



*Maryland Department of Transportation*

***State Highway Administration***

# **Design Guidelines**

## **Utility Coordination Using Thinking**

### **Beyond the Pavement Principles**



# Design Guidelines

## Utility Coordination Using Thinking Beyond the Pavement Principles

### Purpose

These guidelines have been developed for utility engineers, project design engineers and consultants to use as an aid when designing streetscapes and urban revitalization type projects. While the ideas and concepts discussed here are primarily focused on these types of projects, some of the material presented can apply to all projects. At some future point this guide may be expanded to incorporate additional types of projects and additional alternatives and ideas as they arise and may be applicable. In an effort to make this easy to use, this guide is divided into the following sections:

- Identifying the issues
- Design options and alternatives
- Water and Sewer
- Funding Issues
- Coordination

### Identifying the Issues

When a design team is required to upgrade and rehabilitate a road through a municipality or other urban setting, they are faced with a complicated task. These kinds of projects are inherently complex and have very difficult issues to resolve in order to move the project forward. Frequently some of these issues deal with utilities. It is the objective of this section to help the design team identify some of the issues relating to utilities and the impacts that they may have on the project.

- **Thinking Beyond the Pavement Context Sensitive Design**

In the past, the SHA has designed projects primarily with the roadway in mind. The object was to improve traffic capacity and mobility, but other equivalent elements were not generally considered. Today, we are looking beyond the pavement as to what meets the local community needs as well as the regional functionality of the roadway. This means that we are now doing more outside of the roadway edge with sidewalks, bike paths, green spaces, landscaping, etc. SHA along with the community is looking at the location where the work is to be performed and at the various characteristics of that location. The SHA is trying to improve things like the visual appearance of the project and the safety for both the pedestrian and motorist alike. We are also trying to design a project that will enhance the community after the work is completed.

This is a very critical area for the design team to be aware of with regards to utilities. The very areas this concept deals with are where the utilities are located. Here again is where SHA is making a shift in the way we think and do business. Through experience, we have realized that we need to have some place for the utilities to be moved in order for the highway work to continue. With this in mind, the project design team needs to be aware of the physical constraints of the project and the community's requirements and still provide a corridor for the utilities. Utility relocation is now thought of as a part of highway projects and not as a separate appendage to it. The project design team needs to look for ways to improve things like coordination and consolidation concepts discussed further in this guide.

When the design team includes sidewalks or bike paths in a project, is there still enough room to relocate utility poles out of the way? Is there enough room to accommodate the guy wires on those poles requiring them? When the design team puts trees in the project are they being placed underneath the utility lines? If so, are they the kind that will stay small so that in a few years they won't have to be cut when they grow into the overhead lines? Also are trees going to be planted over underground lines? Can the utility company service the line if necessary? And is the tree the type where the roots won't grow into the water and sewer lines creating a problem later on?

All of these things are important questions and each will have a different impact on the project. But all these questions come down to one idea. When we (meaning SHA) do anything outside the roadway, we need to look at the utilities that are there and decide what impacts we are going to have on them and what can we do about it. This one idea in approaching utilities will save a lot of problems later on.

- **Historic, Archaeological and Environmental Concerns**

Although Context Sensitive design is an all-encompassing idea, which includes historic, archaeological and environmental issues, there are items that are unique to them, which we'd like to discuss. Historic towns frequently try to use highway projects to restore the historic flavor to the area. By that, we mean, removing overhead utility lines, putting in cobblestone or brick sidewalks, pedestrian and ornamental street lighting, etc. **see figure 1-1** This means that undergrounding utilities is usually desired by the residents. We will go into specific underground issues later in this guide, but for now this discussion is limited to potential issues with old and/or historic towns.

First, there are a number of historic communities, which have structural foundations that are questionable. Vibrations from excavation to underground utilities near them could cause severe damage. There are also numerous instances where basements extend into sidewalk areas thus prohibiting placement of utilities in those locations. In addition, the use of directional bore methods would also be unadvisable because of the bentonite fluid used in these bores. The fluid is under sufficient pressure that if close enough to the basements of these old homes, could follow a crevasse or other flaw in the soil to the basement resulting in a flooding situation.



**Figure 1-1**

Along with historic areas are archeological areas. These are areas where there are known cultural resources. These areas must and can be planned for and avoided. More commonly are the situations where the projects are underway and while excavating for the project some artifact is unearthed. Again, this guide is intended to give the project design team options to accommodate the utility relocations and still protect our past.

