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Effectiveness of self healing in repair of strategic concrete structures "a simplified model"

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Effectiveness of Self-Healing in Repair of Strategic Concrete Structures "A Simplified Model"

BY

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Abstract

Concrete cracking has various causes and is unavoidable. Cracking has adverse effects on structure's integrity, durability and serviceability. In strategic structures such as nuclear reactors and dams this cannot be tolerated, this means that strategic structures should be under a continuous process of inspection and repair. This process has many drawbacks as it is costly, tiring and not sustainable, also it cannot be 100% trusted that the inspection is carried out on time and with enough accuracy. Moreover shutting down any of the strategic structures for the purpose of repair would negatively impact the economy.

The addition of self-healing capsules to concrete for the aim of crack recovery is a new promising technique that can be used in strategic structures to minimize the need for inspection and repair. Although a fair amount of research has been carried out to prove that the addition of self-healing capsules to concrete is effective in the sealing of cracks no research has been carried out to investigate if this method is cost effective.

The aim of this study is to develop a model that predicts the rate of crack propagation in self-healing concrete and compare it to conventional concrete through a five year period assuming 12 different initial crack areas and also to compare the final cost of using the self-healing concrete versus that of conventional concrete taking factors like cost of repair, type of repair, cost of inspection, cost of disruption and the time value for money in each case into account. This was done through three what if scenarios assuming concrete cracking starts immediately after hardening or after a period of five years have passed and finally if cracking starts after 10 years and through a period of five years.

This work gave a promising insight showing that the expected final crack areas were smaller in case of self-healing concrete if no repair takes place and lower costs in all scenarios in case of intervening to carry out repair works. It is recommended to expand this work by taking factors that affect the healing percentages into account.

Keywords: Concrete, Cracking, Self-healing, Strategic structures, repair cost.

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1 Chapter I: Introduction

1.1 Concrete Industry:

Concrete is the most frequently used construction material on planet earth because of its various advantages. Concrete is usually included in all types of construction projects such as residential buildings, bridges, tunnels, roads and other structures. Around 25 billion Cubic meters of concrete are used worldwide annually. Concrete usage is that frequent is as a result of its comparatively cheap cost and the fact that it can be easily casted into several shapes (Bhattacharyya 2011). Concrete is also manufactured from highly abundant materials (Water, sand, gravel) and is highly resistant to fire (Reinke 2012). Although concrete has many advantages but the manufacturing process of concrete is not a sustainable process. Concrete production requires of depletion of water and natural aggregates, high Portland cement consumption accompanied by high emissions of carbon dioxide (CO_2) during its lifecycle process and also due to the large quantities of generated construction and demolition waste causing land-fill space depletion. As a consequence the concrete manufacturing is currently facing exceptional challenges to make it a greener material. (Meyers 2008).

There are two facts that can be guaranteed in case of any mix that can be called a concrete mix, the first fact is that it is going to harden and gain strength while the other fact is that no matter how of good quality the concrete is at some point of time it is going to crack.

1.2 Effect of Cracking on Concrete Structure

“Micro-cracks of width up to 0.2 mm do not impact the safety of the structure” (Jonkers 2011). Although most of the cracks do not usually affect the safety of the structure at the beginning, however they cannot be left neglected and untreated as cracks with time get deeper, wider and

start forming large networks and this is when the safety and serviceability of the structure will be compromised. Also the appearance of cracks might cause some sort of public unsettlement despite the fact that the structure would be considered safe by construction experts. Additionally in case of some structures that has a high strategic value (nuclear reactor, dams, …..) even the smallest cracks cannot be tolerated. In order to prevent this from taking place the only option is that for each and every concrete structure continuous monitoring is essential and carrying out periodical maintenance and repair work is imminent.

1.3 Causes of Concrete Cracking

Causes of concrete cracking are various and each cause results in cracks that differ in their depth, shape, probability of occurrence and effect on the structure's safety and performance.

Causes of concrete cracking can be divided into 4 main groups: (Kim et al. 2009)

1. Concrete material cracks
2. Construction works
3. Environmental factors
4. Applied loads

1.3.1 Concrete Material Cracks

1.3.1.1 Shrinkage Cracks

Shrinkage cracks are considered the most abundant reason for concrete cracking especially in hot climate as it might only take a few hours before they start to appear. Shrinkage cracks occur when concrete is still in its plastic state and has not hardened yet. The cracks start to appear when concrete starts to lose some of its water content this result in a decrease of the concrete section volume and as the concrete starts to harden this loss in volume causes stress leading to

shrinkage cracks. These cracks are often discontinuous hair line cracks that range from 1 to 7 millimeters. Although these cracks are barely visible they might extended through the whole depth of the concrete section.

