

DAMAGE PREVENTION PROJECT

FINAL REPORT

December 2003

Prepared by
Dean Katerndahl, Mid America Regional Council
Tom Bizal, Black & Veatch

This project was funded under Damage Prevention Grant No. DTRS56-01-G-0012.
United States Department of Transportation, Research and Special Programs Administration, Office of Pipeline
Safety

TABLE OF CONTENTS

❖ Acknowledgements	2
❖ Executive Summary	3
❖ Project History	7
❖ Project Description	11
❖ Best Practices	16
❖ Best Practice Implementation	20
❖ Conclusion	25
❖ Appendices	
• Appendix A: Damage Prevention Steering Committee	
• Appendix B: Stakeholder Questionnaire	
• Appendix C: Full Practices	
▪ Strategic Relationships	
▪ Horizontal Directional Drilling Guidelines	
▪ In-Ground Facility Identification	
▪ Potholing	
▪ Design Drawings	
• Appendix D: Report on Legal Liability Issues Associated with the Operation of A Regional GIS Database	
• Appendix E: Report on the Technical, Financial, and Business Issues Associated with the Development and Use of a Regional GIS Database	
• Appendix F: Shawnee Ordinance	
• Appendix G: Unified Government Best Practices Implementation	
• Appendix H: Independence Best Practices Implementation	
• Appendix I: Implementation by Other Municipalities	
• Appendix J: Homeowner Education Material	
❖ The final report, all appendices, and other documents related to damage prevention can be found on the project web site at http://www.marc.org/damprev/DamagePrev.htm .	

ACKNOWLEDGEMENTS

A report like this does not get done without the help of a lot of people. The United States Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety deserves a lot of credit for not only funding this project, but also initiating and sustaining the national Common Ground effort.

The Kansas Corporation Commission (KCC), particularly Leo Haynos, was the one that originally saw the need to address underground damage prevention at a local government level and initiated the discussions, and applied for the grant, that resulted in this project. The KCC, along with the Missouri Public Service Commission and Amy Brox, has also been a continuous supporter of the project.

A key element of the project has been the support of local governments in the Kansas City metro area and particularly those right-of-way managers and public works officials that served on the Damage Prevention Steering Committee. It was their guidance and work that made this project so successful. Significant support and participation has come from the cities of Independence, Kansas City, Lawrence, Lee's Summit, Lenexa, Olathe, Overland Park, Prairie Village, Shawnee, St. Joseph, and the Unified Government of Wyandotte County Kansas City, Kansas.

A lot of stakeholders are involved in developing a safer environment for underground facilities. They include the state one-call programs, utilities, locaters, and excavators. The project has to acknowledge their support for this project. In particular the newly formed Kansas City Regional Common Ground Committee, the state one-call programs in both Kansas and Missouri, and One Call Concepts, the operator of both state one-call systems.

Finally, the services of our principal consultant, Black and Veatch, have to be acknowledged. In particular the work of Thomas Bizal, project manager. Without Tom's flexibility and persistence we wouldn't have gotten this far. Also the work of Bruce Goekel of Black & Veatch and Kyle Foote of Stinson Morrison Hecker in bringing our special report on development of a regional utility map together with very short deadlines.

EXECUTIVE SUMMARY

The Common Ground Report, a national joint effort of a wide array of stakeholders in underground damage prevention, was produced in 1999 and sponsored by the U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety. The Common Ground Report provided a compendium of best practices for preventing damage to underground facilities.

The Kansas City regional project focused on how local governments in particular could enhance management of underground facilities. Local government, cities and counties, are responsible for a large amount of public right-of-way. In this right-of-way is located much of our nation's underground infrastructure including facilities for electricity, telecommunications, natural gas, water, and waste water services. Because of this concentration of underground facilities in local government right-of-way, cities and counties are in a unique position to influence the development and implementation of practices that will minimize damage to underground facilities and enhance the safety of the public.

The Damage Prevention Project grew directly out of the national Common Ground report and how its practices could be applied at the local level.

The project was guided by the Damage Prevention Steering Committee comprised of local government right-of-way and public works officials and officials of the Kansas Corporation Commission and the Missouri Public Service Commission. Administration of the project was the responsibility of the Mid-America Regional Council (MARC), the Kansas City region's council of government and metropolitan planning organization. Black & Veatch (engineering) and Stinson Morrison Hecker LLP (legal) provided consulting assistance. Beyond the cooperation and support of these participants, the project also relied on input from a large community of stakeholders including utilities, locaters, excavators, engineers, the Kansas and Missouri One-Call Programs, and the Kansas City Regional Common Ground Committee.

The main body of the project involved an extensive process to identify potential practices and policies that would reduce damage to underground facilities and were appropriate for implementation by local government. The list began with the Common Ground report. It was supplemented by an extensive survey conducted by Black & Veatch. This survey asked utilities, locaters, excavators, engineers, the One-Call Programs, the state corporation commissions, and local governments for their opinion on a wide array of questions related to current and potential practices and policies to prevent damage to underground facilities.

The chief product of the Damage Prevention Project is a set of five best practices.

This list then underwent a review process that involved the Steering Committee reducing the number of practices to five that the were felt to

have the greatest potential for impact, were the most likely to be implemented, and were particularly suited for local governments. These five practices are:

- ④ **Strategic Relationships.** The objective of this practice is to develop goodwill and positive relationships between key stakeholders that results in the exchange of useful

information regarding facility location and protection. This practice can include periodic meetings of stakeholders, sometimes called utility location coordinating committees (ULCC), pre-construction conferences with potentially affected underground facility owners, and maintenance of an up-to-date contact list for emergency and planning purposes.

