
INTERNET BIDDING FOR HIGHWAY CONSTRUCTION PROJECTS

November 15, 2002

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1. PURPOSE. To provide guidance for using electronic Internet bidding in transportation construction projects, specifically the software/hardware applications based on the technology available, identify the benefits to State Departments of Transportation (DOTs) and bidders (contractors), address implementation issues, the linkage to electronic bid bond, and Internet electronic plan drawings¹. This technical guide does not constitute a standard, specification, or regulation.

¹Valuable information on current technology was obtained from many companies, organizations, and transportation agencies. Direct credit is given in the Bibliography for these sources. Info Tech, American Association of State Highway and Transportation Officials (AASHTO), InSure Vision Technologies, Surety2000, Surety Association of America, Digital Paper Corporation™, Engineering News Record, Ohio Department of Transportation, Georgia Department of Transportation, TranspoLink™, and Pelleon™ provided helpful suggestions and reference materials.

2. **BACKGROUND.** A number of DOTs are using the Internet for electronic bidding in the announcement of bid proposals, bid submission, and posting of bid results. Internet bidding promises potential savings in time and cost to both DOTs and contractors. With the further development of the World Wide Web, Internet bidding will become more prevalent. Therefore, FHWA and the DOTs determined that guidance in the area of Internet bidding was warranted. Due to the current technology available in adopting Internet bidding effectively, this guidance is predominantly based on the AASHTO software called Trns•port Expedite®, in addition to an on-line document and bid transmission service named Bid Express™ which is specifically designed to interface with AASHTO's Trns•port Expedite®.

Some DOTs have elected to develop their own customized systems that do not use the AASHTO Trns•port Expedite® software. Their software would support the entire process of Internet bidding from bid solicitation to awarding of contracts. States that are proceeding in this direction include Texas and Washington. The Texas and Washington State DOTs expect to have their systems in operation in 2003. A future edition of this technical guide will provide introductory and explanatory information related to some of these customized electronic bidding systems once they have been implemented.

TranspoLink™ is a New York City based firm targeting turnpike commissions, local transportation agencies, and the DOTs. TranspoLink's DOTLink™ electronic bidding system is an online bidding that employs public key encryption with Secure Socket Layers technology and digital signatures. DOTLink's online bid packages include electronic bid bonds, Disadvantage Business Enterprises (DBE) information, and forms in addition to the proposals. TranspoLink™ informs that there is no software to purchase, download, store, test, update and maintain. DOTLink™ can be customized to meet the needs of an agency and to integrate with existing systems. TranspoLink™ plans to have its DOTLink™ system adopted by a local transportation agency(is) and/or State DOT(s) in 2003. In addition, TranspoLink™ through its BidWire™ system, provides a national database of current and archived transportation construction projects and procurement opportunities advertised by federal, state, and local transportation and public works authorities. TranspoLink™ reports to have thousands of transportation prime contractors, subcontractors, and suppliers subscribing to Bid Wire™. More information on TranspoLink's services can be found at: <http://www.transpolink.com>.

A company named Pelleon™, headquartered in Pittsburgh, Pennsylvania, has introduced an electronic bidding system targeting mid-size public agencies and private owners which automates the entire construction procurement process including: project advertisement, document distribution on CD-ROM or paper; pre-bid management functions including bidders' list, addenda, pre-bid Request For Proposals, and on-line pre-bid meetings; receipt of electronic bids and bid bonds in a secure environment; and sorting of bid data and conversion/export into other electronic formats. Pelleon's system operates as an application service provider and requires Microsoft® Internet Explorer with no additional hardware or software to purchase. Pelleon's system can be branded and customized to meet specific needs of an individual agency or owner. Pelleon's bidding system was

successfully used in a road construction project in Allegheny County, Pennsylvania. The Pennsylvania Turnpike Commission hired Pelleon™ as one of several consultants to perform a study on developing an electronic bidding system for implementation in 2003. Currently, no State DOT has experience with Pelleon's electronic bidding system. More information on Pelleon™ can be found at: www.pelleon.com/process/process.asp.

