (preferably in Microsoft Project). The plan should

- follow an incremental, iterative development methodology. The plan should include a detailed scope and work breakdown structure for each iteration.
- 2.3.1.2 Provide written monthly high-level status reports to the Mn/DOT Project Manager.
  - 2.3.1.3 Provide weekly status reports, in a format acceptable to the Mn/DOT Project Manager, detailing the status of tasks, deliverables and issues throughout the life of the project.
  - 2.3.1.4 Meet with Mn/DOT Project Manager and technical expert weekly (or as requested by the Mn/DOT Project Manager) to report on project progress, issues, and planned work.
- 2.3.2 Quality Assurance
- 2.3.2.1 Develop a project Quality Assurance (QA) Plan that details the quality assurance tasks that will be applied to all phases of the design, construction, implementation and execution of the application and database. A QA plan template will be provided by Mn/DOT.
  - 2.3.2.2 Conduct reviews of analysis deliverables with Mn/DOT experts.
- 2.3.3 Testing
- 2.3.3.1 Perform unit, integration, regression and system testing and document the results.
  - 2.3.3.2 Document, modify and re-test the system problems identified during the testing process.
  - 2.3.3.3 Provide monthly defect reports to Mn/DOT's Project Manager.
  - 2.3.3.4 Provide weekly defect reports to Mn/DOT's Test Manager.
  - 2.3.3.5 Document and maintain status of system defects, change requests, and related artifacts in JIRA.
  - 2.3.3.6 Collaborate with Mn/DOT staff in the development and maintenance of detailed test plan, test inventory, detailed test cases, defect reports, test logs, and regression test reports.
- 2.3.4 Analysis
- 2.3.4.1 Work with functional and business experts to refine application requirements, use cases and the entity relationship diagram.
  - 2.3.4.2 Refine and update business rules and processes.
  - 2.3.4.3 Collaborate with Mn/DOT staff in project risk management.
  - 2.3.4.4 Conduct review of project with Mn/DOT Office of Finance and incorporate appropriate changes into the project deliverables.
  - 2.3.4.5 Develop a detailed logical database design (diagram) showing tables, relationships, and attributes.
- 2.3.5 Design
- 2.3.5.1 Develop a detailed physical database design (diagram) showing tables, relationships, and attributes.
  - 2.3.5.2 Develop a data meta-data dictionary of all entities/ tables and attributes/ columns including definitions in business language.
  - 2.3.5.3 Develop a GIS meta-data dictionary.
  - 2.3.5.4 Refine use cases and create prototype user interface screens.
  - 2.3.5.5 Conduct design reviews with Mn/DOT experts.
  - 2.3.5.6 Present design to Mn/DOT project architect, system architect, and database administrator for review and approval.
  - 2.3.5.7 Develop a class diagram showing proposed application classes including class definitions.
  - 2.3.5.8 Develop sequence diagrams showing the proposed design for the more complex use cases.

- 2.3.5.9 Design an application security mechanism that works with OAPRT access control to control user access and rights.
- 2.3.6 Construction
  - 2.3.6.1 Provide and maintain application source files, configuration files, developer documentation, and related artifacts in Mn/DOT's CVS.
  - 2.3.6.2 Provide database scripts.
  - 2.3.6.3 Code, test, debug, document, and implement the application using the business rules and specifications to build the application according to the approved design and technical models.
  - 2.3.6.4 Document the application classes.
  - 2.3.6.5 Create on-line help.
  - 2.3.6.6 Implement Oracle tables according to approved design and technical models.
- 2.3.7 Iteration-Specific Deliverables
  - 2.3.7.1 An updated project schedule to show scope and schedule of tasks for the iteration.
  - 2.3.7.2 Refined use cases and prototype screens.
  - 2.3.7.3 Class diagram and class definitions.
  - 2.3.7.4 Sequence diagram for complex use cases.
  - 2.3.7.5 Business test scenarios and system test cases to be executed for each iteration.
  - 2.3.7.6 Updated data dictionary and database diagram for the Oracle database.
  - 2.3.7.7 Updated application installed in the system test environment prior to acceptance testing.
  - 2.3.7.8 Updated on-line help.
  - 2.3.7.9 Report of defects identified/fixed during vendor system testing for each iteration.
  - 2.3.7.10 Coordinate iteration design with Mn/DOT report developer.
- 2.3.8 Implementation & Training
  - 2.3.8.1 Develop and implement an application deployment plan that does not adversely affect other Mn/DOT systems.
  - 2.3.8.2 Develop training resource materials, and train Mn/DOT Outdoor Advertising key experts.
  - 2.3.8.3 Develop a system administration guide (to be approved by Mn/DOT's Project Manager)
  - 2.3.8.4 Train/mentor Mn/DOT staff to support the system.
  - 2.3.8.5 Support deployment of the system into production.
  - 2.3.8.6 Provide release notes and installation guide.
  - 2.3.8.7 Provide Mn/DOT with a transfer of knowledge of software for future maintenance.
- 2.3.9 Enhancement & Maintenance
  - 2.3.9.1 Develop information technology support documentation that includes technical architecture, database and application design, installation procedures and other information required to support the application.
  - 2.3.9.2 Provide scripts to build, test and deploy the application (including database objects).
  - 2.3.9.3 Provide any updates to documentation required by new features or enhancements.
  - 2.3.9.4 Maintain any non-standard software infrastructure required by the application (custom components) for the development, system test, and production environments.
- 2.3.10 Warranty

- 2.3.10.1 Provide a one year written product warranty. The warranty period begins upon final project signoff.
- 2.3.10.2 Any software errors or defects found during the warranty period will be fixed free of charge by the Selected Responder.
- 2.3.10.3 After the expiration of the system warranty period, the system will be maintained by Mn/DOT.

**3.0 Project Milestones and Schedule**

The Selected Responder will be required to meet the timeframes as identified in this section.

3.1 Project start date: Upon Contract Execution

3.2 Key deliverable dates:

<b>Deliverable</b>		<b>Due Date</b>
3.2.1	Iteration 1- Project plan, SQA plan, Test Plan, review Requirements	3 weeks after start of contract
3.2.2	Iteration 2 - Use Cases 1, 3, 4, 6	4 weeks after completion of Iteration 1
3.2.3	Iteration 3 - Use Cases 2, 12, 5	4 weeks after completion of Iteration 2
3.2.4	Iteration 4 - Use Cases 17,18, 15	4 weeks after completion of Iteration 3
3.2.5	Iteration 5 - Refactoring	4weeks after completion of Iteration 4
3.2.6	Iteration 6 – Use Cases 11,15	4 weeks after completion of Iteration 5
3.2.7	Iteration 7 – Deployment to Production, Training plan, training materials, etc.	2 weeks after completion of Iteration 6

3.3 End date: 25 weeks after

**4.0 Project Environment (Mn/DOT Resources)**

4.1 Mn/DOT will provide technical and business resources to assist with the project as follows:

- 4.1.1 Approximately 15 IT staff and 3 business staff to assist with the project, on an “as-needed” basis.
- 4.1.2 Mn/DOT’s Project Manager will be K.McDonald, Office of Information & Technology Services. For all inquiries regarding this SOW contact the Mn/DOT Contract Administrator Melissa McGinnis at 651-366-4644. Contact with any other Mn/DOT personnel regarding this SOW may result in disqualification.
- 4.1.3 The basic project organizational structure consists of:  
 Mn/DOT Project Manager- K. McDonald  
 Mn/DOT Database Administrator- S. Sethi  
 Mn/DOT Project Architect- to be determined  
 Mn/DOT Test Manager- to be determined  
 Mn/DOT Application System Architect- R. Meyer  
 Mn/DOT Infrastructure System Architect – M. Kangas  
 Mn/DOT GIS System Architect – C. McCarty  
 Mn/DOT Outdoor Advertising Technical Expert- J. Rossi  
 Mn/DOT Crystal Enterprise Report Developer- S. Netland  
 Mn/DOT Outdoor Advertising Business Experts- S. Robinson, J. Constant, W. Scheer  
 Mn/DOT Application Server Administrator- F. Sasse  
 Mn/DOT JIRA Administrator- J. Lee

Mn/DOT Microsoft C# support expert – R. Fisher  
 Mn/DOT CVS Administrator – L. Dolan  
 Mn/DOT Office of Finance Coordinator– S. Dwight

- 4.1.4 Mn/DOT Office of Technical Support staff are proficient in use of the current Outdoor Advertising Permit Reporting and Tracking system (OAPRT) and have many years of experience with the business processes used in managing outdoor advertising sign permits. Mn/DOT Office of Information & Technology Services staff have a high level of experience with the tools and technologies specified for this project.
- 4.2 Mn/DOT will complete the following activities:
- 4.2.1 General Activities
- 4.2.1.1 Provide a core project team that includes a project sponsor, project manager, project architect, business subject matter experts, key business stakeholders, system architects, and IT application and database support staff. The team will also include other Mn/DOT IT resources for support of the project technical infrastructure (network, system, security, etc.) and application development support.
- 4.2.1.2 Provide change management process and change control board members.
- 4.2.1.3 Manage project scope, cost and schedule.
- 4.2.1.4 Provide timely resolution to business issues.
- 4.2.1.5 Provide end user training.
- 4.2.2 Requirements/Analysis/Design
- 4.2.2.1 Provide information on project requirements.
- 4.2.2.2 Track change requests and issues.
- 4.2.2.3 Review and approve design.
- 4.2.3 Testing
- 4.2.3.1 Develop acceptance test criteria.
- 4.2.3.2 Perform and document user acceptance testing.
- 4.2.3.3 Identify defects and change requests during acceptance testing.
- 4.2.3.4 Provide on-site test lab facility.
- 4.2.4 Data
- 4.2.4.1 Provide information on the current OAPRT application database.
- 4.2.4.2 Assist in database design and implementation.
- 4.2.4.3 Addition of an outdoor advertising layer to the Mn/DOT base map so that it is available for external access.
- 4.2.4.4 Migrate current OAPRT data from the PRD2 Oracle database instance to the Transactional Geodata Production Oracle database instance.
- 4.2.5 Infrastructure
- 4.2.5.1 Build and maintain the development, system test, and production hardware, operating system, and database infrastructure for the application.
- 4.2.5.2 Provide all hardware and software licenses for the production environment.
- 4.2.6 Integration
- 4.2.6.1 Provide information on the Mn/DOT base map, Transactional Geodata Production Oracle database instance, and OAPRT system.
- 4.3 See attached document, (Exhibit E) - [Technical Development Architecture Guide P1281 GIS Mapping for Outdoor Advertising](#) for more information regarding the technical infrastructure and support structures currently in place or expected to be in place for this project.

## 5.0 Project Requirements

Mn/DOT implementation requirements include:

- 5.1 Compliance with the Statewide Enterprise Architecture
- 5.2 Compliance with Statewide Project Management Methodology
- 5.3 Compliance with applicable industry/agency standards
- 5.4 The application will be implemented at the Mn/DOT central office network center. It will be accessible from offices within Mn/DOT through the department wide area network.
- 5.5 Training of Mn/DOT staff includes training staff in the operation of the new system and training of the application administrator in the administration of the new system.
- 5.6 The computer and network hardware will be maintained by Mn/DOT.

**6.0 Required Skills**

Required minimum qualifications are shown in the following table. The proposal must specifically indicate how members of the Responders team meet these minimum qualifications. This portion of the proposal review will be conducted on a pass/fail basis. If Mn/DOT determines, in its sole discretion, that the Responder fails to meet one or more of these requirements (or that the Responder has not submitted sufficient information to make the pass/fail determination), then the proposal will be eliminated from further review.

	<b>Minimum Years</b>	<b>Required Skill Type</b>
6.1	3 years	ESRI GIS software and development products
6.2	3 years	Iterative application development
6.3		Familiarity with Oracle Spatial Database and knowledge of Arc SDE
6.4	3 years	Microsoft ASP/.NET
6.5	3 years	Database Design
6.6	3 years	Systems Analysis
6.7	2 years	ARC GIS/ ARC Mobile Development
6.8	3 years	Development using Microsoft .NET - framework
6.9		<p>All team members must have working knowledge of Section 508 of the Rehabilitation Act of 1973 as amended and be able to apply the technical standards for the following as needed in the performance of this contract:</p> <ul style="list-style-type: none"> <li>• Subpart B -- Technical Standards                             <ul style="list-style-type: none"> <li><u>1194.21 Software applications and operating systems.</u></li> <li><u>1194.22 Web-based intranet and internet information and applications.</u></li> <li><u>1194.24 Video and multimedia products.</u></li> </ul> </li> <li>• All electronic and information technology procured and/or developed for this contract shall meet applicable accessibility standards as specified above, viewable at <a href="http://www.section508.gov">http://www.section508.gov</a> - Part 1194.</li> <li>• All products of this contract shall be accessible to people with disabilities. Therefore, all reports and deliverables provided in electronic media, including web-based intranet and internet format shall conform to the relevant accessibility standards references. At a minimum, these provisions include:                             <ul style="list-style-type: none"> <li>1194.22 Web-based Intranet and Internet Information and Applications</li> <li>1194.31 Functional Performance Criteria</li> <li>1194.41 Information, Documentation and Support</li> </ul> </li> </ul>

**7.0 Desired Skills**

Mn/DOT desires a project team with the skills shown in the table below. The extent to which the Responder meets or exceeds the desired skills will be included as part of the qualitative evaluation of the proposal.

<b>Desired Skill Type</b>
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7.1	Project Management Professional (PMP) Certification from Project Management Institute (PMI)
7.2	Strong oral and written communication, analytical and problem solving skills
7.3	Unified Modeling Language (UML)
7.4	Business Process Modeling
7.5	Ability to communicate well with staff at all organizational levels
7.6	Use of CVS
7.7	Use of MS Visual Studio
7.8	Test Design
7.9	Spatial for Oracle / Structured Query Language (SQL) & PL SQL
7.10	Form and Report Prototyping
7.11	Software Quality Assurance Methods
7.12	Configuration Management
7.13	Object Oriented Analysis and Design Techniques
7.14	Conducting unit, integration, system and regression testing
7.15	Object-oriented design patterns
7.16	Defect tracking software
7.17	Defect determination and tracking
7.18	Wireless Markup Language (WML)
7.19	User Interface Design
7.20	Testing Methods
7.21	Test Management

## 8.0 Processing Time

8.1 Deadline for Questions	01/08/2010, 2:00pm Central Standard Time
8.2 Posted Response to Questions	01/11/2010, 2:00pm Central Standard Time
8.3 Proposals due	01/15/2010 2:00pm Central Standard Time
8.4 Anticipated proposal evaluation begins	01/19/2010
8.5 Anticipated proposal evaluation & decision	02/13/2010

## 9.0 Questions

All questions regarding this SOW must be addressed to Mn/DOT's Contract Administrator listed below. Responders may not discuss the content of this SOW with other Mn/DOT staff. Any questions regarding this SOW must be received via e-mail by 01/08/2010, 2:00pm, Central Standard Time.

Contract Administrator: Melissa McGinnis  
E-mail Address: [melissa.mcgininis@dot.state.mn.us](mailto:melissa.mcgininis@dot.state.mn.us)

It is anticipated that questions and answers will be posted on the Office of Enterprise Technology web site by 01/11/2010, end of business day ([www.ot.state.mn.us](http://www.ot.state.mn.us)). Note that questions may be posted verbatim as submitted.

## 10.0 Liability for Work Performed

The Selected Responder must indemnify, save, and hold the Mn/DOT and Mn/DOT's agents and employees harmless from any claims or causes of action, including attorneys fees incurred by Mn/DOT, arising from the performance of this contract by the Selected Responder, or the Selected Responder's agents and employees. This clause will not be construed to bar any legal remedies the Selected Responder may have for Mn/DOT's failure to fulfill its obligations under this contract.

The “Standard Liability Clause” (see above) will apply to this project and will be incorporated into the work order issued for this project. No exceptions to, or deviations from, this clause will be permitted. Do not submit a proposal if you cannot accept this liability clause. Proposals which Mn/DOT determines, in its sole discretion, indicate non-acceptance of this liability clause, will be rejected by Mn/DOT.

**11.0 SOW Evaluation Process**

Mn/DOT representatives will evaluate proposals received by the deadline. Proposals will be evaluated on a “Best Value” basis of 70% qualifications and 30% cost considerations. The review committee will not open the cost proposals until after the qualifications points have been awarded.

The selection process being used for this project involves a three step process. Step one will include the pass/fail assessment and a qualitative evaluation of Contractors’ technical proposal. Step Two will be an interview of two or more Responders who received the top scores in step one. Step Two may be eliminated at Mn/DOT’s discretion based on the results of the step one’s evaluations. Step three will be an analysis of the cost proposal.

Mn/DOT will review proposals according to the following criteria:

•	Experience of personnel assigned to this project	10%
•	Proposed work plan, including the apparent ability to complete project on time and on budget	20%
•	Extent to which personnel assigned to this project meet the Desired Skills	10%
•	References or demonstrated experience with similar engagements	10%
•	Interview	10%
•	Cost	30%
•	Extent to which services will be performed within the U.S.	10%

Mn/DOT reserves the right to check references and to review previous performance reviews for work performed for Mn/DOT or other state agencies, and to take such references and reviews into account for consultant selection purposes.

The following contains additional information describing the proposal evaluation process:

**Step One**

In step one the proposals will first be reviewed to verify whether the Responder meets the “Required Skills” (see section six). Proposals receiving a “fail” on one or more of the required skills will not be reviewed further. Proposals which pass the Required Skills review will then be scored on the non-cost and non-interview factors identified in this SOW.

**Step Two**

The two (or more, at Mn/DOT’s discretion) Responder receiving the highest score in step one may be required to participate in a structured interview. The interview will be approximately one hour in length and consist of structured interview questions prepared by Mn/DOT. Mn/DOT will designate the number and type of Responder team members to attend the interview. The interview will be 10 points of the total evaluation. Mn/DOT reserves the rights to eliminate Step Two interviews if in the judgment of Mn/DOT selection committee, additional questions are not required. If, after completion of step one, Mn/DOT decides not to require interviews, then the 10 points will not be utilized and the selection will be based on a 90 point scale.

It is anticipated that interviews will be conducted during the week of 01/26/2010 so please plan accordingly. Interview questions will be available to the Responders 15 minutes prior to the interview. The Responder will be responsible for its own interview costs.

**Step Three**

The Cost proposal will be evaluated and scored in accordance with the percentage identified in this SOW. Cost will not be revealed to selection committee members until after the technical scoring (and interviews, if any) has been completed.

**12.0 Response Requirements**

- 12.1 Introduction. This includes the Responder’s company name, business address, the contact person’s name, telephone number, fax number and email address (as available).
- 12.2 Company overview. This includes information on company background and expertise.
- 12.3 Project overview.
- 12.4 Detailed response to “Mn/DOT Project Requirements”.
  - 12.4.1 Description of the responder’s understanding of the need and explanation of their proposed solution. Clearly identify that the Responder fully understands the requirements of this project.
  - 12.4.2 Explain how the vendor will meet the project requirements.
  - 12.4.3 Clearly identify your company’s warranty for the work performed.
- 12.5 Detailed response to “Project Approach”.  
Explain how the responder will approach their participation in the project. This includes:
  - 12.5.1 Organization and staffing. Include staff qualifications in a chart, resumes or other manner that will allow Mn/DOT to easily determine if assigned key staff meets the required skills and the extent to which assigned staff meet or exceed the desired skills. No change in personnel assigned to the project will be permitted without the written approval of Mn/DOT’s Project Manager.

Required Skill type	Personnel/ Years of Experience	Project(s) worked on demonstrating these skills	Reference (name, company, phone number)

- 12.5.2 A detailed work-plan, including a realistic plan to meet the project target completion date. The work plan includes a timeline and identifies major tasks for the development, construction, testing, debugging, documenting and deployment of the system. The work plan must present the responder’s approach, work breakdown, deliverable milestones, dates, and a staffing plan to deliver the project results.
- 12.5.3 Contract/change management procedures.
- 12.5.4 Project management (e.g. quality management, risk assessment/management, etc.).
- 12.5.5 Documentation of progress such as status reports.
- 12.5.6 Description of the deliverables to be provided by the responder.
- 12.6 References: Provide three clients for similar type projects. Project references for work completed for government agencies are preferred.
- 12.7 Submit a cost proposal in a separate sealed envelope.
- 12.8 Required forms to be returned or additional provisions that must be included in proposal
  - 12.1.1 Location of Service Disclosure Form
  - 12.1.2 Conflict of Interest Form

- 12.1.3 Affidavit of non-collusion Form
- 12.1.4 Immigration Status Certification Form
- 12.1.5 Veteran-Owned/Service-Disabled Veteran-Owned Preference Form

**13.0 Proposal Submission Instructions**

Submit 7 copies of the response. Responses are to be submitted in a mailing envelope or package, clearly marked “Proposal” on the outside. Cost proposals are to be submitted in a separate sealed envelope. An authorized member of the firm must sign each copy of the response in ink.

All responses must be sent to:

Melissa McGinnis, Contract Administrator  
Minnesota Department of Transportation  
395 John Ireland Boulevard  
Consultant Services Section, Mail Stop 680  
St. Paul, Minnesota 55155

All responses must be received not later than 2:00 p.m. Central Standard Time on 01/15/2010, as indicated by the time stamp made by the Contract Administrator. **Please note that Mn/DOT Offices have implemented security measures.** These procedures do not allow non-Mn/DOT employees to have access to the elevators or the stairs. You should plan enough time and follow these instructions for drop-off:

- Enter through the Rice Street side of the Central Office building (1<sup>st</sup> Floor).
- Once you enter through the doors, you should proceed to the first floor Information Desk.
- **Proposals are accepted at the first floor Information Desk only.** The receptionist will call the Contract Administrator to come down and to time stamp the proposal. Please keep in mind Mn/DOT is very strict on the proposal deadline. Proposals will not be accepted after 2:00pm.