Next are environmental issues. While utilities do not typically affect environmental issues on projects, from time to time problems do arise in storm water management facilities. When designing Storm Water Management (SWM) ponds, the design team needs to be aware of any existing utilities in the area. Most utilities can be relocated without too much difficulty. But if a utility such as a gravity sewer line is located in the middle of a proposed pond location, it may be impossible to relocate such a utility.

In the examples of the historic, archeological, and the environmental areas, we still need to improve the situation and move the project forward. One thing the design team should do is to contact the environmental manager to adequately determine potential impacts. Once potential impacts are identified, proper design options can be selected to avoid the conflicts. In the case of an historic area another design option such as relocating the aerial facilities along alleys may be possible or depending on the physical constraints of the project the only option available may be the normal relocations necessary for the roadway construction. In the case of archeological areas only by research and use of subsurface designation can these areas be avoided. In the case of a SWM pond possibly adjusting the shape of the pond could avoid the line.

- **Local Town and Community Issues**

These can be and most frequently are the most difficult and challenging issues facing the design team. Yet this is really at the heart of Thinking Beyond The Pavement. The residents of the community are customers and they are ones that will use our product day after day after the SHA's work is done. While the residents may want a job that provides easy access and is attractive, the local government officials may desire a project that will attract more businesses. Both will be concerned with how long the project will take? How much will it cost them? And what kind of inconvenience will there be until the project is completed? How does this apply to utilities? Well, to make the project look attractive, it may mean reducing the visual impact of overhead lines. With the local government officials it may mean that increasing the capacity of water and sewer lines. The design team is very important in acting as liaison and disseminating information between the community, District utilities staff and the Office of Construction utilities staff. By keeping everyone in the loop, the best options for utility design, the least amount of impact on the completion of the project and the best costs are obtained. By making the community and local officials' part of the team concerning utility and design relocation, we can truly accomplish the Thinking Beyond the Pavement principles.

- **Safety and Vulnerability**

Another concern regarding overhead utilities is safety. On occasion, vehicular fatalities have resulted from impacts with utility poles. Removing or relocating a pole removes another object a vehicle can hit if the driver loses control. Although the potential for impact with poles can be reduced by using traffic barriers, they have a visual impact. Traffic barriers would only make things look worse.

Another consideration for relocating or removing utility poles are to afford traffic control devices the proper sight distance clearance for viewing distances and operational clearances.

There is also the issue of vulnerability. By this we mean how vulnerable is the facility to storm or winter damage. During severe wind from storms, falling trees and limbs can knock down overhead lines. Also, as seen in recent news reports ice storms can cause extreme damage to overhead facilities. As ice builds up the lines, the weight places tremendous stress on the lines. Finally the aerial utility lines just can't take the strain and break. The result can be numerous downed lines and loss of service. Design teams should be aware of the frequency of these kinds of incidents in order to improve reliability of service to the community with our project. If there is a noted frequency of disruptions to service to the community due to downed utility lines, then consideration maybe given to undergrounding the portions most vulnerable to such damage.

## **Design Options and Alternatives**

In this section we will look at various design options and alternatives ranging from standard adjustments to major aerial relocation and undergrounding and how they apply to the Thinking Beyond the Pavement concept. Due to the cost and time utility relocations have on a project, there may not always be only one option available or feasible which would satisfy the desires of the community and which would also be most cost effective to do. This does not mean the project needs to incur a significant utility relocation cost to achieve this objective. Rather it means SHA should look at the utility relocations as a whole for the project to see what is the best that can be achieved at the most reasonable cost.

- **Standard Relocations**

We will first look at our historical method of handling relocations on projects. Typically this would involve relocating only those utilities impacted by the proposed highway construction. Even though the project itself may not have a particular need to relocate the aerial utility lines or poles not in conflict with the highway construction, the SHA still has a responsibility to improve all aspects of the project in keeping with the Thinking Beyond the Pavement concept. For example, it is SHA's policy that utilities are placed one foot within the right-of-way line when utilities are relocated within SHA's right-of-way. That means that through communities and other urban areas where the utility poles are to be relocated our policy would require the poles to be placed behind the sidewalks where feasible. **See figure 2-1 and 2-2**



**Figure 2-1**



**Figure 2-2**

Please note that the key phrase here is "where feasible". Typically there is insufficient room to place poles behind sidewalks through cities or towns because it would place the electric lines too close to the homes and businesses violating the National Electric Safety Code. In these situations, the project design team may be able to create "green space" and/or textured surface area between the curb and sidewalk. **See figure 2-3 & 2-4** This not only creates a place for landscaping, but also allows a place to put the utility poles.