Shrinkage cracks propagation is highly unpredictable as it can vary widely depending on several factors including W/C ratio, mix design, type and quality of used aggregates, humidity and the ratio between the exposed areas of a concrete section to its overall volume.

Unless handled and controlled properly shrinkage cracks might lead to serviceability and durability problems causing deflection or curvatures to concrete structures.

1.3.1.2 Chemical Reaction Cracks

Chemical reaction cracks can occur as a result of the materials used in concrete production or as a result of materials that come in contact with hardened concrete.

1.3.1.3 Sulphate Attack Cracks

This type of cracks is caused by a chemical breakdown process where sulphate ions from sulphate containing salts (sodium, calcium, potassium, and magnesium) attack the components of cement startin a chemical reaction that forms crystalline components. This leads to filling concrete pores causing an increase in volume generating internal stresses in concrete. Sulphate attack cracks are usually patterned cracks. These cracks usually take from 1 to 5 years before they become visible. The sulphate containing salts might get in contact with concrete from an internal source such as the presence of natural gypsum in aggregate or upon the usage of untested admixtures containing small amounts of sulphates, or from an external source such as the exposure to certain types of soil or sewage or underground water.

1.3.1.4 Alkali-Aggregate Reactions

Alkali-aggregate reactions are reactions that takes place between aggregates and alkali, either from the inside of the concrete mix “Alkali-carbonate reaction” or an outside source” Alkali silicate reaction”. These reactions result in the production of a gel that absorbs water upon exposure to it which causes it to expand. The expansion process causes longitudinal or patterned cracks to appear. This type of cracks usually takes about 5 years until they start to appear. This type of cracks may result in total deterioration of the structure.

1.3.1.5 Clay in Aggregate Cracks

Clay is not as strong as aggregate and it can absorb water. If clay particles are present in the aggregate used in the concrete mix and if after the concrete gets in contact with water, clay particles will absorb it and swell causing internal stresses that will result in cracks.

1.3.2 Construction Works Cracks

1.3.2.1 Thermal Contraction Cracks

During the hydration process of the cement, the temperature of concrete starts to increase till it peaks in around 18 hours and then temperature starts to decrease. This change in temperature causes the concrete to shrink which leads to generation of tensile stresses. If the generated stresses exceed the tensile strength of concrete cracks will appear. This process leads to the formation of transvers cracks. This types of cracks start to appear in a period between 1 day and 3 weeks. This type of cracking usually accompanies mass concrete (large columns, dams,…) as it is more susceptible to difference in temperature between different portions of the structure since the exteriors of the concrete section tend to lose heat faster than the interiors during the hydration process.

1.3.2.2 Segregation Cracks

There are two types of concrete segregation. The first type takes place after the separation of coarse aggregate from the concrete, this usually occurs when concrete is poured into formwork from a high distance. The second type occurs when cement paste gets separated from the concrete mass, this usually happens when concrete is too wet. Segregation negatively impacts the durability and strength of concrete making it more prone to cracking.

1.3.2.3 Deformation of Forms Cracks

Improperly strengthened formworks that cannot withstand the weight of the poured concrete are prone to deformation and displacement that occurs before concrete has hardened or before concrete gains enough strength to support its own weight. This would result in cracking in concrete sections.

1.3.2.4 Settlement Cracks

Settlement cracks appear when concrete is still in its plastic state it takes only between 10 minutes to 3 hours until they are visible over and aligned with the reinforcement bars. This type of cracking starts when heavier and denser particles inside concrete sink downwards by the action of the gravitational force and water floats on top of the concrete slab, this action gets restrained by the reinforcement bars resulting in tension that causes the cracks. This type of cracks are more abundant in extra wet mixes where excessive bleeding happens and the can also increase by over-vibrating the concrete. It is also more abundant along rigidly supported elements and bridge slabs, or slabs with a concrete cover that is less than12.5 cm.