**14.0 General Requirements**

**14.1 Proposal Contents**

By submission of a proposal, Responder warrants that the information provided is true, correct and reliable for purposes of evaluation for potential award of a work order. The submission of inaccurate or misleading information may be grounds for disqualification from the award as well as subject the Responder to suspension or debarment proceedings and other remedies available at law.

**14.2 Disposition of Responses**

All materials submitted in response to this SOW will become property of Mn/DOT and will become public record in accordance with Minnesota Statutes, section 13.591, after the evaluation process is completed. Pursuant to the statute, completion of the evaluation process occurs when the government entity has completed negotiating the contract with the selected Responder. If the Responder submits information in response to this SOW that it believes to be trade secret materials, as defined by the Minnesota Government Data Practices Act, Minn. Stat. § 13.37, the Responder must: clearly mark all trade secret materials in its response at the time the response is submitted, include a statement with its response justifying the trade secret designation for each item, and defend any action seeking release of the materials it believes to be trade secret, and indemnify and hold harmless Mn/DOT, its agents and employees, from any judgments or damages awarded against Mn/DOT in favor of the party requesting the materials, and any and all costs connected with that defense. This indemnification survives the State’s award of a contract. In submitting a response to this RFP, the Responder agrees that this

indemnification survives as long as the trade secret materials are in possession of the State.

Mn/DOT will not consider the prices submitted by the Responder to be proprietary or trade secret materials.

**15.0 No State Obligation**

Issuance of this SOW does not obligate Mn/DOT to award a contract or complete the assignment, and Mn/DOT reserves the right to cancel this SOW if it is considered to be in its best interest. Mn/DOT reserves the right to reject any and all proposals.

**16.0 Veteran-owned/Service Disabled Veteran-Owned Preference**

In accordance with Laws of Minnesota, 2009, Chapter 101, Article 2, Section 56, eligible certified veteran-owned and eligible certified service-disabled veteran-owned small businesses will receive a 6 percent preference in the evaluation of their proposal.

Eligible veteran-owned and eligible service-disabled veteran-owned small businesses should complete the Veteran-Owned/Service Disabled Veteran-Owned Preference Form in this solicitation, and include the required documentation. Only eligible, certified, veteran-owned/service disabled small businesses that provide the required documentation, per the form, will be given the preference.

Eligible veteran-owned and eligible service-disabled veteran-owned small businesses must be **currently** certified by the U.S. Department of Veterans Affairs prior to the solicitation opening date and time to receive the preference.

Information regarding certification by the United States Department of Veterans Affairs may be found at <http://www.vetbiz.gov>.

**STATE OF MINNESOTA**

***LOCATION OF SERVICE DISCLOSURE AND CERTIFICATION***

**LOCATION OF SERVICE DISCLOSURE**

**Check all that apply:**

- The services to be performed under the anticipated contract as specified in our proposal will be performed ENTIRELY within the State of Minnesota
- The services to be performed under the anticipated contract as specified in our proposal entail work ENTIRELY within another state within the United States.
- The services to be performed under the anticipated contract as specified in our proposal will be performed in part within Minnesota and in part within another state within the United States.
- The services to be performed under the anticipated contract as specified in our proposal DO involve work outside the United States. Below (or attached) is a description of:
  - The identity of the company (identify if subcontractor) performing services outside the United States;
  - The location where services under the contract will be performed; and  
The percentage of work (in dollars) as compared to the whole that will be conducted in each identified foreign location.

**CERTIFICATION**

By signing this statement, I certify that the information provided above is accurate and that the location where services have been indicated to be performed will not change during the course of the contract without prior, written approval from the State of Minnesota.

Name of Company: \_\_\_\_\_

Authorized Signature: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_ Telephone Number: \_\_\_\_\_

**STATE OF MINNESOTA  
VETERAN-OWNED/SERVICE DISABLED VETERAN-OWNED PREFERENCE FORM**

In accordance with Laws of Minnesota, 2009, Chapter 101, Article 2, Section 56, eligible certified veteran-owned and eligible certified service-disabled veteran-owned small businesses will receive a 6 percent preference in the evaluation of their proposal.

Eligible veteran-owned and eligible service-disabled veteran-owned small businesses include certified small businesses that are majority-owned and operated by either (check the box that applies and attach the certification documents required with your response to this solicitation):

- (1) recently separated veterans, who are veterans as defined in Minn. Stat. §197.447, who have served in active military service, at any time on or after September 11, 2001, and who have been discharged under honorable conditions from active service, as indicated by the person's United States Department of Defense form DD-214 or by the commissioner of veterans affairs; or  
Required Documentation:
  - certification by the United States Department of Veterans Affairs as a veteran-owned small business
  - discharge form (DD-214) dated on or after September 11, 2001 with condition honorable
- (2) Veterans who are veterans as defined in Minn. Stat. § 197.447, with service-connected disabilities, as determined at any time by the United States Department of Veterans Affairs.  
Required Documentation:
  - certification by the United States Department of Veterans Affairs as a service-disabled veteran-owned small business.

Eligible veteran-owned and eligible service-disabled veteran-owned small businesses must be **currently** certified by the U.S. Department of Veterans Affairs prior to the solicitation opening date and time to receive the preference.

Information regarding certification by the United States Department of Veterans Affairs may be found at <http://www.vetbiz.gov> .

You must submit this form and the documentation required above with your response in order to be considered for this preference.

## CONFLICT OF INTEREST CHECKLIST AND DISCLOSURE FORM

**Purpose of this Checklist.** This checklist is provided to assist proposers in screening for potential organizational conflicts of interest. The checklist is for the internal use of proposers and does not need to be submitted to Mn/DOT, however, the Disclosure of Potential Conflict of Interest form should be submitted in a separate envelope along with your proposal.

**Definition of “Proposer”.** As used herein, the word “Proposer” includes both the prime contractor and all proposed subcontractors.

**Checklist is Not Exclusive.** Please note that this checklist serves as a guide only, and that there may be additional potential conflict situations not covered by this checklist. If a proposer determines a potential conflict of interest exists that is not covered by this checklist, that potential conflict must still be disclosed.

**Use of the Disclosure Form.** A proposer must complete the attached disclosure form and submit it with their Proposal (or separately as directed by Mn/DOT for projects not awarded through a competitive solicitation). If a proposer determines a potential conflict of interest exists, it must disclose the potential conflict to Mn/DOT; however, such a disclosure will not necessarily disqualify a proposer from being awarded a Contract. To avoid any unfair “taint” of the selection process, the disclosure form should be provided separate from the bound proposal, and it will not be provided to selection committee members. Mn/DOT Contract Management personnel will review the disclosure and the appropriateness of the proposed mitigation measures to determine if the proposer may be awarded the contract notwithstanding the potential conflict. Mn/DOT Contract Management personnel may consult with Mn/DOT’s Project Manager and Department of Administration personnel. By statute, resolution of conflict of interest issues is ultimately at the sole discretion of the Commissioner of Administration.

**Material Representation.** The proposer is required to submit the attached disclosure form either declaring, to the best of its knowledge and belief, either that no potential conflict exists, or identifying potential conflicts and proposing remedial measures to ameliorate such conflict. The proposer must also update conflict information if such information changes after the submission of the proposal. Information provided on the form will constitute a material representation as to the award of this Contract. Mn/DOT reserves the right to cancel or amend the resulting contract if the successful proposer failed to disclose a potential conflict, which it knew or should have known about, or if the proposer provided information on the disclosure form that is materially false or misleading.

**Approach to Reviewing Potential Conflicts.** Mn/DOT recognizes that proposer’s must maintain business relations with other public and private sector entities in order to continue as viable businesses. Mn/DOT will take this reality into account as it evaluates the appropriateness of proposed measures to mitigate potential conflicts. It is not Mn/DOT’s intent to disqualify proposers based merely on the existence of a business relationship with another entity, but rather only when such relationship causes a conflict that potentially impairs the proposer’s ability to provide objective advice to Mn/DOT. Mn/DOT would seek to disqualify proposers only in those cases where a potential conflict cannot be adequately mitigated. Nevertheless, Mn/DOT must follow statutory guidance on Organizational Conflicts of Interest.

**Statutory Guidance.** Minnesota Statutes §16C.02, subd. 10 (a) places limits on state agencies ability to contract with entities having an “Organizational Conflict of Interest”. For purposes of this checklist and disclosure requirement, the term “Vendor” includes “Proposer” as defined above. Pursuant to such statute, “Organizational Conflict of Interest” means that because of existing or planned activities or because of relationships with other persons: (1) the vendor is unable or potentially unable to render impartial assistance or advice to the state; (2) the vendor’s objectivity in performing the contract work is or might otherwise be impaired; or (3) the vendor has an unfair advantage.

**Additional Guidance for Professionals Licensed by the Minnesota Board of Engineering.** The Minnesota Board of Engineering has established conflict of interest rules applicable to those professionals licensed by the Board (see Minnesota Rules part 1805.0300) Subpart 1 of the rule provides “A licensee shall avoid accepting a commission where duty to the client or the public would conflict with the personal interest of the licensee or the interest of another client. Prior to accepting such employment the licensee shall disclose to a prospective client such facts as may give rise to a conflict of interest”.

**An organizational conflict of interest may exist in any of the following cases:**

- ❑ The proposer, or its principals, own real property in a location where there may be a positive or adverse impact on the value of such property based on the recommendations, designs, appraisals, or other deliverables required by this Contract.
- ❑ The proposer is providing services to another governmental or private entity and the proposer knows or has reason to believe, that entity's interests are, or may be, adverse to the state's interests with respect to the specific project covered by this contract. **Comment:** the mere existence of a business relationship with another entity would not ordinarily need to be disclosed. Rather, this focuses on the nature of services commissioned by the other entity. For example, it would not be appropriate to propose on a Mn/DOT project if a local government has also retained the proposer for the purpose of persuading Mn/DOT to stop or alter the project plans.
- ❑ The Contract is for right-of-way acquisition services or related services (e.g. geotechnical exploration) and the proposer has an existing business relationship with a governmental or private entity that owns property to be acquired pursuant to the Contract.
- ❑ The proposer is providing real estate or design services to a private entity, including but not limited to developers, whom the proposer knows or has good reason to believe, own or are planning to purchase property affected by the project covered by this Contract, when the value or potential uses of such property may be affected by the proposer's performance of work pursuant to this Contract. "Property affected by the project" includes property that is in, adjacent to, or in reasonable proximity to current or potential right-of-way for the project. The value or potential uses of the private entity's property may be affected by the proposer's work pursuant to the Contract when such work involves providing recommendations for right-of-way acquisition, access control, and the design or location of frontage roads and interchanges. **Comment:** this provision does not presume proposers know or have a duty to inquire as to all of the business objectives of their clients. Rather, it seeks the disclosure of information regarding cases where the proposer has reason to believe that its performance of work under this contract may materially affect the value or viability of a project it is performing for the other entity.
- ❑ The proposer has a business arrangement with a current Mn/DOT employee or immediate family member of such employee, including promised future employment of such person, or a subcontracting arrangement with such person, when such arrangement is contingent on the proposer being awarded this Contract. This item does not apply to pre-existing employment of current or former Mn/DOT employees, or their immediate family members. **Comment:** this provision is not intended to supersede any Mn/DOT policies applicable to its own employees accepting outside employment. This provision is intended to focus on identifying situations where promises of employment have been made contingent on the outcome of this particular procurement. It is intended to avoid a situation where a proposer may have unfair access to "inside" information.
- ❑ The proposer has, in previous work for the state, been given access to "data" relevant to this procurement or this project that is classified as "private" or "nonpublic" under the Minnesota Government Data Practices Act, and such data potentially provides the proposer with an unfair advantage in preparing a proposal for this project. **Comment:** this provision will not, for example, necessarily disqualify a proposer who performed some preliminary work from obtaining a final design Contract, especially when the results of such previous work are public data available to all other proposers. Rather, it attempts to avoid an "unfair advantage" when such information cannot be provided to other potential proposers. Definitions of "government data", "public data", "non-public data" and "private data" can be found in Minnesota Statutes Chapter 13.
- ❑ The proposer has, in previous work for the state, helped create the "ground rules" for this solicitation by performing work such as: writing this solicitation, or preparing evaluation criteria or evaluation guides for this solicitation.
- ❑ The proposer, or any of its principals, because of any current or planned business arrangement, investment interest, or ownership interest in any other business, may be unable to provide objective advice to the state.

**DISCLOSURE OF POTENTIAL CONFLICT OF INTEREST**

Having had the opportunity to review the Organizational Conflict of Interest Checklist, the proposer hereby indicates that it has, to the best of its knowledge and belief:

- Determined that no potential organizational conflict of interest exists.
- Determined a potential organizational conflict of interest as follows:

Describe nature of potential conflict:

Describe measures proposed to mitigate the potential conflict:

\_\_\_\_\_  
Signature Date

If a potential conflict has been identified, please provide name and phone number for a contact person authorized to discuss this disclosure form with Mn/DOT contract personnel.

\_\_\_\_\_  
Name Date

**STATE OF MINNESOTA  
AFFIDAVIT OF NONCOLLUSION**

I swear (or affirm) under the penalty of perjury:

1. That I am the Responder (if the Responder is an individual), a partner in the company (if the Responder is a partnership), or an officer or employee of the responding corporation having authority to sign on its behalf (if the Responder is a corporation);
2. That the attached proposal submitted in response to the \_\_\_\_\_ Statement of Work has been arrived at by the Responder independently and has been submitted without collusion with and without any agreement, understanding or planned common course of action with, any other Responder of materials, supplies, equipment or services described in the Request for Proposal, designed to limit fair and open competition;
3. That the contents of the proposal have not been communicated by the Responder or its employees or agents to any person not an employee or agent of the Responder and will not be communicated to any such persons prior to the official opening of the proposals; and
4. That I am fully informed regarding the accuracy of the statements made in this affidavit.

Responders' Firm Name: \_\_\_\_\_

Authorized Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Subscribed and sworn to me this \_\_\_\_\_ day of \_\_\_\_\_  
(day) (Month Year)

Notary Public \_\_\_\_\_

My commission expires: \_\_\_\_\_

**State of Minnesota — Immigration Status Certification**

By order of the Governor (Governor’s Executive Order 08-01), vendors and subcontractors MUST certify compliance with the Immigration Reform and Control Act of 1986 (8 U.S.C. 1101 et seq.) and certify use of the *E-Verify* system established by the Department of Homeland Security.

*E-Verify* program information can be found at <http://www.dhs.gov/ximgtn/programs>.

If any response to a solicitation is or could be in excess of \$50,000.00, vendors and subcontractors must certify compliance with items 1 and 2 below. In addition, prior to the delivery of the product or initiation of services, vendors MUST obtain this certification from all subcontractors who will participate in the performance of the Contract. All subcontractor certifications must be kept on file with the Contract vendor and made available to the state upon request.

1. The company shown below is in compliance with the Immigration Reform and Control Act of 1986 in relation to all employees performing work in the United States and does not knowingly employ persons in violation of the United States immigration laws. The company shown below will obtain this certification from all subcontractors who will participate in the performance of this Contract and maintain subcontractor certifications for inspection by the state if such inspection is requested; and
2. By the date of the delivery of the product and/or performance of services, the company shown below will have implemented or will be in the process of implementing the *E-Verify* program for all newly hired employees in the United States who will perform work on behalf of the State of Minnesota.

**I certify that the company shown below is in compliance with items 1 and 2 above and that I am authorized to sign on its behalf.**

Name of Company \_\_\_\_\_ Date \_\_\_\_\_

Authorized Signature \_\_\_\_\_ Telephone Number \_\_\_\_\_

Printed Name \_\_\_\_\_ Title \_\_\_\_\_

If the Contract vendor and/or the subcontractors are not in compliance with the Immigration Reform and Control Act, or knowingly employ persons in violation of the United States immigration laws, or have not begun or implemented the *E-Verify* program for all newly hired employees in support of the Contract, the state reserves the right to determine what action it may take. This action could include, but would not be limited to cancellation of the Contract, and/or suspending or debaring the Contract vendor from state purchasing.

**For assistance with the *E-Verify* Program**

Contact the National Customer Service Center (NCSC) at **1-800-375-5283** (TTY 1-800-767-1833).

**For assistance with this form, contact:**

Mail: 112 Administration Building, 50 Sherburne Avenue, St. Paul, Minnesota 55155

E-Mail: [MMDHelp.Line@state.mn.us](mailto:MMDHelp.Line@state.mn.us)

Telephone: 651-296-2600

Persons with a hearing or speech disability may contact us by dialing 711 or 1-800-627-3529

**SAMPLE WORK ORDER LANGUAGE**

**STATE OF MINNESOTA  
IT Professional Services Master Contract Work Order**

This work order is between the State of Minnesota, acting through its Commissioner of Transportation ("State") and [fill in name of contractor, be sure to indicate if corporation, partnership, limited liability company, sole proprietor, etc] ("Contractor"). This Work Order is issued under the authority of Master Contract T-Number 502TS, CFMS Number [fill in CFMS number from the contractor's master contract], and is subject to all provisions of the Master Contract which is incorporated by reference.

**Recitals**

1. Under Minn. Stat. § 15.061 [Insert additional statutory authorization if necessary] the State is authorized to engage such assistance as deemed necessary.
2. The State is in need of [Add brief narrative of the purpose of the contract].
3. The Contractor represents that it is duly qualified and agrees to perform all services described in this work order to the satisfaction of the State.

**Work Order**

**1 Term of Work Order; Incorporation of Exhibits; Survival of Terms**

**1.1 Effective date.** This Work Order will take effect on the date the State obtains all required signatures as required by Minn. Stat. § 16C.05, subd. 2.  
*The Contractor must not begin work under this work order until it is fully executed and the Contractor has been notified by the State's Authorized Representative to begin the work.*

**1.2 Expiration date.** This Work Order will expire on [fill in date], or when all obligations have been satisfactorily fulfilled, whichever occurs first.

**1.3 Exhibits.** Exhibits [fill in, e.g. A – D] are attached and incorporated into this Work Order.

**1.4 Survival of terms.** All clauses which impose obligations continuing in their nature and which must survive in order to give effect to their meaning will survive the expiration or termination of this Work Order.

**2 Contractor's Duties**

The Contractor, who is not a state employee, will:

[Provide a detailed scope of services. The services must define specific duties, deliverables, and deliverable completion dates. Do not simply attach the same scope that was used in the "Statement of Work" (RFP) as a greater level of detail is needed in this work order. If using a separate attachment, use "Perform the duties specified in Exhibit A, "Scope of Services".]

**3 Consideration and Payment**

**3.1 Consideration**

The State will pay for all services performed by the Contractor under this work order as follows:

- 3.1.1 *Compensation.* The Contractor will be paid as follows:  
[Provide a detailed explanation of how the Contractor will be paid, for example a fixed hourly rate, or a lump sum per deliverable, some examples may be: an Hourly Rate of \$\_\_\_\_\_ up to maximum of \_\_\_\_\_ hours, but not to exceed \$\_\_\_\_\_.  
  
a Lump Sum of \$\_\_\_\_\_.]  
[Rate: rates paid may not exceed the Contractor's rates specified in their Master Contract.]
- 3.1.2 *Travel Expenses.* Reimbursement for travel and subsistence expenses actually and necessarily incurred by Contractor, as a result of this Work Order, will be reimbursed for travel and subsistence expenses in the same manner and in no greater amount than provided in the current Minnesota Department of Transportation Travel Regulations. Contractor will not be reimbursed for travel and subsistence expenses incurred outside Minnesota unless it has received State's prior written approval for out of state travel. Minnesota will be considered the home state for determining whether travel is out of state. See Exhibit \_\_\_\_ for the current Minnesota Department of Transportation Reimbursement Rates for Travel Expenses.
- 3.1.3 *Total Obligation.* The total obligation of the State for all compensation and reimbursements to the Contractor under this Work Order will not exceed \$ [fill in].

### 3.2 **Payment**

- 3.2.1 *Invoices.* State will promptly pay Contractor after Contractor presents an itemized invoice for the services actually performed and State's Authorized Representative accepts the invoiced services. Invoices must be submitted in the format prescribed in Exhibit \_\_\_\_ and according to the following schedule:
- [INDICATE WHEN YOU WANT THE CONTRACTOR TO SUBMIT INVOICES, FOR EXAMPLE: "MONTHLY" OR "UPON COMPLETION OF SERVICES," OR IF THERE ARE SPECIFIC DELIVERABLES, LIST HOW MUCH WILL BE PAID FOR EACH DELIVERABLE. THE STATE DOES NOT PAY MERELY FOR THE PASSAGE OF TIME.]
- 3.2.1.1 Each invoice must contain the following information: Mn/DOT Contract Number, Mn/DOT Contract invoice number (sequentially numbered), billing address if different from business address, and Contractor's original signature attesting that the invoiced service and costs are new and that no previous charge for those services or goods has been included in any prior invoice.
- 3.2.1.2 Direct nonsalary costs allocable to the work under this Work Order must be itemized and supported with invoices or billing documents to show that such costs are properly allocable to the work. Direct nonsalary costs are any costs that are not the salaried costs directly related to the work of Contractor. Supporting documentation must be provided in a manner that corresponds to each direct cost.