Because Trns•port Expedite® and Bid Express™ are currently the only software systems with practical experience in handling the Internet bidding process for several DOTs, they are discussed throughout much of this document to make Internet bidding more understandable. Reference to such proprietary items is done for informational purposes in demonstrating the technology and should not be construed as an endorsement. Furthermore, the inclusion or omission of any particular software or company should not be construed as an endorsement or disapproval by FHWA.

More information on Expedite can be found at AASHTO's web site at www.aashtoware.org and www.cloverleaf.net, and on Bid Express™ at: www.BIDX.COM.

3. IMPLEMENTING AN INTERNET BIDDING SYSTEM

A. What is Electronic Bidding?

Electronic bidding is the electronic transfer of proposal bid data between DOTs and bidders. Electronic bidding can either supplement or replace traditional paper bid documents.

Trns•port Expedite® is used for preparing and submitting electronic bids on a CD/floppy disk or via the Internet. Expedite is currently used in bid preparation by 36 DOTs. It is a personal computer based collection of programs designed to work with bid letting management systems to allow bidders to receive, prepare, and submit electronic bids in a secure machine readable form. In addition, it performs all calculations and checks for completeness of bid.

Bidders using the Expedite software can submit their bid tab information on a CD/floppy disk that they have prepared, this is called one-way bidding. In many State DOTs with one-way bidding, the contractor still must submit a paper proposal in addition to the bid tabulation printout from Expedite.

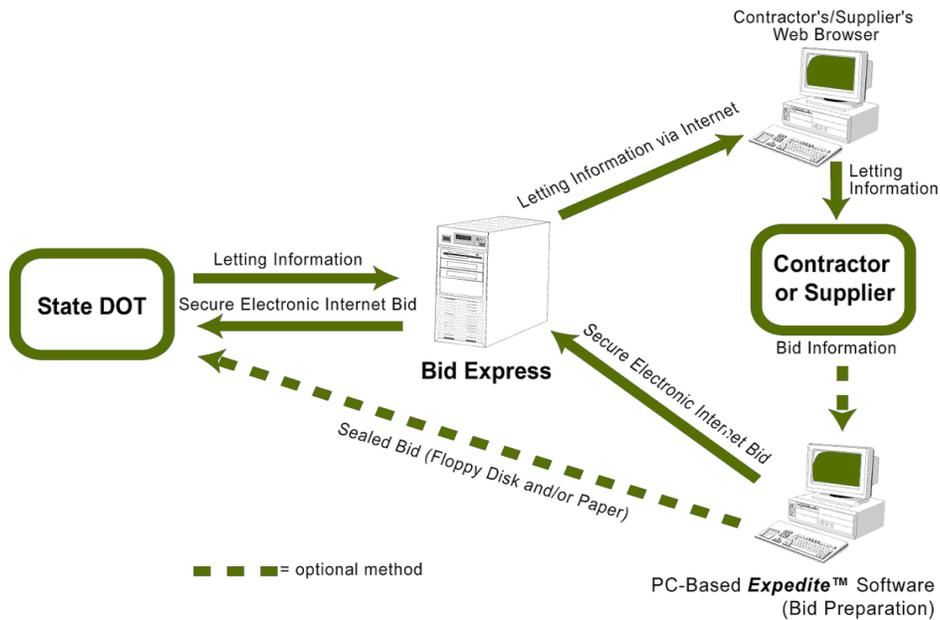
B. What is Internet Bidding?

With Internet bidding, the bid tab information contained on the CD/floppy disk becomes a bid proposal. So when the bidder digitally signs and submits bid tab information (bid proposal) via the Internet, no paper is required or CD/floppy disk needed. With Internet bid submission, commonly called two-way electronic bidding, the need for data entry on the DOTs' part is eliminated.

Bid Express™ serves as an interface between the Expedite module to exchange bid information between the DOTs and the bidders. Info Tech is a Florida-based company that owns Bid Express™. Through the Bid Express™ web site, bidding service is contracted for by DOTs to handle their bidding process. This exchange service web site is where bidders find and submit bid data. The DOT utilizes Bid Express™ to advertise its contract Request For Proposals information and manage its bid submission process. When the bidder submits the bid data to Bid Express™, the bid data is encrypted (transformed into an unreadable form to ensure privacy) and sent to secured computer servers in Florida and Georgia. These encrypted files are held in an electronic lockbox until the public bid opening.