1.3.3 Environmental Factors

1.3.3.1 Freezing and Thawing Cracks

Unlike shrinkage cracks freezing and thawing cracks occur in cold areas. Since concrete is a porous material therefore when its temperature drops the water inside it freezes this causes its volume to increase by around 9% resulting in internal stresses in concrete. “Concrete may be damaged by freezing of water inside the paste, aggregate or both” (Powers 1975). The occurrence of freezing and thawing through successive winter seasons would result in surface parallel cracking to appear.

1.3.3.2 Corrosion Cracks

Concrete has low resistance towards withstanding tensile loads; this is why steel reinforcement is added to concrete sections. Steel reinforcement is protected when it is inside concrete away from air and moisture and also due the highly alkaline nature of concrete. But when concrete starts to crack for any reason (even micro-cracks) this opens a passageway for moisture and oxygen to reach the reinforcement thus reinforcement starts to corrode. Since corrosion products have an expansive nature so they expand causing tensile pressure inside the concrete. Splitting cracks start to take place starting form directly around the reinforcement and propagate till they reach the surface causing concrete spalling (Yoon et al. 2002)

1.3.4 Structure and Applied Loads

1.3.4.1 Applied Loads Cracks

Concrete has different resistance to each type of loading (compression, tension, torsion, …) and although concrete is designed to withstand loads this does not mean that it will not crack even if the loads did not exceed the ultimate load in the design.

1.3.4.2 Static Loading

Concrete is considered a composite material where cement is used as a binder that binds coarse and fine aggregates together, this results in different strain for each material upon being stressed. The transition zone between cement and aggregate is also a weak point (Mehta 1996) which means that it is easy for cracks to start at these weak points and propagate upon continuous loading.

1.3.4.3 Fatigue

Fatigue is known as failure upon repeated mechanical loading i.e (the same load is removed and then added again several times), this leads to continuous deterioration in between the concrete mix and the coarse aggregates. In case there are already any micro-cracks in the concrete section this action will cause them to grow bigger and become macro-cracks.

1.4 Reasonable Crack Width:

According to ACI 224 committee the acceptable crack widths for structures depending on their exposure conditions area as shown in Table 1-1. However these crack width are expected to increase with time if they are left without any intervention.

Table 1-1 Allowable width for concrete cracking (ACI 224 2006)

Exposure condition	Crack width (mm)
Dry air	0.41
Humidity, moist air, soil	0.3
Deicing chemicals	0.18
Sea water	0.15
Water retaining structures	0.10

1.5 Problems Facing Maintenance and Repair of Structures

As explained previously causes of concrete cracking are various and inspection, monitoring and maintenance of structure are a necessary to keep the structure safe and sound. However the inspection and maintenance process is not always an easy thing to do.

1.5.1 Cost Consuming

Experts are required to carry out periodical inspection tests, special equipment are usually needed too in order to reach a reliable assessment regarding the condition of the structure and make the right decision about the right time for an interference to carry out the repair works. The types of labor that execute the repair works should be more skillful than ordinary labor the equipment used are more advanced and even the materials are more expensive. For instance the cost of maintenance and repair of concrete bridges in the US is nearly 4 billion dollars annually (Sierra-Beltran et al. 2014) and in Europe 50% of the annual construction cost is spent on repair and rehabilitation of already existing structures (Hilloulin et al. 2015).All this makes the repair process very cost consuming. There is also the indirect additional cost of disruption resulting from shutting down the structure even if it was partial during inspection and repair.

1.5.2 Time Consuming

The same applies to in case of time lost during both inspection and repair. In some types of structures like bridges the deck or at least some of the lanes should be closed and detours might be necessary, this causes traffic congestion and consumes a lot of time. This might also lead to some public unrest and frustration.

1.5.3 Inaccessibility of Structures

Some types of structures cannot be accessed easily for inspection like underground tunnels or under water structures, in these cases very expensive and sophisticated robots are the only solution to provide an adequate and reliable inspection. The problem of inaccessibility becomes even more complicated during maintenance and repair, for instance in order to do some repairs for a dam, diversion of the water flow path might be necessary which of course might be impossible in some cases or at least very tiring and costly