- 3.2.1.3 The original of each invoice must be sent to State's Authorized Representative for review and payment. A copy of the invoice will be sent to State's Project Manager for review.
  - 3.2.1.4 Contractor must provide, upon request of State's Authorized Representative, the following supporting documentation:
  - 3.2.1.5 Direct salary costs of employees' time directly chargeable for the services performed under this Work Order. This must include a payroll cost breakdown identifying the name of the employee, classification, actual rate of pay, hours worked, and total payment for each invoice period; and
  - 3.2.1.6 Signed time sheets or payroll cost breakdown for each employee listing dates and hours worked. Computer generated printouts of labor costs for the project must contain the project number, each employee's name, hourly rate, regular and overtime hours, and the dollar amount charged to the project for each pay period.
  - 3.2.1.7 If Contractor is authorized by State to use or uses any subcontractors, Contractor must include all the above supporting documentation in any subcontractor's contract, and Contractor must make timely payments to its subcontractors. Contractor must require subcontractors' invoices to follow the same form and contain the same information as set forth above.
- 3.2.2 *Retainage.* Under Minnesota Statutes § 16C.08, subdivision 5(b), no more than 90% of the amount due under this Contract may be paid until State's agency head has reviewed the final product of this Contract. The balance due will be paid when State's agency head determines that Contractor has satisfactorily fulfilled all the terms of this Contract.
- 3.2.3 *Federal Funds.* If federal funds are used, Contractor is responsible for compliance with all federal requirements imposed on these funds and accepts full financial responsibility for any requirements imposed by Contractor's failure to comply with these federal requirements.
- 3.2.4 *Progress Reports.* Contractor will submit progress reports in a format and timeline designated by the State's Project Manager.

#### **4 Liability**

[Note: the following clause is the "standard" liability clause, an alternative liability clause may have been agreed to as part of the Statement of Work, in which case the liability clause offered by a vendor should have been part of the selection criteria. The contract must include a liability clause, either the standard clause or an approved alternate. Contact Contract Management if you have questions about whether to use the standard clause or an alternative]

The Contractor must indemnify, save and hold the State, its agents, and employees harmless from any claims or causes of action, including attorney's fees incurred by the State, arising from the performance of this Work Order by the Contractor or the Contractor's agents or employees. This clause will not be construed to bar any legal remedies the Contractor may have for the State's failure to fulfill its obligations under this Work Order.

#### **5 Foreign Outsourcing**

The Contractor agrees that the disclosures and certifications made in its Location of Service Disclosure and Certification Form submitted with its proposal are true, accurate and incorporated into this work order contract by reference.

**6 Authorized Representatives**

**6.1 State's Authorized Representative.** State's Authorized Representative will be:  
NAME, TITLE  
ADDRESS  
TELEPHONE NUMBER  
FAX NUMBER  
E-MAIL ADDRESS

State's Authorized Representative or his /her successor, will monitor Contractor's performance and has the authority to accept or reject the services provided under this Work Order.

**6.2 State's Project Manager.** State's Project Manager will be:  
NAME, TITLE  
ADDRESS  
TELEPHONE NUMBER  
FAX NUMBER  
E-MAIL ADDRESS

State's Project Manager, or his/her successor, has the responsibility to monitor Contractor's performance and progress.

State's Project Manager will sign progress reports, review billing statements, make recommendations to State's Authorized Representative for acceptance of Contractor's good or services and make recommendations to State's Authorized Representative for certification for payment of each Invoice submitted for payment.

**6.3 Contractor's Authorized Representative.** Contractor's Authorized Representative will be:  
NAME, TITLE  
ADDRESS  
TELEPHONE NUMBER  
FAX NUMBER  
E-MAIL ADDRESS

If Contractor's Authorized Representative changes at any time during this contract, Contractor must immediately notify State.

**6.4 Contractor's Key Personnel.** Contractor's Key Personnel will be:  
(names, titles)

Key Personnel assigned to this project cannot be changed without the written approval of the State's Project Manager. Contractor will submit a change request in writing to the State's Project Manager along with a resume for each potential candidate. Potential new or additional personnel may be required to participate in an interview. Upon approval of new or additional personnel, the State's Authorized Representative may issue a change order to add or delete key personnel.

**7 Time**

The Contractor must comply with all the time requirements described in this Work Order. In the performance of this Work Order, time is of the essence.

**8 Employee Status**

Pursuant to the Governor’s Executive Order 08-01, if this contract, including any extension options, is or could be in excess of \$50,000, Contractor certifies that it and its subcontractors:

**8.2** Comply with the Immigration Reform and Control Act of 1986 (U.S.C. 1101 et. seq.) in relation to all employees performing work in the United States and do not knowingly employ persons in violation of United States immigrations laws; and

**8.3** By the date of the performance of services under this contract, Contractor and all its subcontractors have implemented or are in the process of implementing the E-Verify program for all newly hired employees in the United States who will perform work on behalf of the State of Minnesota.

Contractor must obtain certifications of compliance with this section from all subcontractors who will participate in the performance of this contract. Subcontractor certifications must be maintained by Contractor and made available to the state upon request. If Contractor or its subcontractors are not in compliance with 1 or 2 above or have not begun or implemented the E-Verify program for all newly hired employees performing work under the contract, the state reserves the right to determine what action it may take including but not limited to, canceling the contract and suspending or debaring the contractor from state purchasing.

**9 Additional Provisions**

[Use this space to add information not covered elsewhere in this Work Order. If not needed, delete this section or state “None”. The following should be used in any Work Order that includes web design:

The Contractor will comply with the “Minnesota Office of Enterprise Technology: Web Design Guidelines” available at the URL:

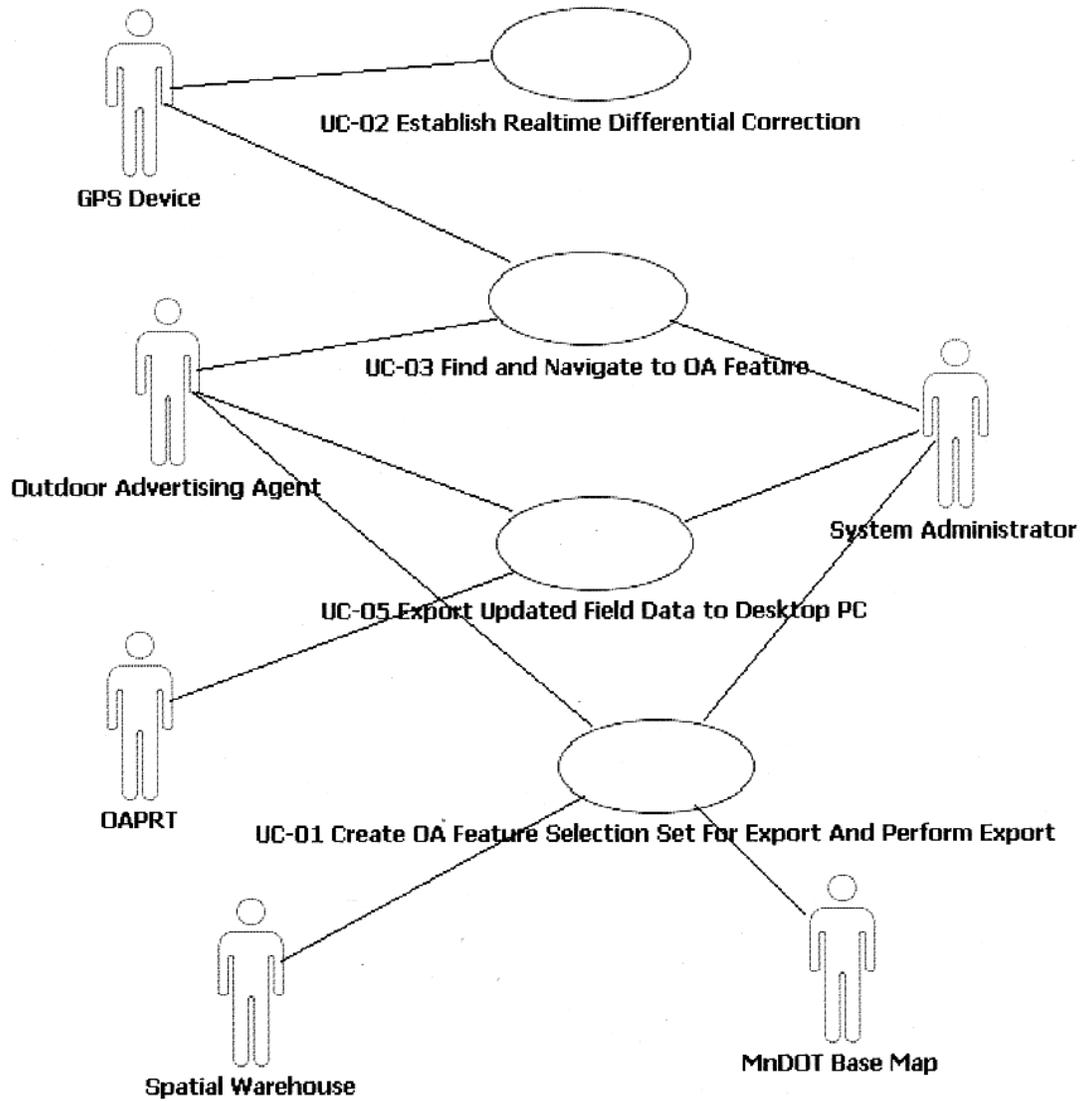
<http://www.state.mn.us/portal/mn/jsp/content.do?programid=536911233&id=536891917&agency=OETweb>.

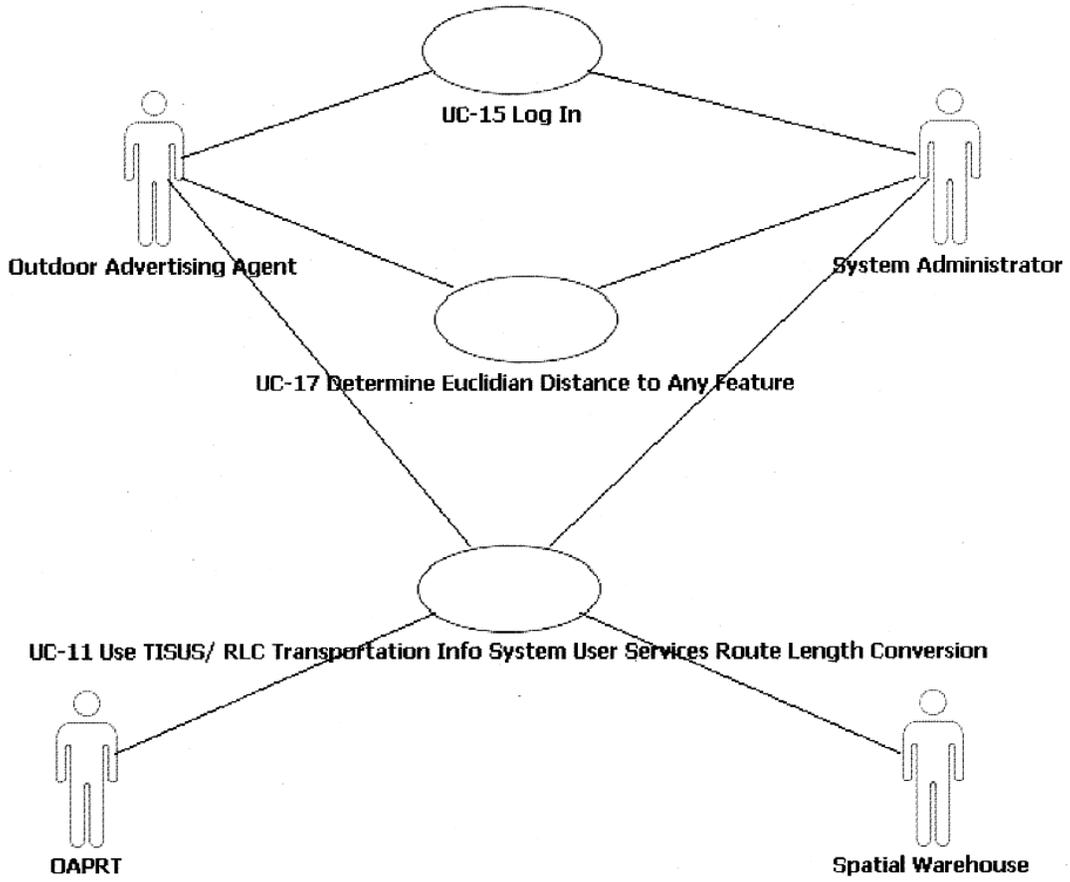
*The balance of this page has been intentionally left blank.*

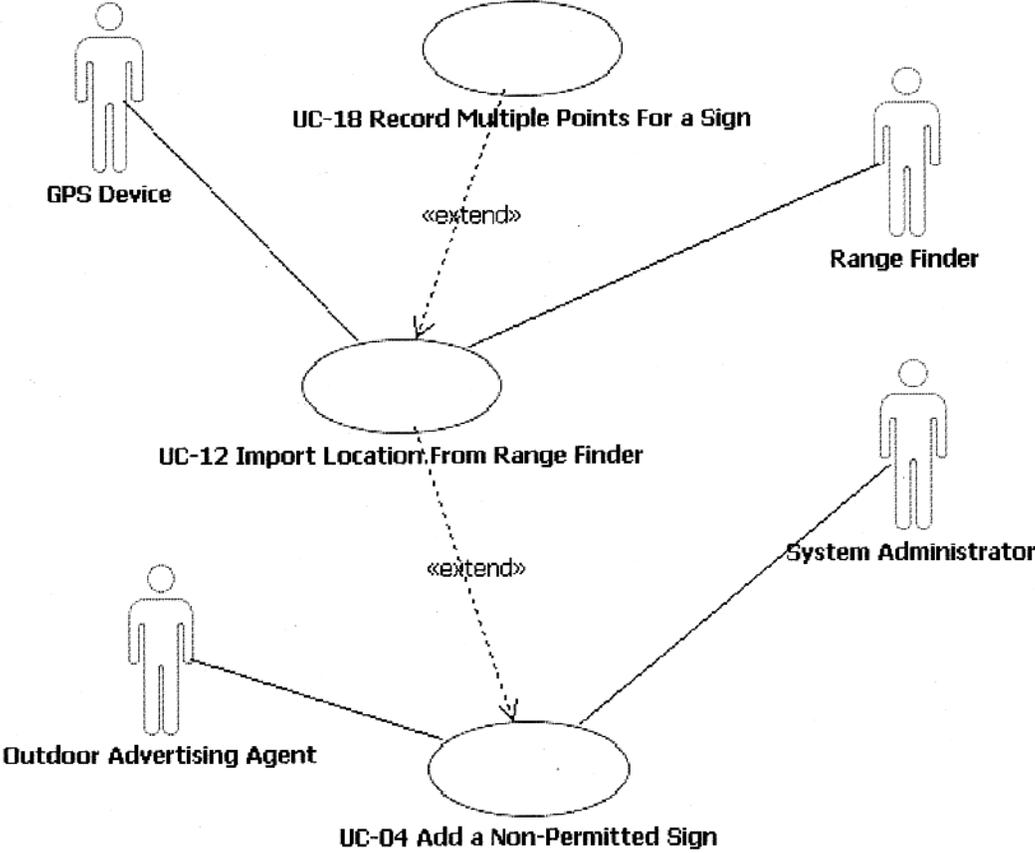
## **P1281 Exhibits**

**09/14/09 PM**

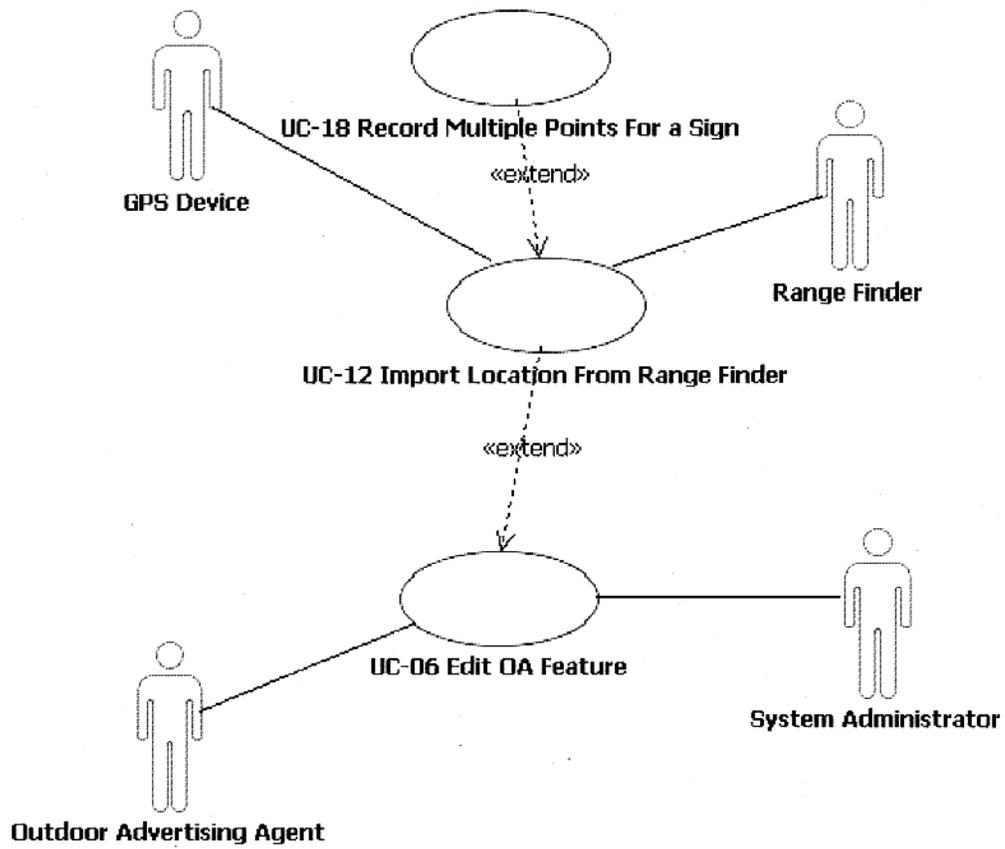
## **Exhibit A – Use Case Diagrams**







P1281 Use Cases Pg 4 - 30Jul09



## **Exhibit B – Use Case Documents**

## UC-01

<b>Use Case</b>		<b><u>Create OA Feature Selection Set For Export and Perform Export</u></b>
<b>Primary Actor</b>	Outdoor Advertising Agent, System Administrator, Spatial Warehouse, MnDOT Base Map	
<b>Goal in Context</b>	Provide the ability to select an Outdoor Advertising Feature (OA) or a set of OA Features and conditions of interest (selection set) and export to a field unit.	
<b>Preconditions</b>	All mobile application data has to exist in a GIS format at the mobile service. The ArcGIS mobile and map service is operating and available. The ArcGIS mobile application has to have connectivity to the service. The application is preconfigured to know where the data stores are.	
<b>Success End Condition</b>	Selected data is made local to the mobile device	
<b>Failed End Condition</b>	No cache of data is stored for use by the mobile application.	
<b>Trigger</b>	Actor chooses to select data for download	
<b>Priority</b>	High	
<b>Performance</b>	less than 10 minutes	
<b>Frequency</b>	twice a day in each district – approx 26 / day	

### Scenario 1

#### Description – Select data for field work in a district

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Selects the selection tool	Displays selection tool
2	Selects the data that they want to download	Retrieves selected data from the service (spatial warehouse & MnDOT Base Map) and stores it in a cache. Displays message “complete”
3		Returns to main menu
4		
5		

**Alternates – none identified**

**Exceptions –**

**2a Service fails – Display message “The mobile application is unable to store data for this reason ...”**

### **General Comments**

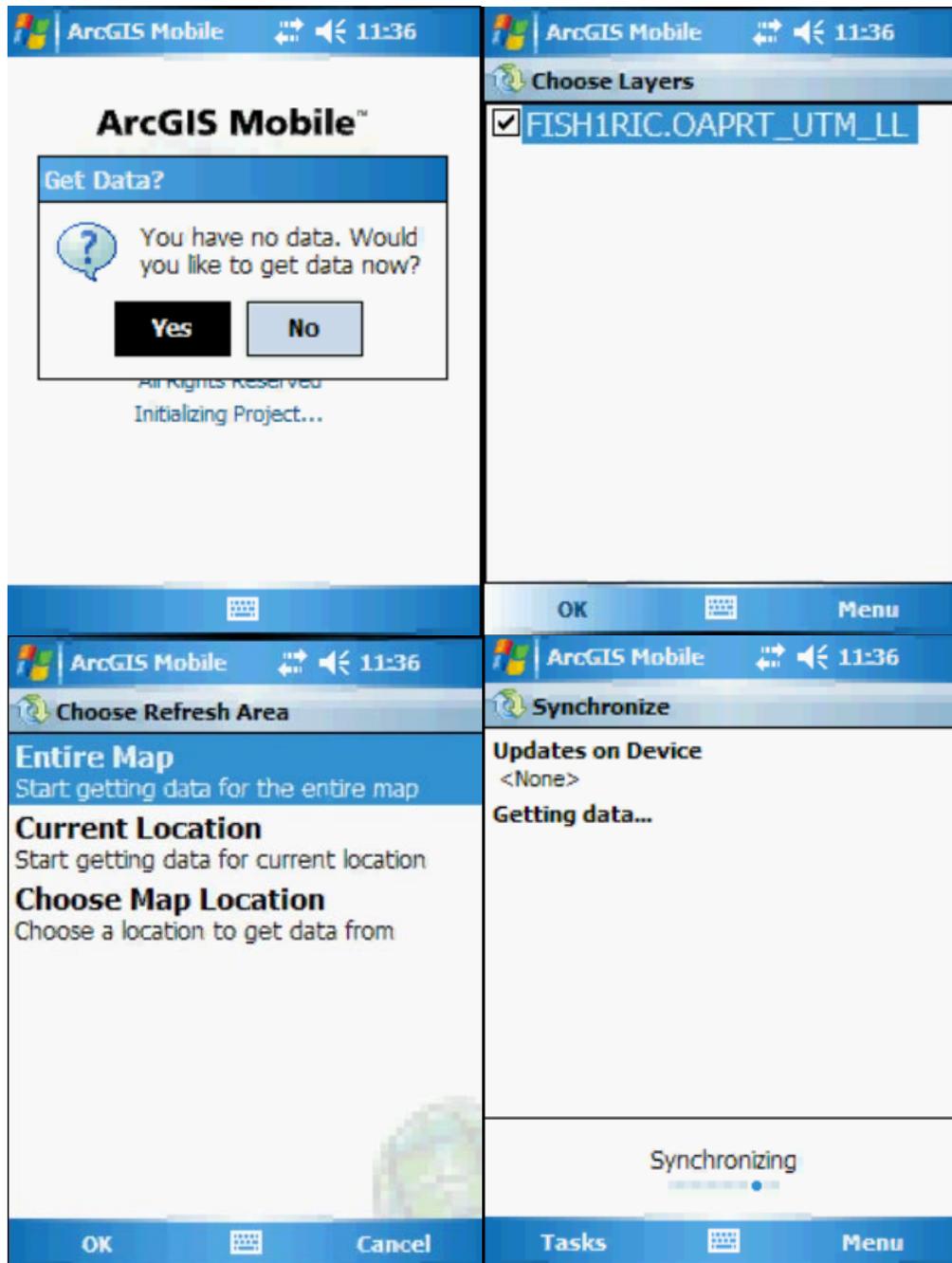
- This assumes the use of ArcGIS mobile technology version 9.3.1
- Selection options include: select by district, county, trunk highway, control section, customer, permit, etc.
- Selection methods include: logical, ~~spatial, polygon,~~
- Data can be selected and loaded in an additive context. For example: select TH 61, then TH 53, then TH 2 and the total data set gets exported.