A flow diagram of this general process is shown below:

Electronic Bidding Flow of Information



Source: *Info Tech*

As of this writing, and to the best of FHWA’s knowledge, Info Tech is the only company serving the State DOTs with the capability to accept encrypted bids over the Internet. This is expected to change as more computer science companies develop encryption/decryption software for DOT Internet usage.

C. Benefits for DOTs and bidders

The implementation of Internet bidding enables the DOTs and bidders to optimize the use of the latest technology in electronic bidding. It provides a variety of benefits to the DOT, among these:

- S secure reliable exchange with bidders
- S elimination of bidding errors (system checks calculations and will reject bids missing data)
- S bids are received in a consistent, formatted manner
- S savings in personnel costs to prepare and distribute bid proposals
- S access to a potentially larger group of bidders for each bid
- S bid submission cut-off times are enforced
- S streamlines the bidding process by eliminating paper bidding and reducing costs.

The principal benefits of Internet bidding for bidders are similar to those of the DOT, these benefits include:

- S access to project (bidding) information 24 hours a day, 7 days per week
- S more efficient process for preparing bids
- S time savings and error checking in bid preparation (system checks calculations and will kick back bids missing data)
- S increased ease of submitting bids to the DOT
- S convenience of submitting bids from home office without the risk of last minute delays
- S ability to resubmit bids before the bid submission deadline
- S security and confidentiality of the bid information
- S savings in time and expenses by eliminating the requirement to travel to the letting location.

Several DOTs have fully implemented the Internet two-way bidding system. Their share of successful experiences and the concomitant benefits reaped by both the DOTs and the bidders can be found at: http://www.bidx.com/main/info/news/status_article.pdf and in http://www.bidx.com/main/info/news/ENR_states_turn.pdf.

D. Crucial Issues

Some DOTs have expressed concerns whether the benefits of going with Internet bidding would offset the crucial issues associated with the security requirements necessary for full Internet bidding to function. The following information is provided to facilitate the understanding for fostering secure Internet bidding.

Authentication

The *Electronic Signatures in Global and National Commerce Act*, more commonly known as the *E-Sign Law*, became law in June 2000. It allows for the nationwide use of electronic signatures. "Electronic signature" is a generic, technology-neutral term that refers to all of the various methods by which an electronic record can be signed.

Expedite and Bid Express™ use digital signature technology, which is simply a term for one technology-specific type of electronic signature. Therefore, the bidders must have a digital signature on file at the Bid Express™ web site. The Internet bidding system used with Expedite is a closed loop system not accessible to the public. With this system, the DOT does not have access to the bids prior to the bid opening, nor does Bid Express™ have the capability to decode the encrypted bid data. Only bidders with digital signatures can have access to their submitted bids and can make modifications prior to the bid deadline. At the actual time of bid opening, the encrypted bids are downloaded to the DOT, which can only be opened with a pass phase protected private key that only the DOT holds.

Validation

Unlike paper documents, changes made to electronic files are generally undetectable. A bidder unhappy with the result of a letting could claim that his bid had been altered, repudiating the process. Digital signatures, prevent a bidder from repudiating a valid bid, as any alteration of the file would invalidate the signature. When a document is digitally signed, a hash function, a computation that leaves a specific code, or "digital fingerprint" is applied to it. If the fingerprint on the receiver's message does not match the original fingerprint, the message has been altered. Simple electronic signatures do not provide this capability.

Guaranteed delivery

Under the traditional practice, bidders often personally deliver their paper bids to the DOT. They know their bid has been received, and will be opened at the public letting. One of the key benefits of Internet bidding is not having to attend lettings in person to assure a bid is submitted. When a bidder "delivers" his electronic bid file, there must be a mechanism to assure that it will be received by the DOT and opened at the public letting. Bid Express™ handles this requirement by returning a digitally signed receipt for each bid submission. That receipt provides the bidder with legally binding proof that the bid was received by the service at the stated time.

