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OPTIONS AND RECOMMENDATIONS FOR WEB DATABASE OF MATERIAL AND CONSTRUCTION INSPECTION

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A report of the findings of
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Options and Recommendations for Web Database of Material and Construction Inspection

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16. Abstract

The Illinois Department of Transportation (IDOT) has been using software developed in-house for their materials management and construction project management needs. The primary packages under review MISTIC (Materials Management) and ICORS (Construction Project Management) were developed at a time when there were no suitable commercial offerings. These packages have continued to provide functionality for decades, but due to personnel changes, hardware improvements, and additional software requirements; the packages should be replaced before they fail and create an untenable situation in IDOT.

The purpose of this project is to determine if there are commercial packages available that will meet the ongoing needs of IDOT in these two areas.

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EXECUTIVE SUMMARY

The Illinois Department of Transportation (IDOT) created software packages to fill the void in commercial offerings over the past few decades. These packages, though functioning, have exceeded their design life and are rapidly becoming unsupportable. There is a very real possibility that one or more of these packages will experience catastrophic failure and leave IDOT with no automated solution. This would not be workable in a state this size with the complexity and volume of project activities.

The MISTIC Materials Management System was written in the 1970s in a language that is no longer taught locally and using constructs that have been upgraded many times since. Even with identification or training of staff who could maintain this package, the amount of work to maintain the 40-year-old architecture far exceeds the effort required by current protocols. Maintenance of this package will become more costly as the talent pool dwindles and the modifications become more complex to meet the changing materials management protocols.

The ICORS package, though half the age of MISTIC, was developed using software that is designed for more limited applications. This package is currently functioning and is somewhat easier to support. But because of the limitations of the software protocols used, implementing the increasingly complex changes in requirements is becoming more of a challenge.

It was determined that the most reasonable course of action is replacing these two systems while they are still functioning so that there is some type of orderly transition possible. To this end, an investigation into the type and availability of commercial packages was undertaken.

After confirming the capabilities of the original software and, in some cases, expanding the initial capability requirements to meet anticipated needs of the user departments, a search for commercial packages was begun. The number of packages identified that satisfied the user requirements completely or in part resulted in a far greater selection of commercial packages than initially thought available.

These packages were reviewed via data sheets and websites with a goal of narrowing the almost 100 packages down to a workable number for intense review.

After the initial review, the packages that closely adhered to the list of requirements were selected for in-depth analysis. This analysis included emails, telephone conversations, and face-to-face meetings.

Based on this further analysis, the packages most closely meeting the requirements of IDOT were selected and ranked.

These findings were presented to IDOT for review and suggestions for further refinement. The comments and questions that stemmed from that meeting have been incorporated into this report.

This report outlines the methodology used, assumptions made, and the analysis results with recommendation for further action.

When a frontrunner was identified that clearly satisfied more requirements than other packages reviewed, an additional, more in-depth review of specific critical areas was undertaken to ensure that the package would be usable in the environment defined. Examples of current funding

situations were reviewed to ensure that the selected package could handle the complexities. One of the more complex examples is discussed in Appendix 1.

To further facilitate planning, information was obtained on the pricing model anticipated to be in effect at implementation. Supporting this information is a document from the vendor that confirms this pricing. This document is contained in Appendix 2.

A PowerPoint Presentation that summarizes key points of this report designed for both department and higher use is included in Appendix 3. This presentation was created to assist in organizing information and assisting IDOT officials in making an informed decision. The PowerPoint can be used in its entirely, or slides can be extracted based on the audience.

Information on the current testing of the 2.0 software released in December 2014, including contact information for the primary test site, is included in Appendix 4.

CONTENTS

CHAPTER 1 PROJECT SCOPE

The purpose of this project can be divided into four distinct phases:

- Identity the requirements of the MISTIC and ICORS users to determine whether the existing capabilities of the software continue to be relevant, to eliminate current capabilities that are worked around or not used, and to define desirable capabilities for any new project.
- Identify existing software packages available in the marketplace that might replace MISTIC and ICORS.
- Analyze these existing packages.
- Determine the most suitable packages or determine the desirable direction to take in the absence of a usable package.

CHAPTER 2 BACKGROUND

Two distinct, stand-alone software packages are involved in this project. Though the users indicated satisfaction with the software that documents materials used by the Department of Transportation in projects statewide (MISTIC) and the software used to generate contractor payment and track progress (ICORS), the age of the system and the restrictions imposed by the hardware and software involved deter addition of desirable elements and upgrade of capabilities. The restrictions of the languages and protocols of the original software packages make modifications cumbersome and/or impossible. The current system is reliable but is rapidly becoming unsupportable as hardware components become more scarce. With hardware/software of this vintage, a major concern is that the system will function until the occurrence of a major catastrophic failure that may not have a recovery path. Because it can be difficult or impossible to recover from major failures of this type of system, it is important that plans be made prior to a failure to ensure that plans are well thought out and not created in haste because the operation is at or near a halt. Uncertainty as to the longevity of the existing systems gives this project a sense of urgency.

2.1 THE MISTIC SYSTEM

The MISTIC system was developed in the 1970s to ensure that regulatory compliance for materials was properly documented. Though the existing system contains much of the information needed to prove compliance and even tracks trends in supplies from specific suppliers, facilities, or processes, the 1970s file architecture is cumbersome to use and difficult to expand or modify. Modernization of the system is fairly easy to justify. The current system is on borrowed time. A major failure would seriously jeopardize IDOT construction operations.

2.1.1 Data Access

The 3270-emulation data access lacks the intuitive look and feel of more modern systems. The easy inquiry that is routine on more modern database suites does not exist in this system, and access to data outside the existing inquiry set requires planning and effort to extract the data. Although some locations have developed processes to extract data to satellite systems and make the information available on a limited basis in formats more in line with current standard methodology, not all locations have this level of access. There is a strong set of legacy data that would provide invaluable information if it could be manipulated with less effort.

2.1.2 Maintenance

Maintenance tasks as simple as expanding the size of a field are a major project. These tasks require significant time not only to add or modify the field but also to ensure that this change is reflected through the library of reports, standard inquires, and analytical programs. In addition to the problems inherent in the tedious nature of maintenance tasks that make them unattractive to most programmers, the software used is no longer widely taught, making it difficult to locate proficient programmers. A secondary consideration is that the methodologies used with current programming suites almost negates the philosophies used with the earlier languages. As the population knowledgeable of the older approaches ages, this pool shrinks.

2.1.3 Expandability

Responding to changes in regulatory documentation requirements is difficult at best within the constraints of an aging system. Tracking additional factors requires major planning and a careful implementation process. Expanding the system is even more cumbersome than performing routine maintenance. Increasing the size of the data file can require complex scaling tasks as specific hard thresholds are reached and passed.

2.1.4 Staff Availability and Training

The language and methodology of the existing system are no longer in the standard tool set of programmers/analysts. Staff with appropriate skill sets to continue maintenance is extremely difficult to recruit. It is also hard to maintain this skill set because of the limited nature of the applicability in current operations. It is not uncommon for staff trained on more modern software products to resist having to “regress” and learn skills that have limited applicability outside the project in question. It is necessary to change programming mindsets completely when going from a purely procedural language like COBOL to item-object oriented languages like C++. This change can lead to lengthy debug processes to ensure that results are properly validated. As the capability of the programmers charged with maintenance diminishes, the sophistication of the system degrades.

2.1.5 Hardware/Software Availability

As older hardware becomes harder to obtain, complicated procedures to emulate older systems are often needed. These convoluted systems hamper performance and further restrict the ability of the system to be truly responsive. As the availability of platforms capable of hosting the software decreases, it will become more costly to maintain the system.

2.2 ICORS

The ICORS system was developed in the 1990s using Microsoft Access. Although Access allows ICORS to avoid some of the problems faced by MISTIC, it still imposes limitations. The staff has been adept at working around some of the inherent limitations in Access. Though ICORS is not as obvious a candidate for replacement, there are sufficient grounds to move to a more modern system.

2.2.1 Expandability

The Access database targets small to medium endeavors. Although it has a strong feature set, limitations make it more desirable for large enterprises to move to SQL or Oracle. Access was not designed to manage large quantities of information. In fact, in numerous applications distributed Access systems feed data to a large Oracle or SQL aggregator system.

2.2.2 Database Infrastructure

MS Access was not designed for a multi-user application. The multi-user interfaces do not provide robust transactional control. Future complex analysis using the Access base is cumbersome or requires moving data to a longer-term repository. To realize full utility of the

information contained in the lengthy history, a stronger database structure with more extensive analytical tools is needed.

2.2.3 Staff Availability

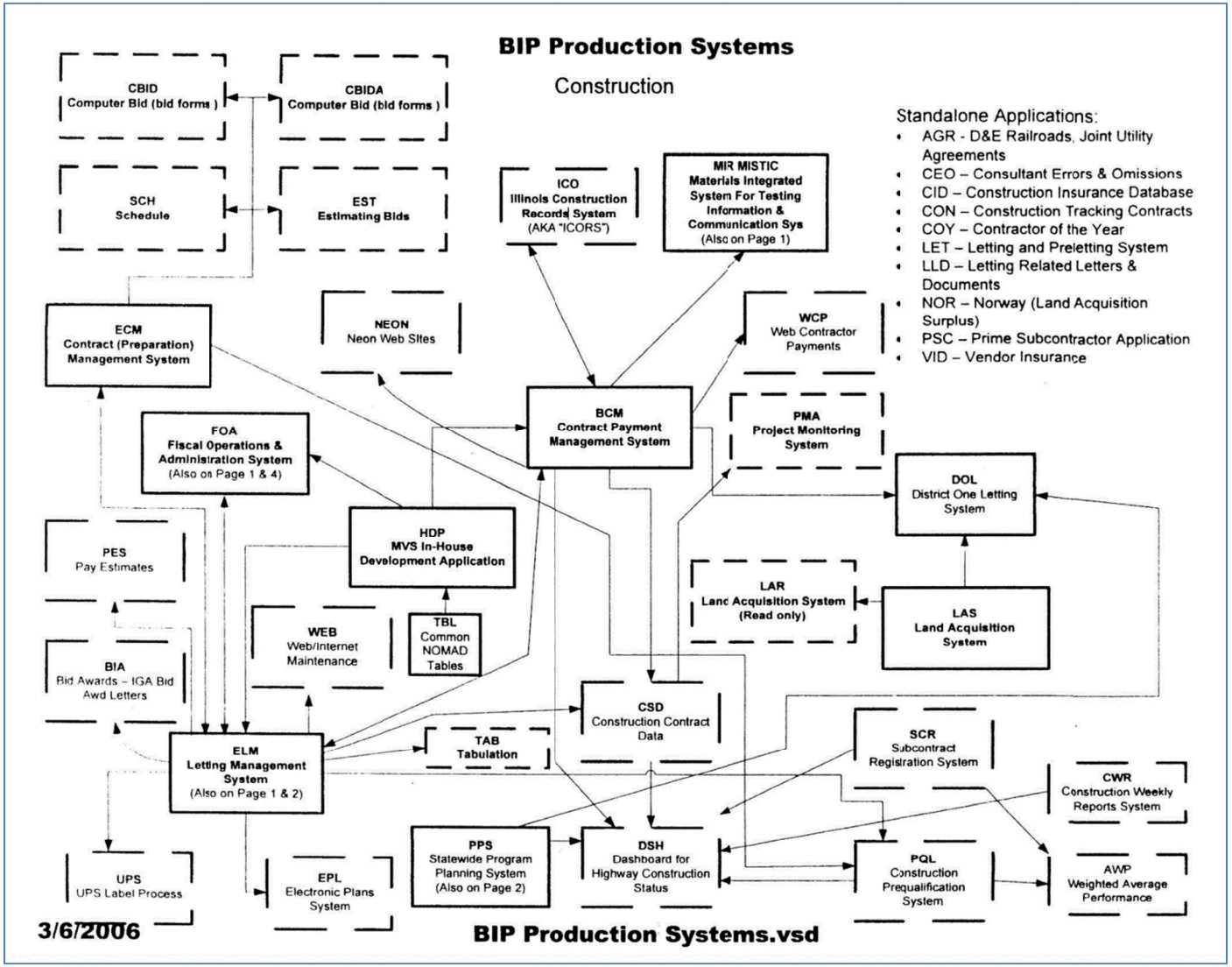
Because Access is standard with many of the Microsoft Office packages, the pool of programmers/analysts who have worked with Access is fairly large. However, the average depth of knowledge is not extensive. Most people use Access for a specific purpose, with a limited numbers of users. Though not as shallow as the pool of available COBOL programmers, the depth of the talent pool with strong, sophisticated Access knowledge is decidedly smaller than the pool of talent for products more widely used commercially.

2.3 INTERSYSTEM COMMUNICATION

Currently, many of the intersystem correlations are manual. Updating the system to a more modern platform would facilitate the communication between the two functions. As every interface is a custom interface because of the file structures and platforms involved, a new system would also address intersystem communication with existing and future systems. The level of application programming interfaces (APIs) with modern software packages provides reliability and ease of implementation not associated with older systems.

2.4 OTHER CONSIDERATIONS

Both MISTIC and ICORS have high acceptance among current users, but many of these users are facing retirement, and the newer users are more familiar with modern systems. Training future users will be affected by the type of system in place.


BIP Production Systems
Construction
Standalone Applications:
AGR - D&E Railroads, Joint Utility Agreements
CEO – Consultant Errors & Omissions
CID – Construction Insurance Database
CON – Construction Tracking Contracts
COY – Contractor of the Year
LET – Letting and Preletting System
LLD – Letting Related Letters & Documents
NOR – Norway (Land Acquisition Surplus)
PSC – Prime Subcontractor Application
VID – Vendor Insurance
CBID Computer Bid (bid forms)
CBIDA Computer Bid (bid forms)
SCH Schedule
EST Estimating Bids
ICO Illinois Construction Records System (AKA "ICORS")
MIR MISTIC Materials Integrated System For Testing Information & Communication Sys (Also on Page 1)
ECM Contract (Preparation) Management System
NEON Neon Web Sites
WCP Web Contractor Payments
BCM Contract Payment Management System
PMA Project Monitoring System
FOA Fiscal Operations & Administration System (Also on Page 1 & 4)
DOL District One Letting System
PES Pay Estimates
HDP MVS In-House Development Application
LAR Land Acquisition System (Read only)
LAS Land Acquisition System
WEB Web/Internet Maintenance
TBL Common NOMAD Tables
BIA Bid Awards – IGA Bid Awd Letters
CSD Construction Contract Data
SCR Subcontract Registration System
TAB Tabulation
ELM Letting Management System (Also on Page 1 & 2)
CWR Construction Weekly Reports System
PPS Statewide Program Planning System (Also on Page 2)
DSH Dashboard for Highway Construction Status
PQL Construction Prequalification System
AWP Weighted Average Performance
UPS UPS Label Process
EPL Electronic Plans System
3/6/2006
BIP Production Systems.vsd

CHAPTER 3 DEFINING USERS' REQUIREMENTS

The first step in assembling the catalog of packages to review was to determine whether the existing systems served all needs or if there were needs beyond the initially stated "communications." A wide range of users from both Springfield and district offices was consulted on optimum system characteristics. There was strong agreement across offices. Items desired are beyond the scope of the current systems. The ability to perform existing functions is a given. But there was also a strong desire to improve data flow, validation, and access to information while building an archive that would provide improved management data for future planning and decision making.