### **Business Rules**

- Any valid user can perform this operation

Prototype screen

[att:uc-01 Create OA Feature Selection Set For Export and Perform Export 23jul09.DOC](#)



## UC-02

<b>Use Case</b>		<b><u>Establish Realtime Differential Correction</u></b>
<b>Primary Actor</b>	GPS Device	
<b>Goal in Context</b>	Provide the ability to connect to the Mn/DOT COR/VRS via cell phone to extend the Mn/DOT correction data to the receiver using NSTRIP protocol to deliver CMR+ or RTCM format sentences for correction, or have the ability to use WAAS Satellite based corrections, or have the ability to use beacon receivers for radio delivery of correction sentences. This is preferred as it allows for accurate collection AND navigation to sites of interest.	
<b>Preconditions</b>	The GPS unit has cell phone connectivity with the MnDOT network or WAS (wide area augmented system) is available. GPS signal is available. The initial setup of the GPS is complete.	
<b>Success End Condition</b>	GPS unit differential correction is working.	
<b>Failed End Condition</b>	GPS coordinates are available, but are uncorrected.	
<b>Trigger</b>	GPS unit initiates connection	
<b>Priority</b>	High	
<b>Performance</b>	<performance goal>	
<b>Frequency</b>	once a day per user, per district	

### Scenario 1

#### Description – Get corrected coordinates

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Turns on GPS handheld unit	Runs entire GPS cycle and starts presenting corrected coordinates
2		
3		
4		
5		

#### Alternates –

2a none identified

#### Exceptions –

1a the preferred correction signal is unavailable – device switches to the 2<sup>nd</sup> preferred correction signal, if unavailable it does without

### **General Comments**

- Each district must acquire the phone card for use in the field
- We need to figure out if the field unit (laptop) can share its cache or transfer its cache of data to the GPS handheld unit

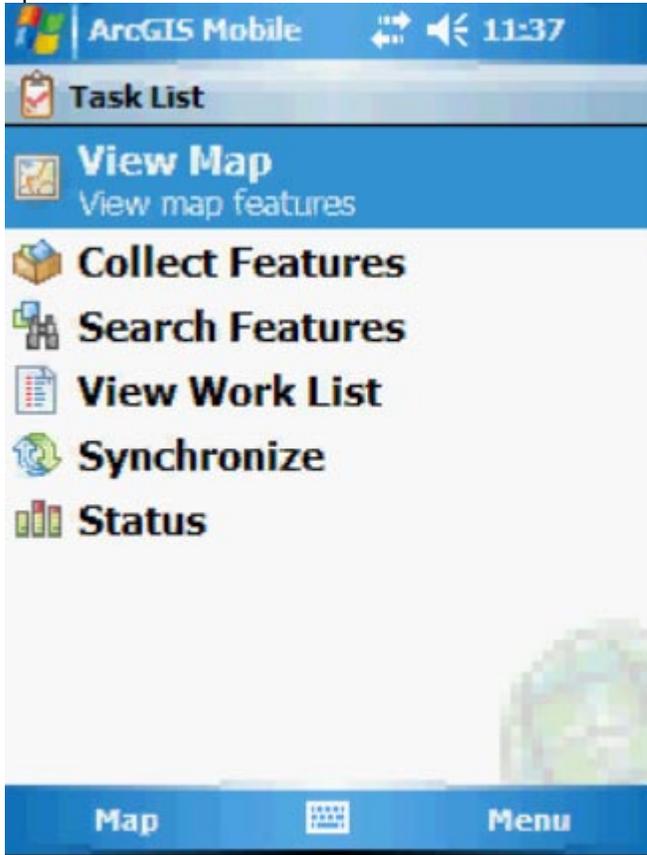
### **Business Rules**

- none identified

Example screen

[att:uc-02 Establish Realtime Differential Correction 18jun09.DOC](#)

The Status menu or similar can provide information related to the GPS device operation and status.



## UC-03

<b>Use Case</b> <i>Find and Navigate to OA Feature</i>	
<b>Primary Actor</b>	Outdoor Ad Agent, System Admin, GPS Device
<b>Goal in Context</b>	Provide the ability to view a selected OA Feature and navigate to it.
<b>Preconditions</b>	Necessary data (e.g. sign and map layers) have been checked out of the database and stored on the field unit. GPS device is receiving location data.
<b>Success End Condition</b>	User has navigated to the OA feature
<b>Failed End Condition</b>	No data is changed or saved.
<b>Trigger</b>	Actor chooses to navigate to a sign
<b>Priority</b>	High
<b>Performance</b>	<performance goal>
<b>Frequency</b>	5000 times a year

### Scenario 1

#### Description – Navigate to an outdoor advertising sign

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Select 'navigate to a sign'	Prompts to select a sign or search
2	Selects 'select a sign'	Displays list of signs and prompts to select one
3	Selects a sign from a list or a map	Receives gps location. Displays the user gps location relative to the sign
4	Changes location	Receives new gps reading. Updates display to show new position
5	Arrive at desired location	Produces 'beep' (or flash)
6		Prompts to exit or select another sign to navigate to.
7	Selects 'Close'	Returns to previous menu

#### Alternates –

- 2a Select zoom in view
- 2b Select zoom out view
- 2c Select add a map layer
- 2d Select hide a map layer

## **Exceptions – none identified**

### **General Comments**

- The tolerance for being near the selected sign is 300'
- This would be used to drive along the highway to a desired sign or walking cross country to a selected sign
- This should include the ability to auto-select the system tolerance to be alerted when you have arrived at the sign
- Linda Waltenberg - Not sure if you have this yet or if Scott brought this to your attention, but during a user meeting, they brought up the fact that only Active permits should display on the map.

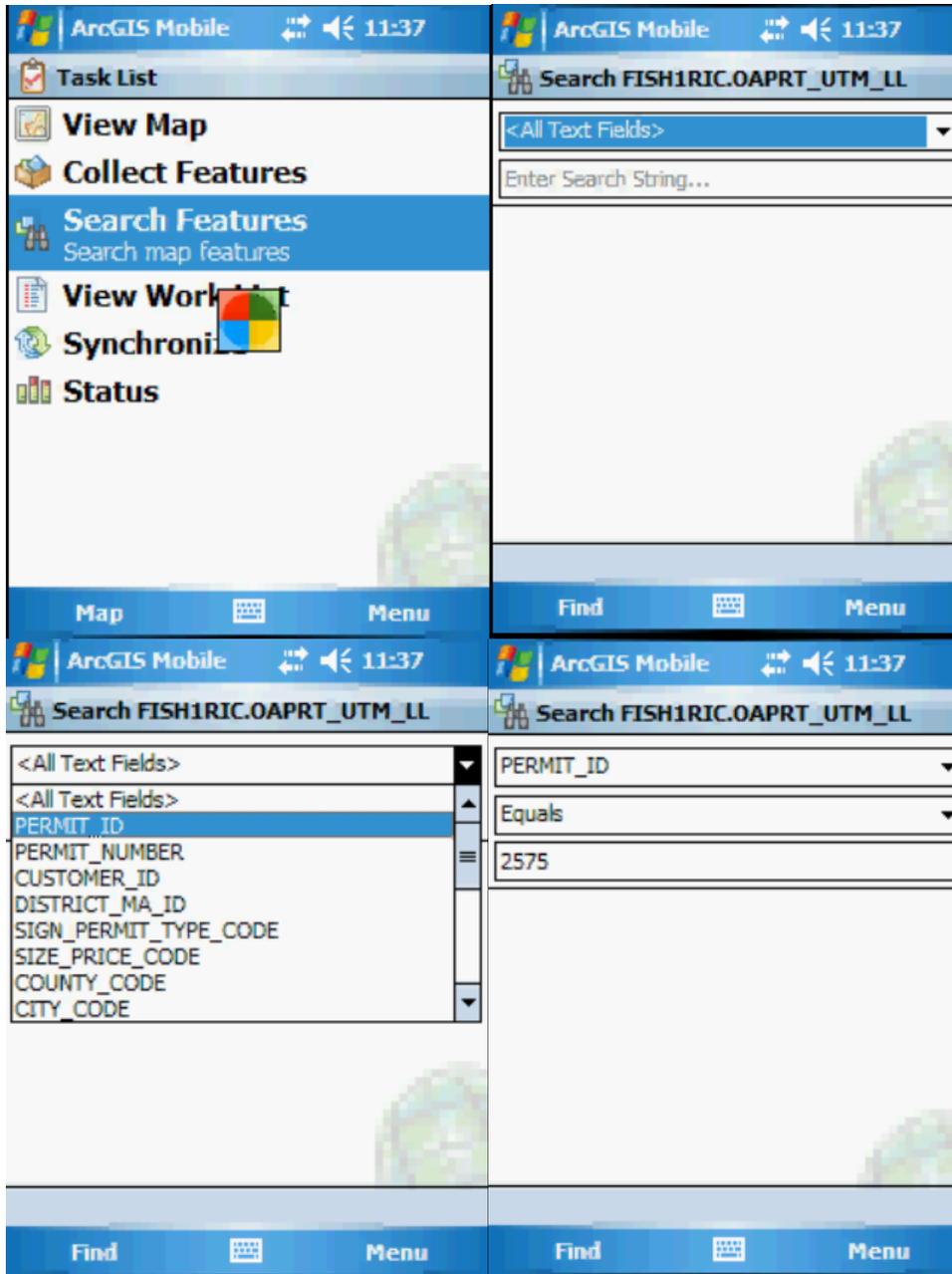
### **Business Rules**

- none identified

## Example screen

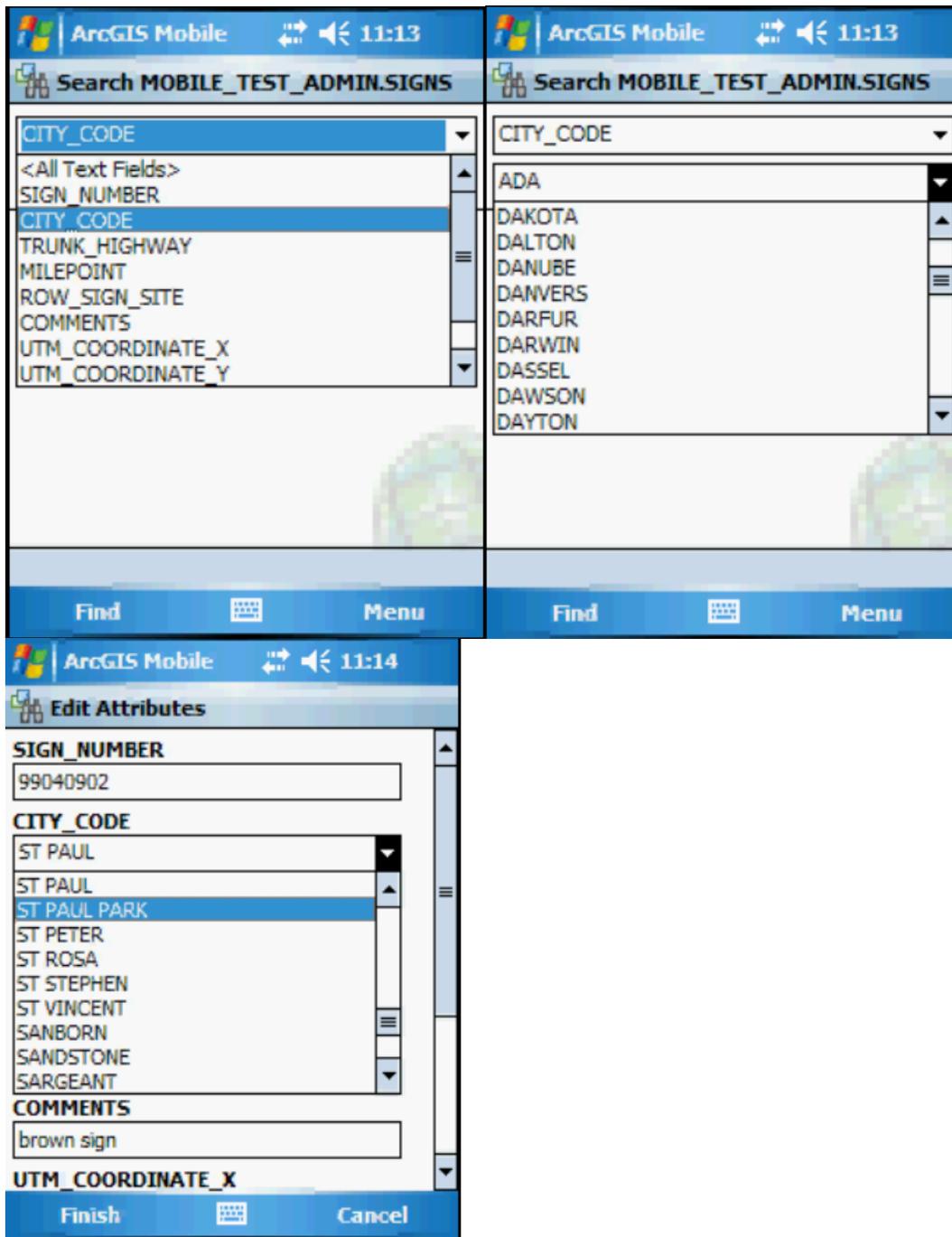
[att:uc-03 Find and Navigate to OA Feature 18jun09.DOC](#)

Search Features can be done by various attributes in the business data and by



Example of using SDE Database "Domains" to populate picklists within the mobile application when needed and appropriate\*

\* Posting additional information to the database based on geographies such as County, City, etc. can be updated after-the-fact based on the GPS location. Spatial procedures can eliminate the need for the field data collector to navigate and record these location fields. This speeds collection, increases accuracy and makes the application simpler.



## UC-04

<b>Use Case</b>		<b><u>Add a Non-Permitted Sign</u></b>
<b>Primary Actor</b>	Outdoor Advertising Agent, System Administrator	
<b>Goal in Context</b>	Provide the ability to create a non-permitted sign and its location (as it is discovered in the field).	
<b>Preconditions</b>	none identified	
<b>Success End Condition</b>	New non-permitted sign data is saved.	
<b>Failed End Condition</b>	New non-permitted sign data is not saved.	
<b>Trigger</b>	Actor chooses to add a non-permitted sign to the system	
<b>Priority</b>	Low	
<b>Performance</b>	<performance goal>	
<b>Frequency</b>	200 times a year	

### Scenario 1

#### Description – Add a non-permitted sign

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Selects add non-permitted sign	Displays form and prompts to add a non-permitted sign and associated data or cancel.
2	Enters sign data	Validates data
3	Selects 'Save'	Stores new data. Prompts to add another sign, add photos, add location data or close
4	Selects 'Close'	Closes the form and returns to the previous menu
5		

#### Alternates –

~~4a Selects 'Add Photo' <call use case UC-07>~~

4b Selects 'Import Distance From Range Finder'  
<call use case UC-12>

## **Exceptions – none identified**

### **General Comments**

- Provide the ability to document a 'rogue' sign that was discovered in the field
- The non-permitted sign data will get saved to OAPRT through the data export.
- Need to modify OAPRT to allow non-permitted signs?
- Later, the non-permitted sign may get a permit in OAPRT or get deleted

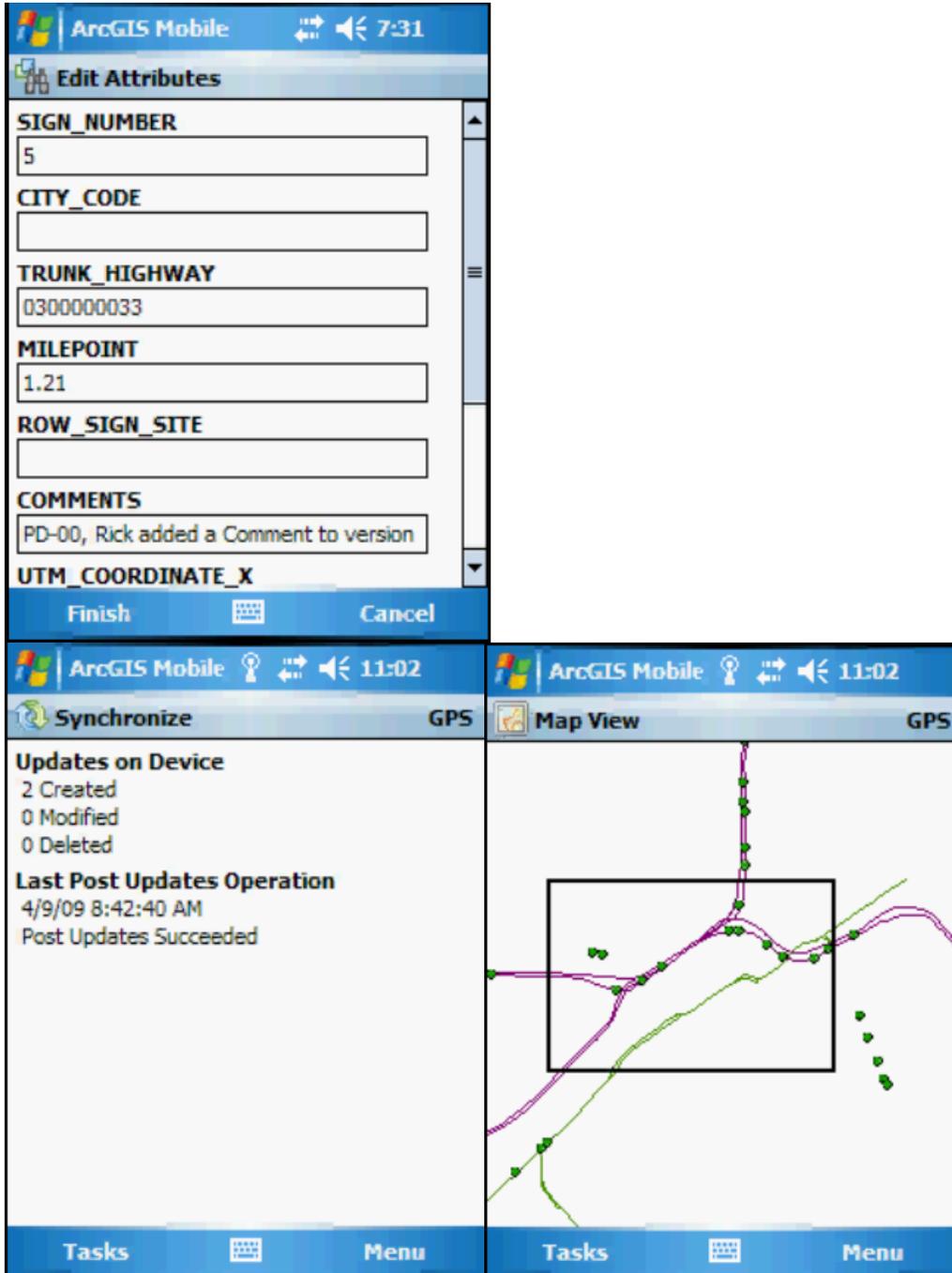
### **Business Rules**

- A non-permitted sign may have coordinate location
- A non-permitted sign must have a description.
- A non-permitted sign could have zero, one or many photos
- A non-permitted sign does have a permit number

Example screen

[att:uc-04 Add Non-Permitted Sign 30Jul09.DOC](#)

Samples of adding a new sign and data, posting and showing on the map.