- ④ **Horizontal Directional Drilling Guidelines.** The objective is to provide a concise, user-friendly handbook of basic guidelines/fundamental elements of the HDD process to ensure public safety and protect existing utilities. The guidelines were developed using the City of Overland Park *Horizontal Directional Drillings Guideline Handbook* and the *Horizontal Directional Drilling Good Practices Guidelines* by the HDD Consortium. The guidelines address planning and design, permitting, construction safety and procedures, use of appropriate drilling fluids and drilling fluid practices, storm water pollution prevention, and construction records.
- ④ **In-Ground Facility Identification.** The objective is to make sure that permanent devices are installed with buried facilities thus allowing those facilities to be detected in the future through non-invasive methods. Two technologies are the focus of this practice: (1) installation of tracer wire with non-conducting underground facilities to enhance opportunities to detect facility location using electromagnetic means and (2) the installation of color coded warning tape above underground facilities to provide excavators a physical warning of an adjacent facility.
- ④ **Potholing.** Potholing is the practice of exposing underground facilities so they can be accurately located. This is the most accurate location practice, but also the most costly. The objective of this practice is to establish criteria for when potholing should be used, principally when excavating in crowded utility corridors or crossing other utilities, and how it should be conducted.
- ④ **Design Drawings.** The objective of this practice is for infrastructure owners and engineers to use utility location as early in the design process as possible in order to avoid problems with underground facilities in the construction phase. This practice has two components. The first is that engineers and utilities are to identify existing utilities on plan drawings when designing new underground facilities. The second part is adoption of the Subsurface Utility Engineering (SUE) standards adopted by the American Society of Civil Engineers (ASCE) under CI/ASCE 38-02, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, as the standards to be used to present this information.

The practices were set out in five papers produced by Black & Veatch and reviewed by the Damage Prevention Steering Committee. They were then presented and reviewed by utility location coordination committees (ULCC) around the region and with the Kansas City Region Common Ground Committee. The intent was for the local governments to try out the practices during the 2003 construction season and then evaluate the practices. The primary concern expressed was with the design drawing practice. The concern was that this would add too much work and cost to the design phase of a project.

Following presentations to local utilities and other stakeholders, individual communities began to implement and track the use of the five practices. In some communities the practices were already a part of the city's procedures while other communities adopted them administratively or took revised language to their city councils. In some cases the practices were incorporated into existing right-of-way ordinances or into the procedures used to implement such ordinances. By the end of the summer of 2003, ten cities had adopted or were in the process of adopting ordinances or regulations that implemented some or all of the practices. The project concluded with an evaluation of the practices by those that had been involved in using them. The information provided was largely anecdotal and impacted the final recommendations for implementation of the practices. In actuality, realized impacts from practice implementation will not be able to be truly assessed until several years after implementation.

Practices were evaluated and implemented, using a variety of approaches, by local governments.

The Damage Prevention Project also worked with the state one-call programs to improve cooperation.

While the principal focus of the Damage Prevention Project was to identify practices that local governments could use to reduce damage to underground facilities in local right-of-way, a considerable amount of time was spent on other initiatives designed to reduce damage to underground facilities. One major initiative was to foster better communication and sharing of information between the state one-call programs, both in Missouri and Kansas, and local governments. A joint meeting of local governments, the Kansas and Missouri corporation commissions, the Missouri and Kansas one-call programs and their operations contractor, One Call Concepts, was held. At the meeting the following issues and potential initiatives were identified:

- Ⓣ A key issue for local governments in participating in their state one-call program is the issue of over-notification, receiving notifications for locates of facilities when the area of interest is outside of the city's right-of-way. Over-notification is expensive both in terms of direct cost and in terms of manpower. The one-call programs are working to improve the precision of notifications to reduce this problem.
- Ⓣ It was determined that the Mid-America Regional Council (MARC), which maintains a regional GIS database for location of 9-1-1 calls could share this information with the state one call programs. Current one call base maps can be as much as 3 years behind, especially important when a large proportion of locate calls relate to newly developing areas. The MARC base map is updated on a monthly basis. Additional meetings were held to explore the technical issues involved, and data has been transferred to the Missouri One-Call program.
- Ⓣ Local governments and the one call programs have a common interest in reducing damage to underground facilities and can help to reinforce each other's programs. For example, cities can require a locate ticket before granting a permit. One call can refer those calling in to their local city for proper permits.
- Ⓣ A major issue for both cities and one-call programs is homeowners. They often are unaware of good practices when operating in their yard and may not know the proper agencies to contact. The Damage Prevention Project implemented a major public education campaign aimed at homeowners. This included the distribution of brochures,

the placement of placards, public service announcements, and the development of a web site (<http://www.marc.org/onecall/>).

One final special study grew out of the development of best practices for preventing damage to underground facilities. A number of stakeholders had identified the need for a master GIS map with the location of existing utilities. Such a map would be of special use to engineers and planners in developing the initial plans for new underground facilities. The need for such a resource was especially noted in conjunction with the recommended design practice. However, there were several issues identified as possibly preventing the development of such a GIS underground utility location map:

- Ⓣ Would any of the parties to such a system incur any liability in the course of collecting information, maintaining the system, or sharing the information in the system with others?
- Ⓣ What are the technical issues involved in establishing such a system?
- Ⓣ What are the security and utility participation issues involved in establishing such a system?

The Damage Prevention Steering Committee retained Black & Veatch to address the technical and security issues and the law firm of Stinson Morrison Hecker to address the issue of liability. While liability does not appear to be a problem, there are substantial technical and business issues in developing a regional GIS utility location map. Black & Veatch recommended the development of such systems on an individual city or county basis.

Although the grant project has concluded, the work by local governments to prevent damage to underground facilities will go on. The local chapter of the American Public Works Association (APWA) has established an facilities protection committee. This committee will pick up the work of the Damage Prevention Steering Committee. They will be considering presentation of the practices to the full chapter for consideration for adoption as official APWA chapter policy. They will also be working with local governments to develop training for local governments in use of the practices.