3.1 REAL TIME

The current batch system has a built-in lag for reporting and data availability. Error handling further adds to the time needed to ensure data is applied to the system. A replacement system should have information available in a more realistic time frame to improve flow among departments. The edits and validation should be in real time as well. The lag between data creation and its availability needs to be minimized to ensure full use of the information.

3.2 IMPROVED EDITING CAPABILITIES

Although some data edits and/or validations are programmed into the existing systems, they are relatively straightforward and generally limited to format edits. A real-time system can improve the quality of possible edits. More complex functions are easier to build into the system with modern software suites. The closer the error generation is to the point of entry, the easier it is to correct any problems and ensure clean data in the system.

3.3 EFFECTIVE USE OF STORED DATA

Over the past few decades, volumes of raw data have accumulated. Much valuable information lies buried in the records. Manipulating the data to bring that information to the fore is not a trivial task, given the storage characteristics of the data. To make decision support and planning information easier to generate, the data need to be in a modern structure with user-friendly analytic tools. A conversion and validation process will be necessary to bring the data into the new system. It is currently possible to access and manipulate the data, but the process does not lend itself to frequent use. Having raw data accessible by modeling programs and simulation software will make the information valuable for more than the occasional project. Planning, ordering, and research can be more efficient with solid data to work from.

3.4 ACCESS

Ease of access varies by location. Some offices have built work-arounds to improve access to the information, but these systems are not widely used statewide. It is desirable to provide high availability and ease of access to all personnel. Improved field access can make processes more efficient. Access to information by staff members who need to use it should be a major consideration not an afterthought.

3.5 TABLET AND SMARTPHONE ACCESS

As use of tablets and smartphones increases, their use in the field as an “entry” or “store and forward” device can reduce the transcription done by engineers on site. With the reduction or elimination of clerical personnel in the field offices, the transcription of notes and diary entries generally falls to the engineers. Allowing direct entry at the point of information collection will make these engineers more efficient and remove many chances for transcription error. Because communication capability is limited at some job sites, the device’s ability to retain the information and transfer it to the main system when communication is reestablished would be the most logical setup.

CHAPTER 4 CRITERIA DEVELOPMENT

To facilitate the review of software packages, we developed a checklist of desired properties that could be used to reduce the array of possibilities to a workable number.

4.1 IMPLEMENTATION MODEL

The data management models for large, complex data suites have evolved greatly since the original MISTIC and even the later ICORS were implemented. The most popular deployment models for the software packages were reviewed during this process. The system should be web-based, with a centralized database updated in real time. The ability of a proposed system to work on multiple platforms—desktop, laptop, tablet, and smartphone (desktop and laptop now, with migration to on-site mobile devices in the future)—will ensure that hardware costs will be phased in as equipment is rotated out and new technology is introduced.

4.2 COMPLEXITY RANGE

Illinois has hundreds of projects in various stages of completion at any given time. There is a great variance in the complexity of existing projects and those slated for the future. The software selected must be applicable to a wide range of project complexities, ranging from short, single-location projects to multi-year, multi-district projects. The ability to track a disparate range of projects easily without negatively impacting either end of the spectrum is critical to the success of the project.

4.3 INTEROPERABILITY

IDOT uses numerous programs and routines that are not specifically limited to IDOT use alone. They are used by numerous agencies and departments across Illinois. The current programs have programmatic connections to dozens of pieces of software that are not currently being considered for replacement. Even if modules were candidates for replacement, the fact that they are used across departments within the state precludes the adoption of an IDOT-only replacement. Although many states have segmented departmental software groups that allow a department to have completely specific software, the State of Illinois manages common functions across agencies and departments and segregates only those functions specific to a department or agency. The new system must interface with existing systems such as the Contract Management System (ECM), the Contract Payment Management System (BCM), and the Letting Management System (ELM) and have appropriate application program interfaces (APIs) or other software capability to facilitate future interfaces as needed. The ability of ICORS to communicate with MISTIC in real-time is needed to streamline the project-reporting process.

4.4 EXPANDABILITY

As new requirements are added, they must be easily incorporated into the existing software. The system should include both off-the-shelf standard reporting options and the ability to customize reports and functions, including the FHWA reporting for complying with federal funding requirements. It may also be desirable for IDOT have the ability to assume responsibility

for project accounting for counties and municipalities lacking expertise to effect a sophisticated funding system in order to ensure that project requirements are met.

4.5 SECURITY AND ACCOUNTABILITY

Access control by project and level of authority with definable read and update capability is the first level of required security. Multi-level approval authority is needed to ensure that approvals are issued at appropriate points. Comprehensive audit trails should be definable and standard. The approval system must match the detailed table of authorities for even the most complex projects.

4.6 DATA USABILITY

The system should provide straightforward, definable data input methods and a variety of data outputs—including real-time inquiry, formal reporting, and data extraction for porting to other systems. Data selection by user base is required to properly monitor systems and projects.

4.7 IMPLEMENTABLE

The system should have strong documentation and available training on a number of levels, from end-use to system administrator. The process should be straightforward and usable by staff with a wide range of experience levels.

4.8 SUPPORT

Reasonable support options must be available for possible implementations, from configuration to training to programming. The available support must be broad enough to handle unforeseen support situations that IDOT is not able to handle efficiently in a realistic time frame.

4.9 FIELD OFFICE REQUIREMENTS

The ability to handle the field diary, approvals and approvals review, materials, contract status, and work progress is required. Functions created in the field office to circumvent deficiencies in MISTIC and ICORS either should be available in the system as configured or a program extension be allowed to achieve the desired effect. An important goal is to minimize transcription by both engineers and clerical personnel.

4.10 PROJECT-FUNDING TRACKING

Because of the inability to automatically assign expenses to accounts based on the fund-accounting model used by the State of Illinois, previous attempts at replacing the system fell short. It is mandatory that any system be able to handle a varied mix of funding options without major manual intervention after the initial funding definition for a project.

CHAPTER 5 POSSIBLE OUTCOMES

There are six possible courses of action, with varying levels of IDOT action required:

1. Complete commercial package implementation—This option assumes that a commercial package can be implemented without modification or departmental interaction.
2. Configurable commercial package—This option assumes that a commercial package can be implemented with no programming changes but with populating tables and answering options. Although no programming is involved, some type of configuration program must be run.
3. Customizable commercial package—This option assumes that a commercial package allows for modification of source code to achieve the desired implementation.
4. Configurable/customizable package—This option assumes that both option tables and programming efforts are required to effect the required implementation.
5. Conversion package—This option assumes that existing programs will be converted to a web-based system in a modern language, preserving existing logic and methodology where not in conflict with coding conventions of the language selected.
6. Custom package—This option assumes that original code will be written to effect the desired implementation.

Summary of Required Levels of Involvement

Package Type	Programming Required	Configuration Required	IDOT/CMS Level of Effort	IDOT Control over Package
Complete	No	No	Low	Low*
Configurable	No	Yes	Medium	Medium
Customizable	Yes**	No	Medium to High	High
Configurable/customizable	Yes**	Yes	High	High
Conversion	Yes	TBD	High	High
Custom	Yes	TBD	Very High	High

*Any modifications to the complete package would be vendor created and done at the discretion of the selected vendor. This type of customization is the most expensive.

**In addition to the training involved in implementing the package, some type of additional training in the structure of the software and coding conventions would be required to modify the code adequately.

5.1 RECOMMENDED PATH

The configurable/customizable option is the most realistic option. Owing to the number and type of communications required with foreign systems, numerous interfaces will be required. Because some of these systems are State of Illinois custom systems, there may not be APIs and other software methods to facilitate integration. Though standard data import/export is desirable, it may not always be a realistic option in view of the types of systems in use.

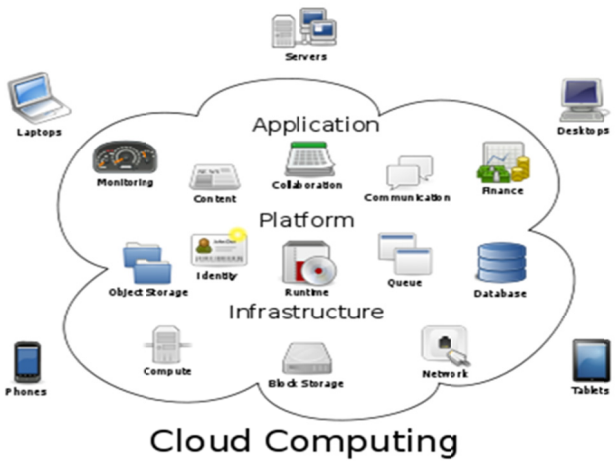
CHAPTER 6 DEPLOYMENT MODEL

There are five types of deployment models to consider. software as a service (SaaS), client–server, thin client, fat client, and a web-based hybrid of one or more of the four preceding types.

6.1 SOFTWARE AS A SERVICE (SaaS)

SaaS is a deployment method in which the data and associated software exist in the cloud (i.e., over the Internet), managed by an application service provider (ASP). Software is accessed via a web browser using a thin client and is a common delivery method that continues the centralized processing themes of the 1960s but moves it from a local mainframe to the cloud. Some SaaS models lack flexibility. Pricing models vary by company but include fees based on the number of users, hours used, number of transactions, amount of storage used, or a combination of these and other factors. SaaS applications are typically configurable, but the level of customization is tightly controlled and minimized. SaaS is most suited for software that is fairly consistent over the range of users and in cases for which a high level of customization is not required. Though it can be cheaper because the IT development and maintenance staff is shared with all users, pricing models that rely on per item pricing can quickly become more costly than fixed-price software. The client–server model of computing is a distributed application structure that partitions tasks or workloads between the providers of a resource or service, called servers, and service requesters, called clients. Often clients and servers communicate over a computer network on separate hardware, but both client and server may reside in the same system. A server host runs one or more server programs that share their resources with clients. A client does not share any of its resources but requests a server's content or service function. Clients therefore initiate communication sessions with servers that await incoming requests.

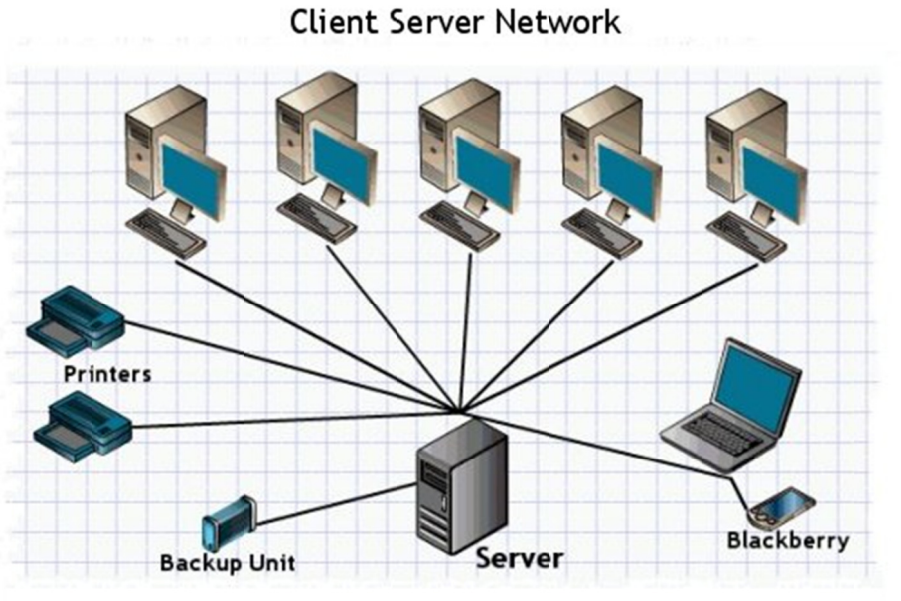
In a cloud computing environment, information is collected with minimal, if any, editing at distributed locations and transferred via the Internet to a server that performs the processing, storage, and reporting. All software and data reside permanently in the cloud—the offsite server or servers. This deployment model facilitates software upgrades, as only the main server is upgraded. Any changes required by the source systems are created on the cloud server and pushed to the remote client. Network reliability is mandatory for this deployment model.



6.2 CLIENT–SERVER

In the client–server deployment method, a distributed application structure partitions tasks or workloads between the providers of a resource, or a server, and service requesters, or clients. The members of the application communicate over a computer network that may be hard-wired,

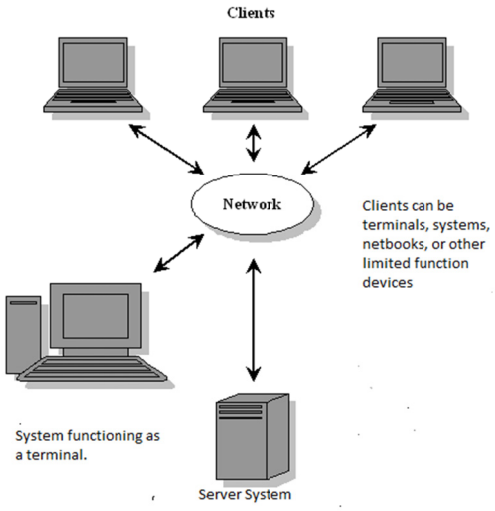
a local network, or on the Internet. Client and server may be on separate hardware sets, or, less commonly, both client and server may reside in the same system, as different concurrent functions. Servers are the hosts that run one or more processing programs and share resources with clients. Clients do not share their resources, and some implementations may have limited processing on the client. Clients may use their own resources and also request server content, functions, or resources by requesting communication sessions with waiting servers. Servers also perform such accumulation, aggregation, and other combining functions not in conjunction with an active connection to a client. In client–server deployments, clients do not communicate with each other (peer to peer) but only through the server.



