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Extend the Life of Your Bridge

By: Chris Ernst, P.E.

Recent events including the failure of the I-35 Bridge in Minneapolis, Minnesota, the American Society of Civil Engineers' (ASCE) report card for the nation's infrastructure and the passing of the American Recovery and Reinvestment Act have brought the condition of the nation's bridges to the forefront of many people's mind. Sustainability has become a hot topic in the Civil Engineering world with everyone trying to utilize materials and designs that will not only be cost effective and environmentally-friendly during the construction, but will also have a long design life as long as proper maintenance is performed on the bridge. The key word in that last sentence for a bridge owner, whether it is a municipality, county or state, is maintenance. This article will give some basic maintenance suggestions that a bridge owner should perform in order to extend the life of the structure. Without the necessary maintenance, materials will begin to fail much sooner than necessary, thus creating a need for expensive repairs or possibly a full bridge replacement. The specific maintenance suggestions we have for your bridge are as follows:

1. Concrete decks, parapets, etc. – All concrete that is exposed to winter maintenance materials such as salt and sand should be cleaned every spring. The excess materials should be brushed off of the concrete and a power washer should be used to remove all salt residues. A penetrating sealer should be applied to all concrete exposed to de-icing materials once every two years to help protect the concrete. A crack sealant should be placed in all noticeable cracks in order to minimize their growth. An asphalt wearing surface (with a proper

tack coat) should be installed over a concrete bridge deck (if the bridge was designed for it) once significant spalling of the concrete has taken place.

2. Steel Beams – Like the concrete described above, all beams exposed to winter maintenance materials should be cleaned every spring along with the bridge seats on which the steel beams sit. The bridge owner should also have a painting program in place to ensure that the beams are properly protected from the elements. If you are planning on using steel beams to build a new bridge or replace an existing bridge, you may want to consider using weathering steel. This type of steel will not rust like bare steel, therefore, only minimal painting (at each end of the beam) is required.



Members of the Allegany County DPW Bridge Maintenance Crew washing off the railing and deck of a bridge

3. Joints – All joints should be cleaned in the spring at a minimum and all failing joints should be replaced to help prolong the life of structure.

Without a properly functioning joint, the rest of the structure may experience expensive damage if the materials aren't able to expand and contract as designed. Replacing a failing joint will end up costing the bridge owner a lot less in the long run.



Members of the Allegany County DPW Bridge Maintenance Crew cleaning out a bridge joint

4. Railings – The condition of the bridge railings should be checked on a regular basis. Repair all damaged areas and make sure that all bolts and nuts remain tight.
5. Signs – Make sure that all signs remain in place, especially bridge width delineators, height and width restriction signs, and load posting signs.
6. Bridge Inspection Recommendations – As the owner of the bridge, it is very important to follow through on the recommendations made by the bridge inspectors.
7. Inspect structures with spans less than 20 ft. - You should have your Engineer inspect all structures every two years that are not on the Federal N.B.I.S. program. Neglecting these structures could lead to failures that could endanger the safety of the public and/or lead to expensive repairs or replacements that could have been avoided if an inspection had been performed.

It is very important for bridge owners to have a responsible bridge maintenance program in place, especially during times such as these where there is such economic uncertainty. Having a budget that will provide for annual bridge maintenance work will end up saving the owner in the long run by prolonging the life of the structure. A bridge will

remain in good condition for a long time, but if there is no maintenance performed during this time period the bridge will begin to fail at a very rapid rate. The cost of completing the normal maintenance during the good condition period will pale in comparison to the money required to make the necessary repairs when the bridge begins to fail. I'm sure that all bridge owners who have a maintenance program would agree that it is much easier to budget for the annual maintenance for all of their bridges as compared with trying to budget for the replacement of just one structure.

Please contact our office if we can provide any additional information in regards to the above bridge maintenance suggestions or if you would like a proposal from us to complete an inspection of a structure that you are concerned about that is not on the Federal N.B.I.S Program.

Fluoridation of Public Water Supplies

by Jeffrey C. Bahret, P.E.

Here in the northeast, approximately 5% of all water supplies are fluoridated. This percentage accounts for about 60% of the population on a community municipal water supply. This article will present some of the information necessary to evaluate if fluoridation of your public water supply is an issue meriting further consideration.

Small concentrations of fluoride in drinking water reduces the prevalence of dental decay. Excessive amounts of fluorides are definitely associated with the mottling of teeth. Fluoride, therefore, must be regarded as both a beneficial and potential dangerous material.