1.5.4 Not a Sustainable Process

Concrete is the second most consumed product on the planet after water. Repairing process is resource consuming and usually cement is required. The cement industry depends on heating limestone to produce cement, as a result cement production is regarded as the biggest contributor to all negative ecological effects of concrete. Research showed that the cement industry is responsible for nearly 5–7% of total worldwide CO_2 emissions (Hednriks et. al 2004). A conservative estimate indicates that for every 1 Kilogram manufactured a byproduct of 0.9 kilograms of carbon dioxide is generated. Other epoxies that are used in repair have negative environmental impacts and even some of them are hazardous to human health. In some cases even the inspection process might have some negative impacts on the environment too, for example using robots for the investigation of underground structures might result in disruption of the eco-system. “Also currently available repair systems are mainly based on environmental un-friendly materials such as epoxy systems, acrylic resins or sili-cone-based polymers” (Sierra-Beltran et.al 2014)

1.6 Efforts to Avoid Concrete Cracking

No matter how of high quality the concrete mix was proven to be, it can be said that all types of cracks can be avoided for some period of time, or some types of cracks can be avoided through the whole lifetime of the structure but it is never possible to avoid all types of crack through the whole life time of the structure.

One solution for the cracking problem is to add fibers made of steel or carbon to the concrete mix. These fibers prevent the cracks from expanding or getting wider thus preventing them from affecting the structure's safety. However using fibers has some drawbacks and limitations as they negatively impact concrete's workability so they can't be used in heavily reinforced sections as in bridges, also if not mixed and vibrated properly fibers tend to accumulate and ball in one area instead of being distributed uniformly in the section, Also adding fibers to concrete is resource depleting so it is not an environment friendly solution. A better solution to cracking or what can be better expressed as a concrete miracle is finding a way a sustainable way that would not only stop crack propagation, but will even repair them without the need for any interference and this is where the "self-healing concrete" comes.

1.7 Self-healing Concrete

"Self-healing is the property of a material to be able to heal or cure damages caused to it autonomously" (Bhattacharyya 2012). "The natural self-healing ability of concrete, known as autogenous healing, has been observed since 1836, it was initially discovered by the French academy of sciences" (Ferrara et al. 2013). The concrete's ability to self-heal can be observed in older structures that have endured for long periods although they are not appropriately monitored

or repaired. It was noticed that Cracks in the older concrete buildings such as Roman aqueducts and gothic churches have healed without any interference because the un-hydrated cement particles in the crack reacted with the moisture in the air producing a cement paste that sealed the cracks; however in newer structures the un-hydrated cement content is reduced, thus the natural self-healing effect has diminished. (Dunn 2011)

Although newer mixes possess better properties (higher compressive strength, better durability,…), the ability of concrete to self-heal has decreased due to two main reasons. Firstly better and more efficient mixing processes result in less un-hydrated cement particles to react with moisture in air later, secondly the replacement of a portion of cement by other materials or additives such as fly ash or silica fumes.

Although the self-healing ability of concrete has diminished in newer mixes it will not be a smart choice to sacrifice all the other better properties only for better self-healing, that's why the need for finding a method to enhance the self-healing ability of concrete has evolved. By enhancing self-healing ability three goals need to be achieved which are speeding up the process, increasing the frequency of self-healing to occur and sealing larger cracks.

1.7.1 Self-healing Capsules

Self-healing capsules are capsules added to the concrete mix in order to enhance the self-healing process; they are usually composed of three components.

1.7.1.1 Protective Casing

It is the substance from which the outer casing of the capsule is made of. It must be chosen to be a water proof material that can withstand the mixing process without breaking and it should also be compatible with concrete so that it will not react with any of its components. The protective

casing material should also possess lower strength than that of the concrete matrix as this will affect the crack propagation process, since cracks tend to change direction to pass through the weakest points. This means that capsules will act as a magnet that attracts the crack causing the capsule breakage which is essential for the healing process to start.

1.7.1.2 Healing Agent

Mostly consists of a type of bacteria and a solution that the bacteria reacts and a buffer solution with to produce the sealant. This fills about 97% of the whole capsule volume. Several different types of bacteria have been tested, but commonly bacteria should be an alkali resistant type of bacteria as concrete is a highly alkaline material (PH value = 12). It should also be a spore forming bacteria with a long life span (>50 years) in order to last through the life time of the structure whenever cracks appear. Spore forming means that when the bacteria experiences unfavorable conditions they can get in a dormant state where they cannot reproduce but can survive for long durations. The selected type of bacteria should also be proven harmless to human health.

1.7.1.3 Nutrient

It is a solution added in the capsule for the bacteria to feed on when it is in an active state. The nutrient should also be chosen and tested carefully to guarantee that it is concrete compatible.