**Figure 2-3**

The project design team needs to be cautioned though that utility poles cannot be placed within the sidewalk. This may be in conflict with the Americans with Disabilities Act. In the same thought, where the sidewalk still allows sufficient clearance to meet ADA requirements and it is decided to keep the area between the curb and sidewalk paved or landscaped, this area should be a different material or texture. **See figure 2-5** Texturing this area differentiates this area from the sidewalk.



**Figure 2-4**



**Figure 2-5**

- **Consolidating Utilities**

One method of reducing the number of utility poles and lessening the utility impact on projects is called consolidation. This concept can involve several aspects. There are a number of towns where electric lines are on one side of the road and telephone lines are on the other side. In addition, the laterals (service lines connecting the homes and businesses to the main utility line at the pole) from each utility supplying service to the other side of the road can give a very busy, confused and unpleasant appearance. First is to consolidate the utilities to one location and then move them out of the average field of view. However, when moving aerial facilities the design team needs to be aware that the utilities have to be able to comply with the National Electric Safety Code for clearances. Placing both or all utilities, if cable television (CATV) is involved, on one pole line can eliminate half of the poles along a roadway. **See figure 2-6.** Instead of a 10 foot cross arm for the electric lines a visually small arrangement can be used at the top. **See figure 2-7.** Using taller poles can be used to move all the lines above the area of signs and windows along the street.





**Figure 2-6**



**Figure 2-7**

This is typically the normal range of view for the public. Additionally landscaping such as low growing trees can be planted to obstruct the view of overhead lines even more. **See figure 2-8 and 2-9.** Another technique is to place the laterals underground. These simple ideas can greatly improve the appearance of an urban revitalization project at a significantly lower cost than undergrounding. Thus these can be very useful methods for achieving the Thinking Beyond the Pavement principles.



**Figure 2-8**



**Figure 2-9**

- **Relocating Lines**

Another option is to relocate the aerial lines to another location away from the primary visual zone of the community such as behind the properties in alleyways and access roads. **See figures 2-10 and 2-11.** There are at times, opportunities to place utilities along the back edge of properties where reservations for utilities exist. In this relocation scenario the poles and overhead utility lines may be relocated behind the homes and businesses along the alleys and/or utility easements. This would serve a dual benefit. It would enhance the visual aesthetics of the project and is less costly than undergrounding. If the aerial crossings at the alleys were to be removed, then undergrounding those portions would be a possible alternative.



**Figure 2-10**



**Figure 2-11**

- **Undergrounding**

When looking to improve the appearance of a community, the first option that often comes to the mind of the public is to underground the utilities. **See figures 2-12 and 2-13** Typically, this has been very costly for a town or community. In the past, the SHA and the utility would determine the cost responsibility of the overhead relocations that each would bear based on prior rights and any additional monies needed to meet the underground cost would be borne by the community. This additional cost could be quite significant. We will discuss funding issues later on in this document. The subsection cost responsibility in funding issues will give a brief definition of "prior rights." The subsection

Undergrounding Utilities in funding issues will give a brief explanation why the utility companies are not required to absorb the cost of undergrounding their facilities. For now, we will discuss some items to look for when undergrounding overhead utilities is the appropriate option.



**Figure 2-12**



**Figure 2-13**

The design team must first have base topographic plans which include all existing underground facilities such as water, sewer, gas, telephone, electric, and CATV. One excellent method for providing this utility information is through Subsurface Utility Engineering (SUE) firms. The SUE firms can designate the facilities (horizontal information by station and offset) and they can be contracted to locate (test holes) the utility facilities (vertical information as to depth of facility) as well. This information is invaluable in identifying potential conflicts and the SUE firms guarantee their

work. The Plats and Surveys Section administers the designating portion of this process and the Highway Design utilities team administers the locating portion. The project design team should contact the appropriate section depending on the type of information they wish the SUE firm to provide.