In client–server operations, remote sites communicate with a central system. The amount of processing performed at a client varies based on the deployment submodel and can be “thin client” or “fat client.” This designation refers directly to the amount of computing done by the client system. It can vary from the system treating the client as a “dumb terminal,” in which once the communications link is established all computation occurs at the server end, to treating the client as a fully functioning system capable of performing all functions.

6.2.1 Thin Client

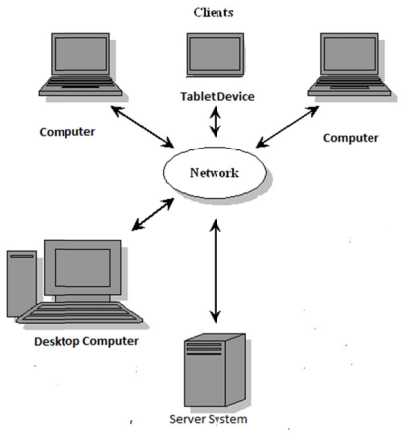
Thin client is a deployment method in which the client computers are connected to a computer that performs most of the processing and stores the data. Levels of thin client configuration vary, based on the location and the complexity of the input equipment. Thin clients have their roots in mainframe systems, and limited smart devices such as tablets, smartphones, and netbooks have made thin client computing attractive again. Results of processes may be displayed on the client, but the client functions as a predominately passive device.



The thin client model assumes minimal equipment at the user end and maximal computing power at the server. The access method may be via a notebook, tablet, dumb terminal, Chromebook, or any other device capable of establishing a connection and passing data input via scanner, keyboard, or other device.

6.2.2. Fat Client

Fat client is a deployment method in which the bulk of the computing power rests with the client; and processed information is transferred to the main server for storage, aggregation and report generation. Client preprocessing at point of service requires a more robust computing unit but decreases the demand on the connection medium. Distributed processing is a deployment method in which computation activity resides on systems that are linked via a network. Rather than requesting resources from the server, distributed processors perform virtually all of the computational actions, although they may transfer the completed work product to a single site for aggregation. Distributed systems may allow peer-to-peer communication. Distributed processing at its limit minimizes the risk of a single point of failure crippling the operation.



6.3 HYBRID SYSTEM

A hybrid approach flexible enough to handle a wide range of participating architectures is the most desirable option. Intelligent systems that can perform some local editing and store information when a connection to the server cannot be readily established are desired for site work, as communications may be severely limited. The ability to communicate and interact seamlessly ensures that current edits are applied on a uniform basis. A robust server with the capacity to communicate with multiple types of clients provides the best solution. Software that can communicate and switch to “store and forward” as needed provides the best solution. Software as a service is not currently priced to accommodate large, complex systems. Ongoing customization could easily price the system beyond projected budget limitations.

CHAPTER 7 METHODOLOGY

In addition to the software packages included in the original documentation of the project, we undertook an extensive search for and review of available products. Software use by other state agencies and large municipalities was identified. Searches of software directories supplemented agency information. Almost 100 different packages were identified. After a robust list was developed, elimination passes brought the list down to a workable number. The website for each vendor/package was reviewed and the capabilities noted. A basic dataset of specific information was extracted from datasheets and websites. The information was used to simplify further review of the packages.

7.1 CONSIDERATIONS

- Most software as a service (SaaS) packages were eliminated because of the pricing models.
- Packages with limited concurrent access were eliminated.
- Packages that did not afford programming options or have sufficiently robust APIs were eliminated because of the requirement to interface to the existing system.
- Packages without multi-level security were eliminated.
- Packages with restricted numbers of available reports were eliminated.
- Packages with limited capabilities (thereby necessitating multiple vendors to effect the required results) were eliminated.
- Not all vendors contacted provided responses or had websites that contained information sufficient for analysis.

CHAPTER 8 PACKAGES REVIEWED

The following packages were reviewed to determine their applicability.

4Projects Online Construction Management Software (4projects.com)

Functions: Project management, estimating, accounting, service management

AASHTOWare Project, Project PreConstruction, SiteManager, Construction Manager, Decision Support and Historical Database, Lab Manager (cloverleaf.net)

Functions: Project management, construction management, laboratory management, estimating, accounting,

AccuBuild Construction Project Management Construction Accounting, Job Cost Accounting, Document Management Construction Management Software (accu-build.com)

Functions: Project management, accounting, service management

Aconex Online Construction Management Software (aconex.com)

Function: Project management

ARES PRISM G2 Construction Management Software (aresprism.com)

Functions: Project management, accounting

AutoCAD Design Suite Construction Management Software (usa.autodesk.com)

Function: Estimating

Axium Ajera Online Construction Management Software (axium.com)

Functions: Project management, accounting

B2W Software ONE Construction Management Software (b2wsoftware.com)

Functions: Project management, estimating, accounting, service management

Base Builders Praesto AE Construction Management Software (basebuilders.com)

Functions: Project management, accounting

Bid4Build Digital TakeOff, Enterprise Estimating Construction Management Software (bid4build.com)

Functions: Project management, estimating

BrickControl Construction Management Software (brickcontrol.com)

Functions: Project management, estimating, accounting, service management

Builder WorkBench TREND Online Construction Management Software (builderworkbench.com)

Function: Project management

BuilderMT Workflow Management Suite Construction Management Software (buildermt.com)

Functions: Project management, estimating, accounting

BuildLinks Online Construction Management Software (buildlinks.com)

Functions: Project management, estimating, accounting, service management

BuildStar Technologies Online Construction Management Software (buildstar.com)

Functions: Project management, estimating, accounting, service management

BuildTools Construction Management Platform Online Construction Management Software (buildtools.com)

Functions: Project management, estimating, accounting, service management

BuildTopia BTBuilder Online Construction Management Software (buildtopia.com)

Functions: Project management, estimating, accounting, service management

CapitalSoft CapEx Manager Online Construction Management Software (capitalsoft.com)

Functions: Project management, estimating, accounting, service management

Carlson Takeoff, Grade Supervisor Construction Management Software (carlsonsw.com)

Functions: Project management, estimating, accounting

CMiC Open Enterprise v10x, xProjects Online Construction Management Software (cmicglobal.com)

Functions: Project management, estimating, accounting, service management

CMIS Online Construction Management Software (eclsoftware.com)

Functions: Project management, estimating, accounting

Co-construct Online Construction Management Software (co-construct.com)

Function: Project management

COINS Online Construction Management Software (coins-global.com)

Functions: Project management, estimating, service management

Compusource Ascente Construction Management Software (servicecontractorsoftware.com)

Functions: Project management, accounting, service management

ComputerEase Construction Project Management, Construction Accounting, FieldEase, Estimating Online Construction Management Software (construction-software.com)

Functions: Project management, estimating, accounting, service management

Computer Guidance Business Intelligence software, Construction Operations & Project Management Online Construction Management Software (computerguidance.com)

Functions: Project management, estimating, accounting, service management

CompuTool Online Construction Management Software (computool.com)

Functions: Project management, estimating, accounting, service management

Constellation NEWSTAR Construction Management Software (constellationhb.com)

Functions: Project management, estimating, accounting, service management

Construction Partner Construction Management Software (constructionpartner.com)

Functions: Project management, estimating, accounting

Coreworx Online Construction Management Software (coreworx.com)

Functions: Project management, accounting

Cosential Online Construction Management Software (cosential.com)

Function: Accounting

cProject Construction Collaboration Software Construction Management Software (cproject.com)

Function: Project management

Deltek Vision Construction Management Software (deltek.com)

Functions: Project management, accounting

Docunet Online Construction Management Software (docunetonline.com)

Function: Project management

EADOC Online Construction Management Software (eadocsoftware.com)

Functions: Project management, estimating, accounting

e-Builder Enterprise Online Construction Management Software (e-builder.net)

Functions: Project management, estimating, accounting

eTEK Construction Systems Online Construction Management Software (etek.com)

Functions: Project management, estimating, accounting, service management

eTransmittal Online Construction Management Software (etransmittal.com)

Functions: Project management, estimating

Expesite VisionPM, Vision MM Online Construction Management Software (expesite.com)

Functions: Project management, service management

FastTrack Schedule Construction Management Software (aecsoftware.com)

Function: Project management

FieldOne Sky Online Construction Management Software (fieldone.com)

Functions: Project management, accounting, service management

Foundation for Windows Online Construction Management Software (foundationsoft.com)

Functions: Project management, accounting, service management

GALA Construction Management Software (gala-construction-software.com)

Functions: Project management, estimating, accounting, service management

GATOR Information Technologies Acteo Online Construction Management Software (gatorit.com)

Functions: Project management, accounting

GroupLink ContactWise CRM Online Construction Management Software (grouplink.com)

Functions: Project management, service management

HCSS Heavy Bid, Heavy Job Construction, GPS, Dispatcher, FuelerPlus, Build 360 Management Software (hcss.com)

Functions: Estimating, project management, accounting

HD Project Cost Management Construction Management Software (harddollar.com)

Functions: Project management, estimating, accounting

HomeFront Management Tool Kit Online Construction Management Software (homefront-software.com)

Functions: Project management, estimating, accounting

IPD Software (ExeVision Consulting) iPDweb, iCXweb (ipdsoftware.com)

Functions: Project management, construction management, bidding

IPM Project Management Construction Management Software (ipmglobal.net)

Functions: Project management, accounting

Maestro ERP Construction Management Software (maestro.ca)

Functions: Project management, estimating, accounting, service management

Marathon System Services eCaliper Construction Management Software (marasys.com)

Functions: Project management, estimating, accounting

Maxwell Systems ProContractorMX, Systems Estimation, Estimating, Accounting and Project Management, Systems Management Suite, StreetSmarts Online Construction Management Software (maxwellsystems.com)

Functions: Estimating, project management, accounting

McCormick WIN 4000 Construction Management Software (mccormicksys.com)

Functions: Project management, estimating, accounting, service management

MeasurePlans.com Construction Management Software (measureplans.com)

Function: Estimating

Microsoft Dynamics SL Online Construction Management Software (microsoft.com)

Functions: Project management, accounting, service management

MSI Data Service Pro Online Construction Management Software (serviceprointl.com)

Functions: Project management, estimating, accounting, service management

Newforma Project Analyzer, Project Center, Project Cloud Online Construction Management Software (newforma.com)

Functions: Project management, estimating, accounting, service management

Omega Pims Online Construction Management Software (pims.omega.no)

Functions: Project management, accounting, service management

On Center Software Quick Bid, Digital Production Control, On-Screen Takeoff Construction Management Software (oncenter.com)

Functions: Project management, estimating, accounting, service management

PENTA Construction ERP Software Construction Management Software (penta.com)

Functions: Project management, estimating, accounting, service management

PMWeb Online Construction Management Software (pmweb.com)

Functions: Project management, estimating, accounting, service management

Primavera Contract Management, Primavera Unifier, P6Professional Project Management Construction Management Software (oracle.com)

Functions: Project management, accounting

Procore Construction Management Software (procore.com)

Functions: Project management, estimating, accounting, service management

ProEst Estimating Software Construction Management Software (proest.com)

Functions: Project management, estimating

Project Drive Online Construction Management Software (project-drive.net)

Function: Project management

Project Insight Workgroup Edition Online Construction Management Software (projectinsight.net)

Functions: Project management, estimating, accounting, service management

Projectmates Online Construction Management Software (projectmates.com)

Functions: Project management, accounting

ProjecTools Online Construction Management Software (projectools.com)

Functions: Project management, accounting

Project-SalesAchiever Construction Management Software (constructioncrm.com)

Functions: Project management, estimating, service management

Proliance Online Construction Management Software (meridiansystems.com)

Functions: Project management, estimating, service management

Sage 300 Construction and Real Estate Construction Management Software (na.sage.com)

Functions: Project management, estimating, accounting, service management

SalesBuilder Professional Construction Management Software (csgsoftware.com)

Functions: Project management, estimating, accounting, service management

SmartContractor Construction Management Software (smartcontractor.com)

Functions: Project management, estimating, accounting, service management

Software Advice BidTracer Construction Bid Management Software Online Construction Management Software (bidtracer.com)

Functions: Project management, estimating

Solutions360 Construction Management Software
(solutions360.com)

Functions: Project management, estimating, accounting, service management

Spitfire Project Management System Online Construction Management Software
(spitfiremanagement.com)

Functions: Project management, accounting

STRUCTURE Construction Management Software
(cfdatasystems.com)

Functions: Project management, accounting, service management

Synergy Software Systems Aurigo BRIX Online Construction Management Software
(synergy-software.com)

Functions: Project management, estimating, accounting

TracTime Construction Management Software
(tractime.com)

Functions: Project management, estimating, accounting, service management

Trimble AutoBid SheetMetal, ConstructJob, Accubid Enterprise Estimating,
Accubid Classic Estimating All Trak, AutoBid Mechanical, Meridian Prolog
Construction Management Software
(mep.trimble.com)

Functions: Project management, estimating, service management

TurboBid Construction Estimating Software Online Construction Management Software
(turbobid.net)

Functions: Project management, estimating, accounting, service management

Viewpoint Online Construction Management Software
(viewpointcs.com)

Functions: Project management, estimating

Vision InfoSoft Plumbing Bid Manager, InfoSoft Electrical Bid Manager Pro,
Plus Construction Management Software
(visioninfosoft.com)

Functions: Project management, estimating, accounting

VPO Virtual Project Office Online Construction Management Software
(simplexgroup.com)

Function: Project management

WinEst Construction Management Software
(meridiansystems.com)

Functions: Project management, estimating, accounting

CHAPTER 9 BEST-FIT SELECTIONS

After review the websites and datasheets of the software packages listed in Chapter 8, we narrowed the list to three packages. The majority of the packages removed from consideration lacked the ability to scale to the level required by the State of Illinois's construction projects. Either the number of concurrent sessions was limited, or the reporting was limited. Most of the SaaS packages had pricing per seat and per storage amount and were not easily modifiable. While software developed by and for the state of Utah had some desirable features, the lack of response to inquiries raised support questions and led to their elimination.

The three selections that most closely approximated the requirements put forth by IDOT were e-Builder, Primavera, and AASHTOWare Project.

9.1 e-BUILDER

Though e-Builder had the required functionality to handle the contracts portion of the requirements, no materials management was available, and that capability was not listed as a near-future modification. The package had communications utilities to allow the movement of data. The software was configurable, but any changes to functionality would be costed and custom-programmed. Custom software was recommended to be external to the system and use the import/export libraries. e-Builder is used locally by the Chicago Transit Authority (CTA) and Illinois State Toll Highway Authority (ISTHA). The software is a custom implementation of a suite that crosses industries. e-Builder has predefined interfaces with Oracle Primavera to provide capabilities that e-Builder does not have.

