

CONCRETE EVALUATION & REHABILITATION

Introduction

Evergreen Engineering, Inc., in Eugene, Oregon provides its clients with a broad selection of services in Mechanical, Civil/Structural, and Electrical Engineering. One area of specialization is the inspection and evaluation of man made structures constructed of CONCRETE, MASONRY, WOOD, and STEEL.

Let's Examine Concrete

Almost everyone thinks of concrete as a rock hard building material that lasts forever. Unfortunately, nothing lasts forever, including concrete. Please take a moment and think about your answers to the following questions.

- ▶ Are my concrete structures old?
- ▶ Are they showing any signs of deterioration?
- ▶ Were my concrete structures designed prior to modern earthquake codes?
- ▶ Could someone get injured if they failed?
- ▶ Would I be out of business if they failed?

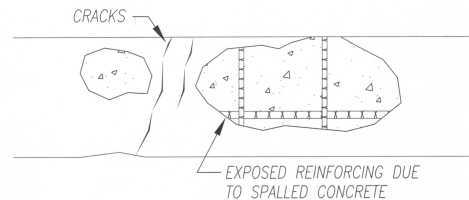


Figure 1

If you answered "yes" to any of the above questions, or if your concrete looks like Figure 1, perhaps your structures should be looked at by a professional engineer to verify if the deterioration is cosmetic, or structurally serious and likely to progress to failure.

Concrete Corrosion

Concrete corrosion can be caused by a variety of factors. Once started, the corrosion process accelerates. Typically, corrosion damage that occurs in the first five years will duplicate in the next 2.5 years, then again in 1.25 years, and so-on. When concrete corrosion is detected and contaminants have entered the concrete matrix, no traditional repair methods, such as patching, sealers, or membranes have proven to stop the corrosion. Also, no one repair system is suitable for all repair applications. An experienced professional can properly evaluate and recommend a specific repair method.

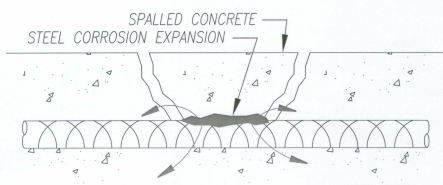


Figure 2

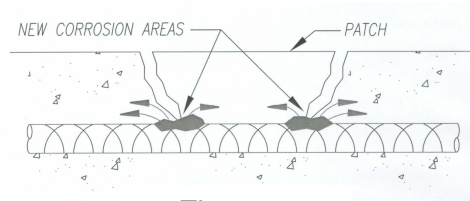


Figure 3

Figure 2 shows spalling due to corroding reinforcing steel and Figure 3 shows continuing corrosion under an improper repair patch

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EVERGREEN ENGINEERING

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CONCRETE EVALUATION & REHABILITATION (continued)

Approach to Concrete Repair

A concrete rehabilitation program will achieve the desired results only after a thorough diagnosis is performed and a specific repair plan is developed by a firm experienced in this type of repair. Evergreen Engineering, Inc. has extensive experience in helping a variety of clients repair and maintain the integrity of their concrete structures. Our engineers will work with you to develop a rehabilitation plan that is thorough and cost effective. This is usually done in a two step process; first, a site visit and assessment, followed by testing and evaluation.

ASSESSMENT

- ▶ Review the historical documents of construction and previous repairs.
- ▶ Make a preliminary diagnosis as to the cause of the problem.
- ▶ Evaluate the effect of deterioration and the structural integrity of the structure.
- ▶ Predict the ability of the repair to restore strength and durability to the structure.
- ▶ Make a preliminary cost estimate for the repairs.

TESTING AND EVALUATION

- ▶ Determine if there is deeper (unseen) damage in addition to visible damage.
- ▶ Delamination survey can locate areas of concrete bond failure.
- ▶ Electrical potential profiles can locate areas of reinforcement bar corrosion.
- ▶ Chloride analysis can determine the severity of the corrosion.
- ▶ Core samples can determine concrete quality and depth of reinforcement covering.
- ▶ Electrical continuity of the reinforcing steel can be measured.

At the conclusion of testing and evaluation, we will provide a complete report evaluating the present and future structural integrity of the structure, the suggested repair methods, and the expected cost of the repair.

Conclusion

While concrete corrosion is a serious matter, most structures can be professionally repaired, provided the corrosion and deterioration is discovered early enough and the proper repairs are made. Once repaired, the structure's service life will be extended provided no additional deterioration is allowed to take place.

Evergreen Engineering, Inc. has the experience to help you determine if a problem exists in concrete, masonry, wood or steel structures. Our staff of professional engineers and designers can provide you with accurate assessments plus economical and efficient solutions if repairs are needed.

As a full service engineering firm, Evergreen can provide planning, design, drawings, contract documents, field inspections, and project management for a wide variety of engineering disciplines. Please call **(541) 484-4771** and we will be happy to provide references and additional information about our services.



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