This will enhance SHA's ability to make determinations for undergrounding utilities without undue impact on other existing facilities. It is also necessary to have any information of any potential utility upgrades or replacements being contemplated. Also the design team can integrate conduit for traffic signals interconnect into their design.

When establishing corridors for various utilities there are a couple of things that the design team should keep in mind. To eliminate lateral crossings at each home and business, it is good to have the larger conduit system on one side of the road and a smaller one or two duct distribution system on the other side of the road to provide service to those homes and businesses on that side. This way there will only be a few selected crossings and thus less impacts with other underground facilities.

Another consideration is facilities such as cabinets for communication and transformers for electric. Typically people only find the overhead crossings to be objectionable, most do not object to seeing the occasional transformer box or electronics cabinet. Even then some low cost remedies can be used such as placing these kinds of facilities in out of the way locations or plantings some decorative shrubs which would conceal the structure. It should be noted that if possible, undergrounding these facilities should be avoided. Even if there is sufficient room to place an underground vault for these items, it can be more costly than the undergrounding of the wires. For an example, if a Controlled Environment Vault (CEV) is needed for communications equipment, it alone could cost a million dollars and the community may be indifferent to seeing a cabinet in the corner of a parking lot. That's why community input is needed before designs are complete. The design team should evaluate all the various options for the placement of vaults, cabinets, etc., as well as the specific criteria requirements for their placement. This would include accessibility, easements, etc.

Another issue in the design of undergrounding service connections in that some county and/or local ordinances require that if a service is changed then the structure needs to meet existing standards. This means that if a home needs to be upgraded to meet code requirements, the homeowner could face an unexpected and costly expense. One thing the design team needs to do if undergrounding is the preferred option, is to check with the county and/or local permits office to see if they have such a requirement and if so if it could be waived for the highway project.

- **Water & Sewer Issues**

In this section we will discuss water and sewer issues on highway projects. There are some things the project design team should keep in mind concerning water and sewer work in the contract. There may be multiple water and sewer lines along the roadway and due to age of the lines a town or municipality may not even have accurate plans on the location of existing facilities. Even the age and/or condition of existing facilities may not even be known. There have been projects where the existing water lines still in use were the wooden barrel like lines installed in the late 1800's.

Currently, when SHA rehabilitates a section of road, we will prohibit open cutting the pavement for a period of time. The moratorium can be from 2 to 7 years depending on which district the project is located. Because of the moratorium on open cutting newly paved roads the design team needs to make every reasonable effort to determine if any existing utilities under the pavement are of sufficient condition so as to not require open cutting the road during the moratorium. Also, if the water and

sanitary sewer system is piece meal as many are in older towns, the SHA would encourage the municipality or county to consolidate, upgrade and/or replace their facilities during our construction project or they would be required to wait until the moratorium is lifted for proposed work of that magnitude.

In addition, SHA policy does not show preferences to any utility. Because we do not show preference, it is "First come, First Served" and we do not require one utility to move to accommodate another utility's facilities. Obviously, since water and sewer lines are already underground and existing, they can pose a problem in placing other existing overhead utilities underground. Any utility placing facilities within SHA right-of-way will have to work around existing utilities and coordinate with the other utility companies.

Clearly identifying location and condition of existing facilities is essential in order to avoid potential conflicts with other design elements such as storm drains and also to avoid a situation where a new roadway will be torn up within a year because of a waterline rupture. The design team will start identifying the location of the existing water and sanitary sewer by obtaining copies of any as-built plans the county or municipality has on file. The design team can also use subsurface utility engineering (SUE) firms to provide this information. The next step for the design team is to ascertain the condition of the existing facilities. The design team can research district permit files for any history of maintenance on emergency repairs of the facilities. The design team will also review the town or county's maintenance files for the facility. If the town or county has a maintenance engineer or Department of Public Works, the design team can obtain a lot of information on the facility. Once this information is known, utility corridors can be proposed for the other utilities. Also if the area has a known future development planned accommodations can be made so as to avoid any unnecessary pavement repairs.

So far, the project design team has done is obtained the basic information. With this information placed on preliminary road plans, the design team can generally see the potential for utility impacts with highway construction. The design team will also have a good indication if the facilities which will require replacement or upgrades. For the purpose of this example we will assume that water and sanitary sewer work will be required.

At this point, the design team needs to have the municipality or county submit a formal request to the SHA to design/or and include construction in our contract if this is how they choose to proceed. In most cases, the towns or counties do not have the resources available and will opt to have the SHA include the work in our project.