## UC-05

<b>Use Case</b>		<b><u>Export Updated Field Data to Desktop PC</u></b>
<b>Primary Actor</b>	Outdoor Advertising Agent, System Admin, OAPRT	
<b>Goal in Context</b>	Provide the ability to push the field collected data (transfer it) to the desktop PC. The data is removed from the field unit upon successful arrival on the PC.	
<b>Preconditions</b>	The collected data (new or updated) exists on the field unit. The field unit is connected to the MnDOT network and can see the mobile service. User is logged into the system.	
<b>Success End Condition</b>	New or updated data is sent to the OAPRT database. Data is removed from the handheld/ field unit.	
<b>Failed End Condition</b>	No data is transferred. The OAPRT database is not updated.	
<b>Trigger</b>	Actor chooses to upload data from the field unit.	
<b>Priority</b>	High	
<b>Performance</b>	less than 10 minutes	
<b>Frequency</b>	twice a day in each district – approx 26 / day	

### Scenario 1

#### Description – Download daily data at the end of the mission

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Selects 'Post Data'	Sends user credentials to the mobile web service and data cache.
2		System validates the data.
3		System writes data to OAPRT
4		Mobile web service informs the application that the data post was successful.
5		Removes data from field unit
6		Displays a message that transfer was successful.
7		Returns to the main menu

Alternates – none identified

**Exceptions – 3a Transfer not successful – System traps common errors and displays an understandable message as to the reason why data not posted.**

### **General Comments**

- This use case assumes the architecture of ArcGIS Enterprise Mobile technologies as expressed in version 9.3.1
- This could occur in the office or in the field where the user can connect to the network and reach the mobile service.
- PW- There are several alternatives for accomplishing this use case.
  - 1-When mobile device is synched in the office, the OAPRT database is updated. (This is the preferred alternative).
  - 2-Business would work with a versioned database. The changes would get saved to a version until data is checked back in. The database would then need to have someone review all changes before committing to the database. This alternative would require a disciplined business process.
- RF Possible Issues: Custom export from mobile application from ESRI proprietary binary format to 'X'-format on PC? Is the PC running a GeoDB or using shapefiles, or SDE? What is the format, and transformation process?

### **Business Rules**

- none identified

## UC-06

<b>Use Case</b>	<b><u>Edit OA Feature</u></b>
<b>Primary Actor</b>	Outdoor Advertising Agent, System Administrator
<b>Goal in Context</b>	Provide the ability to edit the attributes of an existing OA Feature. (Users can only edit using the field application or OAPRT. The desktop app (ArcMap) is for map viewing only).
<b>Preconditions</b>	The OA feature to be edited exists in the system.
<b>Success End Condition</b>	New or updated OA feature data is saved.
<b>Failed End Condition</b>	New or changed OA feature data is not saved.
<b>Trigger</b>	Actor chooses to add or edit an OA feature
<b>Priority</b>	High
<b>Performance</b>	<performance goal>
<b>Frequency</b>	14 times a day

### Scenario 1

#### Description – Select and edit data for an existing sign

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Selects 'view/edit sign data'	Displays a list of signs. Prompts to select a sign
2	Selects a sign	Highlights the selected sign
3	Selects 'edit'	Displays data for the selected sign in an editable form. Prompts to edit or cancel.
4	Enters new values for the sign	Validates data entered.
5	Selects 'Save'	Stores the changes
6	Selects 'Close'	Closes the form and returns to the previous menu.
7		
8		

## Alternates –

~~2a Selects ‘Add a new OA feature’~~

~~2b Selects ‘Edit Photo’ <call use case UC-08 View/ Edit Photo>~~

~~2c Selects ‘Import Photo’ <call use case UC-07>~~

~~3a Selects ‘Delete OA feature’~~

3 b Import distance from range finder <call use case UC-12>

## Exceptions –

2a none identified

## General Comments

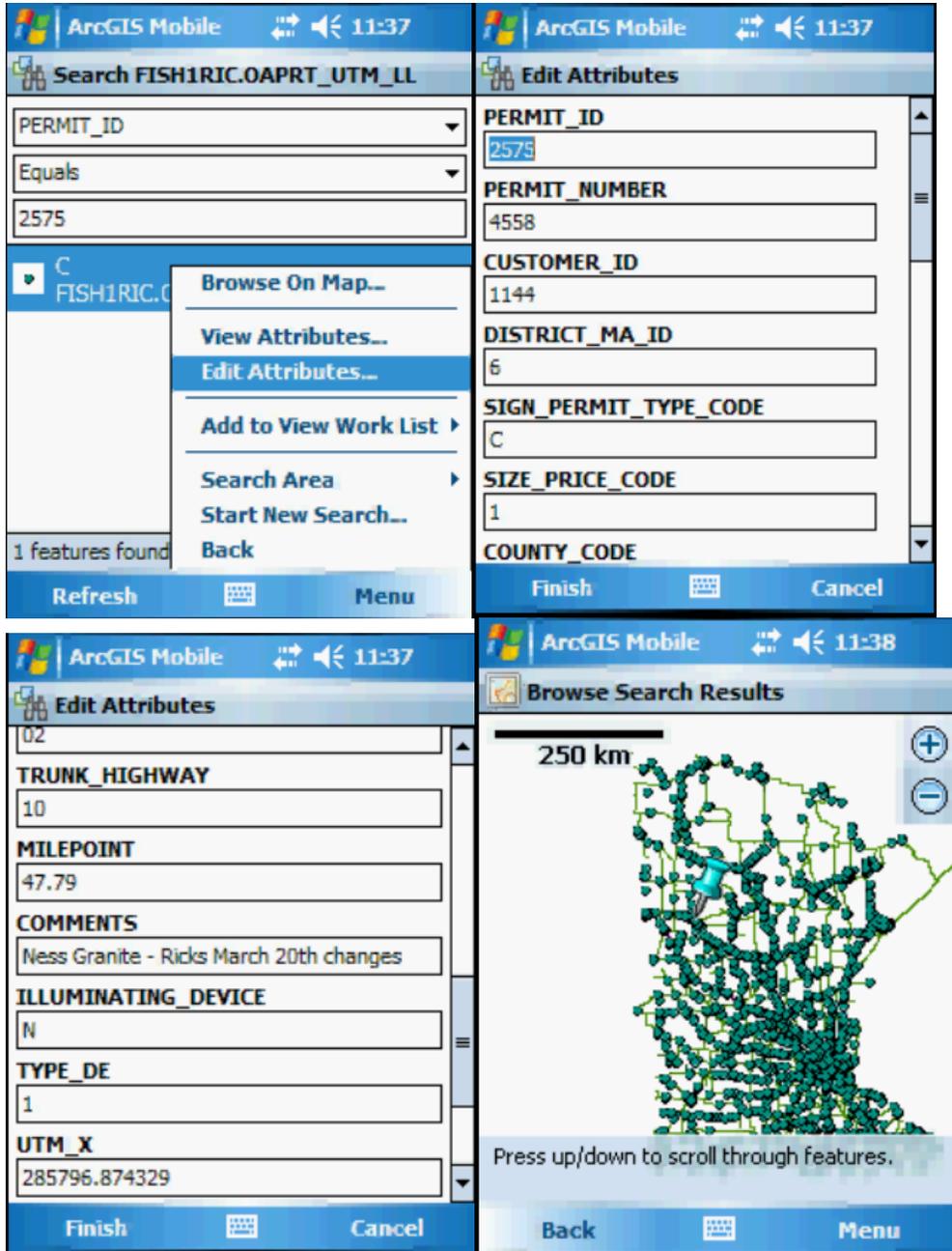
- Outdoor advertising sign data displayed (OAPRT fields) includes: permit #, owner, location, contact name, account #, date permit issued, type of sign, highway, county, or city, conforming/ non-conforming, size, comments, etc.
- Linda Waltenberg – “Not sure if you have this yet or if Scott brought this to your attention, but during a user meeting, they brought up the fact that only Active permits should display on the map.”
- This screen would include the ability to add a permit number to a non-permitted sign to make it legal.
- Need to include the capability to delete a non-permitted sign through this use case?

## Business Rules

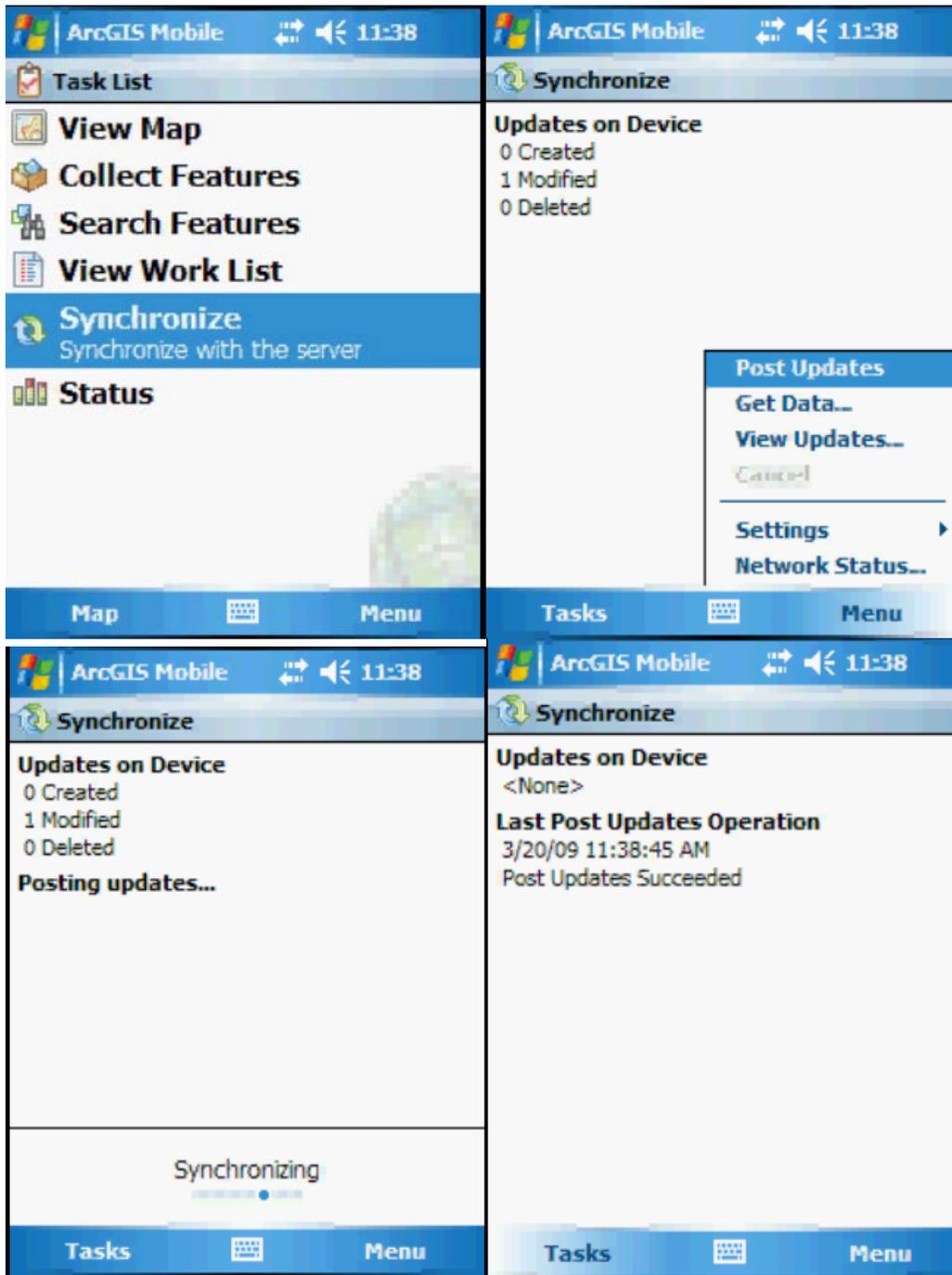
- An outdoor advertising feature can have only one location
- An outdoor advertising feature can have only one permit
-

## Prototype Screen

Example Editing comments by PERMIT\_ID Search showing updated location on the map.



Example Posting to 'database' Master or review.



## UC-11

<b>Use Case</b>	<b><i>Use TISUS/ RLC Transportation Info System User Services-Route Length Convert</i></b>
<b>Primary Actor</b>	Spatial Warehouse, OAPRT, Outdoor Ad Agent, System Admin
<b>Goal in Context</b>	Provide the ability to extract data from the MnDOT Transportation Information System. The data extracted includes: control sections, city, county, townships, routes, streets, true mile measures, reference posts, GPS coordinate conversions, rail grade crossing, etc. These are core services provided by the EGIS unit.
<b>Preconditions</b>	The PC has network access. Arc map is located on the PC and a session is open The actor has called the service from Arc Map. A map is displayed in an Arc Map session.
<b>Success End Condition</b>	Updated OAPRT data is saved
<b>Failed End Condition</b>	No changes are saved
<b>Trigger</b>	Actor chooses to retrieve TIS/US values.
<b>Priority</b>	High
<b>Performance</b>	<performance goal>
<b>Frequency</b>	<Xxx per day/week/year>

### Scenario 1

#### Description – Associate TDA Admin Data with OAPRT Data

Step	Actor Action	System Response
1	Select an OAPRT feature Select the 'Retrieve TIS/US Info' button	Retrieves the selected data and displays it
2	Selects 'Update Data Stores'	Updates OAPRT Displays message that OAPRT has been updated.
3		Returns to the previous menu
4		
5		

Alternates – none identified

## **Exceptions –**

### **General Comments**

- This only works on a PC that is connected to the network
- Also set this up to work as the data is imported from the field
- Services include: Location Services as exists in TIS\_Admin Schema on TGP. Plus several related packages of stored procedures commonly used with location services.
- Will this require a change to the OAPRT database?

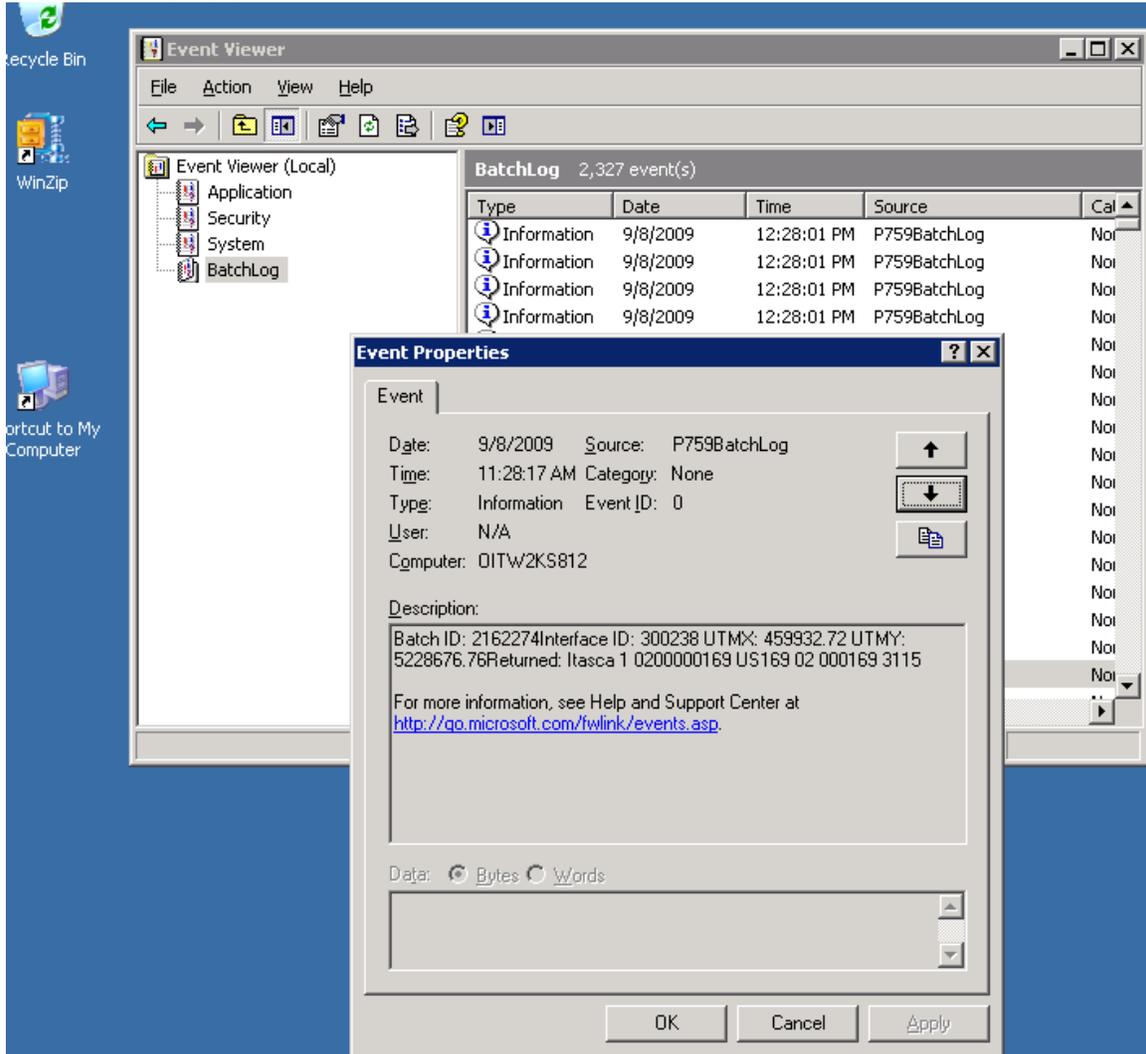
### **Business Rules**

- business rules associated with this use case

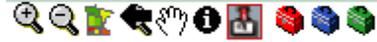
## Example screen

[att:uc-11 Use TISUS\\_RLC Transportation Info System User Services 16Jul09.doc](#)

Example of LocationServices (TISUS\_RLC) as background updating 'batch' event putting in location data directly to the database from a field collection X,Y location; thus eliminating the need to collect TISCODE, ROUTE NAME, CITY, COUNTY, etc values in the field...



Example of Location information discovered via LocationServices (TISUS\_RLC) processes from an XY point on a map.



<http://gisdev/website/mndot-basem...>

### MnDOT/EGIS/DPS

TIS Roadway Information at an X,Y location.

<b>TIS Route</b>	1024300572
<b>Route Name</b>	91st Ave
<b>Reference Point</b>	000+00.623
<b>True Mile</b>	.623
<b>City</b>	2430 - Maple Grove
<b>County</b>	27 - Hennepin
<b>Township</b>	null
<b>Longitude</b>	-93.4670304
<b>Latitude</b>	45.1198098
<b>UTMx</b>	463267.651185
<b>UTMy</b>	4996365.967380
<b>Distance to roadway [feet]</b>	2.16240157809

Close

## UC-12

<b>Use Case</b>		<b><u>Import Location from Range Finder</u></b>
<b>Primary Actor</b>	Range Finder, GPS Device, Outdoor Advertising Agent, System Admin	
<b>Goal in Context</b>	Provide the ability to determine the location of an OA Feature (sign) and save it.	
<b>Preconditions</b>	The range finder is connected to the field GPS unit/ field computer. The GPS signal must be active and available. The user has already selected a sign.	
<b>Success End Condition</b>	The calculated coordinate location of the sign is stored on the field unit.	
<b>Failed End Condition</b>	Location data is not saved.	
<b>Trigger</b>	Actor chooses to get a location for a sign via the range finder.	
<b>Priority</b>	High	
<b>Performance</b>	Within 2-5 seconds	
<b>Frequency</b>	100 times per week	

### Scenario 1

#### Description – Get the x/y/z coordinates for a sign (OA Feature)

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Selects 'Take Range Finder Reading'	Prompts to shoot
2	Pushes the range finder button	Calculates the location of the sign. Displays the new location values in the location fields of the form.
3	Selects 'Accept'	Saves values and returns to previous menu.
4		

**Alternates –**

**3a Selects ‘Display the new location on a map’**

Step	Actor Action	System Response
3a-1	Selects ‘Display	Display a map showing the new location
3a-2		

**4a- Determine Euclidian Distance – Call use case UC-17**

**4b- Record other points for a sign – Call use case UC-18**

**Exceptions –**

**General Comments**

- This use case is for the official location of the sign.
- ~~=If a user wants to record multiple points for a sign they could record this in the ‘comments’ field for the sign.~~
- Business will need to define best practices/ guideline for which point to record for a sign

**Business Rules**

- A sign can have only one location (X/Y/Z)

## Example screen

[att:uc-12 Import Location from Range Finder 30Jul09.DOC](#)

Range finder location must take into account angles and calculate the position and display in on the device for review prior to saving it. This example is for illustration only, actual methods may be 'canned' into the existing range finder api and software.