9.2 PRIMAVERA

The Oracle Primavera Suite addresses contract management, project management, portfolio management, timekeeping, risk analysis, and decision support. Primavera was developed by an Oracle-certified software developer. Oracle provides a wide range of training and implementation products. The software can be installed on site or to an environment hosted by Prescient Solutions Group, an Oracle partner, as an SaaS implementation. Current offerings do not completely address the material requirement.

9.3 AASHTOWARE PROJECT

AASHTOWare Project has been optimized for the construction management at the state or large-agency level. The next revision of the Project construction and materials modules, due for release in December 2014, will provide functionality needed to manage contract data integrating field data collection, administration of contract, contractor payments, and materials management. The laboratory information module will integrate material and lab administration to provide sampling and laboratory workflow management.

CHAPTER 10 RECOMMENDATION

Based on the closest adherence to the review criteria, the AASHTOWare Project modules provide the best fit. Although the software will not be available for implementation until the end of the year, the specifications are set and the product is finishing alpha testing, with beta testing scheduled for May. The December time frame is well within the time needed for IDOT to plan, and implement any conversion.

10.1 DETAILED CRITERIA REVIEW

10.1.1 Implementation Model

AASHTOWare Project software is implemented as a client–server system. A list of compatible hardware is maintained on the www.cloverleaf.net website so that users can obtain compatible and tested hardware and software on their in-force vendor contracts. In addition to the AASHTOWare software, an Oracle, My SQL, or DB2 database is needed to host the data. The tablet/smartphone accessibility will be part of the upcoming release.

10.1.2 Complexity Range

The AASHTOWare software has been designed specifically to handle infrastructure construction. Appropriate editing and reporting capabilities are already part of the package, and additional reporting is possible via configuration. Data extraction is also available to move information into external packages for even more extensive analysis and reporting.

10.1.3 Interoperability

The communication between the material functions and the contract/project management modules is part of the functionality of the Project package. Should IDOT not elect to implement all of the available project modules, there are import–export capabilities to allow porting of data.

10.1.4 Expandability

Because AASHTO is closely aligned with FHWA and the majority of states are either using the current Project package or in the process of planning to implement the upgrade, the product will keep pace with federal requirements. After considering federal directives, the user community provides input on the direction of the product development. Any user can request specialized programming. If a significant number of users find merit in the request, it will be incorporated into the product.

10.1.5 Security and Accountability

Data is controlled and accessed via a definable security structure in accordance with federal guidelines. Permissions, approvals, and other authorities are in accordance with accepted federal approval guidelines.

10.1.6 Data Usability

Reports can be accepted from a standard package or configured per user requirements. Data can also be extracted from the system and ported to another system for inclusion with non-Project data. Data analysis and decision support packages can be implemented at a later date, should more sophisticated data analysis be desired.

10.1.7 Implementable

The system has extensive documentation and guidelines for implementation. Because the majority of the states already uses or plans to use all or part of the software, there is a large, knowledgeable user community. A full set of standards and guidelines is available on the AASHTOWare website (http://www.aashtoware.org). This includes templates and checklists for implementation.

10.1.8 Support

In addition to support from InfoTech, the contracted software developer for AASHTOWare, there is an active user community. The community addresses new developments in infrastructure construction management and sets the direction for the product—as long as it is not in conflict with federal guidelines. Various specific interest items are distributed to subcommittees for review, analysis, and final disposition.

10.1.9 Field Office Requirements

Because this package is optimized for infrastructure construction management, the needs of field engineers, central office, laboratory, and construction have all been accounted for in an integrated fashion. The ability to replace much of the paper with tablet-generated records will simplify site record keeping. Transferring data from one medium to another will no longer require manual intervention. A single entry into the tablet will record the information. This approach will be a better use of engineer time and eliminate the problems of deciphering handwriting in those areas where clerical assistance is available. The entry and review of data at the source will improve the quality of the data and can eliminate costly backtracking necessary as a result of smudged or illegible handwriting.

10.1.10 Civil Rights and Labor Module

Though not within the original scope of the project, the need for a strong labor module has recently been identified. The AASHTOWare Project Civil Rights and Labor module is a web-based system that facilitates the compliance burden for both agencies and contractors by processing all data required to administer external compliance efficiently. The software has the capability to process contractor payrolls, wage decisions, disadvantaged business enterprise (DBE) certification and commitments, vendor data management, tracking of on-the-job trainees, and more. Tools for formatting Extensible Markup Language (XML) files for import into the software are also available. The module handles both contractor and agency compliance information so that a complete labor analysis is available. This module is deployed in conjunction with the Preconstruction module. The Preconstruction module is the point at which funding is defined, therefore funding and compliance can be tied together.

10.1.11 Tracking of Project Funding

Structure of Fund Component Record

Id	Type	Label
FundPackageId	key	Fund Package ID
RefFundId	key	Fund ID
Priority	number(2)	Priority
Description	char	Description
Percentage	number(7,4)	Percentage
Limit	number(14,2)	Fund Limit
Type	char	Fund Type
AccountingFund	char	Accounting Fund
FundingGroup	char	Funding Group

When setting up funding, you can set priorities to identify which funds are used first, second third, etc. Within each priority, you can have as many funds as you like, setting a percentage for that fund. The percentages within a priority must add up to 100%. Multiple priorities are allowed, and each priority has a unique funding definition within that specific level of funding.

If funds are limited, you can set a dollar (not percentage) limit. If a limit is reached, the funds roll to the next priority.

A fairly common funding allocation would be state and federal funding, and a municipality that agrees to pay up to a certain amount. Once that designated amount has been reached, the funds go back to state and federal funding (or some other funding).

Example

Priority 1 Funds
State 10%
Federal 75%
Municipal 15% with a $12,000 limit.

Priority 2 Funds
State 20%
Federal 80%

These two priorities would be in a single fund package (the shell).

As payment is made on items with this fund package, once the $12,000 limit is reached for the municipal funds (which means $60,000 has been paid on the federal fund and $8,000 on the

state fund—a 10/75/15 percentage split), then funding will roll to priority 2 funds; and the next payments would use the funds and percentages of that priority.

Each fund package can have up to 99 funding priorities.

The discussions on the current method of funding indicated that because of change orders, funding sources can be underutilized. By identifying charges allowable for each source or type of funding, an item can be given a hierarchy and percentage of use, which can be associated with an individual fund. Because items in change orders would also be coded based on funding scheme, the allocations would be dynamically calculated. That is, each item would have a participating fund, percentage of participation of that fund, fund use order, and fund cap. As each item is charged, it would be tested for participation, then order, then cap attainment, then the percentage would be applied. This approach should prevent accidentally redistributing participating because of change orders that have a mix of participation that alters the original distribution.

10.1.12 De Facto Standard

Currently, 46 states and the District of Columbia have either implemented modules in the current release or are in the process of implementing the new release. At the time of the review, 28 states were using the project management software. Though a specific number was not stated, the addition of several states with the December release was indicated. Because of this critical mass, it is safe to assume that FHWA reporting will be standardized in the project and could even progress to electronic reporting initiated in software routines after review and approval. With all of the states adjacent to Illinois using this system, there will be no shortage of states to consult on implementation, use, training, and other operational topics. Illinois participates in the Lake Michigan Interstate Gateway Alliance (LMIGA) and the Great Lakes Region Transportation Operations Coalition (GLRTOC) and has numerous technical contacts already established that can be leveraged for optimizing implementation. No other package reviewed had state-level infrastructure community penetration comparable to the AASHTOWare.

10.1.13 Participation in Development Process

AASHTO users may participate in a full range of committees to ensure their interests are addressed. These committees address changes in the operation of the marketplace, advances in technology, regulatory requirements, and other topics of general concern. Items that transcend state boundaries may be incorporated into the software suite. If a user determines a software modification is desired to streamline their process or comply with local regulations, it is possible to present the specifications to the appropriate committee to determine whether the proposed modification has wider interest. If there is wide acceptance, the modification would be added to the base software suite. If interest does not exist beyond the state, the state would have the option to fund the change.

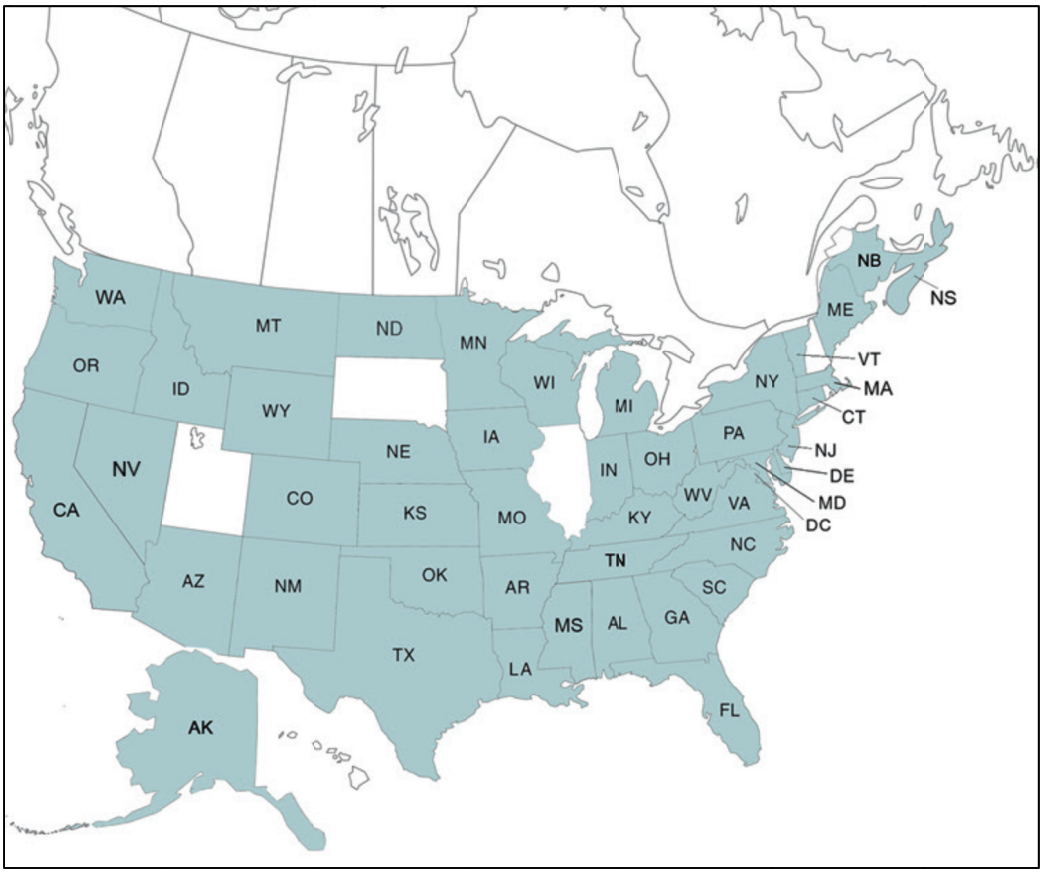
Committees are designated for a number of diverse topics:

- Special Committee on Joint Development
- Special Committee on Transportation Security and Emergency Management
- Standing Committee on Aviation

- Standing Committee on the Environment
- Standing Committee on Finance and Administration
- Subcommittee on Civil Rights
- Subcommittee on Fiscal Management and Accounting
- Subcommittee on Information Systems
- Subcommittee on Internal and External Audit
- Subcommittee on Personnel and Human Resources
- Special Committee on Transportation and Civil Engineering (TRAC)
- Subcommittee on Transportation Communications
- Subcommittee on Transportation Finance Policy
- Standing Committee on Highway Traffic Safety
- Subcommittee on Safety Management
- AASHTO Strategic Highway Safety Plan
- Standing Committee on Highways
- Subcommittee on Bridges and Structures
- Subcommittee on Construction
- Subcommittee on Design
- Subcommittee on Highway Transport
- Subcommittee on Maintenance
- Subcommittee on Materials
- Subcommittee on Right-of-Way and Utilities
- Subcommittee on Systems Operation and Management
- Subcommittee on Traffic Engineering
- National Committee on Uniform Traffic Control Devices
- National Transportation Product Evaluation Program (NTPEP) Oversight Committee
- Special Committee on U.S. Route Numbering
- Special Committee on Wireless Communications Technology
- Technology Implementation Group
- Standing Committee on Performance Management
- Subcommittee on Organizational Management
- Standing Committee on Planning
- Subcommittee on Asset Management
- Task Force on Capacity Building

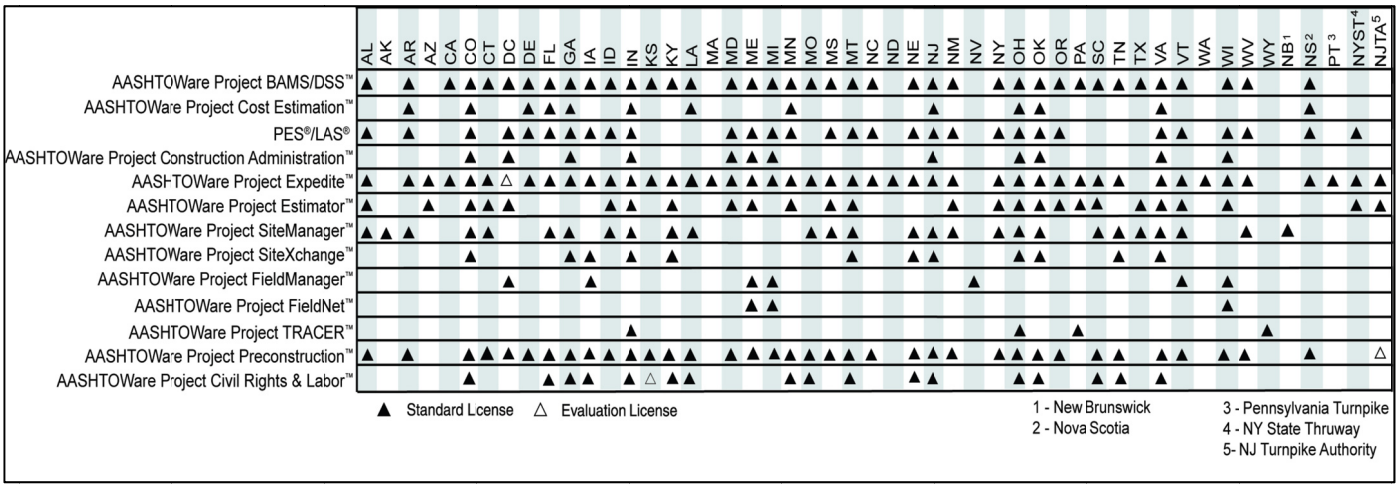
- Subcommittee on Data
- Subcommittee on Policy
- Subcommittee on Research
- Census Transportation Planning Products Program (CTPP)
- Standing Committee on Public Transportation
- Multi-State Technical Assistance Program (MTAP)
- Standing Committee on Rail Transportation
- Standing Committee on Research
- Research Advisory Committee
- Standing Committee on Water Transportation

Because of the wide use of the AASHTOWare Project modules, there are users' group meetings and publications to provide the benefit of shared experiences. The dedicated website for the Project experience is https://www.cloverleaf.net.