Security

Security may be the most serious concern to bidders. The security of the information is critical to bidders who may not feel comfortable sending their bid through electronic means. Encryption is currently the best solution to address the security issue. Bid Express™ provides an electronic lock box, whereby bidders encrypt their bids before submitting them to Bid Express™, using a key under control of the DOT. Bid Express™ holds the bids until the public opening, but doesn't have the key, preventing disclosure of the contents of the bids. The bids are passed to the DOT at the time of the public opening for decryption and analysis.

Key management

Digital signatures require each signer to create a pair of encryption keys, safeguard one of them (the "secret" key) and publish the other (the "public" key). A bidder relying on a digital signature needs to obtain the appropriate public key, along with verification that the entity named in it (the DOT) really created and controls the public key. Encrypting bid documents requires similar keys to be created and transferred. Creating the keys, managing them, and verifying the holders of them is difficult and often perplexing for the end users. Bid Express™ and Expedite perform all those functions.

Reliability

This concerns the probability of system failures, especially caused during high network traffic generated by the nearness of the bid date. An electronic bid depository must be always available during its stated operating times. It would be economically devastating for a bidder if unable to submit a bid because of a problem with the depository. This kind of paramount reliability requires significant parallel of power, hardware, and communications lines in physically separate locations. Bid Express™ has parallel servers in Florida as well as in Atlanta.

Information Flow

At large lettings, when there are many projects and bidders, much information flow occurs in checking the many details that arise when bids are received. Migrating to Internet bidding should not disrupt this flow, but rather enhance it. As the bid opening proceeds, electronic bids must be fetched from the depository, have their signatures checked, be decrypted, summarized for public reading, and analyzed for tabulation. Bid Express™ provides a tool called the Retrieval Console that performs all these functions for a smooth bid opening process.

E. Technical Issues

The Internet bidding process requires that several technical issues be considered. The following paragraphs elaborate on the implementation issues aimed at Expedite and Bid Express™. It includes costs, equipment needs, and compatibility in the software and operating systems. This information is provided for guidance only and does not imply preferential endorsement of Expedite and Bid Express™ by the FHWA.

► Trns•port Expedite®

This section describes the AASHTO's Trns•port Expedite® components that should guide the successful implementation of Internet bidding for a DOT. This information was obtained from AASHTO.

Trns•port Expedite® is a 32-bit Microsoft®Windows® application designed to work with Trns•port PES/LAS (Proposal and Estimate System/Letting and Award System), or any similar proposal preparation and bid letting management system. PES and LAS were designed to work together. PES addresses the needs of the pre-letting phase of construction. It is designed specifically to prepare PS&E estimates, combine them into proposals, and select a group of proposals for a bid letting package, all on-line. LAS

addresses the needs during advertisement and award phase of activity. It is designed to aid DOT personnel in advertising proposals, tracking plan and proposal holders, processing bid information and making award decisions.

Expedite allows bidders to receive proposal information including item schedules, DBE requirements, and affidavits, enter all information required for a valid proposal and submit item bids in a secure machine-readable form. Expedite supports proposals with alternate sections and alternate items, lump-sum and fixed price items, marking proposals as information only or with serial numbers and distributions of amendments in electronic form.

Expedite consists of several components, some intended to be run by the DOTs and others to be run by bidders. The first component will convert a flat file of proposal item information, taken from PES or a similar system, into an electronic proposal or amendments file for distribution to prospective bidders. The second component, called the electronic bid manager, is run by the bidder and allows item bids to be entered interactively, as on a spreadsheet, with item extensions and section and proposal totals calculated and displayed immediately. It also facilitates the submission of DBE commitment information, certification statements (i.e. anti-collusion), and an electronic bid bond identifier or manually delivered check or payment indication. The third component, run by the DOT, checks the electronic bid for validity and data errors, prints a log listing information about the electronic bid for comparison to the paper bid and produces a flat file suitable for loading into LAS or a similar system. The final component allows the DOT to enter bid data from proposals submitted manually in a personal computer based program for loading into LAS or a similar system.

Expedite is licensed for free to all DOTs that also license Trns•port PES and LAS. For DOTs not licensing PES and LAS, the annual fee in 2002 was \$10,000.