1.7.2 Self-healing Process

The encapsulated bacteria capsules are added to concrete during the mixing process. As long as the capsules are sealed and the bacteria is not exposed to neither air nor humidity it remains in a spore state. When concrete starts to crack afterwards cracks tear the capsules that they pass through open. As bacteria get exposed to air they become in an active state. Also the cracks

provide an easy path for water to penetrate the concrete. The bacteria starts a chemical reaction between itself, the nutrient and the water producing calcium silicate hydrate (CSH) which is cement paste like gel that seals the crack. After the crack is sealed the un-favorable conditions for the bacteria return so they get into the spore state again and the process is repeated if the same crack appears as shown in Figure 1-1.

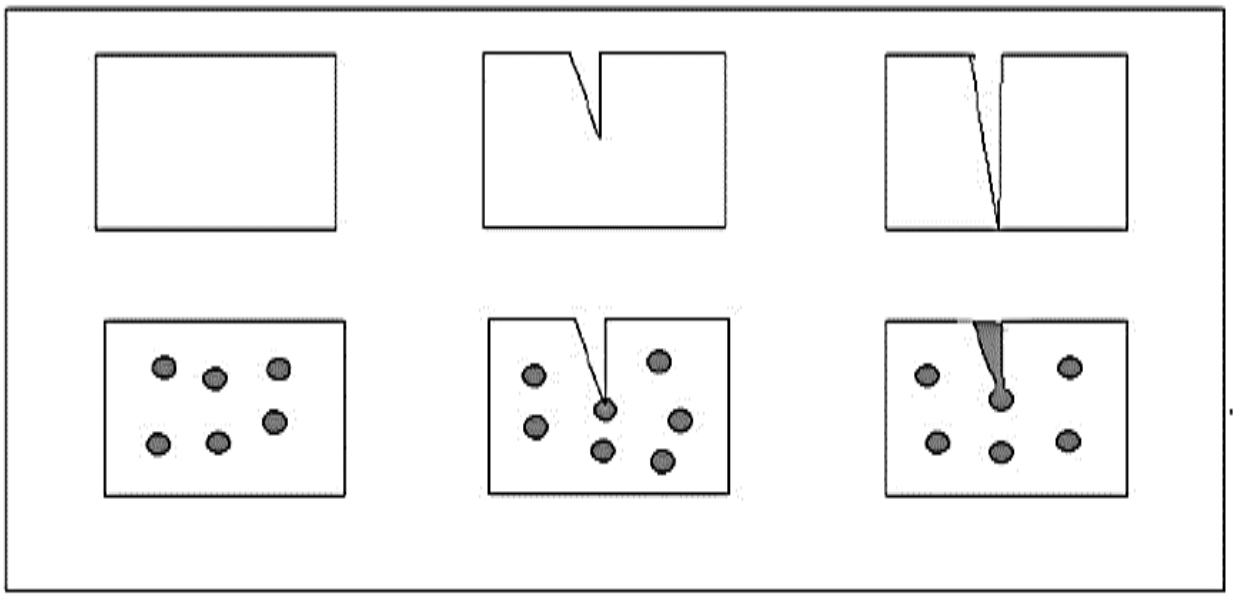

Figure 1-1Sequence of self-healing process (Bahhattacharrya 2011)

1.7.3 Previous self-healing Concrete Research

A fairly good amount of research has been conducted on self-healing concrete. At the beginning the healing agent was added to concrete without any protective casing and then came out the idea of adding the healing agent inside a brittle material like glass, but these two approaches did not achieve the expected success due to the large losses during the mixing process. The first to use microcapsules were the Sottos group, a lot of different types of healing agents and protective casings have been experimented since then. Bacillus Pasterii bacteria was tested as a healing agent enclosed in polyurethane microcapsules (Patil et al. 2008). Another tested approach was to replace the bacteria with sodium silicate solution (Bhattacharyya 2011). Bacillus Alkalinitrilicus

bacteria obtained from Wadi al Natrun in Egypt and enclosed in expanded clay particles as protective casing was also tested (Wiktors and Jonkers 2011). Additionally using Bacillus Sphaericus bacteria was experimented with two different types of casing (polyurethane and silica gel) microcapsules(Wang et al. 2012). Bacillus pseudofirmus bacteria combined with some organic compounds as peptone and calcium glutamate were also inspected to find out their effectiveness as a healing agent (Jonkers and Shlangen 2014).