Three fluoride compounds are available for commercial water treatment, namely: sodium fluoride, fluosilica acid and sodium silicafluoride. Sodium fluoride and sodium silicafluoride are the most widely used. Water apparently has no fluoride demand; and, therefore, all fluoride added to the supply is indicated by the standard test as an active ion.

The courts of 25 state have held that fluoridation of public water supply does not infringe on the constitutional or legal rights of an individual.

Opponents of fluoridation have alleged that the procedure violates constitutional rights such as religious freedom and other liberties. They have argued that fluoridation represents the unlicensed practice of medicine and dentistry and is mass medication. Over the years, every conceivable legal and constitutional objection to fluoridation has been argued unsuccessfully in the courts.

Although community water fluoridation has been proven to be both the safest and most cost-effective method to prevent dental cavities, a small percentage of the population continues to oppose its introduction into community water systems. It has been estimated that fluoridated water systems, if available throughout the country, could in time reduce the national dental bill by one half. In these terms, and considering the national public health care crisis presently under way, the benefits expected from this water supply fluoridation trend are monumental.

The American Academy of Pediatrics (AAP) has issued a schedule for fluoride supplementation (see Table 1). These recommendations take account of the levels of fluoride contained in the primary drinking water supply as well as the age of the pediatric patient. Changes in the current AAP schedule include the elimination of fluoride supplementation during the first six months, decreased doses of supplemental fluoride from age six months to six years, and decreasing the level at which no supplementation is needed from 0.7 ppm to 0.6 ppm. Dietary supplementation among children in fluoride-deficient communities is also supported by the U.S. Preventive Services Task Force.

Handicap Accessible Standards

By: Al Vanderpoel

Accessible buildings are now a required standard in the United States. New buildings must meet these standards, and renovations almost always have to be retro-fitted to the handicap accessible standards. The building code of New York State and the International Building Code of Pennsylvania both require compliance with handicap accessible standards, using the American National Standards (ANSI A117.1). Local building inspectors will insist upon these requirements.

There are several areas that apply to building structures as far as accessible standards are concerned, but three of the most common, and most misunderstood, are accessible routes, bathrooms and parking spaces.

Accessible routes require a maximum 5% slope (1 in 20), and this can be increased to a 1 in 12 slope with hand railings. A 1/4" vertical bump is allowed, as well as a 1/2" beveled change in elevation. There are exceptions such as curb ramps. A 36" wide path must be maintained, but this can be reduced to 32" if an obstruction is less than 2' in length along the path. Doors must have a 32" clear opening, and the approach to doors must have clear access for a large variety of conditions. The handicap access ramps that are commonly seen at entrances must maintain the 1 in 12 slope, but they must have a level landing area at least every 30'. The ramps often include a 180° turn, and these require a 60" level area past the ramp. A rule of thumb with accessibility is to allow for a 60" circle whereby a wheel chair can turn.

Bathrooms are another area that require close attention to dimensions. The 60" turning circle is essential in public restrooms. At least one toilet stall is required to be 60" wide by 59" long, with grab bars on one side wall and the back wall.

Sinks must be positioned for accessibility, with knee space and requirements for height and distance from the wall. Mirrors and hand dryers, even the restroom "mens" and "womens" signs have height requirements that must be maintained.

Table 1. Schedule for Fluoride Supplementation

Fluoride content of drinking water
(in parts per million [ppm])

Child's age	<0.3ppm	0.3-0.6 ppm	>0.6ppm
birth to 6 months	0 mg	0 mg	0 mg
6 month - 3 years	0.25 mg	0 mg	0 mg
3-6 years	0.50 mg	0.25 mg	0 mg
6-16 years	1.00 mg	0.50 mg	0 mg

If you are interested in investigating further the procedure for acquiring approval to fluoridate a water supply, a phone call to either one of our offices will get you started.

Parking spaces are a third area that cause confusion. The requirement for a normal accessible space is to have 96" width, and each parking space must have an access aisle of at least 60" width. (Two spaces can share one access aisle). At least one of every eight accessible parking spaces (but not less than one) must be van accessible, which requires either a 132" wide space, or a 96" wide access aisle. The number of spaces required is one per 25 total parking spaces up to 100 spaces, with a ratio for spaces over 100.

The requirements can be confusing, and there are exceptions to almost every rule. The best advice is to get in touch with us and confirm the requirements before plans are drawn up and submitted to the building code officials. The correct dimensioning can save a lot of time in revisions and frustration with the changes that would otherwise have to be made

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