Some DOTs, such as the Virginia Department of Transportation, have provided free training to contractors on its Internet bid submissions process.

- ▶ Bid Express™

The following information was obtained from Info Tech. It provides answers to frequently asked questions for contractors in their Internet bidding implementation efforts. FHWA can accept no responsibility for the consequences of any inaccuracy which it might contain.

Frequently Asked Questions

What's the difference between Trns•port Expedite® and Bid Express™?

Expedite is a computer software used to prepare the electronic bid. Bid Express™ is an Internet-based online service that allows a DOT and its contracting community to communicate with each other. You can use Expedite without Bid Express™ or Bid Express™ without Expedite. However, transferring Expedite files is usually a key function of Bid Express™.

What kind of computer and software do I need for Expedite?

Any Intel 80496 or equivalent computer can run Expedite, but a Pentium or better is recommended. 16 MB RAM minimum for Microsoft®Windows® 95 or 32 MB minimum for Windows® NT with 20MB free hard disk space is recommended. Expedite for Windows® operates on computers running Microsoft®Windows® (95, 98, 2000, XP or NT 3.5 or 4). A modem or network connection with Internet availability is required for bid submission over the Internet. Due to strong encryption within Expedite for Windows®, certain restrictions apply for export and use of the software outside of the United States or Canada.

What kind of computer and software do I need for Bid Express™?

Any computer that can access the Internet either via a modem or a network connection can connect to Bid Express™. However, full support is only provided for computers running Microsoft®Windows® (95, 98, 2000, XP or NT 3.5 or 4).

Is there a charge to the contractor for Expedite?

No. Expedite is funded by each participating DOT and is available at no charge to the contractor.

How much does Bid Express™ cost?

Each contractor pays a \$30.00 monthly subscription fee for the basic service to the Bid Express™ web site. This level of service provides access to information from all active Bid Express™ states. If the contractor wishes to use Bid Express™ to submit bids over the Internet to a State DOT that is in production with Bid Express™, the contractor must pay an additional \$10 per month per state in which it is registered to bid.

Do I need an account with an Internet Service Provider to use Bid Express™?

Yes, it is required that you have an independent provider. It is highly recommend that you have an independent back-up Internet provider if doing Internet bid submission.

How do I sign bids that are in electronic form?

Expedite 4.x and newer versions include digital signature capability (this capability is currently in use by eight State DOTs with many other states planning implementation within the next couple of years). This will require you to first create and register a Digital ID Certificate, which can be done when installing the Expedite 4.x or newer versions. Once you have the registered digital certificate (which involves submitting a signed, notarized printout to Bidx.com) and been approved by Bidx.com, it can be used to sign your bids using the Expedite software. Note that the certificate is kept in an encrypted file on your personal computer, so you need both that file and the decryption key (a password) to sign files.

How much does a Digital Signature cost?

There is a charge of \$50.00 by Bid Express™ for each Digital Signature Certificate registration. One Digital Signature is required for each individual submitting bids over the Internet.

Can multiple people at my company share a Digital ID Certificate?

No, each Digital ID Certificate identifies a particular person. However, any number of people at your business can each have their own Digital ID Certificates, and if they are authorized to sign for the company, any of them can digitally sign bids. Each Digital ID Certificate is capable of submitting bids for only a single state. A person can obtain a Digital ID Certificate for multiple states if desired.

What happens if I lose my Digital ID or Password?

You must resubmit it and pay the \$50.00 registration fee again. There are detailed instructions on how to back up the Digital ID on the Digital ID Certificate that is printed when a Digital ID is created. There are no means available to regenerate your Digital ID when no back up exists or to recover the password if lost. If a Digital ID is properly backed up using the Expedite program it can also be easily recovered from within the Expedite program. If the password is lost there is no way to determine or recover it.

Can I submit a bid more than once? Can I withdraw a bid?

Yes, to both questions. If you submit a bid multiple times before the deadline, only the last submission will be kept and passed on to the DOT. The bids are over-written each time a new bid is submitted, therefore only one bid exists at any time. If you request a bid to be withdrawn before the deadline, it will not be passed on to the DOT.