All the previous research was showing really promising results. Self-healing ability was clearly enhanced in most samples and the initial compressive strength was not noticeably affected. Also the samples that were tested for permeability showed a huge decrease in permeability in self-healing concrete samples.

The suitability to improve concrete healing was also checked using three different types of bacteria form bacillus gene added as a solution to the mixing water. Concrete beam specimens with dimensions of (50cm*10cm*10cm) were cast and cracks of 0.3mm width and 10mm depth were induced to the beams using a thin copper plate while concrete was still fresh. The copper plates were removed before the final setting of concrete and samples were cured for 28 days before testing the compressive strength. Compressive test results showed 6-12% recovery compared to control sample as shown in Table 1-2 (Krishnapriya et al. 2015).

Table 1-2 Compressive strength of self-healing concrete VS conventional concrete after 28 days (Krishanpriya 2015)

Bacteria	Bacterial Cells/ ml of mixing water	Concrete mixture	Compressive strength after 28 days (MPa)
No bacterial cells	0	M1	33
Live cells	10^5	M2	37
Live cells	10^5	M3	36.5
Live cells	10^5	M4	35
Live cells	10^5	M5	38.3

Figure 1-2 Crack complete healing for self-healing concrete after 28 days (Krishanpriya 2015)

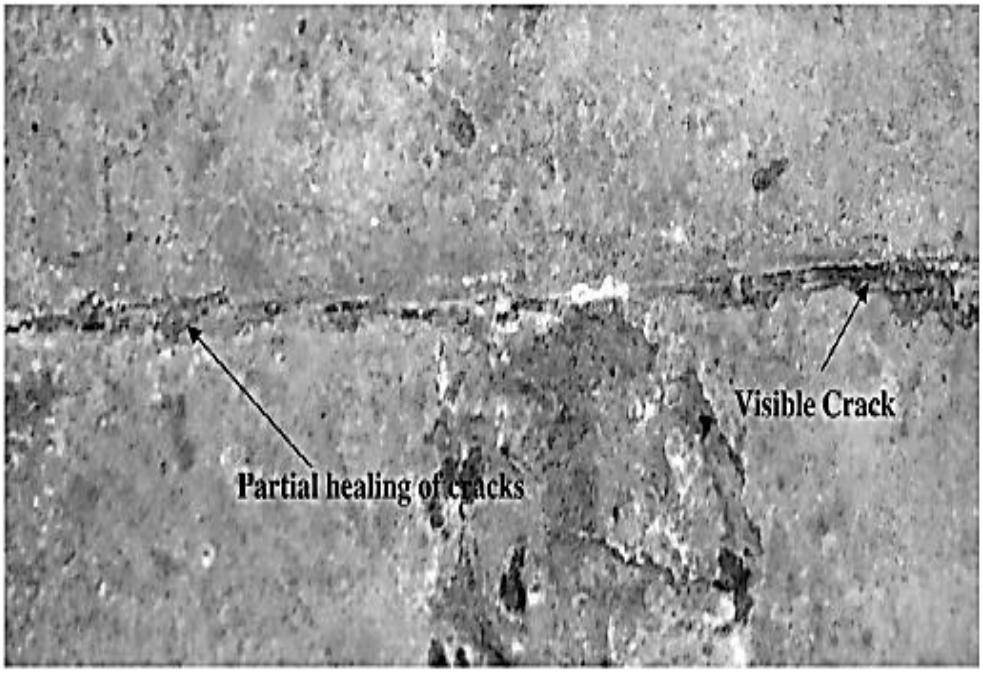

Figure 1-3 Crack condition after 28 days for conventional concrete (Krishanpriya 2015)

Although it was claimed that despite the fact that self-healing concrete costs nearly double that of normal concrete, but on the long run it is cheaper due to the savings in the costs of maintenance and repair (Jonkers 2011). No real research have been done to prove that statement.

1.8 Work Objective

The aim of this work is to compare the condition of conventional concrete (any concrete mix without self-healing capsules) against concrete containing self-healing capsules after cracking starts to appear and through a period of five years and monitor the condition of each and their need for repair. This study also aims to investigate the economic feasibility of adding self-healing capsules to concrete and comparing it with the cost of inspection and repair through a

period of 5 years from the point of time where cracks start to appear in three scenarios (cracking appears immediately, cracking appears after 5 years, cracking appears after 10 years).