Licensing of AASHTOWare components by state as of December 2013.

Annual fees and licensing options (according to InfoTech, although pricing for 2015 has not been announced, any increase would likely be in the 3% to 5% range).



10.1.14 Pricing

Pricing is based on the modules selected and the number of users anticipated. These software fees are for only the AASHTO software and do not include costs for the Windows server or the database management system. License fees are paid annually.

10.1.14.1 AASHTOWare Project Site License

An annual site license is available to any agency/organization desiring to license all the following AASHTOWare Project modules: Cost Estimation, PES/LAS or Preconstruction, Construction Administration, BAMS/DSS, Civil Rights and Labor, SiteManager, SiteXchange, Expedite, and the worksheet. The Estimator and FieldNet modules, as well as the FieldManager Suite, are *not* included in this site license.

Description	Annual License
AASHTOWare Project site license; unlimited use	$412,000

Note: The BAMS/DSS module is available only to AASHTO members and associate/international members.

10.1.14.2 Annual License Fees by Module

Annual fees for the AASHTOWare Project BAMS/DSS, Cost Estimation, Preconstruction, Construction Administration, Expedite, SiteManager, SiteXchange, and Civil Rights and Labor modules are as follows:

Module	Annual License Fee[5]	Other Suggested Modules
AASHTOWare Project BAMS/DSS[1]	$67,000	
AASHTOWare Project Cost Estimation[4]	$51,500	BAMS/DSS
PES/LAS[2,4]	$51,500	BAMS/DSS
AASHTOWare Project Worksheet[3]	$8,500	PES/LAS or Preconstruction and BAMS/DSS
AASHTOWare Project Contract Administration	$51,500	PES/LAS or Preconstruction and BAMS/DSS
AASHTOWare Project Expedite	$17,000	
AASHTOWare Project SiteManager[4]	$200,500	
AASHTOWare Project SiteXchange	$17,000	SiteManager
AASHTOWare Project Preconstruction[6]	$41,250	
AASHTOWare Project Civil Rights and Labor[7]	$41,250	Preconstruction

Notes

1. BAMS/DSS is available to AASHTO members and associate/international members only. There is no additional fee for the BAMS/DSS workstation option.

2.Because of the complementary nature of PES and LAS, these modules must be licensed together.

3. A single copy of Project Worksheet is included at no additional cost with PES/LAS and with Preconstruction. Agencies acquiring an additional license may provide copies for consultant and contractor use. However, the agencies are responsible for (1) distributing copies of Project Worksheet software, including copying and distributing user documentation as needed to contractors and/or consultants; (2) maintaining a list of contractors/consultants to whom the agency distributes the Project Worksheet software; (3) acting as the single point of contact for all contractor and/or consultant software support inquiries (Such inquiries may be forwarded by the agency to InfoTech for resolution, with responses coming back to the agency.); and (4) protecting AASHTO's proprietary rights associated with the Project Worksheet software product.

4. The PES, LAS, Cost Estimation, and SiteManager licenses are intended for use by all client implementations configured by the licensee to communicate to the corporate database server(s) under the direct technical and administrative control of the licensee.

5. If any individual module is to be initially installed during the license year, the module fee may be prorated for the remaining months in that licensing year only. (All subsequent licensing of previously installed modules is for the full year and will not be prorated for a partial year.)

6. If requested, Preconstruction may be obtained at no additional cost with the licensing of the PES/LAS module.

7. Because of the nature of the software, Civil Rights and Labor is only licensed with Preconstruction.

10.1.14.3 Annual License Fees for Modules, Based on Copy Quantity

AASHTOWare Project Estimator has the following fee structure:

AASHTOWare Project Estimator	Annual License Fee
1–15 copies (each copy)	$1,275
16–20 copies	$21,000
21–30 copies	$28,000
31–40 copies	$33,800
41–50 copies	$38,200
51–60 copies	$42,600
Site license*	$47,100

Note: The above figures are annual fees. The total amount varies depending upon the number of workstations licensed. If AASHTOWare Project Estimator is installed on any additional workstations during the license year, the annual fee for the additional workstations will be prorated for the remaining months of the license year (July 1–June 30). This proration applies to only the initial installation of AASHTOWare Project Estimator. These license fees include support and maintenance by InfoTech consistent with AASHTOWare products.

*****Agencies holding a site license for AASHTOWare Project Estimator may, with no additional license fee, extend their site license to their local governments for projects in which federal money is involved and for which the agency has oversight responsibilities. This exception does not apply to consultants who are doing design work for the agency or to local governments that are doing their own non-federal projects. Consultants (and local agencies doing non-federal projects) must purchase their own AASHTOWare Project Estimator license at the special reduced license fee available on the InfoTech, Inc., website: www.infotechfl.com.

Pricing for AASHTOWare Project FieldManager is calculated on either a “per copy” or “per site” license basis. AASHTOWare Project FieldManager has the following fee structure:

AASHTOWare Project FieldManager Suite (FieldManager and FieldBuilder Components Only)	Annual License Fees
Each installed copy	$3,100
Each installed copy of FieldBook	$925
Site license (all FieldManager components)	
1–15 users	$15,700
16–30 users	$26,200
31–50 users	$39,300
51–300 users	$78,600
301–800 users	$118,100
More than 800 users	$157,400

Note: These AASHTOWare Project FieldManager licenses are intended to cover only actual employees of the licensing agency. Consultants and other agencies (i.e., cities and counties) doing work for a licensing agency are not covered under this type of license agreement. Agencies wishing to cover (in addition to their own employees) consultants working directly under their control or local governments administering state-let, state-paid contracts should use the AASHTOWare Project FieldManager extended license option detailed below instead of this option.

10.1.14.4 AASHTOWare Project FieldManager Extended License

The AASHTOWare Project FieldManager extended license is intended for member agencies wishing to cover not only their own employees but also consultants working directly under their control (for example, as field inspectors) and/or local governments administering state-let, state-paid contracts under their license agreement. Agencies acquiring an extended license may provide copies of the software to their consultant workforce and local governments and are responsible for the following:

- Distributing copies of the AASHTOWare Project FieldManager software, including copying and distributing user documentation, as needed, to consultants and local agencies;
- Maintaining a list of consultants and local agencies to which the agency distributes the AASHTOWare Project FieldManager software (including any of its components);
- Acting as the single point of contact for all consultant and local agency software support inquiries. Inquiries that are clearly beyond the normal technical expertise of the agency may be forwarded by the agency to InfoTech for resolution, with responses going back to the agency. In accordance with standard AASHTO policy, the agency will identify a maximum of four people authorized to contact InfoTech with support requests;
- Ensuring that FieldBuilder is not provided to anyone outside the state agency. Because the intent of this license is to allow performance of work on state-let, state-paid contracts only, consultants and local governments wishing to use AASHTOWare Project FieldManager (or any of its components) for accomplishing work on their own projects must purchase their own, separate licenses to do this; and
- Recovering all copies of the AASHTOWare Project FieldManager software and documentation from all consultants and local agencies whenever appropriate: for example, upon termination of service and/or consulting agreement under which the distribution of the software was initiated.

Thus, member agencies now have two options available to them to provide access to the AASHTOWare Project FieldManager software to their consultant work force (project managers, field inspectors, etc.) and/or their local government agencies administering state-let, state-paid contracts:

- Purchase this extended license for the appropriate number of anticipated total users (state employees, consultant work force, and local government employees); or
- Continue to require their consultants and locals to purchase their own copies of the software directly from InfoTech. In the latter case, technical and administrative support will be available from InfoTech.

The AASHTOWare Project FieldManager extended license has the following fee structure:

FieldManager Suite (All FieldManager Components Except FieldBuilder)	Annual License Fees
1–15 users	$24,200
16–30 users	$36,700
31–50 users	$55,800
51–300 users	$103,00
301–800 users	$150,800
More than 800 users	$196,800

10.1.14.5 AASHTOWare Project FieldNet

AASHTOWare Project FieldNet has the following fee structure:

FieldNet Site License	Annual License Fees
1–100 users	$30,400
101–500 users	$60,900
501–600 users	$68,100
611–750 users	$77,900
751–900 users	$86,700
901–1,000 users	$91,500
1,001 or more users	$122,000

10.1.14.6 AASHTOWare Project TRACER

AASHTOWare Project TRACER has the following fee structure:

AASHTOWare Project TRACER	Annual License Fees
Up to 10 copies	$2,000 per copy
11–20 copies	$21,750 + $1,750 per copy in excess of 11
21–30 copies	$38,750 + $1,250 per copy in excess of 21
31–40 copies	$50,900 + $900 per copy in excess of 31
41–50 copies	$68,750 + $ 750 per copy in excess of 51
More than 90 copies	Customized quote*

Note: The above figures are annual fees. The total amount varies depending upon the number of workstations licensed. If AASHTOWare Project TRACER is installed on any additional workstations during the license year, the annual fee for the additional workstations will be prorated for the remaining months of the license year (July 1–June 30). This proration applies only to the initial installation of AASHTOWare Project TRACER. These license fees include support and maintenance by AECOM consistent with AASHTOWare products.

*Due to license fee royalties for the RS Means® industry cost data used by AASHTOWare Project TRACER, the purchase of more than 90 licenses requires a customized quote; please contact the AASHTO Project Manager or AASHTOWare Project TRACER contractor.

10.1.15 Considerations on Pricing

There are four possible ways to proceed with the implementation of Project, should that software be selected:

1. It is possible to select one or more modules and license only the limited number of modules if implementation of all modules in parallel is not feasible. The license can be converted to a site license at any time. (When the cost of the individual modules exceeds the site fee, it is assumed that the conversion would take place.)
2. The full site license can be obtained that provides full access to all included modules. Because IDOT is a member of AASHTO, the member-restricted modules BAMS/DSS would be available to IDOT.
3. A 6-month right-to-use evaluation license may be obtained that allows the agency to work with the modules and finalize review.
4. A one-year evaluation license is also available. The full site fee is charged, but the evaluation includes two “service units” of InfoTech assistance, valued at $37,000. (The charge for InfoTech assistance is $13,500 per unit, which includes the AASHTO administrative fee of $1,300.)

Technical assistance for implementation is available from InfoTech through AASHTO. InfoTech, and the agency determine the level of assistance that will be required, and that is converted to “units.” These units are purchased through AASHTO, which then assigns the time to InfoTech. Purchase of service units is a separate consideration from the purchase of the software license and does not influence the pricing or other service in any way. If the decision is made to proceed, option 4 provides the best value, while option 1 provides the best cash-flow consideration.

CHAPTER 11 NEXT STEPS

A roughly 7 month-window precedes the earliest possible implementation. Final review and development of the transition plan should begin immediately for a smooth transition prior to any type of hardware failure or major changes in processing that would require significant program changes.

11.1 DEMONSTRATION

A formal demonstration of the software in beta should be requested from AASHTO for major IDOT stakeholders. AASHTO will schedule appropriate meetings with InfoTech, the software developer, to provide necessary technical presentations for the selected individuals.

11.2 SITE VISIT

Because adjacent states are using the software, a visit by selected stakeholders to confer with current users would assist in future planning. Attendance at project users' group (PUG) meetings would supplement information obtained at the main AASHTO meetings.

11.3 CAPACITY PLANNING

It will be necessary to develop a series of technical committees to determine the requirements for hardware and operating licenses. It will also be prudent to determine the growth probabilities for the next 5 years and to develop a hardware-replacement schedule so that turnover is gradual, rather than having a massive periodic changeover.

11.4 BUDGET PLANNING

A formal budget proposal will be required, based on the capacity determined in 11.3. It may be possible to use some existing hardware and software licenses. The current inventory must be reviewed against the requirements of the new system.

11.5 INSTALLATION PLANNING

Two committees are recommended to manage the implementation: There should be a working group that will gather the data to implement the new system; there should also be a higher-level review group to validate the data and to reconcile competing interests, if any. A specific plan for resolving anticipated conflicts, including the decision escalation plan and the final resolution authority, should be predetermined. The working group will fill in the templates and complete the checklists, while the review group will validate the templates and checklists and resolve any issues. One committee would be tasked with identifying all of the needed elements for implementing the software. The second committee would arbitrate any differences among the various groups. This isolates final decisions from the working committee into an "oversight" group that has the power to make decisions on which requests prevail.

11.6 TRAINING PLANNING

The most effective way to train large numbers of staff is to identify individuals in each office or area to become “superusers” They become the training cadre and receive more intensive training. They become local resources. A number of experts on individual modules, as well as several expert Project (entire suite) users, should be identified early on. It would be beneficial if the identified experts were part of the configuration-definition team, as that will give them a greater overall comfort level.

11.7 IMPLEMENTATION PLANNING

The master files and configuration items will require inputting. It will also be necessary to convert the existing data files from ICORS and MISTIC to the new formats. Conversion routines may be needed to extract the data from the old files and to enter the information into the new system. There also needs to be a validation process and a hard cutover date or a process for updating interim data during the implementation process. Parallel processing and data validation need to be assigned and reviewed.

CHAPTER 12 SUMMARY

After determining user requirements put forth by field- and state-level users, we reviewed almost 100 different software packages and compared them with the requirements. After careful consideration, the packages that best fit the criteria were selected, demonstrations were reviewed, and a clear leader was chosen. Because it is specifically designed for the state DOT community and has been adopted almost universally nationwide, AASHTOWare Project and its related modules were determined to be the best solution to the complex issues facing IDOT. Efforts to implement the software in the January 2015 time frame should start now, to ensure that conversion precedes software failure. AASHTO offers a free, 6-month evaluation period, meaning that the interval leading up to the availability of the upgrade can be used to learn base operations and create configuration workbooks.