Who can read my bid?

No one but you until the public bid opening. Until you deliberately submit a bid to the service it stays on your PC, and there's no way for anyone else to see it. When you *do* submit a bid, the Expedite software encrypts it before sending, using the DOT's key. Bid Express™ cannot read your bid and will not pass it to the DOT until the official bid opening.

Could my bid be lost?

Bid Express™ has designed the system to avoid this happening, including keeping multiple copies of submitted files and keeping data on read-only media.

In addition, you will receive electronic bid receipts whenever you submit a bid, which can be used to prove when the bid was submitted. These bid receipts will be digitally signed by Bid Express™, using the same technology you use to sign your bid.

How secure is my bid?

Your bid is VERY secure in the Bid Express™ system. Expedite and Bid Express™ use PGP™ (Pretty Good Privacy), public/private Key Pair technology, which is used throughout the world for encrypting and digitally signing documents. PGP™ is widely becoming an Internet standard for signing and encrypting technology.

Is Bid Express™ reliable?

Yes. It has been in operation for over two years, with better than 99.95% uptime. The Bid Express™ servers are connected to battery backup, and the battery systems are connected to generator backup. Info Tech is working to increase this reliability further; soon all Bid Express™ servers will be paired, with each server monitoring the other and

automatically taking over should there be a problem. Furthermore, there are servers in a separate geographical location, using a separate Internet provider, for greater redundancy.

More technical information can be obtained from the Bid Express™ web site.

The Georgia DOT (GDOT) implemented the nation's first Internet-based bidding system. GDOT's contract administration web site illustrates the two way bidding process as it covers bid proposals, bid submission, and posting of bid results. The web site can be found at:

<http://www.dot.state.ga.us/dot/construction/contractsadm/>

F. Bid Bond Registries

The following information is provided for guidance only and does not imply preferential endorsement of Surety2000 (<http://www.surety2000.com/>) and InSure Vision Technologies' SurePath (www.insurevision.com) electronic bid bond registry systems or any other system by the FHWA.

Until recently, the technology for electronic bid bond verification was not available. Therefore, paper bid bonds had to be submitted, thus the bidding process was not totally electronic. Bid Express™ facilitates the bidding process, but the highway agency or broker must use a bonding system that works with Bid Express™. There are currently two systems that work with Bid Express™, Surety2000 and SurePath. Both provide similar work flow and work over the Internet, and neither requires additional software or hardware.

Bidders receive an electronic Bond I.D. from any licensed surety agent using Surety2000 or SurePath. Bidders download electronic bid files for a DOT's letting from Bid Express™, or from the DOT's contract administration's Internet web site. The bidders then use the Expedite 5.0 Bid Program to electronically fill out the bid information which includes a Bid Bond folder. By entering the required fields in the Bond form, the bid bond can be validated on-line via the Internet through the bond registry. The contractor can thus securely verify his bid bond using digital I.D. and the Expedite 5.0 Bid program.

As of this writing, bonds issued through SurePath can be submitted via Bid Express™ in Maine and Vermont, with other States planning to evaluate the SurePath system by late 2002. Surety2000 has Arizona, Minnesota, South Carolina, Virginia, and Wyoming as active States utilizing its system, with other States targeted for 2003.

Another vendor in discussions with Info Tech regarding a bid bond solution is Airborne Express® (<http://www.airborne.com/home/home.asp>). In addition, Airborne Express® is also in discussions with Texas DOT pertaining to bid bond registry services. e-Solve Technologies (www.esolvetechnology.com) is also pursuing surety bond processing service.

A contractor should inform his surety agent before using Internet bid bonding. The surety agent makes arrangements with the bond registry. In lieu of paper bonds, the surety agent will generate authorization codes consisting of several numerical digits, and provide these codes to the contractors who in turn will include it with their bid submission. Surety agents digitally sign these codes. The surety company also authorizes the electronic power of attorney. The power of attorney in writing or electronically with a digital signature is verified proof of the surety's liability under the attached bond. The contractor can request the bond and retrieve the bond from the agent through the bond registry.