*APWA takes over
where the Damage
Prevention Project
left off.*

PROJECT HISTORY

The Kansas City Damage Prevention Project represents the intersection of two longer-term initiatives. The first initiative involves the effort by local governments in the Kansas City metro area to improve management of their rights-of-way. The second initiative is Common Ground, a national effort to develop practices to reduce damage to underground facilities. The local initiative developed local government capacity to address right-of-way issues, which put them in a position to implement the practices identified in the Common Ground study.

ROW Management in the Kansas City Metro Area

In the mid-1990s, not a single city in the Kansas City metropolitan area had a person solely dedicated to managing the right-of-way and coordinating with underground utilities. Also few cities, if any, had dedicated right-of-way ordinances. Any requirements for working in the right-of-way were typically contained in individual franchise agreements with the possibility that the requirements might vary from one agreement to the next.

Probably the single most important event to change this situation was passage of the Telecommunications Act of 1996. Prior to 1996, cities generally had to deal with a single company representing each utility. This made management of the right-of-way, if not easy, at least within manageable bounds. There were a limited number of readily identifiable and accessible utilities operating underground.

Following passage of the Telecommunications Act of 1996, at least within the telecommunications sector, there was the possibility of having a large number of providers with facilities in the right-of-way. In addition, it became more difficult to identify who owned facilities and who was responsible for the facilities that were in the ground. This became an increasing management, safety, and cost issue for local governments. With more utilities in the ground, there was an increased chance of utility cutoffs, disruption of utility service, and the creation of hazardous conditions. In addition, the increasing number of street cuts for new underground utilities caused increasing disruption to traffic and degraded the life of public streets.

Kansas City metro cities have been working together on right-of-way issues for a number of years.

Local governments in the Kansas City metro area began to address this increased activity in several ways. Cities created positions for right-of-way managers or utility coordinators. Now, most large and many medium size cities have full-time right-of-way managers. Cities came together through MARC to work jointly on right-of-way management issues. Through this joint effort, a cost of right-of-way study was commissioned. It provided cities with information used in the development of right-of-way ordinances. MARC also convened local governments to discuss right-of-way ordinances, the respective issues, and how could they be addressed. While this effort did not create a model right-of-way management ordinance, it did provide local governments with a common set of understandings, allowed local governments to share ideas and ordinances, and contributed to the development of a model right-of-way ordinance in the state of Missouri. This information is captured on the Telecommunications Consortium document web page: <http://www.marc.org/telecom/telecomdocs.htm>.

These cooperative efforts regarding management of the public rights-of-way were further reinforced when forty communities came together to form the Kansas City Regional Telecommunications Consortium. The Consortium developed model telecommunications and cable agreements, shared information on telecommunications activities, and encouraged communities to adopt right-of-way ordinances. The Consortium also participated with local governments and the state leagues in debates in the Missouri and Kansas legislatures regarding right-of-way legislation. Although this legislation restricted local governments ability to receive compensation for use of the right-of-way, it generally reinforced a city's authority to manage the right-of-way.

Comment [b1]: Dean, I think you mean to use "by and large"; however, I think "generally" or "overall" does it better.

Common Ground

The Common Ground initiative was started in 1998 as a part of the Transportation Equity Act for the 21st Century (TEA 21). The initiative was sponsored by the US Department of Transportation; Research and Special Programs Administration; Office of Pipeline Safety. The Common Ground report, issued in August 1999, represented the work of a wide variety of stakeholders to investigate and identify practices, particularly in conjunction with state one-call programs, that would serve to reduce damage to underground facilities.

Common Ground is national initiative to develop common practices to prevent damage to underground facilities.

The Common Ground Report is divided into nine study areas:

- Ⓞ Planning and Design
- Ⓞ One Call-Center
- Ⓞ Locating and Marking
- Ⓞ Excavation
- Ⓞ Mapping
- Ⓞ Compliance
- Ⓞ Public Education and Awareness
- Ⓞ Reporting and Evaluation
- Ⓞ Emerging Technologies

Each study area had its own committee. Only practices that were a consensus selection by each committee were placed in the Common Ground report. The full report can be found online at: <http://www.commongroundalliance.com/wc.dll?webdoc~Details~&id=000016&query=no&sub=01&lp=5&u=lp>.

Following the issuance of the Common Ground report a national, not-for-profit organization was formed to continue the research and to advocate for the practices that had been identified. This is the Common Ground Alliance (<http://www.commongroundalliance.com/>).

Initiation of the Kansas City Damage Prevention Project

In 2001, the Kansas City metropolitan area had two cable overbuilders simultaneously constructing new cable systems. This put as many as 100 crews on the street at a single time. In addition, many other telecommunication companies were proposing major facility installations. This level of activity resulted in a high number of utility cuts and disruptions. Sometimes whole subdivisions were cut off from services for several days. Of particular concern was the adverse impact on public safety, the potential outcome of any damage to gas lines.

High number of utility cuts in 2001 leads the KCC and local governments to initiate the Damage Prevention projects.

The increased number of gas line breaks led the Kansas Corporation Commission (KCC) to ask MARC if they would consider participating in a grant to develop local practices to prevent damage to underground facilities. MARC convened a meeting of right-of-way managers and public works officials to see if this was a project in which they would like to be involved. The decision was made that MARC should work with the Kansas Corporation Commission, as the grant applicant, and the Missouri Public Service Commission, to apply for a federal grant to assist in the development of local government practices that would reduce damage to underground facilities.


A premise of the grant was that local governments would have the greatest potential impact on the prevention of damage to underground facilities by focusing on the practices to be utilized in their jurisdictions. There are several reasons that local governments present a special opportunity to impact this issue:

Local governments are in a special position to help prevent damage to underground facilities.