After the review, the best options for satisfying all of the IDOT requirements were to create a project in-house or to install AASHTOWare. Creating the project in-house would address the IDOT culture to the extent that technology was available. However, attacking a project of this size would require a sizeable staff to complete it in a reasonable amount of time. The staff must be hired and trained, and become familiar with the IDOT operation. It is doubtful that the existing staff at Bureau of Information Processing (BIP) could assume this level of project without augmentation. The BIP staff would also be tasked with keeping the existing software operational until the new software could be implemented. Managing the existing system while preparing for the installation of new hardware/software will require careful planning.

In addition to the staffing consideration, the systems analysis required to create a set of programs must be considered. It is more extensive than the analysis required for completing configuration workbooks and specifying interface requirements. For example, specific federal reporting is already implemented in Project, whereas the specifics of which data to include in the reports and what type of edits or calculations would be needed would have to be documented and coded.

Whereas the purchased software comes with import/export routines that would be the foundation of the interface required to connect the package to the numerous external programs, for a custom effort not only would the reformatting of data be needed, but also the import/export utility would need to be created. The proposed package would also require extensive validation and testing.

It is highly unlikely that an in-house package could be implemented in the same time frame as a purchased package. And for the reasons stated earlier, because of numerous considerations, the luxury of a lengthy development time may not be available.

There are a number of stark contrasts between starting from scratch and starting with a package. Some of the most striking are as follows:

Task	Custom In-House	Purchased Package
Security structure	Define table of authorities and code and test the approvals and oversights.	Define table of authorities and enter configuration table.
Reports and displays	Define formats and edits, code, and test screens and hard-copy reports.	Configure screens and hard-copy reports.
Interfaces to existing State of Illinois programs	Define data requirements of programs, create import and export utilities, and create translation routines.	Define date requirements of programs and create translation routines.
Data structures	Define and build data structure.	Populate existing data structure and include IDOT-unique items to basic structure.
Access structure	Define and build routines to provide web access for multiple devices.	Define numbers and types of access devices allowed.
Testing	Testing by programming staff, followed by IDOT departmental staff	Testing by programming staff, followed by extensive testing by several client DOT departmental staffs prior to final testing by IDOT staff
Project staff	Substantial additional staff to hire, train, and deploy to supplement limited existing resources	Experienced contractor staff on board and trained, available to assist in making in-house staff operational
Anticipated time frame	Multiple years to obtain staff, develop requirements, code, test, and implement—all while supporting existing system	Several months, depending on modules selected
Additional assistance	Being the sole user of software limits information sharing.	Regularly meeting users group
Informational publications	None defined	Published newsletter
Program modification funding	Sole responsibility for defining, implementing, and funding	Modifications that appeal to multiple users may be included in future updates.
Product use website	N/A	https://www.cloverleaf.net

Although the dollars involved may end up being comparable, the time frame to implement a usable system would be decidedly shorter with a purchased package. The time to implement would be roughly the same, but the systems analysis and coding would add numerous man-months to the project. Many industry standard constructs are already defined and require only configuration-type customization. There is a great deal of in-depth expertise available to facilitate implementation of the software. This same level of understanding would have to be nurtured and not be readily available to assist departmental personnel to the same extent. A project team from both IDOT and BIP would be required regardless of the option selected, but the involvement would be far less. There will a programming component to create the inter-program links. There may also be additional custom reports that are not configurable with the existing options but could be created by extracting the data and formatting the desired report.

APPENDIX 1 SAMPLE FUNDING SCENARIO

The following funding scenario was supplied by IDOT personnel. It incorporates not only two major classes of expenditure but also multiple funding sources and participating percentages. It also requires a final analysis and review of allocations.

Division of Cost

Type of Work	FHWA	%	STATE	%	LA	%	Total
Participating Construction	1,100,000	(*)		( )		( )	1,100,000
Participating Construction		( )	5,000,000	(**)		( )	5,000,000
Participating Construction	2,223,000	(***)	277,875	(******)	277,875	(BAL)	2,778,750
Participating Construction	242,400	(****)	30,300	(******)	30,300	(BAL)	303,000
Participating Construction	7,845,781	(*****)	980,723	(******)	980,723	(BAL)	9,807,227
Construction Engineering	1,797,580	(*****)	224,697	(******)	224,697	(BAL)	2,246,974
TOTAL	$ 13,208,761		$ 6,513,595		$ 1,513,595		$ 21,235,951

* Maximum FHWA (ARU) Participation 100% Not to Exceed $1,100,000.00 to be used first;
** Maximum STATE Only Participation Not to Exceed $5,000,000.00 to be used second;
*** Maximum FHWA (STA) Participation 80% Not to Exceed $2,223,000.00 to be used third;
**** Maximum FHWA (STE) Participation 80% Not to Exceed $242,400.00 to be used fourth;
***** Maximum FHWA (HPP) Participation 80% Not to Exceed $9,643,361.00 to be used fifth; shortfall to be covered by the LA in the event the Federal Allocation Differs from this amount;
****** State Participation 50% of Local Match

NOTE: The costs shown in the Division of Cost table are approximate and subject to change. The final LA share is dependent on the final Federal and State participation. The actual costs will be used in the final division of cost for billing and reimbursment.

If funding is not a percentage of the total, place an asterisk in the space provided for the percentage and explain above.

The Federal share of construction engineering may not exceed 15% of the Federal share of the final construction cost.

There are two distinct expenditure types: Cost of construction and cost of engineering. The ratio of these two categories will determine the final actual participation.

There are three distinct funding sources: federal, state, and local funds. Each funding plateau after the federal-only and state-only tiers are distributed 80-10-10 federal-state-local.

The initial $1,100,000 of construction charges will be charged to federal funding (ARA). The next $5,000,000 will be charged to IDOT funding.

Of the next $2,778,750 of construction, 80%, or 2,223,000, will be charged to federal funds (STA) with $277,875 each charged to IDOT and local fund sources.

The fourth distribution of $303,000 will be allocated at 80%, or $242,000, to federal funds (STE) and $30,300 each charged to IDOT and local fund sources. Again, differentiation will be made between construction and engineering.

The last funding definition includes both construction and engineering costs. The final $7,845,781 of construction costs will be allocated to federal funds (HPP), with 980,723 each going to state and local funds. $1,797,580 of engineering costs is tentatively allocated to federal funds, with $224,697 each going to state and local sources. The distribution is again 80-10-10; however, the federal participation in the engineering costs cannot exceed 15% of the federal construction total, so the final disposition of funds must include a proviso to reallocate funds to state and local funds if the anticipated budget is not met.

Fund A is federal construction ARU only and is capped at $1,100,000.

Fund B is IDOT construction only and is capped at $5,000,000.

For amounts ranging from $6,100,000 to $8,878,750, construction charges are allocated 80-10-10 (with the primary federal source being STA) among Funds C, D, and E as follows:

- Fund C is federal construction source STA and is capped at 80% of $2,778,750, or $2,223,000.
- Fund D is Illinois STA matching and is capped at 10% of $2,778,750, or $277,875.
- Fund E is local STA matching and is capped at 10% of $2,778,750, or $277,875.

For amounts ranging from $8,878,750 to $9,181,750, construction charges are allocated 80-10-10 (with the primary federal source being STE) among Funds F,G, and H as follows:

- Fund F is federal construction source STE and is capped at 80% of $303,000, or $242,000.
- Fund G is Illinois STE matching and is capped at 10% of $303,000, or $30,300.
- Fund H is local STE matching and is capped at 10% of $303,000, or $30,000.

For amounts ranging from $9,181,750 to $18,988,977, construction charges are allocated 80-10-10 (with the primary federal source being HPP) among Funds I, J, and K as follows:

- Fund I is federal construction source HPP and is capped at 80% of $9,807,227, or $7,845,781.
- Fund J is Illinois HPP matching and is capped at 10% of $9,807,227, or $980,723.
- Funk K is local HPP matching and is capped at 10% of $9,807,227, or $980,723.

Total construction funds are budgeted at $18,988,977.

Construction engineering is budgeted at $2,246,974, with charges allocated 80-10-10 among Funds L, M, and N as follows:

- Fund L is federal construction engineering source and is capped at 80% of $2,246,974, or $1,797,580.
- Fund M is Illinois construction engineering matching and is capped at 10% of $2,246,974, or $224,697.
- Fund N is local construction engineering matching and is capped at 10% of $2,246,974, or $224,697.

The amounts charged to Fund L cannot exceed 15% of the final total of the amounts charged to Funds A, C, F, and I, with excess engineering costs distributed on a 50-50 basis between Funds J and K. Note that it is possible to apply this 85-15 construction-to-engineering test on all charges as they are posted, but since construction engineering tends to be front loaded, this can result in dramatic shifts in numbers. It may minimize reallocation journals to apply this test when 50% of the charges are posted, when 95% of the charges are posted, and when final payment is made to effect any adjustments that might be necessary.

It is possible to set up reallocation triggers such as the construction-to-engineering ratio to kick in at various points in the project or wait until the final payment is made.

Though there is no formal requirement that separate funds be set up for the Illinois and local components of the funding, the relationships are identified in this example for ease of review. The construction dollars could be lumped into a single Illinois fund and a single local fund if desired. It may also be advantageous to set up Fund O for Illinois' share of budget overrun and Fund P for the local share of budget overruns where Funds O and P each receive a 50-50 share of the charges. Similarly, it may be desirous to establish Fund Q for Illinois engineering overrun and Fund R for local engineering overruns so that the actual amounts of engineering cost overruns are easy to identify.

The accounts can be combined or separated as desired, but clean allocations make it easier to monitor the exact costs in all phases of the construction. The flexibility is there to afford the level of ease of review desired.

Illinois Department of Transportation **Local Agency Agreement for Federal Participation**	Local Agency County of Kane	State Contract X	Day Labor	Local Contract	RR Force Account
	Section 06-00214-15-BR	Fund Type HPP, ARU, STA, STE		ITEP Number 102182	

Construction		Engineering		Right-of-Way	
Job Number	Project Number	Job Number	Project Number	Job Number	Project Number
C-91-246-06	ARA-TE-CMM-HPP-1527(012)				

This Agreement is made and entered into between the above local agency hereinafter referred to as the "**LA**" and the state of Illinois, acting by and through its Department of Transportation, hereinafter referred to as "**STATE**". The **STATE** and **LA** jointly propose to improve the designated location as described below. The improvement shall be constructed in accordance with plans approved by the **STATE** and the **STATE**'s policies and procedures approved and/or required by the Federal Highway Administration hereinafter referred to as "**FHWA**".

Location

Local Name Stearns Road (Stage 3) Route FAP 0361 Length 2.22 Miles

Termini DuPage County Line to IL Route 25

Current Jurisdiction Kane County, DuPage County, State of Illinois Existing Structure No See below

Project Description

Realignment and intersection improvement. Project includes new structure numbers: 045-2035, 045-3173, 045-3174, 045-2032, and existing structure number 045-3021.

Division of Cost

Type of Work	FHWA	%	STATE	%	LA	%	Total
Participating Construction	1,100,000	(*)		( )		( )	1,100,000
Participating Construction		( )	5,000,000	(**)		( )	5,000,000
Participating Construction	2,223,000	(***)	277,875	(******)	277,875	(BAL)	2,778,750
Participating Construction	242,400	(****)	30,300	(******)	30,300	(BAL)	303,000
Participating Construction	7,845,781	(*****)	980,723	(******)	980,723	(BAL)	9,807,227
Construction Engineering	1,797,580	(*****)	224,697	(******)	224,697	(BAL)	2,246,974
TOTAL	$ 13,208,761		$ 6,513,595		$ 1,513,595		$ 21,235,951

* Maximum FHWA (ARU) Participation 100% Not to Exceed $1,100,000.00 to be used first;
** Maximum STATE Only Participation Not to Exceed $5,000,000.00 to be used second;
*** Maximum FHWA (STA) Participation 80% Not to Exceed $2,223,000.00 to be used third;
**** Maximum FHWA (STE) Participation 80% Not to Exceed $242,400.00 to be used fourth;
***** Maximum FHWA (HPP) Participation 80% Not to Exceed $9,643,361.00 to be used fifth; shortfall to be covered by the LA in the event the Federal Allocation Differs from this amount;
****** State Participation 50% of Local Match

NOTE: The costs shown in the Division of Cost table are approximate and subject to change. The final **LA** share is dependent on the final Federal and State participation. The actual costs will be used in the final division of cost for billing and reimbursment.

If funding is not a percentage of the total, place an asterisk in the space provided for the percentage and explain above.

The Federal share of construction engineering may not exceed 15% of the Federal share of the final construction cost.

Local Agency Appropriation

By execution of this Agreement, the **LA** is indicating sufficient funds have been set aside to cover the local share of the project cost and additional funds will be appropriated, if required, to cover the **LA**'s total cost.

Method of Financing (State Contract Work)

METHOD A---Lump Sum (80% of **LA** Obligation) _____

METHOD B--- _____ Monthly Payments of _____

METHOD C---**LA**'s Share Balance divided by estimated total cost multiplied by actual progress payment.

(See page two for details of the above methods and the financing of Day Labor and Local Contracts)

APPENDIX 2 PRICING MODEL FOR AASHTOWARE

American Association of State Highway
and Transportation Officials, Inc.
444 N. Capitol St. NW, Suite 249
Washington, DC 20001

aashtoware.org

Todd R. Bergland
Portfolio Manager
Minnesota Department of
Transportation
395 John Ireland Blvd. MS 692
St. Paul, Minnesota

DATE: April 11, 2014

TO: AASHTOWare Project™ End User Designees

SUBJECT: AASHTOWare Project License Fees, FY2014-2017

The AASHTOWare Project Task Force (PTF) has reviewed the current product licensing structure and has set licensing fees for FY2015 for both AASHTO owned and shared products. The PTF has determined the need for an increase in FY2015 in accordance with previous projections.

New next fiscal year are license fees for AASHTOWare Project Construction & Materials™ and AASHTOWare Project Estimation™ as well as a decrease in the PES®/LAS® license fee.

The table below represents the licensing fees for the current fiscal year (FY2014), the next fiscal year (FY2015) as well as the maximum projected licensing fees for the next two fiscal years (FY2016 through FY2017).