In setting forth the environment for electronic bid bonds, the surety industry has defined some features that it believes any bond system should possess. In particular, the Surety Association of America (SAA), <http://www.surety.org/>, has developed a checklist of required features. These features have a profound effect on the legal relationships of the bonding parties. The SAA believes electronic bonding should be driven by business and legal issues rather than simply by the technical capabilities of a particular system. More information on the subject checklist can be obtained from the SAA's website.

4. INTERNET ELECTRONIC PLAN DRAWINGS. The Ohio Department of Transportation (ODOT) is a pioneer of road construction plan drawings on the Internet. According to ODOT officials, this technology has significantly improved the efficiency of access to and distribution of plan drawings, as well as reducing the overall print volume for bid sets. By reducing the print volume, the ODOT's print room operates more efficiently with fewer people. This user-friendly technology enables bidders nationwide to search, view, and print locally electronic road construction plan drawings (e-plans) using only an Internet service provider (web browser). Just by accessing the ODOT web site at www.dot.state.oh.us/cadd/, a bidder can obtain project plan drawings without having to order them, thus saving the DOT's charge for each bid set. ODOT uses the TIFF file format to illustrate its Internet e-plans.

In the ODOT, before the advent of Internet e-plans, a bidder would have to order plan drawings for pre-bid review. These were prepared and distributed generally four weeks prior to the letting date. With e-plans available on-line (up to two weeks before mailing), contractors, small contractors, sub-contractors, and suppliers can search for e-plans by project number, county, project type, route section, or other parameters. All project addenda are posted on ODOT's web site. Automatic notification to e-plans holders of changes in plans drawings is also available. For addenda, Adobe® Acrobat® software is required. This software can be downloaded free of charge from www.adobe.com.

With this pertinent information readily available, bidders can decide early on whether or not to bid. Upon the implementation of ODOT's e-mail notification process in November 2002,

all users will be required to log-in to get bidding documents including project e-plans. ODOT also makes project plan drawings available on CDs.

Successful innovations are based on well defined user-needs with specific payoffs. Ohio DOT has successfully handled this challenge by delivering “road shows” throughout the state demonstrating this incipient technology for Internet e-plans accessibility, and thereby alleviating the contractors’ concerns regarding the new Internet e-plans system.

The considerations for providing e-plans on the Internet are several. For example:

- S what file format (i.e. TIFF, PDF, etc.) should be used to illustrate Internet e-plans?
- S would the end-users (contractors) have to load any new client software on their PC for access to Internet e-plans?
- S would the end-user need the functionality of a computer aided design package or just the ability to see the Internet e-plans as printed?
- S what are the security measures incorporated into the e-plans data transmission?
- S will the document distribution service provide maintenance upkeep? (i.e. software upgrades, automatically incorporating the latest revisions to e-plans, etc.)

There are various companies that provide the service of Internet e-plans. Digital Paper Corporation™, www.digitalpaper.com, through its document management and distribution product docQuest™, provides the Ohio DOT with Internet e-plans service.

Washington State DOT uses FastBid™ for illustrating its plans on-line. The imaging system was developed by Builders Exchange of Washington Inc. (<http://www.bxwa.com/>).

Maxview™ Corporation (<http://www.maxview.com/>), TranspoLink™, and tsaADVET (www.tsaADVET.com) also offer Internet e-plans. tsaADVET is providing the Virginia DOT with an e-plans management and distribution software called Falcon/DMS® for illustrating Internet e-plans by the end of 2002.

The Georgia DOT (GDOT) is considering several companies to make e-plans service available on GDOT’s web site by the end of 2002.

5. CONCLUSION. This technical guide illustrates to DOT personnel, contractors, and interested parties the use of current technology available on Internet

electronic bidding, and guidance to facilitate its adaptation. Among the items discussed are the current software applications, the benefits and concerns in adopting the technology, known providers of the different technological aspects involved in Internet bidding, and the means through which successful implementation can be accomplished.

As more DOTs and contractors take advantage of Internet bidding, the availability of more computer science consultants and software vendors to accommodate this demand should increase.

Given the transient nature of computer software technology, updates and changes should be made to this document as determined to be necessary in order to remain aligned with future technology associated with Internet bidding.

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