- ④ Many local governments in the Kansas City metro area have experience in right-of-way management and had existing right-of-way managers coordinating such activities.
- ④ A great deal of the country's underground facilities is located in city rights-of-way.
- ④ Often, underground facilities in urban areas are in fairly crowded conditions that can lead to damage of such facilities.
- ④ The intensity of new underground activity in metropolitan areas, especially in the telecommunications field, presents a hazard for existing underground facilities.

Comment [b2]: Dean, I deleted "extensive" based on earlier comments on ROW management in the mid 1990's (see the 2nd paragraph).

The Kansas Corporation Commission applied successfully for a federal grant to the U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety. The plan behind the grant was to contract with the Mid-America Regional Council to supply administrative and communication support to the project and insure that local governments participated in and benefited from the project. The two principal goals of the Damage Prevention Project were:

- ④ Adoption and implementation of uniform damage prevention best practices by cities and counties in the Kansas City metro  an area.

- Ⓢ Improved sharing of geographic information between cities, counties and state one-call systems reducing over-notification.

Once the two-year grant had been awarded to the KCC, they executed a contract with MARC to manage the project. MARC invited all local governments in the Kansas City metropolitan area and in surrounding communities to participate on a Damage Prevention Steering Committee to assist in providing direction to the project and to assist with implementation (see Appendix A). The Steering Committee then issued a Request for Proposals for an engineering consulting firm to assist in the development of the practices and other aspects of the project. The Steering Committee chose Black & Veatch to assist with the project.

PROJECT DESCRIPTION

The Damage Prevention Steering Committee began the project by identifying two principle goals:

- ⊕ Adoption and implementation of uniform damage prevention best practices by cities and counties in the Kansas City metropolitan area.
- ⊕ Improved sharing of geographic information between cities, counties and state one-call systems reducing over-notification.

The principal focus of the steering committee was on the first goal and an elaborate process to identify and evaluate potential practices was put in place. The second goal expanded, as discussions with the Missouri and Kansas one-call programs progressed, to include homeowner education and assessment of the potential for developing a regional utility location map.

Best Practices

The Damage Prevention Steering Committee felt it was important to retain assistance to help in sifting through the wide array of potential practices and the opinions of the many stakeholders in underground damage prevention. A Request for Proposals was issued and two respondents were asked to interview for the project. The Steering Committee then selected the firm of Black & Veatch to assist in the project, in part because of the extensive experience in this field that they could draw on during the project.

After pertinent coordination and review of current sources of information, Black & Veatch developed an extensive questionnaire (see Appendix B) and interviewed approximately fifty stakeholders on the subject of underground damage prevention. Interviewees included utilities, excavators, utility locate firms, engineering firms, one-call programs in both states, corporation commission staff from both states, and representatives of local governments. The interviewees were asked to identify what they thought were the biggest problems causing damage to underground facilities and what practices they thought would contribute to correcting these problems. These interviews, along with information from the Common Ground report and interviews with other metropolitan areas in the U.S., were used by Black & Veatch to develop a list of 84 potential practices grouped into a number of categories.

Extensive survey of stakeholders provides the basis for development of the best practices.

The Damage Prevention Steering Committee reduced this list to nineteen practices that seemed particularly applicable to implementation by local governments. Black & Veatch took these nineteen practices and developed a more complete description of what the practice might entail and the potential benefits and consequences of implementing the practice. The Damage Prevention Steering Committee then voted on each of the nineteen practices based on two criteria: (1) would there be a positive impact on preventing damage to underground facilities if the practice was implemented and, (2) what was the chance that the practice could be successfully implemented. The latter criteria included consideration of potential legal

ramifications, staffing considerations, and willingness of the underground facility community to comply with the practice.

This assessment produced a list of ten practices that were clearly favored by the Damage Prevention Steering Committee. This list was then reduced to the five final practices through a process of elimination and consolidation. Black & Veatch then wrote detailed practice descriptions for each of the five practices and they were reviewed, amended, and approved by the Steering Committee. These practices are covered in detail in the next section of the report and the practice descriptions can be found in Appendix C.

Once developed, the best practices were extensively reviewed with stakeholders.

Once developed and adopted, the Steering Committee introduced these practices to the underground facility community. This was done through presentations at various local Utility Location Coordinating Committee (ULCC) meetings and a presentation to the Kansas City Regional Common Ground Committee. The practices drew a generally favorable response. However, there was some concern expressed about the design practice. This is discussed further in the next section of this report. At this stage, the intent of the project was to move into an implementation evaluation period and to make more definitive decisions about the practices after this evaluation had occurred. The evaluation consisted of interviews with stakeholders after the 2003 building season to get their assessment of the practices. This assessment has to be considered tentative at this point due to the limited use of the practices because of the sluggish economy. Even now, this is still a work-in-progress, with the practices being tested and evaluated, especially in how and under what circumstances they are implemented. This aspect of the project has been handed off to the newly formed APWA local chapter Infrastructure Protection Committee.

One-Call Related Initiatives

The other objective, i.e., improving the sharing of geographic information between cities, counties and state one-call systems with the intent of reducing over-notification, turned out to be less structured. The original intent of this objective was to address the issue of over-notification, which is often a discouragement for local governments to become involved in one-call. Over-notification occurs when a one-call notification goes to a member city when the utility to be located is not actually in city right-of-way or on city property. The over-notification problem can also be exacerbated by loose and oversized definition of targeted locate areas. This causes undue time and expense in locating utilities. (It should be noted that a number of cities still consider this information valuable in telling them what is going on in their city, if not in their right-of-way.) This objective was based on the belief that a better exchange of information, especially geographic information, would result in more precise notification and less over-notification.

Comment [b3]: Dean, I am not sure I understand your sentence on over-notification occurrence.