### Example Distance to Sign Equations

$$y = \text{Sin} (u * \pi/180) * r$$

$$x = \text{Cos} (u * \pi/180) * r$$

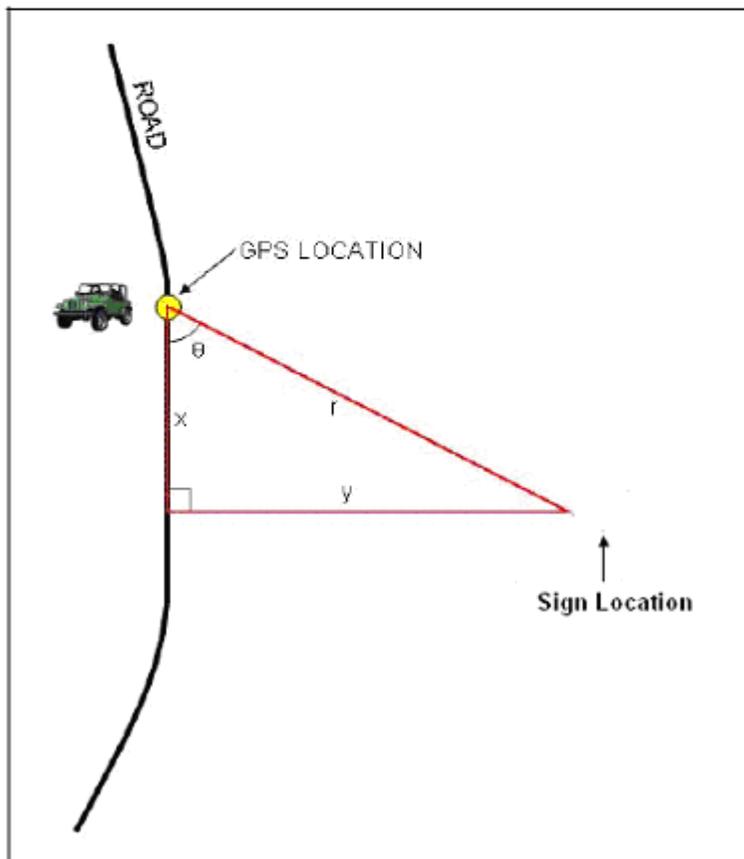
$u$  = angle the vehicle is to the sign.

$r$  = rangefinder distance

$x$  = parallel distance

$y$  = perpendicular distance

$\pi$  = pi (3.14159265358979)



## UC-15

<b>Use Case</b>		<u>Log In</u>
<b>Primary Actor</b>	Outdoor Advertising Agent, System Administrator	
<b>Goal in Context</b>	Provide the ability for a user to log into the system.	
<b>Preconditions</b>	A user has a valid account	
<b>Success End Condition</b>	User is logged into the system and presented with the system menu.	
<b>Failed End Condition</b>	User is returned to the login screen	
<b>Trigger</b>	Actor chooses to login	
<b>Priority</b>	High	
<b>Performance</b>	<performance goal>	
<b>Frequency</b>	10 times a day	

### Scenario 1

#### Description –Login user

Step	User Action	System Response
1	Enters user id and password.	Checks user id and password. (user is valid) Verifies user's group membership to determine which menu options to make visible.
2		Presents the user with the system main menu Prompts to select an option, or Exit.

#### Alternate – none identified

#### Exception -

##### 1a User id or password is not valid

Step	User Action	System Response
1a-1		Displays message that the log in is invalid.
1a-2		Return to step 1

## **General Comments**

-This should authenticate to active directory

-

## **Business Rules**

- Every user must have an id and password
- The user of the field application must log in. They must be an authorized user to use the application.
- A user can be logged into the system more than once at the same time (multiple sessions).
- A user can have only one account? (Now with the OAPRT system a user may have multiple accounts e.g. one account for maint area 1a and one account for maint area 1b).
- A user can attempt to login (and be rejected) a maximum of 5 times a day.

## Example Log In Screen From a Similar MnDOT System

The screenshot shows a web browser window titled "Workforce Information Tracking Initiative - Home - Microsoft Internet Explorer". The address bar displays "https://dotapp7.dot.state.mn.us/witi/index.vm". The page content includes a sidebar on the left with navigation links such as "Office of Civil Rights", "Office Of Contract Management", "Calendar of Events", "Vendor Search", "WITI Forms", "Info Brochure", "Contractor and State Project Registration", "Job Class", "Employee Change", and "Comments". Below these are links for "Mn/DOT Home", "FAQ", "Site Map", "Search", and "Info@DOT", along with the "511" logo and "511mn.org". The main content area features the "Workforce Information Tracking Initiative (WITI)" title, version information (1.0.10), and a "Home" tab. A mission statement follows, describing the goal of improving data collection for the Annual Employment Data Summary Report (1392). A "Login" section contains a text input for "Username:" and a password input for "Password:", with a ">> Log In" button. Below the login fields, there is a help link to "WITI Helpdesk" and a phone number (651-366-3073). A paragraph explains that WITI users are contractors, consultants, and Mn/DOT employees. A final paragraph states that users can register for an account by filling out a "Registration" form in the sidebar.

## UC-17

<b>Use Case</b>	
<b>Primary Actor</b>	Outdoor Advertising Agent, System Administrator
<b>Goal in Context</b>	Provide the ability to determine the distance between any two features that are available on the map interface.
<b>Preconditions</b>	User has already recorded points and/or selectable features are available on the map.
<b>Success End Condition</b>	A distance value was displayed.
<b>Failed End Condition</b>	The tool disappears.
<b>Trigger</b>	Actor chooses to calculate a distance
<b>Priority</b>	High
<b>Performance</b>	<performance goal>
<b>Frequency</b>	100 times a day

### Scenario 1

**Description – Determine the distance between two points**

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Selects 'Calculate Distance'	Prompts to select feature one
2	Select feature one	Prompts to select feature two
3	Select feature two	Prompts to confirm the points
4	Selects 'Yes'	Calculate the Euclidian distance. Display the value. Displays a graphic showing the path of the line.
5		Prompts to enter new points or close
6	Selects close	Closes form and returns to previous menu

**Alternates – Select, copy, and paste a value**

**Exceptions – If the operation fails, a message is displayed as to why.**

### **General Comments**

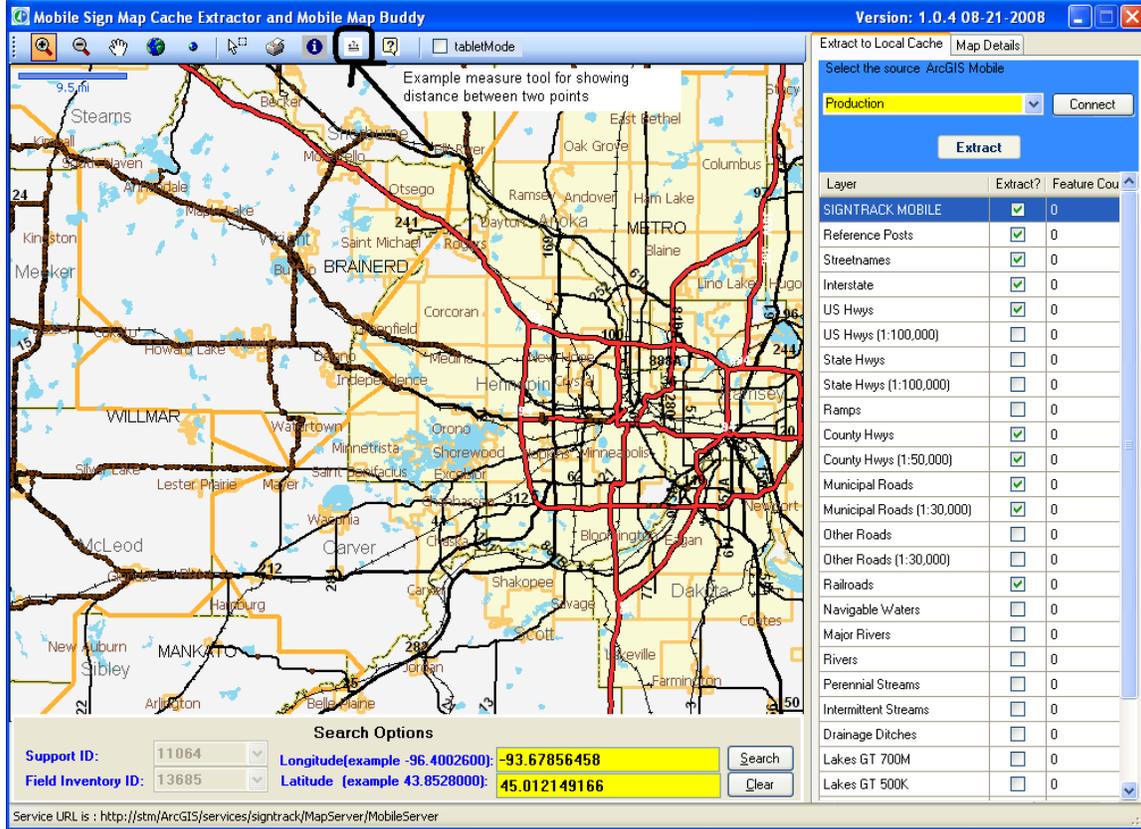
- Distance choices should include: miles, meters, feet, yards, centimeters, etc
- Distance values should be calculate to the tenths

**Business Rules** - none identified

# Prototype screen

[att:uc-17 Determine Euclidian Distance to Any Feature 23jul09.DOC](#)

Map tool which displays the distance between two points clicked on the map.  
Measurement is in FEET or METERS????



## UC-18

<b>Use Case</b>		<b><u>Record Multiple Points For a Sign</u></b>
<b>Primary Actor</b>	Outdoor Advertising Agent, System Administrator	
<b>Goal in Context</b>	Provide the ability to record two or more coordinates for an OA feature (sign).	
<b>Preconditions</b>	Range finder is connected and ready to provide input. A sign has been selected in the system. The sign data is displayed.	
<b>Success End Condition</b>	The multiple point data for the sign is saved.	
<b>Failed End Condition</b>	No data is changed or saved.	
<b>Trigger</b>	Actor chooses to record multiple points for a sign	
<b>Priority</b>	High	
<b>Performance</b>	<performance goal>	
<b>Frequency</b>	5000 times a year	

### Scenario 1

#### Description – Record three points for a sign structure

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Selects 'Collect Multiple Points'	Prompts to shoot point.
2	Shoots point with range finder	Displays point data. Prompts to enter description.
3	Enters point description text Selects 'Save'	Saves point data. Prompts to close or enter another point.
4	Selects 'add point'	Prompts to shoot point
5	Shoots point with range finder	Displays point data Prompts to enter description
6	Enters point description text Selects 'Save'	Saves point data. Prompts to close or enter another point.
7	Selects 'add point'	Prompts to shoot point
8	Shoots point with range finder	Displays point data Prompts to enter description
9	Enters point description text Selects 'Save'	Saves point data. Prompts to close or enter another point.
10	Selects 'Close'	Returns to previous menu

**Alternates – none identified**

**Exceptions – none identified**

**General Comments**

- The points become attributes of the sign but are not the one sign coordinate.
- These points would be used for analysis outside of the system using GIS tools.
- They could also be used in the operations described in UC-17.

**Business Rules**

- A user can record any number of associated points for a sign.
- Each point has a value and a description.

**Exhibit C – Supplemental Requirements**

**MnDOT Office of Technical Support**

**PROJECT 1281  
GIS MAPPING FOR OUTDOOR  
ADVERTISING**

Supplemental Software Requirements

Version 0.5

<u>Revision Log</u>			
<u>Date</u>	<u>Revision No.</u>	<u>Description</u>	<u>Name</u>
6-5-09	0.1	Started document	BD
7-9-09	0.2	Updated	BD
7-16-09	0.3	Updated by GIS Architect	CJM
7-22-09	0.4	Minor revisions	BD
7-23-09	0.5	Changes from the team	BD
	0.6		
	0.7		
	0.8		
	0.9		
	1.0		
	1.1		
	1.2		
	1.3		
	1.4		
	1.5		
	1.6		

Specific Changes In This Revision
<ul style="list-style-type: none"> <li>Deleted obsolete items and added info from Judy</li> </ul>

## **Overview**

**Project Objective:** The objective of the project is to save staff time and expenses needed to administer permits. It will reduce employee mileage used in administering sign permits, reduce the time needed for FHWA review, and reduce the time needed to issue a permit for a new sign. In addition, it would allow technicians instant access to a variety of spatial data in the field improve the quality and accuracy of the outdoor advertising sign location data, improve the safety of the technicians performing field work for outdoor advertising sign permits, increase communication between MnDOT and the FHWA, and with the general public and sign owners, and make it easier to locate missing, incorrect or illegal signs.

**Users:** All users of the application will be Mn/DOT employees responsible for the management of outdoor advertising sign permits.

**Technical Architecture:** The planned architecture is for a browser based, N-tier client server application using an Oracle database. The details of this architecture are documented in the project technology architecture document, [“Technical Development Architecture Guide ArcGIS V9-3-2-0.doc”](#).

<b>ID</b>	<b>Description</b>
	<b>Performance</b>
P-1	The application must accommodate at least 12 simultaneous users with no degradation in performance.
P-2	In populating data fields in a form the application should respond within 2 seconds.
P-3	Upon user login, the application should load within 5 seconds.
P-4	In performing queries, the system should respond with results within 5 seconds.
	<b>Interoperability</b>
I-1	The application must operate concurrently with Microsoft Outlook.
I-2	The application will need to link to other GIS services for such data as roads, waters, jurisdictional boundaries, and maps. Specific services considered are: ESRI ArcGIS based map services. The application must include an interface with the MnDOT Base Map.
I-3	The application must include an interface with the Mn/DOT warehouse (Oracle db). Data such as: employee id will be accessed.
I-4	The system must operate concurrently with Microsoft Active Sync software.
I-5	The application must include an interface with the Mn/DOT OAPRT database. OAPRT is a Java based web application with an Oracle database.
I-6	The GPS Unit must include real time differential correction from WAAS, VRS CORS, or Commercial Satellite (Omnistar).
I-7	The application must include an interface with the MnDOT TISUS/RLC Transportation Information System web Services.
	<b>Usability</b>
U-1	The application must include help text accessible from each user interface screen.
U-2	The application interface must be consistent with Mn/DOT web standards.
U-3	The application should provide features to ensure data uniformity (field level masks).

	For example all caps, no punctuation, phone number format. This should be done in the same manner as OAPRT.
U-4	The application should provide data integrity features so that duplicate records are not created. The application should check for matching records. The application should be designed to eliminate double entry of data (e.g. permit #, date, etc.).
U-5	The application must provide context sensitive help so that if a user enters an invalid value the system would display an appropriate error message and an example of a valid value.
U-6	The application should include data validation triggers that are implemented in the database.
U-7	The application screens must be designed to work on a variety of screen resolutions depending on what platform us being used. Field Computer could be a PDA Windows 2008 Mobile OS (use VGA display (480 x 640), sunlight-readable color touch screen), or a ruggedized laptop computer (with dual screen touch screen/digitizer screen of at least 1024*768 abilities), or both. A desktop PC for ad hoc GIS analysis should have at least 1024 * 768 resolutions, but needs no touch screen abilities.
U-8	The application must be designed to operate in both an office environment and in the field
	<b>Reliability</b>
R-1	The application must provide 8 hours a day x 5 days per week availability. This is likely to be much greater, but support staff for full spectrum incident fixes cannot be found for more than 8 hours by 5 days,
R-2	The availability of Mn/DOT Office of Technical Support, application support staff is planned to be 8 hours a day, Monday through Friday.
R-3	The application must keep a log of application failures (e.g. application is not responding) with details as to the cause of the failure. The failure log must be viewable by the application administrator.
	<b>Expandability</b>
E-1	The application must be designed and built with a component-based architecture using object-oriented design and programming best practices, to facilitate maintenance and extendibility of features and services.
E-2	The application and database must be designed to enable the business to extend the database to include new OA Feature Types.

	<b>Security</b>
S-1	The application and database must be secured to ensure that only authorized accounts have access to information. The accounts should limit the users ability to enter and modify information. This should be done in a manner that is consistent with OAPRT. A ways and means to cache security to the remote machines so that Active Directory Domain can be emulated in offline conditions, and keep unauthenticated user from reaching the mobile application are needed.
S-2	The application must aid MnDOT in conforming to the Minnesota Government Data Practices Act.
	<b>Portability</b>
PB-1	The application should be designed and built so that it can operate on any of the application servers that Mn/DOT OI&TS – EGIS support. That includes IIS and Oracle as defined in the <u><b>Technical Development Architecture Guide ArcGIS V9-3-2-0.doc</b></u>
PB-2	The application must be designed to operate through a web browser.
	<b>Technical Architecture</b>
T-1	The application must operate with the same authentication and authorization means that the existing OAPRT web application uses. Additionally, a way to CACHE this information to bring out to field unit will be necessary to prevent the field application from being used by other operations in district offices.
T-2	It is known that there are specific applications that will do parts of the work in and integrated manner. Those applications are known as the “Field Application” (Mobile), The “Desktop Application” (ArcGIS-ArcMAP) , and the web based business application (OAPRT). There are also some web services that will help out in ETL and postback processes.
T-3	ArcGIS ArcMAP will be provided as the “Desktop PC application” as part of Mn/DOT’s normal infrastructure. There may need to be a wizard or control added to this interface to allow for some specialized functionality required in the use cases. This tool is a full professional GIS analysis tool, and will allow for complete exploration and manipulation of such data collected.
T-4	The application must operate on the Trimble Geo XT GPS Unit .
T-5	The Field Application must operate with Windows Mobile 2008 and up.
T-6	The Field Application (ArcGIS Mobile Based) must have a way to work directly with range finders already purchased for this project. The range finders are: LTI Truepluse 360 B Laser rangefinder with bluetooth technology.

## **Exhibit D – High Level Data Model**

**OWNER**

- o DATE
- o STATUS
- o ACCOUNT NUMBER
- o NAME

**PERMIT**

- o STATUS
- o NUMBER

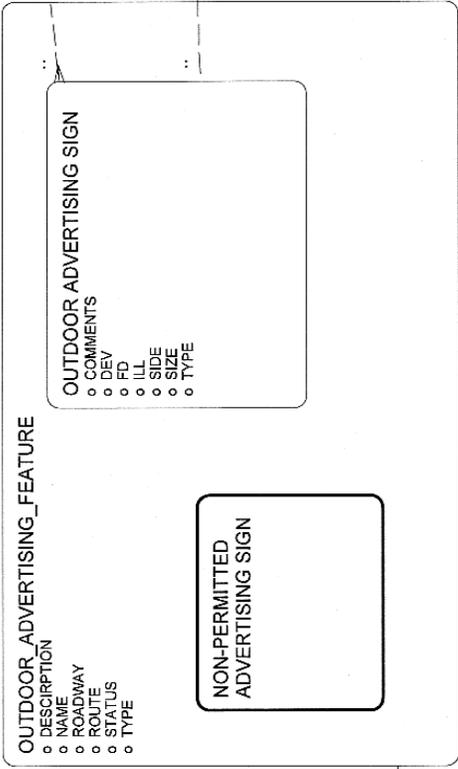


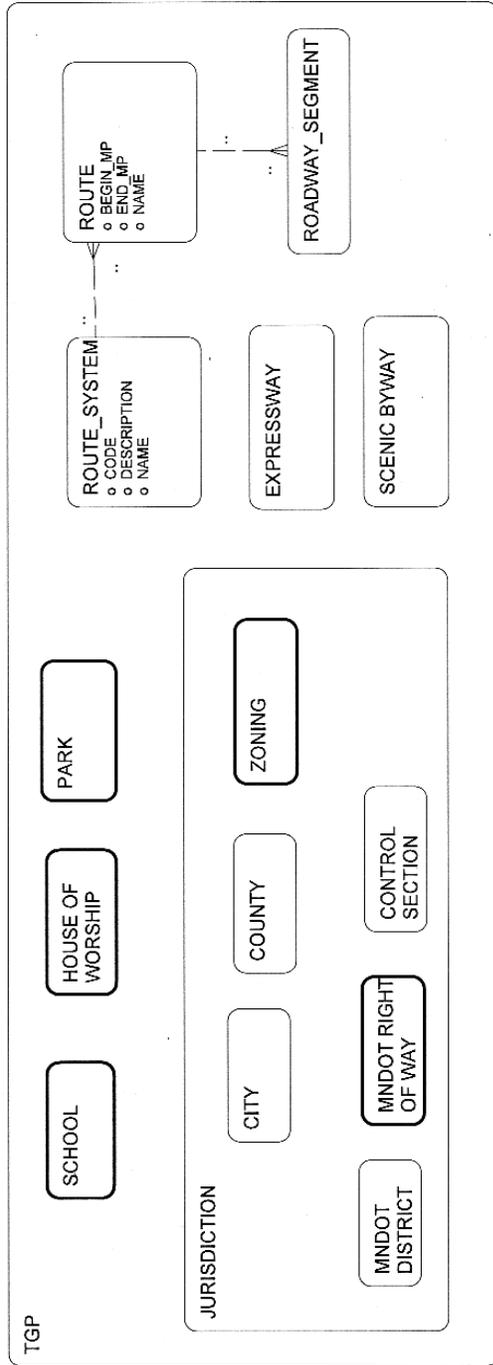
Diagram : P1281 PROPOSED ERD 30JUL09  
 Modified : 30 July 2009 11:06:45

**OA\_FEATURE\_LOCATION**

- o CONTROL STATION
- o MILE POINT
- o OFFSET
- o SEC/TWP/RANGE
- o STATION
- o XYZ COORDINATES

**OA\_FEATURE\_ADDITIONAL\_POINTS**

- o DESCRIPTION
- o X
- o Y
- o Z



## **Exhibit E – Technical Development Architecture Guide**



## Minnesota Department of Transportation

395 John Ireland Blvd.  
St. Paul, MN 55155

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Mn/DOT OI&TS-EGIS Unit

# Technical Development Architecture Guide

## P1281 GIS Mapping for Outdoor Advertising ArcGIS Server Projects

Version 9.3.2.0 (Initial version for P1281)  
July 16, 2009

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## 1. Introduction

This document describes the software development environment to be used for ArcGIS Server Applications and Web Services in a .NET environment at Mn/DOT. It follows Mn/DOT's Office of Decision Support's (OI & TS) GIS Development Framework Strategic Technology Recommendations for GIS applications. Although there is the ability to develop in both a Java and .NET environment, at the time of this writing the .NET environment is the only one that fully encompasses all GIS development. This document describes the shared development server environment for 2 of the approximately 11 ArcGIS Advanced Server functions using .NET technologies – Web ADF and Mobile ADF. These two are expected to cover most map serving needs initially. The other functions (i.e. 3d Services, Geoprocessing Services, and Web Based Editing) should fit into this description in general.