AASHTOWare Project Module	Annual License Fee			
	July 1, 2013 - June 30, 2014	July 1, 2014 - June 30, 2015	July 1, 2015 - June 30, 2016	July 1, 2016 - June 30, 2017
AASHTOWare Project BAMS/DSS™	$67,000	$69,000	$71,000	$73,000
AASHTOWare Project Cost Estimation™	$51,500	$53,000	$54,500	$56,000
PES®/LAS®	$51,500	$42,500	$43,750	$45,000
AASHTOWare Project Preconstruction™	$41,250	$42,500	$43,750	$45,000
AASHTOWare Project Worksheet™	$8,500	$8,750	$9,000	$9,250
AASHTOWare Project Civil Rights & Labor™	$41,250	$42,500	$43,750	$45,000
AASHTOWare Project Construction Administration™	$51,500	$53,000	$54,500	$56,000
AASHTOWare Project Expedite™	$17,000	$17,500	$18,000	$18,500

AASHTOWare Project Module	Annual License Fee			
	July 1, 2013 - June 30, 2014	July 1, 2014 - June 30, 2015	July 1, 2015 - June 30, 2016	July 1, 2016 - June 30, 2017
AASHTOWare Project SiteManager™	$200,500	$206,500	$212,500	$218,700
AASHTOWare Project SiteXchange™	$17,000	$17,500	$18,000	$18,500
AASHTOWare Project Estimation™	N/A	$42,500	$43,750	$45,000
AASHTOWare Project Construction & Materials™	N/A	$185,000	$190,500	$196,000
AASHTOWare Project Site License	$412,000	$424,000	$436,500	$449,500

AASHTOWare Project Shared Products	# of copies	Annual License Fee			
		July 1, 2013 - June 30, 2014	July 1, 2014 - June 30, 2015	July 1, 2015 - June 30, 2016	July 1, 2016 - June 30, 2017
AASHTOWare Project Estimator™	1-15 Copies (each copy)	$1,275	$1,275	Max 3% increase	Max 3% increase
	16-20 Copies	$21,000	$21,000	Max 3% increase	Max 3% increase
	21-30 Copies	$28,000	$28,000	Max 3% increase	Max 3% increase
	31-40 Copies	$33,800	$33,800	Max 3% increase	Max 3% increase
	41-50 Copies	$38,200	$38,200	Max 3% increase	Max 3% increase
	51-60 Copies	$42,600	$42,600	Max 3% increase	Max 3% increase
	Site License	$47,100	$47,100	Max 3% increase	Max 3% increase
AASHTOWare Project FieldManager™ suite (FieldManager® and FieldBuilder® Components Only)	Each Installed Copy	$3,100	$3,150	Max 3% increase	Max 3% increase
	Each installed copy of FieldBook	$925	$950	Max 3% increase	Max 3% increase

AASHTOWare Project Shared Products	# of copies	Annual License Fee			
		July 1, 2013 – June 30, 2014	July 1, 2014 - June 30, 2015	July 1, 2015 - June 30, 2016	July 1, 2016 - June 30, 2017
AASHTOWare Project FieldManager Site License (All FieldManager Components)	Site License (1-15 users)	$15,700	$16,100	Max 3% increase	Max 3% increase
	Site License (16-30 users)	$26,200	$26,900	Max 3% increase	Max 3% increase
	Site License (31-50 users)	$39,300	$40,400	Max 3% increase	Max 3% increase
	Site License (51-300 users)	$78,600	$80,900	Max 3% increase	Max 3% increase
	Site License (301-800 users)	$118,100	$121,600	Max 3% increase	Max 3% increase
	Site License (more than 800 users)	$157,400	$162,100	Max 3% increase	Max 3% increase
Extended License AASHTOWare Project FieldManager Suite (All FieldManager Components except FieldBuilder)	Extended License (1-15 users)	$24,200	$24,900	Max 3% increase	Max 3% increase
	Extended License (16-30 users)	$36,700	$37,800	Max 3% increase	Max 3% increase
	Extended License (31-50 users)	$55,800	$57,400	Max 3% increase	Max 3% increase
	Extended License (51-300 users)	$103,000	$106,000	Max 3% increase	Max 3% increase
	Extended License (301-800 users)	$150,800	$155,300	Max 3% increase	Max 3% increase
	Extended License (more than 800 users)	$196,800	$202,700	Max 3% increase	Max 3% increase
AASHTOWare Project FieldNet™	Site License (up to 100 total users)	$30,400	$31,300	Max 3% increase	Max 3% increase
	Site License (101-500 users)	$60,900	$62,700	Max 3% increase	Max 3% increase
	Site License (501-600 users)	$68,100	$70,100	Max 3% increase	Max 3% increase
	Site License (601-750 users)	$77,900	$80,200	Max 3% increase	Max 3% increase
	Site License (751-900 users)	$86,700	$89,300	Max 3% increase	Max 3% increase
	Site License (901-1,000 users)	$91,500	$94,200	Max 3% increase	Max 3% increase
	Site License (1001 or more users)	$122,000	$125,600	Max 3% increase	Max 3% increase

AASHTOWare Project Shared Products	# of copies	Annual License Fee			
		July 1, 2013 – June 30, 2014	July 1, 2014 - June 30, 2015	July 1, 2015 - June 30, 2016	July 1, 2016 - June 30, 2017
AASHTOWare Project TRACER™	Up to 10 Copies	$2,000 per copy	$2,000 per copy	Max 3% increase	Max 3% increase
	11-20 Copies	$21,750 + $1,750 per copy in excess of 11	$21,750 + $1,750 per copy in excess of 11	Max 3% increase	Max 3% increase
	21-30 Copies	$38,750 + $1,250 per copy in excess of 21	$38,750 + $1,250 per copy in excess of 21	Max 3% increase	Max 3% increase
	31-50 Copies	$50,900 + $900 per copy in excess of 31	$50,900 + $900 per copy in excess of 31	Max 3% increase	Max 3% increase
	51-90 Copies	$68,750 + $750 per copy in excess of 51	$68,750 + $750 per copy in excess of 51	Max 3% increase	Max 3% increase
	More than 90 Copies	Customized Quote	Customized Quote	Max 3% increase	Max 3% increase

Questions regarding license fees can be directed to the AASHTO Associate Project Director, Tony Bianchi, at 202-624-5821 or tbianchi@aashto.org.

Sincerely,

Todd Bergland, AASHTOWare Project Task Force Chair

cc: AASHTOWare Project Task Force
Tony Bianchi, AASHTO
Melanie Douglass, AASHTO
Patrick Yaroch, AASHTO

APPENDIX 3 POWERPOINT PRESENTATION: OPTIONS AND RECOMMENDATIONS FOR WEB DATA BASE OF MATERIAL AND CONSTRUCTION INSPECTION

For a copy of the original PowerPoint file, please contact Constance Kelly (ckelly@core.com)

Project Scope

- Identify requirements of users
- Identify software packages available
- Analyze existing packages
- Determine suitable packages

Two Mission-Critical Software Packages are Candidates for Sudden Software Death Syndrome

MISTIC

- 1970's COBOL/3270 Emulation batch-oriented system
- Issues
  - Data access
  - Maintenance
  - Expandability
  - Staff availability and training
  - Hardware/software availability
  - Intersystem communication

ICORS

- 1990's Access-based system
- Issues
  - Expandability
  - Database infrastructure
  - Staff availability
  - Intersystem communication

User Requirements

- Real time (not batch)
- Improved editing at point of data generation
- Effective use of stored data
- Access
- Tablet and smartphone integration
- Capabilities of the current systems

Analysis Criteria

- Implementation model
- Complexity range
- Interoperability
- Expandability
- Security and accountability
- Data usability
- Implementable
- Supportable
- Meet field office requirements
- Project fund tracking
- Federal reporting requirements

Possible Outcomes

Package Type	Programming Required	Configuration Required	IDOT/CMS Level of Effort	IDOT Control over Package
Complete	No	No	Low	Low*
Configurable	No	Yes	Medium	Medium
Customizable	Yes**	No	Medium to High	High
Configurable/Customizable	Yes**	Yes	High	High
Conversion	Yes	TBD	High	High
Custom	Yes	TBD	Very High	High

*Any modifications to the complete package would be vendor created and done at the discretion of the selected vendor. This type of customization is the most expensive.
**In addition to the training involved in implementing the package, some type of additional training in the structure of the software and coding conventions would be required to modify the code adequately.

Deployment Options

- Software as a service (SaaS)
- Client-Server
  - Thin client
  - Fat/thick client (some form of peer-to-peer)

A dynamic system that offers the most desired characteristics and that is predominantly fat/thick client with peer-to-peer functions when needed is optimum

Methodology

- Identify software packages
- Determine capabilities
- Match capabilities to requirements
- Rank packages based on requirement compliance

Package Review

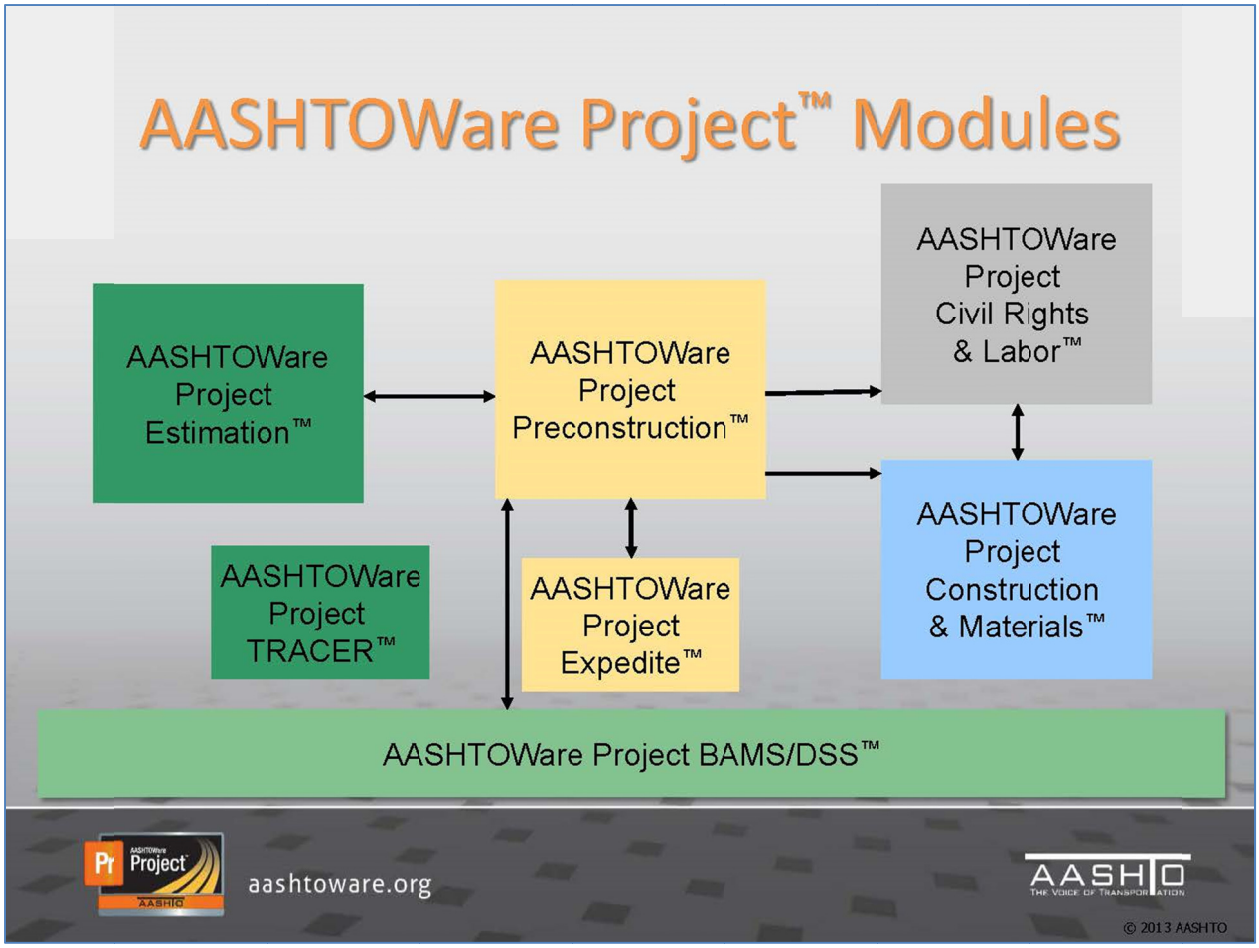
- Over 100 software packages of varying capability were identified and analyzed.
- Some packages did an excellent job but were limited in scope.
- Other packages did not having expansion capabilities.
- Still others had pricing models out of line with the product capability for a large institution.
- Packages were eliminated if vendors did not respond to information requests.

From 100 to the Top Three

- Number Three – eBuilder was extremely capable but had limitations on the materials side. Cloud-based software could get pricey quickly.
- Number Two – Oracle Primavera was a strong contender but was an adaption of a more generalized software suite.

And the Winner Is

- Number One – AASHTOWare Project and related modules
- This package, optimized for state -level construction projects with complex funding and extensive testing and certification requirements, came the closest to meeting every requirement off the shelf.
- Note – there is a revision planned for December 2014. Implementation should coincide with that release to minimize conversion efforts.


AASHTOWare Project™ Modules
AASHTOWare Project Estimation™
AASHTOWare Project Preconstruction™
AASHTOWare Project Civil Rights & Labor™
AASHTOWare Project Construction & Materials™
AASHTOWare Project TRACER™
AASHTOWare Project Expedite™
AASHTOWare Project BAMS/DSS™
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AASHTOWare Project's Integrated Solution
Decision Support
Cost Estimation
Construction & Materials Management
Project Development
Contractor Management
PS&E Estimate
Civil Rights & Labor Management
Proposal Preparation
Contract Award
Bid Letting
AASHTOWare Project
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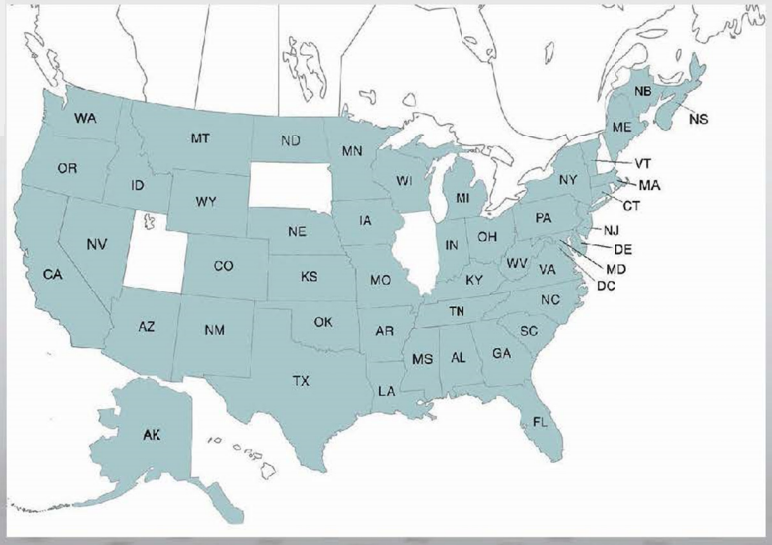
De Facto Standard

- Only four states not using or implementing some portion of the software at this time.
- As more states move to this software to manage construction information, the suite could become a defracto electronic FHWA standard.
- Changes to FHWA management and reporting requirements would be incorporated into the software as a matter of course.