The Damage Prevention Committee started work on this objective by hosting a meeting of members and representatives of the Missouri and Kansas one-call programs and their system operator, One Call Concepts. This turned out to be a very productive meeting which identified a number of common issues, including:



- Ⓢ **Sharing of GIS data.** One-call base map information is generally one to three years old. This is especially a problem with information on new subdivisions and development areas where you would expect the most notifications to occur.
- Ⓢ **Design tickets.** Design tickets are requests for locates in order to have the best available information for design purposes. These requests are often given a lower priority by locating companies, thus undermining the practice of having the best available information at design in order to avoid problems that can lead to damage of underground facilities. This is especially relevant to the design practice adopted by the Damage Prevention Steering Committee.
- Ⓢ **Mutual support.** Cities and one-call programs have similar objectives and should be able to support one another. For example, some cities require one-call locate tickets before approving an excavation permit. One-call can refer excavators to city right-of-way and permit officials.
- Ⓢ **Homeowners.** It was agreed that a significant amount of the problem lies with homeowners that do not use the one-call system when excavating on their property.

Sharing data, improving the design ticket process, mutual support between cities and one-call, and homeowner awareness where important issues for cities and the one-call programs.

The damage prevention project pursued the exchange of GIS data. The 9-1-1 program for the region is coordinated by MARC, which recently developed a GIS database to assist in accurately identifying the location of emergency calls. This base map is updated monthly. The 9-1-1 program offered to electronically share this information with the two state one-call programs. Technical meetings took place and the technical staff from One-Call Concepts was very interested in pursuing this exchange. Neither side felt there were insurmountable technical problems. Missouri One-Call has requested and been sent the MARC GIS data. Use of this base map information update will be evaluated once implemented by Missouri One-Call.

The issue of design tickets is being addressed in two ways. First, the design drawings practice addresses the issue of better design information, thus helping to prevent damage to underground facilities. In addition, the Missouri One-Call program assembled a design ticket task force to address the issue. They will shortly be implementing new policies to assist in design locates. Anyone calling in for a design locate will either be given contact information for local utilities or can request an actual design locate. Design tickets will have a five-day fulfillment period, slightly longer than construction locate requests.

Homeowners are a significant source of damage to underground facilities.

A special joint marketing program was initiated prior to the 2003 building season to make homeowners more aware of their responsibility to use one-call when excavating on their property. The cities and one-call programs identified key messages that they wanted to get across to homeowners. The MARC Public Affairs staff developed a brochure, placard, and web site around these key messages. Damage Prevention Steering Committee members and public information officers for local governments placed the brochures and placards in locations where homeowners might observe them. Posted locations included permit offices, libraries, rental equipment showrooms,

extension offices, and building material companies. In addition, the materials have been used in presentations to home associations. Public service advertisements, already prepared by the two one-call state programs, were given to public information officers for use on local cable outlets.

A major damage prevention initiative that grew out of the work of the Damage Prevention Project was investigation into the development of a composite utility location map or database for the region. A good deal of emphasis during discussions of damage prevention was put on better design practices. This would be greatly facilitated if there were a good map or database of utility locations for the region. Focus would not be on exactness of locations, but on general utility locations, e.g., identifying which side of the street for a utility location. This also came up in discussions with utilities and the need for better information on the location of existing underground facilities at the design phase.

Creating a regional GIS database could greatly improve planning for underground facilities.

The Damage Prevention Steering Committee decided to conduct a preliminary investigation into the feasibility of establishing a regional utility location GIS database. This study was to answer four questions:

- ④ What are the legal liability issues generated by sharing information through a regional utility location GIS database and how can these issues be addressed?
- ④ What are the technical issues in developing a regional GIS database?
- ④ What is a rough estimate of the development and annual operating cost of a GIS utility location database?
- ④ What are the technical, security, and business issues that owners of underground facilities would have with such a system and how can these issues be addressed?

The Damage Prevention Project retained the law firm of Stinson Morrison Hecker to address the legal issues and Black & Veatch to address the other issues.

The legal analysis showed that there was not major legal liability issues associated with sharing information through a regional GIS utility location database. This is especially true if a disclaimer accompanies use of the database, that the information should only be used for planning purposes and that anyone proceeding to excavate should contact their state's one-call program.

Liability in sharing information is not an issue.

The technical, financial, and business feasibility study was not as positive. First, Black & Veatch could find no evidence that such a system (at this scale) existed anywhere else in the country. Constructing such a database on a regional basis would be both a substantial financial and technical challenge. It was recommended that county databases might be a more appropriate level upon which to develop such databases. Johnson County is already in the process of doing just that and has some utility information in the database. However, the biggest problem with such a database was the reluctance of most utilities to place their utility's location information into the database. This response comes out of both a security concern, not wanting terrorists or others to have ready access to this

Utilities are reluctant to share the location of their facilities.

information, and a business concern, feeling that this is proprietary information that might give competitors an advantage. This would be the biggest obstacle to the establishment of such a database.

The full legal and technical, financial, and business reports can be found in Appendices D and E.

BEST PRACTICES

The heart of the Damage Prevention Project was the selection of five practices that can be implemented by local government that will reduce damage to underground facilities. These five practices are:

- ④ **Strategic Relationships**
- ④ **Horizontal Directional Drilling Guidelines**
- ④ **In-Ground Facility Identification**
- ④ **Potholing**
- ④ **Design Drawings**

These are practices that were identified as contributing to the reduction of damage to underground facilities and could be implemented by local governments as a part of their normal right-of-way management activities. Some communities are using these practices regularly, while others have implemented them on an as-desired basis. The intent of the practices is to have these requirements become a routine part of placing underground facilities in the public right-of-way.

This section of the report will provide a brief description of each practice. The actual practice documents can be found in Appendix C.