Several things begin simultaneously now. The design team will bring a consultant engineering firm on board to start developing water and sanitary sewer plans (if this has not been done earlier) and an agreement or Memorandum of Understanding (MOU) will be prepared. If only utility work is to be included in the project, the design team will contact the District Utility Engineer to prepare the MOU for signature. If there are other items to be included such as additional roadway work for the county or municipality then the design team will contact the agreements team in the Office of Planning and Preliminary Engineering to prepare the MOU for signature.

The design team will continue to work with the Utilities team in Highway Design to provide utility location (vertical information) and test pit data as described earlier to the utility consultant. As the design team works with the local government and the consultant to develop plans and cost estimates, the design team will contact the utilities team in the Office of Construction to determine cost responsibility of the work.

Another issue with water and sewer work is the town or municipality's ability to fund the work. Unlike funding the underground of other utilities, which will be discussed later, the water and sewer are owned and maintained by the local government. A total replacement or extensive upgrade of existing facilities may frequently require the town or municipality to obtain a grant or loan in order to pay for the required work. The project design team may need to give the municipality a list of contacts to apply for these loans, as many municipalities do not have this information. In addition the project design team needs to be aware of the time frame for which the loan will be approved so as not to disrupt our advertising the project. Also the project design team should verify that the amount applied for by the municipality is sufficient to cover an actual bid cost if it should come in modestly over the estimated amount for the water and sewer.

We have had projects where the approved funding was based on the engineer's estimate with no contingency costs. When the actual low bid came in, the bid prices for the water and sewer were more than the estimate. This ended up creating problems for the project that may have been avoided if sufficient funds were approved just in case of such a contingency.

## **Funding Issues**

The SHA is currently reviewing our funding policy and when that process is complete, any necessary changes will be made part of these guidelines. A copy of the most current policy is available from the Statewide Utility Engineer who will be able to inform the design team how the policy will apply to the project. For now, this section will deal with general funding issues that relate to cost responsibility, undergrounding utilities, right-of-way, and some creative funding methods employed on previous projects.

- **Cost Responsibility**

Earlier in this document we discussed the typical cost responsibility based on prior rights for SHA's historical method of handling in-kind relocations. The term "prior rights" is used almost exclusively within the utility community and is frequently interchanged with meaning cost responsibility. Prior rights are determined by considering rights in the land over which or in which the utility facility is located. If the Utility owns the land or has real property interest in it, the Utility is said to have prior rights. If the land is outside of the SHA right-of-way and the SHA has no prior rights, the Utility is said to have prior rights even if the Utility has no real property interest in the land.

The party without prior rights is responsible for the non-betterment costs to that segment of utility relocation. For example, a utility acquires an easement from a property owner for the installation of overhead facilities (poles and cables). Ten years later the State acquires the property for road improvements, which requires the overhead facilities to be relocated. In this case, the utility has the prior right because they acquired their easement prior to SHA acquiring the property. Therefore, SHA would pay to relocate the facilities. Another example, same situation except SHA owned the right-of-way first and the utility company obtained a permit from SHA to install the overhead facilities. In this example the SHA has the prior rights over the existing facilities and the utility company would have to relocate the utilities at their expense.

When we refer to prior rights as a whole, meaning cost responsibility for the project, we are referring to an inventory of all the poles impacted and/or linear feet of the underground facilities impacted on the project. A factor is calculated by dividing the number of poles/linear feet of underground facilities determined to be the Utility's responsibility by the total number of poles/linear feet of underground

facilities impacted. This method of determining cost responsibility is the accepted method between the SHA and the utility companies.

Frequently betterment is an issue when cost responsibility is discussed. When the relocated facilities or the restoration of the service is functionally equal to the facilities being replaced, then prior rights are applied. However, if the relocated facilities or restoration of service is functionally greater than the facilities being replaced, then this difference is considered betterment. The cost responsibility for betterment is borne by the utility.

Please note that this is very brief explanation of prior rights and betterment and does not take into account many of the subtleties that can affect the final cost responsibility such as material betterment's, replacement in kind, expired life and salvage. The Utilities Team in the Office of Construction determines prior rights and cost responsibility for utilities for all projects. All questions and concerns should be referred to them.