## 2. Benefits

The following benefits are expected from this development architecture.

- Conforms to an environment that is easy for OIT's Infrastructure Services to support.
- Allows for the proper handling of GIS data from ArcGIS Services.
- Conforms to the main GIS software used at Mn/DOT – ESRI's ArcGIS Suite (Enterprise Levels).
- Is object-oriented, which promotes component-based, reusable, and extendable code. This makes it relatively easy to change, add functionality, and interface to other systems / services.
- Is service-oriented, which promotes the use of common services such as directory-based authentication, Crystal Enterprise Reports service, and Web services.
- Is cost effective when considering developer numbers in the 5-10 range over several years.
- Low entry cost for developers outside of OI & TS-EGIS
- A robust and well exercised development environment benefits solutions building.

### 3. GIS Architectural Overview

#### Application Technology

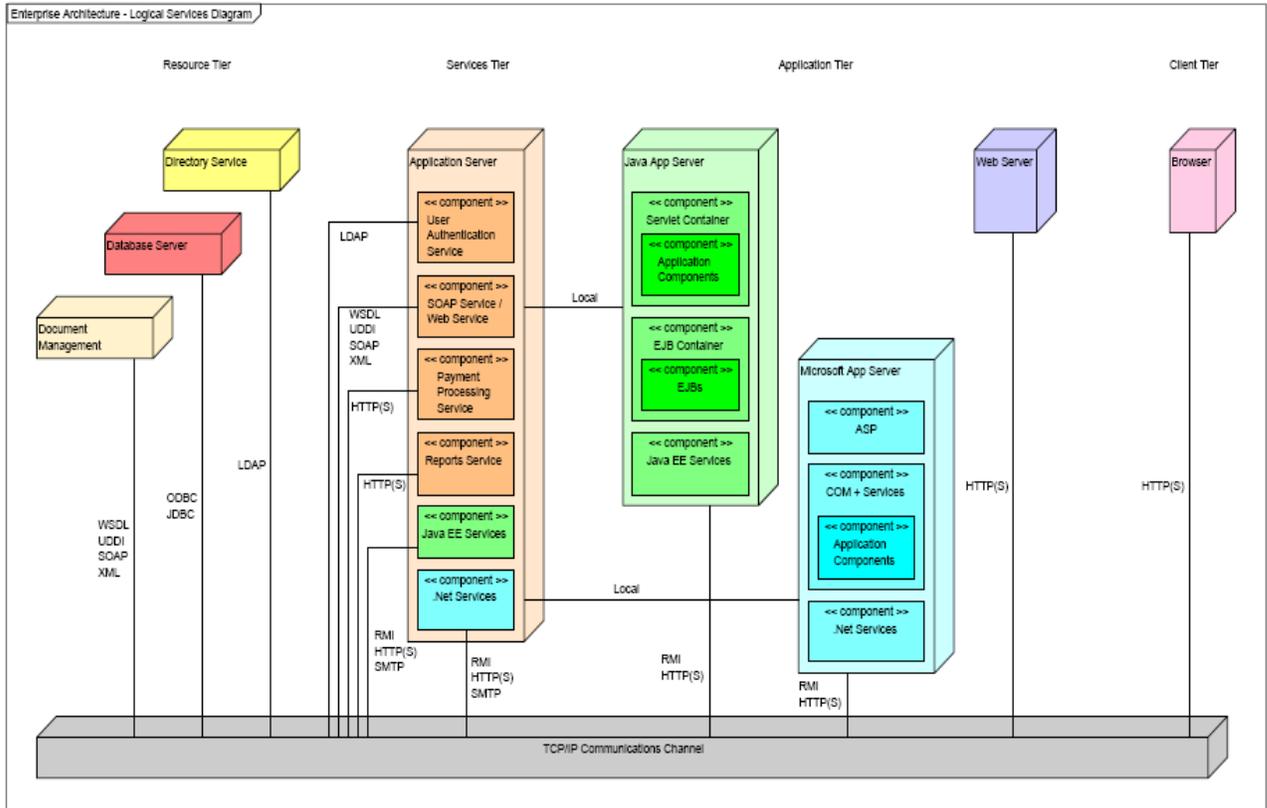
The primary application development / maintenance technology for ArcGIS Services applications is as follows:

Application architecture: or above	Microsoft .Net 3.5, ArcGIS Server 9.3 SP1  ESRI's ArcGIS Web and Mobile SDK's
Primary Architecture for services tier: .NET 3.5	Microsoft Windows 2003 64 Server &
Application development language: Scripting Language	C# (MS Visual Studio 2008 ) JavaScript, Python, VBA
Reports solution:	Crystal Enterprise 11
Database:	Oracle 10G2
Database Middleware: Geometry.	ArcSDE (at 9.2 SP6 level) with SDO  No SDE service, Direct Connect 9.3 to 9.2
libs needed	
Object/Relational mapping: .NET	ESRI's ArcSDE, ESRI's ArcObjects, and
Controller framework: .NET ADF's	MS .NET 3.5, ESRI's Web and Mobile  Geocortex Essentials Version 2.0
View / presentation framework:	Windows XP or Vista PC with .NET 3.5 -Windows Explorer and Windows  -Windows Mobile Device with Compact Framework 2.0 -Tomcat 5.5 HTML, CSS, and ASP.NET Technologies
IIS 6.0 Server	
ASP.NET application server:	MS .Net 3.5
Code version control system / repository:	Mn/DOT's CVS
Build / deploy / dependency tool:	MS Visual Studio 2008 Professional Edition
Integrated Dev Environment (IDE):	MS Visual Studio 2008 Professional Edition
Detail modeling / design tool:	MS Visio UML, Poseidon, Rational Tools
Primary detail build / programming tool:	MS Visual Studio 2008 Professional Edition
Primary testing tools:	MS Visual Studio 2008 Pro Ed., Nunit
CVS interface tools:	Tortoise, ViewCVS, and CVS
Defect / Issue tracking tool:	JIRA

- Ajax technology is integrated with the ESRI .NET application development framework. Terminology used above is based on Model, View, Controller Architectural Pattern used in OI&TS -Applications section for web based applications. Mn/DOT's OI&TS does not require a "Model View Controller" development structure, although it can be used via Visual Studio 2008 and Java Development platforms.
- Secondary platforms would include all things necessary for Java ADF development in an ESRI environment. At present Java ADF development for GIS is a special case and not addressed in this document.
- Geocortex Essentials Vers 2.0 is a .NET oriented development platform for ESRI web clients and Services. This technology is available at Mn/DOT for development of web based applications.

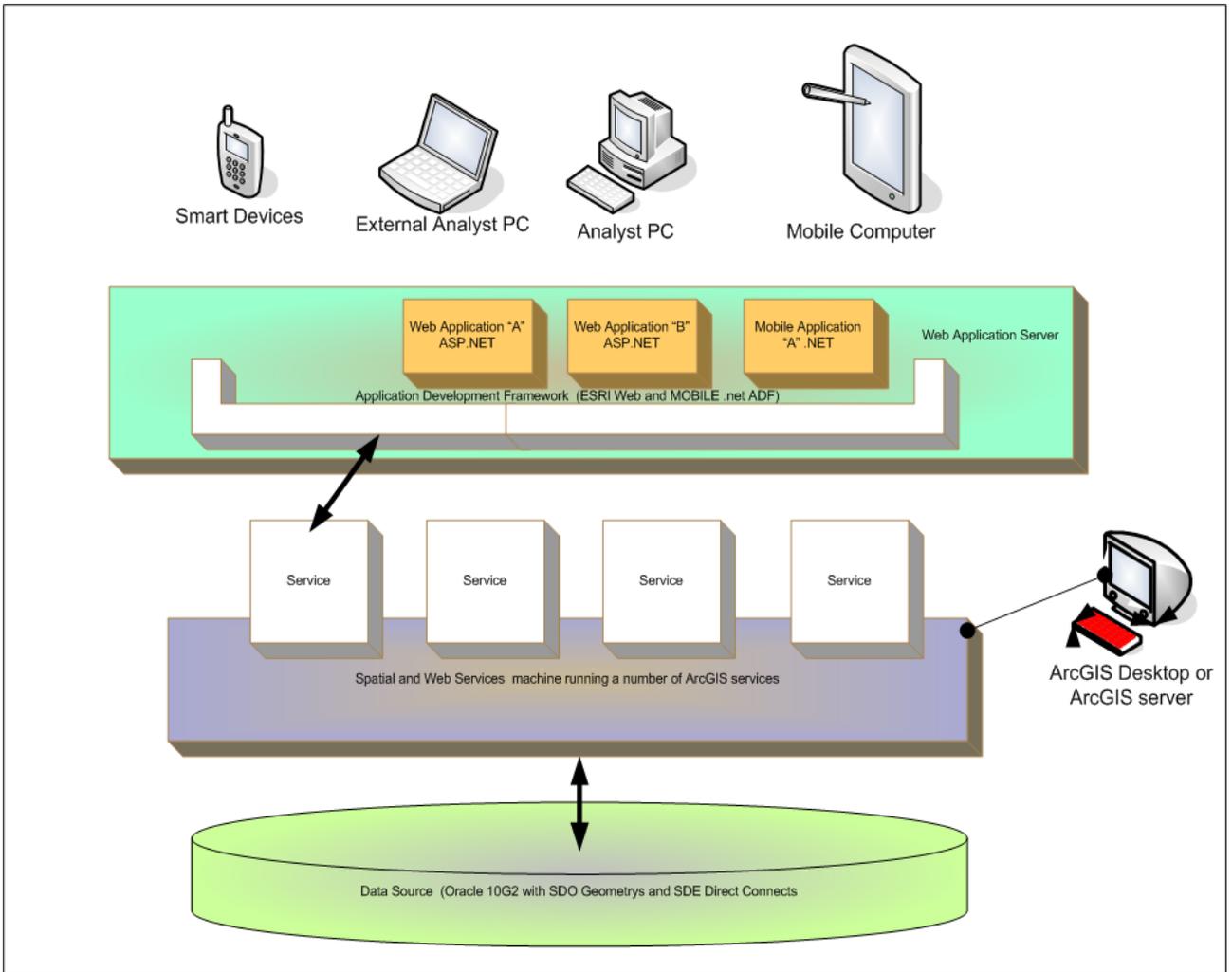
### **Enterprise Architecture – Logical Services Diagram for both .Net and Java**

The primary focus of the GIS development framework will be .NET based. The reality on the ground is that Mn/DOT's current Enterprise Architecture is and will be for the foreseeable future, a mixture of Java/J2EE and Microsoft .NET components. These projects, with needs for Web and Mobile technologies, can take some direct advantage of this mixture. The Enterprise Architecture is presented here to give a picture of what the .NET and JAVA environment looks like. There may be some interoperability offered by Web Services and common SOAP/REST and XML protocols in both architectures, this is extremely powerful and leverages our existing resources to benefit our customers.



## **ESRI Web and .NET Mobile Applications Technology Model**

This diagram shows the system model for a typical ESRI ArcGIS Web and Mobile application. ArcGIS desktop will have a role in the setup and administration of the services (Authoring). ArcGIS Spatial Services serve up data and functionality to the consumers: applications and web clients. In the case of a mobile application, a cache of data is normally delivered to the Mobile Computer for its use in the field. Upon return from the field (or access to enterprise network), the changes to information in the cache are posted back for updates/additions to the main data source for the mobile application.

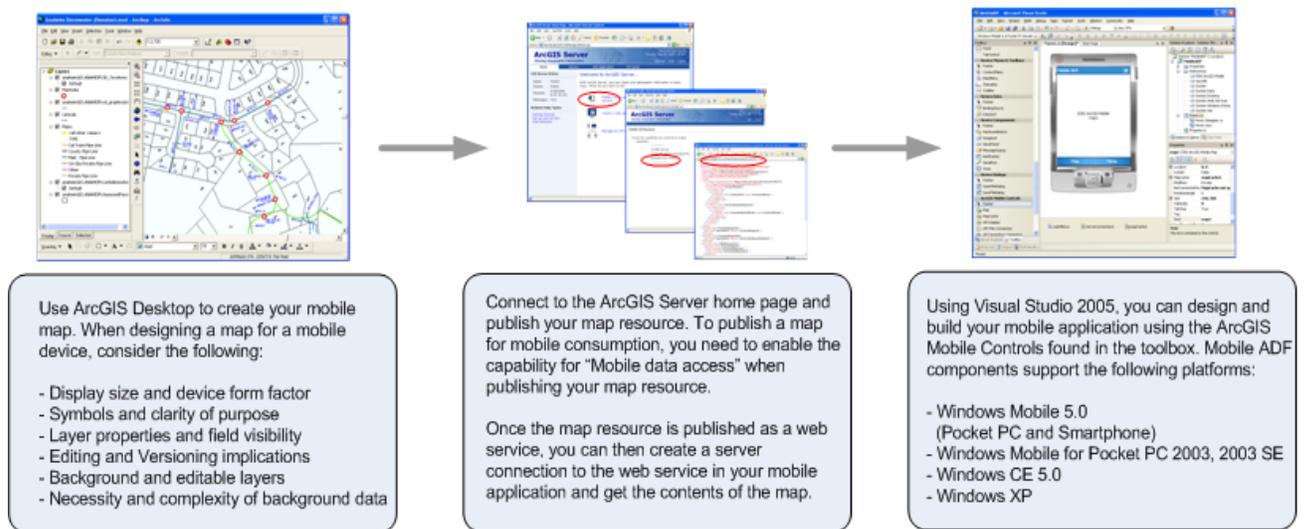


## Development / Maintenance Environment Technology Model:

The following steps are required to build, deploy and maintain a web or mobile solution using ArcGIS Server, and although they are aimed at Mobile technologies, the concept is the same for non-mobile web based applications:

- Design and author web or mobile maps using ArcMap from ArcGIS Desktop. 9.3 SP 1 with GDB 9.2
- Publish mobile maps using ArcCatalog from ArcGIS Desktop and/or the ArcGIS Server Manager.
- Create a web based or mobile application using Visual Studio .NET 2008 and the ArcGIS Server mobile SDK components, and/or Geocortex Essentials.
- In the case of mobile development, deploy the mobile application to targeted devices.

The following graphic is shows the first three steps:

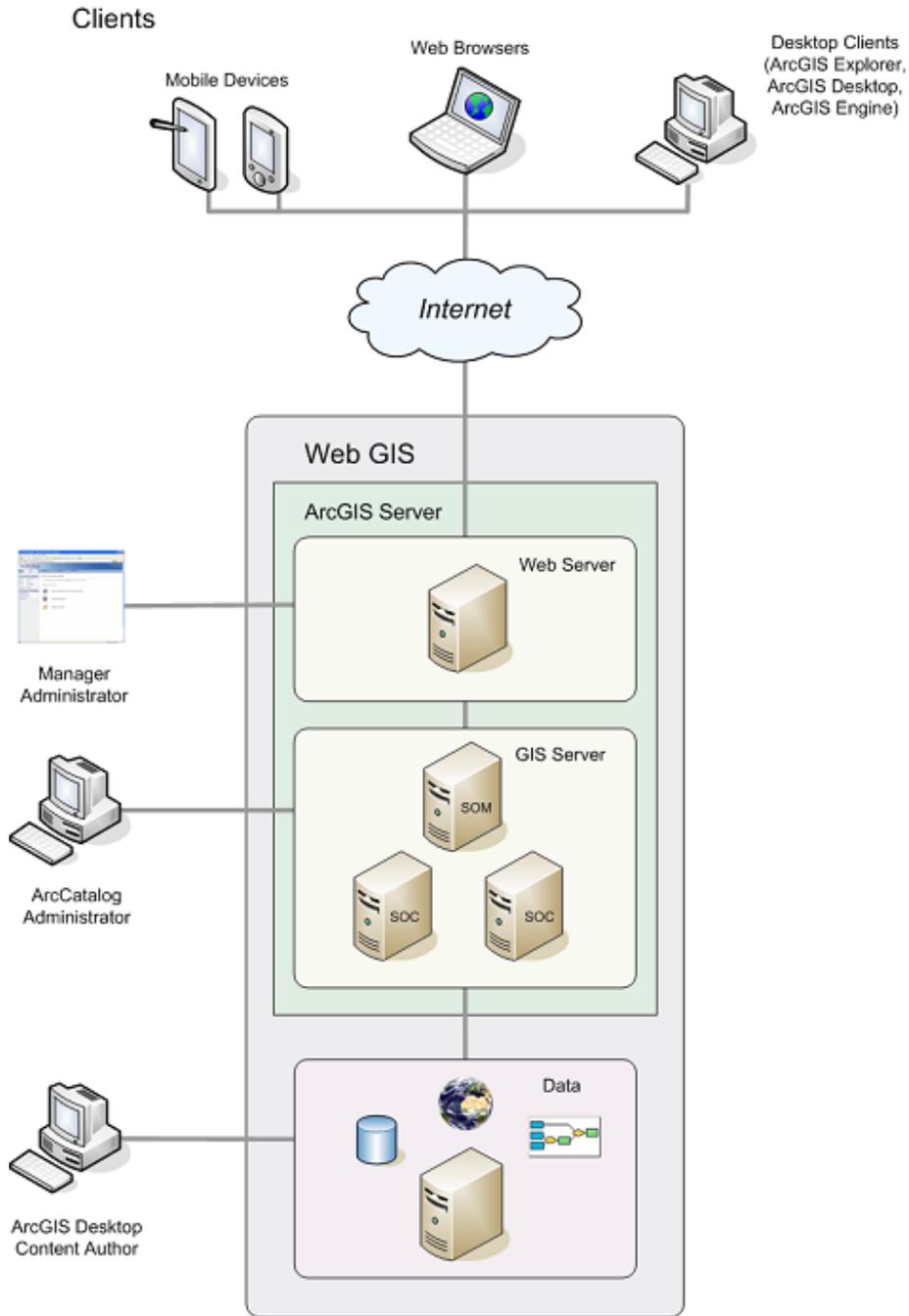


The ArcGIS Mobile SDK (ADF) used in the Visual Studio 2008 environment contains all the necessary components to handle GPS integration, map cache, the map form, sketching, data access via ADO.net, layer and geometry areas of development.

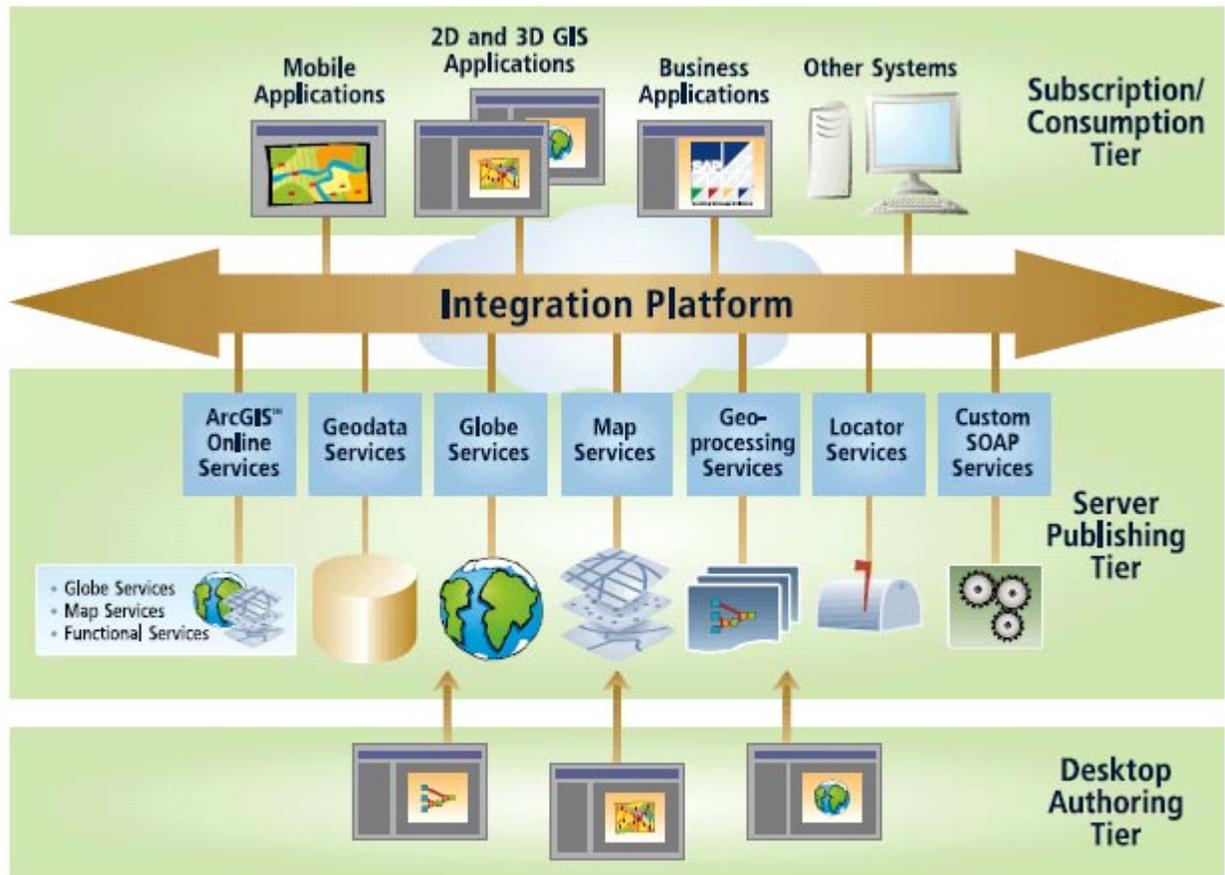
The ArcGIS Web SDK (ADF) contains many of the necessary components to handle map serving and interaction in a web based environment, and a great many other service oriented tasks such as geoprocessing, etc. OI & TS-EGIS will supplement this ADF with Latitude Geographics™ Geocortex® Essentials to provide additional application development tools.