Strategic Relationships

The basic premise of this practice is that the best way to prevent damage to underground facilities is to foster communication between all parties, including the utility, the engineer, the excavator, the locator, one-call, and the city. An exchange of information will allow these parties to identify when and where work is going to take place, if such work might conflict with facilities already in the ground, how potential conflicts can be avoided or at least minimized, and responsibility for actions when a facility is disrupted.

Cities, utilities, and other stakeholders have been increasing communication to coordinate projects as a routine matter of operation. However, the Damage Prevention Steering Committee felt this was such an important element in damage prevention that it should be included in the list of five best practices. This is also recognition that communication between stakeholders can always be improved. While this is an ongoing effort, the intent is to develop good relations between key stakeholders that will pay off in the future when a conflict arises or when there is a critical need for information or action.

Good communications is probably the number one means of reducing damage to underground facilities.

One of the elements of such a practice includes developing and maintaining a contact list of key personnel. Emphasis is also put on pre-construction conferences where all the affected parties can meet, learn what is happening or planned to happen, and determine actions necessary. However, there are a number of other ways that strategic relationships and better communication can be fostered. This includes Utility Location Coordinating Committees (ULCC) where

stakeholders meet on a regular basis and exchange information about current and forthcoming projects. Whether it is through pre-construction conferences, ULCC meetings, or other types of meetings it is critical that decision-makers attend.

The Damage Prevention Steering Committee was one way that such communication was fostered. The project enhanced this communication through the extensive interview of stakeholders, reports to ULCCs and the Kansas City Regional Common Ground Committee, and the implementation evaluation process.

Horizontal Directional Drilling Guidelines

The biggest single issue motivating participation in the Damage Prevention Project was evaluating how to deal with Horizontal Directional Drilling (HDD) and other forms of trenchless technology. Principal exposure to HDD was during the telecommunication boom of two or three years ago. At that time, there were many crews working in city rights-of-way and many significant utility cuts caused while using HDD. This tended to give HDD a bad name and the feeling that it needed to be better regulated.

Trenchless technologies, if used properly, can be a method for preventing damage to underground facilities.

The Damage Prevention Steering Committee became convinced that HDD and other trenchless technologies could be an important tool for not only placing facilities underground, but also for preventing damage to underground facilities if the technology is used properly. The

Steering Committee decided to take a two-prong approach to the issue. First, it adopted as one of its practices an HDD Handbook. Second, it established a seminar on HDD aimed specifically at local government officials so they could better understand the technology, when and how it should be used, and the best practices for implementing it without jeopardizing existing underground facilities.

The handbook was developed by Black & Veatch based on (1) a similar handbook, *Horizontal Directional Drilling Guideline Handbook*, developed and already being used by the city of Overland Park, Kansas, a Damage Prevention Steering Committee member, and (2) the *Horizontal Directional Drilling, Good Practices Guidelines*, published by the HDD Consortium. The handbook sets out practices that contribute to a well-run HDD operation and reduced damage to underground facilities. The handbook addresses a variety of practices including:

- ⊕ The planning and design process
- ⊕ Permitting
- ⊕ Safety
- ⊕ Practices prior to, during, and following construction
- ⊕ Environmental considerations
- ⊕ Record keeping

The training for local government officials was intended to provide background they would need to properly apply the standards in the handbook to trenchless technology projects. The Damage Prevention Steering Committee contracted with Trenchless Flowline, Inc. and their president,

Ted Dimitroff, to organize a two-day workshop on trenchless technology. Fifty local right-of-way managers, public works officials, and local utility personnel attended the workshop. The workshop received high marks from the attendees. The portion of the workshop on the proper use of fluids was especially useful.

In-Ground Facility Identification

A key element in preventing damage to underground facilities is reliable location of facilities either at the design phase or just preceding excavation. Therefore it is important that every reasonable means be used to properly mark new or modified facilities so they can be confidently located in the future. There are a number of good techniques and technologies that can facilitate such location information, but they are not universally used.

This practice seeks to require the use of certain techniques and technologies that will facilitate future location of underground facilities. The full practice (see Appendix C) reviewed several techniques and then recommends two that should be adopted as standard requirements when a right-of-way permit is obtained.

The first technique is the use of warning tape, which is placed 12 to 18 inches above an underground facility. The tape is color coded to match APWA standards for identifying utilities and it is recommended to have the name of the utility on the tape. When an excavator is digging and they hit that tape they know that a utility is in the area and it should be properly located before they proceed. A number of utilities already use this technique. This is only feasible for facilities placed in the ground through open trenching. It is not applicable for HDD projects.

The use of warning tape and tracer wire is one of the recommended practices.

The second technique is the use of a tracer wire with non-conducting facilities. Tracer wire is used to conduct a current, which can then be detected by equipment on the surface. The use of tracer wire, and appropriate connecting points on the surface, greatly facilitates locating technology that is more reliable and accurate. The practice specifies the type of wire to maximize the effective life of the wire.

Both practices are relatively easy and inexpensive to implement.

Potholing

Potholing is the practice of exposing underground facilities so they can be directly seen and positively located. This is the most accurate means of locating facilities. The best practice specifies when potholing should be used and how the practice should be implemented.

The practice requires the use of potholing whenever there is potential conflict between the proposed facility and existing facilities. Specifically, this applies whenever a facility will cross one or more existing facilities, intermittently when a facility will parallel one or more existing facilities, or when a facility will be placed in close proximity to a hazardous facility, such as a gas line. Potholing is especially essential in crowded right-of-way corridors.

There are several techniques that can be used for potholing. The preferred method is air vacuum. Hand digging, although time consuming, is also appropriate. Acceptable in some circumstances is the use of water vacuum. However, such a technique can cause subsidence and utility damage over the long-term. Use of a backhoe is not acceptable. The written practice also covers additional aspects of proper potholing including planning, protecting existing facilities, and backfilling.