- **Undergrounding Utilities**

We touched on some of the general issues in the previous section on undergrounding. When placing existing overhead facilities underground, relocation costs can be substantially higher than aerial relocation costs. If equipment such as electronics and/or transformers is included, these costs can be significantly higher. Additional costs associated with undergrounding can include right-of-way or easement acquisition, upgrading service connections, etc. Funding this significantly higher cost is a major issue. Municipalities do not typically have resources to bear such costs, the SHA would have to spend highway dollars if it were to pick up the cost, and the utility companies need to minimize expenditures to stay competitive.

SHA's current policy requires the utilities to relocate in-kind to accommodate the highway construction using best engineering practices. Therefore, poles would be relocated as necessary to meet SHA standards and aerial facilities would only be placed underground if that were the only way to accommodate highway construction from a safety perspective. Any work performed not considered necessary for the project is considered betterment. As a result, when municipalities or local governments request aerial facilities to be placed underground to improve aesthetics, the work is considered betterment and the local government is viewed as being responsible to bear the cost of the undergrounding expense. Again, as stated earlier, SHA is reviewing its funding policy and this may change after that process is completed.

- **Municipality/Local Government Funding Methods**

As for the overall undergrounding expenses, there have been several different scenarios, which have been employed. One scenario was where the municipality issued municipal bonds to fund the undergrounding. This method however took some time on the part of the municipality to get the bonds issued to raise the necessary funding. Another approach was to apply to the state and federal governments for grants to help defray the enormous costs. This too took some time to realize. Another project had several parties participate in sharing the underground costs. While this seems to be a good approach it too can be very time consuming getting all parties to agree to a share of the cost.

Here are some ideas to help with this approach. When dealing with the utilities, investigate whether it can be shown that undergrounding their system or even part of their system can improve reliability and save the utility maintenance costs in the long run. However for this to be effective there has to be some evidence of vulnerability in the existing system, i.e. previous outages due to storms or ice. From



SHA's perspective, if there is a hazardous location such as a high accident intersection where eliminating the utilities would improve the safety, the SHA may be willing to contribute towards the undergrounding expense. This, however, would be a management decision on a case by case basis. Finally, developers and businesses can be approached if eliminating the overhead facilities can be shown to significantly benefit them.

All of these approaches have pros and cons. The design team will have to evaluate each project to determine which approach would be applicable. Although we have reviewed some approaches used in the past, this does not preclude another form of creative funding for future projects. Hopefully, in the near future MDOT will adopt specific funding guidelines, which will be made part of this document.

- **Right-of-Way**

Historically, SHA does not acquire right-of-way for another party including utilities. On the typical highway project, the utility will relocate their facilities within SHA's right-of-way. If they need any additional easements for guys, aerial easements, etc., the utility will contact the property owner directly and acquire the necessary easement. However, from time to time, the property owner and the utility cannot reach an agreement. Since the utilities do not have the authority to condemn property, this has caused delays in completing the relocations. Recently with the Thinking Beyond the Pavement approach, SHA's Office of Real Estate is starting to view easements to relocate utilities as highway need. If specific right-of-way needs are identified early enough, SHA's Office of Real Estate can acquire the necessary easements to move the project forward.

On neighborhood conservation projects where there are numerous property issues dealing with sidewalks, service connections, etc., the municipality or local government has borne the burden of acquiring the right-of-entries and easement donations for the project.

## **Coordination**

We now come to the section on coordination. We could just as easily call it communication because this is what we are taking about. This communication begins at Project Initiation of the Concept Development Process. The Project Design Team needs to bring utility representatives and community representatives on board to include them in the projects design and coordination of activities. The SHA has held weekly or biweekly "Breakfast Club" meetings on selected large or complex projects. These meetings have greatly helped the coordination process on those jobs and have helped in keeping them moving. By creating this kind of open forum, all parties know what the others need and by getting input from everyone, it helps create a sense of ownership for the project. It cannot be stressed enough how important this is when dealing with difficult or complex issues on these large projects. These coordination meetings also greatly reduce the "unforeseen" problems incurred during construction, which reduces construction delays and costs.

To conclude, these guidelines are just that--guides to aid design teams with utility relocations on their project. This is not intended to imply that the ideas and concepts discussed are the only ones that the project design teams can employ. Rather this process is to help start the Thinking Beyond the Pavement process and to think out of the box.

For any additional help with the utility work on projects, the project design team can contact the Office of Construction Utility Section.