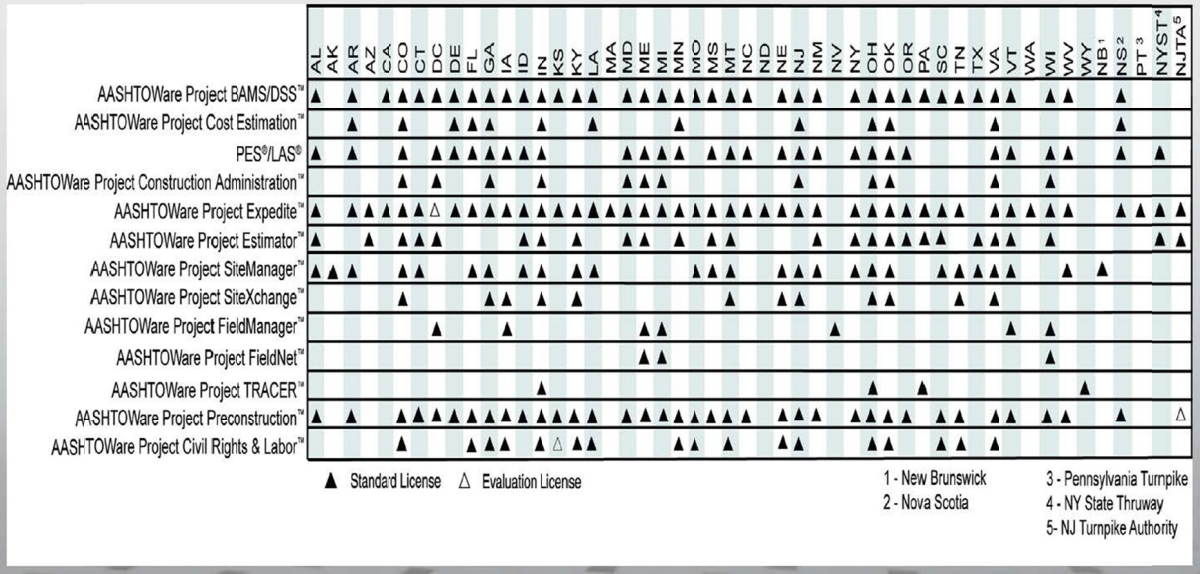
AASHTOWare Project Licensees



50 agencies, including Washington D.C.
and two Canadian provinces

aashtoware.org

Project Module Usage



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Funding: The Elephant in the Room

Id	Type	Label
FundPackageId	key	Fund Package ID
RefFundId	key	Fund ID
Priority	number(2)	Priority
Description	char	Description
Percentage	number(7,4)	Percentage
Limit	number(14,2)	Fund Limit
Type	char	Fund Type
AccountingFund	char	Accounting Fund
FundingGroup	char	Funding Group

Funding is set at the item level with 99 possible entries in each item "Funding Package". In addition complex algorithms can be developed to dynamically reallocate expenses should expense distribution differ from original estimates.

A Stake in the Product

- Users can serve on advisory committees that determine the direction of the product.
- Modifications with strong support from the user community will be included in product upgrades if technically possible, which can minimize the cost of implementation.
- User community provides “shared solutions” for the state construction arena.
- Project users group (PUG) is a powerful voice in the construction community.

Implementation and Training Aids

- www.cloverleaf.net and www.aashtoware.org contain extensive templates, workbooks, and implementation and training aids.
- The Users' Group publishes regular Newsletters which contain experience-based information
- Users' Group meetings afford the opportunity to benefit from shared experiences.

Next Steps

1. Formal system demonstration
2. Obtain free 6-month license
3. Site visit to adjacent state
4. Capacity planning: Host hardware necessary
5. Budget planning
6. Installation planning (hardware and software)
7. Training planning
8. Implementation planning committees
9. Implementation
10. Success!!!!

Questions?????

Thank You

Connie Kelly

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(312) 919-1062

APPENDIX 4 BETA TESTING—AASHTOWARE PROJECT CONSTRUCTION AND MATERIALS, VERSION 2.0

AASHTOWare Project Construction & Materials 2.0 is in beta testing in conjunction with the Departments of Transportation (DOTs) of Michigan, Ohio, Kentucky, and Nebraska.

Assuming the testing continues without adverse events, Version 2.0 is currently scheduled for general release on December 17, 2014. This version has undergone extensive field-driven enhancements. The four DOTs involved in the beta testing were instrumental in developing the specifications and for consolidating and coordinating user input. Michigan was the primary DOT on that project.

The Michigan DOT contact is Kevin Fox. He has given his permission to be contacted with specific questions. Kevin's number is (517) 322-6223, and his email is foxk@michigan.gov.

The InfoTech representative for Illinois is now Mark Douglas, (352) 381-4400.

AASHTOWare Project Construction & Materials™

The AASHTOWare Project Construction & Materials™ software is a comprehensive, web-based construction and materials management software application. Its functionality covers the complete construction and materials management process, including laboratory information management functionality. It is a powerful application spanning all levels of construction and materials enabling personnel to progress a contract and its supporting documentation from award through finalization.

While the application is robust, it is configurable by role and designed with the workflow of each specific user in mind so as not to be overwhelming. In addition to the user-specific features, key features of the system-wide functionality include:

- Attachments and agency fields - Any user with proper access can attach multiple files/URL links and add an unlimited number of agency fields to any record in the system.
- System events and issue tracking – These features enable an agency to automate complex processes and workflows that might require input or review from several different users.
- Integrated agency views (also referred to as templates or forms) – This feature allows an agency to design and implement agency-specific forms, extending contracts, Daily Work Report postings, Daily Source Report postings, materials tests, and mix designs.
- Extensive online help is available throughout the application, including configurable tooltips.

The AASHTOWare Project Construction & Materials software also contains various reports that the agencies will find beneficial in managing their construction projects, including reports for the Contract Status, Change Orders, Work Item Detail, Contractor Payment, Contract Material Acceptance Action Status, and the Outstanding Item List.

Construction Management

The AASHTOWare Project Construction & Materials software is designed to manage all aspects of a construction project by providing:

- Field-based data entry functionality with Daily Work Reports.
- Diaries for the project manager to review the inspectors Daily Work Reports.
- Contract change order functionality for creation, review, and approval of contract changes, including agency-configurable exceptions such as item over-runs, limited funding, missed time, and many more.
- Agency-configurable contractor evaluations, including the ability to create, update and change questions and question value/ratings.
- Functionality to manage construction stockpiles including the ability to set agency-level draw-down triggers and thresholds, as well as contract item-specific recovery percentages.

Materials Management

Accurate management of the materials and sources used for a construction contract is vital to the success of a project. The AASHTOWare Project Construction & Materials software helps agencies ensure contract material acceptance actions are met by quantity, contract, temporal, source, or location per an agency's contract specifications and provisions. Acceptance actions are identified at a global level for all items and are then generated from that list at a contract level, where they can be modified on a contract basis.

The AASHTOWare Project Construction & Materials software provides the ability to track materials, including those that make up other materials, until they are ultimately used or placed. It also provides source- and facility-based data entry functionality with Daily Source Reports. Source authority is used to identify users who may maintain source and facility information. Lab features for this software include:

- Approved materials for sources and facilities.
- Alternate materials.
- Qualifications for testers, samplers, calibrators, welders, and laboratories.
- The ability to track test equipment/calibrated equipment.
- The ability to withhold payment for insufficient materials.
- The ability to approve mix designs for their design and use on a construction contract.

Laboratory Information Management

The laboratory information management features of the AASHTOWare Project Construction & Materials software establish a standardized approach for transportation agency lab management software. These features give an agency the ability to manage and track progress through each critical step of the material sample lifecycle and are highly configurable to fit the needs of an agency's materials lab.

The lab management functions have role-based security settings to ensure that assigned lab personnel have access only to the data and information needed to complete their specific tasks.

The lifecycle tracking of samples and tests through the application expedites the overall testing process. At any point, it is easy to see what samples are waiting to be tested, which have the highest priority, and who is responsible for each sample's current stage of progress. Tests can be assigned (or re-assigned) to specific labs and to specific testers within those labs, based on qualifications and workload.

This functionality allows for a materials test environment that is interactively managed and responsive to a material lab's changing needs.

System Specifications

For details about system specifications for all AASHTOWare Project software, please refer to www.cloverleaf.net/sys_arch/.

For more information about this product, contact AASHTO or the AASHTOWare® contractor:

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91313

Construction Manager/ General Contractor

For transportation projects with sensitive schedules and potential constructability challenges that require special qualifications and extraordinary contractor cooperation, such as those in busy urban areas, the Construction Manager/ General Contractor (CM/GC) delivery method provides many benefits.

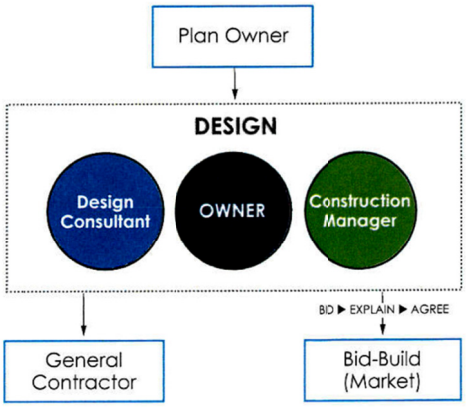
Other projects that are a good fit for the CM/GC method are those that have public involvement or include right-of-way or utility issues that could affect the overall schedule.

By getting the contractor involved early in the planning and design processes, project owners have the opportunity to incorporate a contractor's perspective into planning and design decisions, introduce innovations, improve the design quality and resolve potential third party issues. This allows them to deliver projects that reduce costly change orders, decrease risk, optimize the construction schedule and minimize impact to the traveling public.

INNOVATION DESCRIPTION

The CM/GC project delivery method consists of two phases—design and construction.

When the owner considers the design to be complete, the construction manager then has an opportunity to bid on the project based on the completed design and schedule. If the owner, designer and independent cost estimator agree that the contractor has submitted a fair price, the owner issues a construction contract and the construction manager then becomes the general contractor. The contractor acts as the consultant during the design process and can offer constructability and pricing feedback on design options and can identify risks based on the contractor's established means and



methods. As noted earlier, this process also allows the owner to be an active participant during the design process and make informed decisions on design options based on the contractor's expertise.

BENEFITS

- **Foster innovation.** The collaborative process encourages both contractor and project owner to look at all options including using innovative techniques or approaches that reduce time and cost — for example, use of Self-Propelled Modular Transporter (SPMT) for bridge moves and slide-in bridge technologies.
- **Reduce risk.** Contractor feedback during the design phase can reduce project costs because the owner is able to understand and mitigate risks identified early in project development. Any risk mitigation savings identified during the design phase accrue to the owner in a CM/GC arrangement.

Construction Manager/ General Contractor

- **Improve design quality.** The contractor is able to review the designs and provide feedback, answer designer questions and provide changes. By including the contractor review, the designer can produce better designs that reduce issues in construction and prevent change orders that can lead to project overruns.
- **Improve cost control.** Value Engineering is a natural part of CM/GC during the design process. This allows for the contractor's input during design so the owner can obtain reliable cost data for any design alternative being considered. This allows the owner to consider the budget and make more informed decisions about which alternatives offer the greatest cost-benefit.
- **Optimize construction schedules.** The CM/GC process allows the contractor to begin planning the construction schedule during the design phase. This way, the team can view how construction will impact traffic and adjust the construction schedule accordingly. CM/GC also enables the team to determine right-of-way and utilities issues on the critical path during design and give greater focus to those that affect the overall schedule.

CURRENT STATE OF THE PRACTICE

With the passage of MAP-21, SEP-14 approval is no longer required for State DOTs to use CM/GC so long as their state statutes allow for it. The FHWA does not presently have regulations concerning the CM/GC project delivery method.

SUPPORT AND AVAILABLE TOOLS

If you're interested in getting started with CM/GC in your state and need to better understand the CM/GC technical issues and implementation process, here are some resources to help you get started:

- FHWA CM/GC Project Delivery Program Guide, *http://www.fhwa.dot.gov/construction/cqit/cm.cfm*

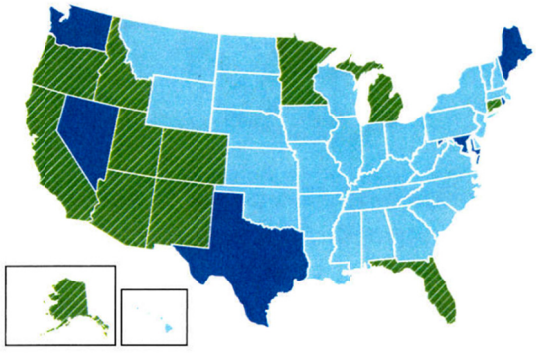


Figure 1: *Use of Construction Manager/General Contractor (or Construction Manager At-Risk); State Authority, Number of Completed Projects; FHWA Division Office Survey 2012*

- NCHRP SYNTHESIS 402 - Construction Manager-at-Risk Project Delivery for Highway Programs, *http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_402.pdf*
- Boston CM/GC Peer Exchange Presentation Materials – May 2012, *https://www.t2events.ce.ufl.edu/events/CMGC_Peer_Exchange_-_Boston%2C_MA.asp*
- Utah DOT Annual CM/GC Reports, *http://www.udot.utah.gov/main/f?p=100:pg:0:::1:T,V:3053*
- Sample Utah DOT CM/GC Documents, *http://www.udot.utah.gov/main/f?p=100:pg:0:::1:T,V:1871*
- Sample Oregon DOT CM/GC Documents, *http://www.oregon.gov/ODOT/HWY/MPB/WRB.shtml#CM_GC_Procurement_Documents*
- Sample CM/GC State Legislation (Arizona, Utah, Oregon, & State of Washington), *http://www.fhwa.dot.gov/construction/contracts/cmgc_statutes.cfm*

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Every Day Counts (EDC), a State-based initiative of FHWA's Center for Accelerating Innovation, works with State, local and private sector partners to encourage the adoption of proven technologies and innovations aimed at shortening and enhancing project delivery

U.S. Department of Transportation
Federal Highway Administration

FHWA-CAI-13-003

www.fhwa.dot.gov/everydaycounts


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