Design Drawings

The design drawing practice proved to be the most innovative and the most controversial. It is based on the premise that good design drawings with information on existing facilities can prevent damage to underground facilities by allowing engineers to design around potential conflicts.

This practice calls for design drawings to be submitted showing the location of existing utilities.

This practice has two key elements. The first is that design drawings presented to local governments in advance of permitting should contain information on the location of existing utilities as well as the proposed location of new facilities.

The second element is the use of Subsurface Utility Engineering (SUE) standards to identify the quality of the information being provided on existing utilities. SUE is a relatively new standard being adopted for projects that may impact existing underground facilities. These have been codified by the American Society of Civil Engineers, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, CI/ASCE Standard No. 38-02, Preliminary Copy, 2002. Basically, four levels of quality for information on existing underground facilities have been identified. The most basic level, Level D, consists of information obtained only from existing records. The highest quality level, Quality Level A, is the most accurate method of locating underground facilities and consists of the use of potholing or visually verifying each utility.

The intent of this practice is to collect information on existing utilities so that the proposed facility can be routed to minimize conflict with existing facilities or, when conflict cannot be avoided, to plan for such conflict. The city would typically require a higher quality level of information for situations where there is a greater probability of conflict.

This practice elicited the most comments and concern. The principal concern is that identifying existing utilities would be too costly and time consuming relative to the benefit of the obtained information. The feeling was that good location information is principally needed at the time of excavation, not at the time of planning. However, the Common Ground report identified good location information at the time of planning as a practice that would contribute to the reduction in damage to underground facilities. In addition, this is a practice that was strongly supported by 29 of the initial interviewees. How it is implemented will greatly determine the effectiveness and acceptance of this practice. (See the next section for a further discussion of this issue.)

Some utilities expressed concern about the cost and time associated with this practice.

IMPLEMENTING THE BEST PRACTICES

Implementing the best practices is one of the most important steps and possibly the most difficult. It is far easier to talk about how things should be than to actually implement specific practices in the real world. The circumstances faced by local governments will vary from jurisdiction to jurisdiction. This includes the development climate, the practices and interests of the development and utility community, the priorities of the city, and their capacity to carry out new practices. There is a tension between wanting the practices to be as consistent as possible across the metropolitan area and wanting to allow each jurisdiction the flexibility to adapt the practices to meet their own particular circumstances.

Each of the five practices (Appendix C) contains a section on practice procedures to provide some guidance for implementation of the practices. The practices were implemented in a number of communities on a test basis during the 2003 construction season. This was primarily done administratively by each jurisdiction. The evaluation of this temporary implementation provides some insights into issues involved in implementation. The American Public Works Association Kansas City metro chapter has established a Infrastructure Protection Committee that is evaluating the practices and providing training on their use.

The city of Shawnee has moved forward and adopted the practices. Their implementation of the practices can be found in Appendix F.

Following is a brief discussion of the implementation issues associated with each of the practices.

Strategic Relationships

Strategic Relationships is the one practice most common to jurisdictions, but also the one that is hardest to codify and implement on a day-to-day basis. Most communities deal with developing and maintaining key relationships regarding underground facilities in their right-of-way, but give little conscious thought to how this is done. Also many communities have mechanisms in place that can be used to build such relationships, such as utility location coordination committees (ULCC).

Persistence in nurturing strategic relationships is vital.

Following are some key elements that should be considered in developing strategic relationships with regard to underground facilities.

The most important element of a successful strategic relationships practice is persistent follow through on the elements in this practice.

- Ⓢ It is important that the right-of-way manager maintain a list of key contacts. These are not the names of just any person, but the right person, for respective stakeholders in underground damage prevention. The “right” person is that person that can make decisions in a timely manner and has the information that is required to make these key decisions. This requires considerable ongoing attention by the right-of-way manager and the cooperation of the key stakeholders. The list can be shared with those on the list, if this is acceptable to the stakeholders. An effort should be made to periodically assemble

those on the list so they can become familiar with each other and discuss damage prevention issues, including when the list should be used.

- ④ The city should hold preconstruction meetings prior to major projects. Key contacts from stakeholders affected by the project should be invited and expected to attend. This is an opportunity to outline the project, identify where there might be conflicts affecting existing underground facilities, and develop strategies for addressing these potential conflicts. The meetings should be kept to the point. This is essential if you are to keep the key contacts involved.
- ④ Besides preconstruction meetings, there should be periodic utility location coordination committee meetings where all utilities can share information about upcoming projects. Again, these meetings should be focused and a city staff person should develop an agenda to keep the meeting flowing. If the meetings take too long or do not provide valuable information, then key stakeholders will stop attending.

Horizontal Directional Drilling Guidelines

The easiest part of the Horizontal Directional Drilling Guidelines practice is adopting the guidelines. The hard part is deciding how or if the guidelines will be enforced. The city with the most experience with this guideline, the city of Overland Park, uses these guidelines as an informal means to affect how projects are conducted in the right-of-way. Following are some considerations in implementing this practice:

Careful consideration should be given to how HDD guidelines will be enforced.

- ④ The guidelines can initially be adopted as just that, guidelines, and then monitored to see to what extent they are followed. If the guidelines are not followed and this results in damage to existing facilities or other problems, then the city can consider adopting the guidelines as mandatory requirements.
- ④ A city might want to consider making a few key elements of the guidelines mandatory, while the bulk of the guidelines remain expectations, not requirements. Such an approach is less burdensome on the enforcing staff and can be focused on those practices that can have the greatest impact on preventing damage to facilities.
- ④ The guidelines can be used as an indicator of the competency of a contractor. The guidelines represent the best practices used by responsible, competent contractors. If the practices are not followed, this is a signal that the respective contractor is either not competent or is willing to abandon good practices in order to cut corners and thus closer scrutiny is advised.
- ④ Some consideration should be given to providing trenchless technology training to right-of-way management staff that will be responsible for implementation of this practice.