The general architecture of both the mobile environment and the web environment is shown in the following graphic:

# The ArcGIS Server System Architecture



Here is the same architecture expanded and presented from the perspective of service oriented architecture.



*A geospatial SOA allows common GIS functions to be delivered as services throughout the enterprise. ArcGIS Desktop can be used to author applications, while ArcGIS Server is used to publish these applications as services. The openness and compliance of ArcGIS Server to standards allow these services to be consumed by many clients beyond those developed by ESRI.*

#### 4. GIS Application Standards

Mn/DOT's Office of Decision Support (OI & TS) has specifications for GIS Applications that software developers will follow. These include:

##### **Coding Standards:**

Web and Mobile GIS Developers will follow good coding practices as described in [Microsoft's C# Programming Guide, Visual Studio 2005](http://www.dotnetspider.com/tutorials/BestPractices.aspx), Mn/DOTS Java UI look and Feel, CVS usage, and program structure when applicable to Visual Studio 2005 C# environment.

## **Graphics User Interface (GUI) Standards:**

GUI standards follow Microsoft .NET GUI recommendations in combination with ESRI's standard industry practices as they relate to GIS and various devices as a base.

From the design process, the Mn/DOT Office of Communications provides a document on External reaching Web Site Rules and Goals that covers:

- Structure
- Tools
- Rules for Content, Writing and Style
- Logos, Fonts, Colors, Meta Tagging, Tables.
- Video, PDFS, Audio, Power points
- Applications items, FTP locations for large transfers
- Naming and Hosting.
- Americans with Disabilities Act Accessibility
- And all items web site construction related.

Mn/DOT's Web Template Application includes pages that meet GUI standards. It's best to start with these pages and a thorough review of the Office of Communications External Guidelines as mentioned above. Note that these apply to the initial or splash page for external sites. See your project contact for these materials.

For desktop applications, the design process will introduce required specifications in the areas of:

- Screen Resolution
- Screen Layout
- Navigation Bars
- Logos Usage
- Security (Pre-Login, Login, Logout)
- Fonts and Colors
- Graphics
- Error and Messaging
- All Controls for Application (GIS and standard)
- Windows and panels.

## **Versioning Standards:**

Developers will follow Apache Software Foundation's versioning guidelines. Located at <http://apr.apache.org/versioning.html>

OI & TS's simple description of versioning guidelines are as follows:

A <Major>-<Minor>-<Patch> numbering system is recommended to track software revisions when a new version is released. Note that CVS system has its own internal revision numbering system, and it will not match this standard. Use CVS Tags to assign this <Major>-<Minor>-<Patch> numbering system within the CVS storage system.

A Major Release is a full product upgrade of the software containing significant new functionality. A Major Release is necessary if there are changes to the model or compatibility with previous versions cannot be maintained. When the Major Release version number is incremented, the Minor and Patch version numbers are reset to zero.

A Minor Release is a planned update to the existing software incorporating standard maintenance, improvements to existing features, enhancements and bug fixes. When a Minor Release number is incremented, the Major Release version number remains unchanged and the Patch Release version number is reset to zero.

A Patch Release is distributed when necessary to correct critical or significant problems that impact a customer's use of the system. When the Patch Release version number is incremented, the Major and Minor Release version numbers remain unchanged.

#### **Software build, dependency, and version management:**

Developers will use Visual Studio 2008 and CVS for build, dependency, and version management when building Mobile and Custom works for Web Based applications.

Developers will build .MSI or EXE files for deployment operations of the mobile client, and either .MSI files or .ZIP files for the .MXD and associated data for the services and the ASP.NET web site structures for the web site files.

#### **Source Code Maintenance:**

Developers will provide and maintain application source files, configuration files, database schemas and scripts, developer documentation, and other related artifacts in Mn/DOT's CVS.

#### **Follow these rules for naming CVS Modules:**

One module (directory) per application (including all variants of that application).

This module (directory) can be under a top level module that indicates the organizations functional unit for which this work is being developed.

The top level module name should be short (3-6 character), all lower case letters and/or digits with no "-"(dash), and "\_"(underscore), "."(period), or spaces. The module name may also be used in the JIRA project key, database schema name, and/or AD role name

The module name is short to facilitate naming of resources and artifacts where long user-friendly names would be problematic. For example, database table names are often pre-pended with the application name. Projects should determine the application's name (typically an acronym) early in the project so project artifacts and configuration files can use this name.

Use of CVS Tagging will allow for the Major Minor Patch pattern. The auto revision number that CVS assigns will be different than the Major Minor Patch pattern and should be left alone.

**Documentation Tags (Visual Studio XML Document Tags):**

It is suggested that developers will use XML Document tags for documentation of source codes in C#. Please follow [Microsoft's C# Programming Guide, Visual Studio 2005](#)

**Object / Relational Mapping (SDE and ADO.Net):**

Developers will use ADO.Net and ESRI's SDE technologies for Object / Relational Mapping for tabular and geographic data. Oracles SDO Geometries are permitted and welcomed in the SDE environment.

**Code Portability:**

Developers will follow practices that insure code portability. Peer reviews and documented justification is required for the use of proprietary application server extensions or libraries.

**Deployment:**

Mobile Developers will follow OI & TS's EGIS Mobile deployment process.

Please consult with Richard Fisher ([richard.fisher@dot.state.mn.us](mailto:richard.fisher@dot.state.mn.us)) or Charlie McCarty ([charlie.mccarty@dot.state.mn.us](mailto:charlie.mccarty@dot.state.mn.us))

**Auditing:**

Models and code will be reviewed for compliance to the specifications listed in Section 3.

**Controller Standards**

Developers will use MS .NET 3.5, ESRI's Web .NET ADF, ESRI's Mobile .NET ADF and Latitude Geographics™ Geocortex® Essentials framework for most web and mobile applications work. Special frameworks for GPS phase information collection (i.e Trimble SDK) are allowed if needed.

**Application Security:**

Developers will use C# specific security recommendations as listed in the [Visual Studio 2005 C# programmers guide](#).

**Scripting Standards**

Developers will use JavaScript for client-side scripting, and JavaScript or Python for server-side scripting.

**Naming Standards for Web applications ('User friendly' name)**

The user-friendly name is the descriptive or popular name that identifies the application. The user-friendly name should be chosen by the project sponsor or application owner.

Projects should determine the application's user-friendly name early in the project so it can be used in documentation.

## **URL**

The URL is the application's Web address.

Projects should determine the URL for the application. The URL is typically based on the user-friendly name, and should follow these sub domain examples:

Production URL =

gisservices.dot.state.mn.us/arcgis/services/appname

Test URL = gistest.dot.state.mn.us /arcgis/services/appname

Development URL = gisdev.dot.state.mn.us/arcgis/services/appname

Web Reverse Proxies are utilized to gate applications to the public side of Mn/DOT firewalls.

The Test and Development URL's are known to change, please check with administrators.

## **SSL for secure communications**

Projects should determine whether the application will use SSL (Secure Sockets) for secure communication early in the project because this affects the naming of server resources and configuration.

## **Short-name**

The application short-name is used to name application and data resources and artifacts where long user-friendly names would be problematic. For example, database schema names are often pre-pended with the application short-name. Projects should determine the application's short-name (typically an acronym) early in the project so project artifacts and configuration files can use this name.

## **Oracle Data Storage and Deployment Progression**

Applications data will always start out on a development schema on a development server offered by Mn/DOT's Infra APP (and arranged by MnDOT/EGIS staff). This data will then progress to a test and finally to a production version, losing the ability to alter schema (make any data definition language changes) while in "Test" or "Production". Therefore, good solid data normalization is required to allow for expansion of the application without altering the schema. Typically some kind of application data management tool is needed as well, or at least a clear manual process needs description. Furthermore,

meta data in 2 distinct forms is required, one set is in Oracle Meta data and Comments and one set in ESRI's formats suitable for inclusion to a Metadata portal application. Some fluency in XML (DOM) and Oracle and scripting is typically needed to keep this all together.

#### **Issue / Bug Tracking (JIRA)**

Developers will use [JIRA](#) for software issue / software bug tracking.

Mn/DOT's JIRA is located at <http://jira.dot.state.mn.us>. You must be connected to a Mn/DOT network for access.

#### **Developer Team Collaboration (Wiki)**

OI & TS has a [Wiki](#) available for collaboration, documentation, and real-time information exchange. Be aware this Wiki is not a production service. Availability is not guaranteed.

Mn/DOT's Wiki is located at <http://wiki.dot.state.mn.us>. You must be connected to a Mn/DOT network for access.

#### **Logging Standards**

Developers should use Standard Windows Logging methods for capture of application and installation events of interest. For web based applications, a special directory is created for logs and messages is created called g:\arcgisserver\arcgiserror, and in here log files of application interest can be created with the project name abbreviation, or functional units abbreviation, to keep them separate from other projects.

#### **Mn/DOT Network Standards:**

Mn/DOT has a network policy of least privilege when it comes to access of resources by people, processes, and devices. This means that the FEWEST privileges will be assigned that are consistent with the duties and functions of the software developed. Protocols not needed, messaging formats not needed, will not be available to use. SOAP is recognized, but is pushing the edge of what is allowable as for rich messaging. There are many items to consider in this area, including reverse proxies usage for external facing apps, ftp, email, and ssh, as well specific software packages. For SMTP email to work from a web based application, the server needs to have McAfee Virus Scan Access Protection Rules modified to allow this to happen, in addition to other asp.net and code setups. SMTP is forwn

All web based applications for Mn/DOT must be aware of network proxies to access resources correctly. For ASP.NET applications, this means the following type tags are needed in the web.config file:

```
<System.Net>
  <defaultProxy>
    <proxy autoDetect="True" />
  </defaultProxy>
</System.Net>
```

## 5. Hosting Environment:

Application hosting services are typically provided by OI & TS's Infrastructure Section. OI & TS-EGIS Applications are hosted by Windows IIS and ArcGIS Server on Windows 2003 64 bit servers. Application hosting typically resides in Mn/DOT's Network Operations Center (NOC).

Database hosting services are typically provided by OI & TS's Infrastructure Section. Databases reside on a Dell storage area network (SAN) managed by an Oracle RDBMS running on Microsoft Windows server. Database hosting typically resides in Mn/DOT's Network Operations Center (NOC).

Reports hosting services are typically provided by OI & TS's Infrastructure Section. The reporting solution is typically Crystal Enterprise. Reports hosting typically resides in Mn/DOT's Network Operations Center (NOC).

## 6. Development / Test Environment

Unit testing is done on development servers.

Integration testing is done on development servers.

System testing and user acceptance testing is done on test servers that reside in the same environment as the development servers.

Code must reside in Mn/DOT's CVS repository and compile at Mn/DOT in Mn/DOTS environment, and perform according to specifications.

## 7. Production Environment

Production instances are deployed on production servers that typically reside in the same environment as the development and test servers.

### **When external user access is required.**

MnDOT has no directory service for external users. External users will be either automatically allowed to access web systems as an anonymous user, or will need to exist in an application database. If an external user authentication and authorization will be

implemented user credentials and roles will reside in the application database, using the concepts of role based security. This is accomplished, for example, by having Oracle tables accessible from the application that store all pertinent information about the users and the roles they carry. When a user logs in, their credentials are verified against information in these Oracle tables and other user persisted data is accessed and used. The users list can also be persisted in XML. This table or list is then maintained by a set of administrators that have administrative level roles on the system. These administrators can add, delete, update, and approve users for access. The XML or Oracle tables can be used to support self-help routines for regular users with none or existing credentials, to email a forgotten or new password, or to request a user account. Some administrative tool coding will be required. The solution must answer the question: “is this user a member of this role and group?”.

External browser to server communication may be encrypted. MnDOT will use 128 bit encryption via SSL.

## 8. Mn/DOT Personal computer and mobile field units.

A wide variety of Personal Computer and Mobile Field Collection units are capable of performing work that conforms to practices with in Mn/DOT. All hardware considerations for all projects should be reviewed by the project manager and system architect as part of the projects scope. For field units, with a GPS involved, its is important to be able to achieve 1 meter or better location accuracy, which means some form of reliable differential correction (real time or post process) must be used. WAAS, Beacon, or VRS are typical real-time correction sources. The ability of the GPS unit to store timings needed for post-process corrections is acceptable. High quality GPS antennas also help reach the best location accuracy. Field computers must be either Windows mobile operating system basis (Windows CE and its variants since 2005) or Windows XP based rugged-ized computers such as Panasonic tough books. OI&TS – EGIS strongly recommends real time differential correction solutions as it makes the data flow much easier to automate.

**Exhibit F – Glossary**

**MnDOT Office of Technical Support**

**PROJECT 1281  
GIS MAPPING FOR OUTDOOR  
ADVERTISING**

**GLOSSARY**

Version 0.4

<u>Revision Log</u>			
<u>Date</u>	<u>Revision No.</u>	<u>Description</u>	<u>Name</u>
7-15-09	0.1	Started document	BD
7-23-09	0.2	Additions	BD
7-30-09	0.3	Changes from the 7/30 meeting	BD
8/4/09	0.4	Additions from Scott	BD
	0.5		
	0.6		
	0.7		
	0.8		
	0.9		
	1.0		
	1.1		
	1.2		
	1.3		
	1.4		
	1.5		
	1.6		

Specific Changes In This Revision
<ul style="list-style-type: none"> <li>Added some definitions and corrected others.</li> </ul>

## Context Diagram Definitions

<b>External Entity</b>	<b>Definition</b>
<b>GPS Device</b>	A device that used global positioning satellite systems to determine a position on the earth.
<b>MnDOT Base Map</b>	A system. MnDOT's system for tracking information about Outdoor Advertising Signs by geographical coordinates.
<b>OAPRT System</b>	The Outdoor Advertising Permits Reporting and Tracking system. This system is used statewide to track outdoor advertising signs and associated permits.
<b>Outdoor Advertising Agent</b>	The role of a person who is responsible for management of outdoor advertising sign permits in a district.
<b>Range Finder</b>	A device that is used to measure a distance.
<b>Spatial Warehouse</b>	The MnDOT spatial data warehouse.
<b>System Administrator</b>	The role of a person who is responsible for overall management of the proposed system.

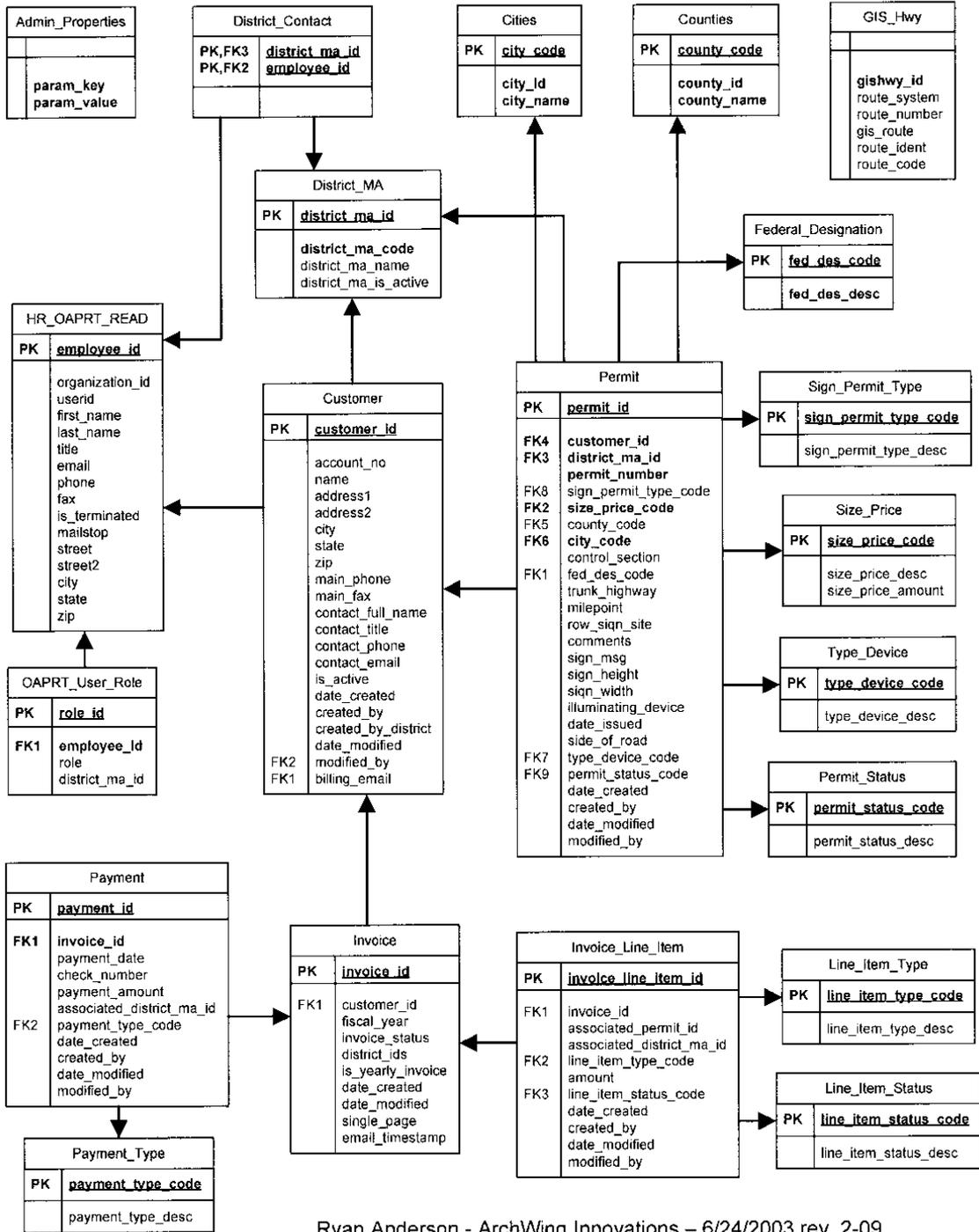
## Data Model Definitions

Entity	Definition
<b>City</b>	A city is a usually large or important municipality in the U.S. governed under a charter granted by the state. E.g. Roseville, Woodbury, Bloomington, etc.
<b>House of Worship</b>	A building established for religious use.
<b>Control Section</b>	A control section is a number assigned to a section of road for identification purposes; Control Sections are established sections of roadway with fixed termini. In dividing the trunk highway system into these separate units or Control Sections the county was used as the basic unit and the county alphabetical order number was used as the first two numbers in the Control Section Number. Every Control Section has a unique four-digit number. An example of a control section would be CS 2901, which represents TH 34 from the Becker/ Hubbard county line to TH 71 in Park Rapids.
<b>County</b>	A county is the largest territorial division for local government within a state of the U.S. E.g. Hennepin county, etc.
<b>Expressway</b>	“Expressway” means a divided highway with partial access control.
<b>Jurisdiction</b>	An abstract entity that contains generic attributes for the various types of jurisdictions.
<b>MNDOT District</b>	A district is an organizational unit of MnDOT. E.g. Metro, District 2, District 6, etc. Each MnDOT district has an assigned geographic area.
<b>MNDOT Right of Way</b>	The width of roadway and adjacent area controlled by MnDOT.
<b>Non-Permitted Advertising Sign (Illegal Sign)</b>	An off-premise sign that is not permitted.
<b>OA Feature Additional Points</b>	Points associated with an outdoor advertising that record that go beyond the base of the pole to include overall configuration of the structure.
<b>OA Feature Location</b>	The place where a Outdoor Advertising Feature is located. E.g. mile point 104 on TH 34, a point line or polygon, X/Y/Z coordinates, a station and offset description, etc.

<b>Outdoor Advertising Feature</b>	An object of interest to the outdoor advertising section E.g. an outdoor advertising sign, an area in need of vegetation removal, etc.
<b>Outdoor Advertising Sign</b>	An off-premise commercial sign structure placed along a roadway. This only includes signs within 660' of a roadway.
<b>Owner</b>	The owner of an outdoor advertising sign. E.g. Lamar Outdoor Advertising Inc.
<b>Park</b>	An area set aside by law that is designated for public recreation.
<b>Permit</b>	A permit that is issued for an outdoor advertising sign.
<b>Roadway Segment</b>	A designated section of road with uniform characteristics of interest. E.g. 4 lane divided, 2-lane rural, etc.
<b>Route</b>	A concept used to name and manage roadways. An example of a route would be USTH 61.
<b>Route System</b>	A concept that categorizes routes. E.g. 01 Interstate trunk highway, 02 U. S. trunk highway, 03 Minnesota trunk highway, 04 County state-aid highway, etc.
<b>Scenic Byway</b>	A type of roadway designation.
<b>School</b>	A building or facility used for education. A building owned by a school district.
<b>TGP</b>	The transactional geo-database. An abstract entity that represents data that will be coming from the TISUS/RLC.
<b>Zoning</b>	A use designation assigned to a location. E.g. commercial, industrial, etc.

**Exhibit G – OAPRT Data Model**

## Outdoor Advertising Permit Reporting and Tracking - ERD Diagram



Ryan Anderson - ArchWing Innovations – 6/24/2003 rev. 2-09