In-ground Facility Identification

The use of tracer wire with non-conductive pipe and the use of warning tape for facilities installed by trenching is a common practice with many underground facilities. It is both a proven technique and one that is relatively inexpensive. There are two particular issues that should be considered in adopting this practice.

- Ⓢ Verification that warning tape and/or tracer wire has been installed per the requirement of this practice will require inspections. A process needs to be established for this inspection.
- Ⓢ When installing tracer wire, or for metallic pipe/conduit installations, access points need to be required so connections can be made. The practice recommends every 300 feet. In addition, it is recommended that a properly gauged and coated wire be used in order to minimize the chances that the wire will deteriorate.

Potholing

Potholing, the exposing of underground facilities for a visual determination of location, is a practice with which some communities have quite a bit of experience. It has proved to be an effective means for accurately locating existing facilities. The key elements of the practice are determining when potholing should be required and developing basic requirements for how it should be carried out.

Following are some considerations in implementing potholing:

- Ⓢ Knowing when to require potholing requires good information on the location of existing underground facilities so that the designer or excavator for a new project knows when a conflict may occur. This entails good locate information to identify potential conflicts and good information on the part of the city with regard to congested right-of-way locations. These locations can be pre-designated so that designers and contractors can plan on potholing when working in these corridors.
- Ⓢ Careful consideration needs to be given for potholing requirements at the design stage. See the following section on Design Drawings.
- Ⓢ The permitted potholing methods and enforcement will be of great interest to excavators. The practice recommends air vacuum as the preferred method, but a city may get requests to use water vacuum. This may be appropriate for certain situations, but may merely be the preference of the excavator because of equipment availability. If water vacuum is allowed, special attention needs to be given to support of the existing facilities, both during the potholing and once the hole is closed. The practice does not condone the use of backhoes for potholing purposes.

Knowing when to pothole requires good information on the location of existing utilities.

Design Drawings

The most far-reaching and controversial of the practices is design drawings. The basic premise behind the practice is that, if information on the location of existing underground facilities is gathered at the design phase and presented on plan drawings, conflicts with existing utilities can either be avoided or noted for special consideration during construction.

Identifying existing utilities at the plan phase allows for conflicts to be avoided or at least managed.

The practice as presented consists of two elements:

- Ⓣ When plan drawings are submitted to the city, they should contain information on the location of existing underground facilities as well as the location of the proposed facility.
- Ⓣ Location information presented on the plan drawings should be done in accordance with Subsurface Utility Engineering (SUE) standards indicating the quality of the information used to locate the facility.

The concern expressed by utilities planning new or upgraded facilities is that it is difficult for them to collect this information, that the information on existing facility locations is often not readily available or willingly provided, and that getting this kind of information is more appropriate at the time of excavation. They are concerned that the requirement will add both to the cost of design and the time required to complete the design phase. However, all parties agree that the intent of the practice is good; they are just concerned about its implementation.

Those that express a concern about providing information on existing utilities are concerned that such information is not readily available.

Following are some of the issues that should be considered in implementing the design drawing practice:

- Ⓣ One of the concerns of stakeholders is that they will have to do a lot of potholing at the design stage. This is costly and will subsequently be repeated prior to the construction phase. However, the typical situational intent of the design drawing practice is not necessarily to get exact locations of existing utilities, but to determine general locations so that potential conflicts can be avoided by resultant changes in design, such as locating a proposed utility on the opposite side of the street.
- Ⓣ It is very important when implementing the design drawing practice to set out the procedure for deciding the SUE quality level to be required for existing facility locations

Selecting the minimum quality level for information is key for smooth implementation.

shown on the drawings. In order to minimize cost and time, the minimum level of quality to ensure safe and non-damaging installations is desired. One approach might be to require that all existing underground facilities be located with quality level D information (the lowest quality level) for the initial drawing, with the city and the design engineer subsequently

determining where higher quality level information might be required (see Shawnee implementation in Appendix F). A variation would be to require a higher quality level for certain congested corridors.

- Ⓣ A big issue is the availability of the information, even at the lowest quality level. This issue exists due to the reluctance of many of the owners of underground facilities to share location information, even in general terms. (A discussion of this issue can be found in the Project Description section of this report.) To the extent that good working relationships can be developed among facility owners, sharing of information in a timely matter is more feasible. In the end, this serves all owners of facilities.

Metropolitan Initiatives

The Kansas City metro chapter of the American Public Works Association (APWA) has established a Facilities Protection Committee to take up the issue of damage prevention. They will be working on two key elements:

The Damage Prevention Project has been handed off to the APWA Infrastructure Protection Committee.

- Ⓢ The committee is organizing a seminar to both spread the understanding of the best practices and to discuss how best to implement them. This seminar should take place prior to the 2004 construction season.
- Ⓢ The committee will be bringing the practices to the full

APWA chapter for consideration to be adopted as recommended policy. This action will help set up a common way to implement the practices and greatly aid in their acceptance.

CONCLUSION

The Damage Prevention Project was a successful collaboration between local governments and the Kansas Corporation Commission and the Missouri Public Service Commission. This collaboration extended to the two state one-call programs, the Kansas City Metro Common Ground Committee, and a wide variety of stakeholders.

The project produced a set of best practices that are now being implemented by local governments and are being considered for official adoption by the metro chapter of the America Public Works Association. The local chapter of the APWA has established a Facilities Protection Committee. The project was a catalyst for the exchange of base map information between the Mid America Regional Council and the state one-call programs. Most important, the project has increased the level of conversation among local governments about how best to protect underground facilities and between local governments and other stakeholders and how they can work together to improve practices.