2 Chapter II: Literature Review

2.1 Proving that Concrete Can Heal Autonomously

In order to prove that concrete possesses the ability to autonomously heal and recover from cracks. Ultrasound diffusion was used to monitor the behavior of cracked concrete. Three different mix designs were tested in the research where the specimens were subjected to a compression force of 6.2 MPa, the applied force allowed only for micro-cracks with width ≤ 200 μm. Diffusion test was performed on specimens before cracking and through a period of 120 days and the results on the last day were almost like the ones of the un-cracked specimens (Wan et al. 2013).

The ultrasonic pulse velocity test was used to prove that concrete can self-heal. Since the higher the velocity measured reflects higher concrete quality and strength, this means that if the velocity measured for cracked specimens was higher after giving the samples time to heal form the results illustrated in Figure 2-1 the self-healing property can be proved.

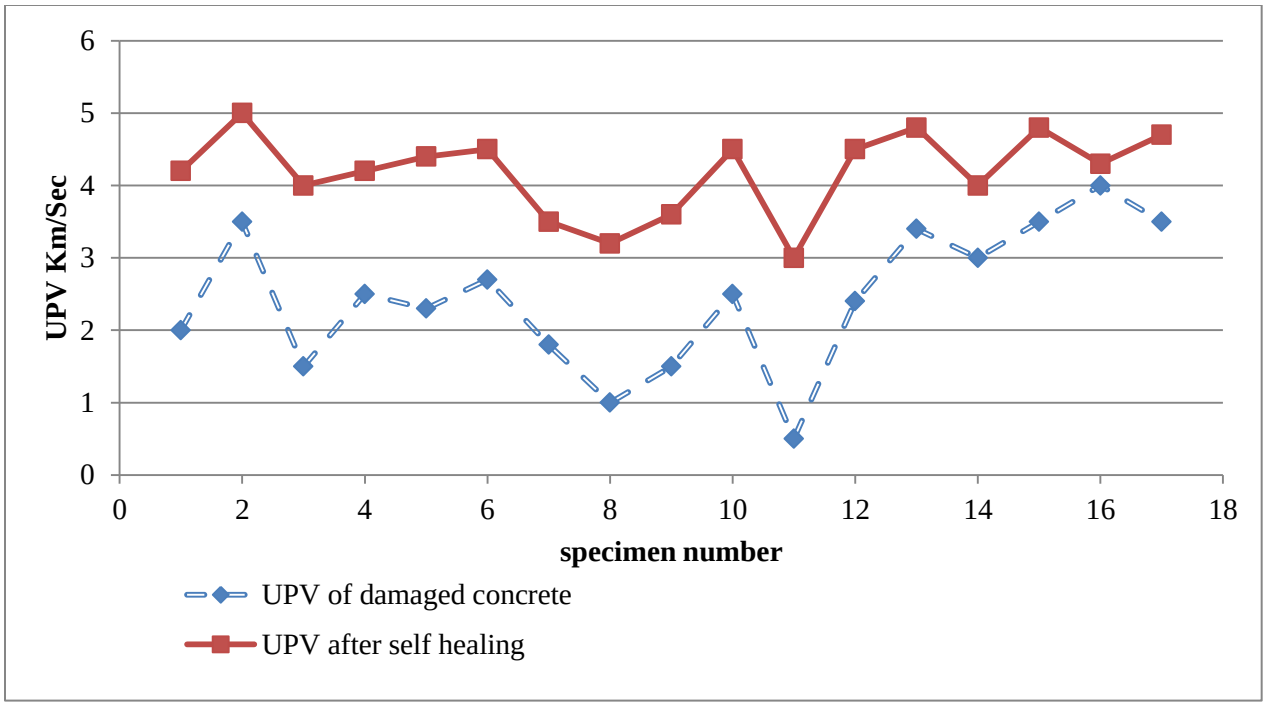

Figure 2-1 UPV of damaged and self-healed concrete (Wan et al. 2013)

However the self-healing ability of concrete differs as the width of crack changes. Crack closure was investigated upon the hydration of un hydrated cementitious particles and it was noticed that there is a border line for the concrete mixture, as long as the crack width remains below this border line the self-healing ability of concrete increases with the increase of crack width. The reason behind that is that wider cracks allows for more air and water to penetrate which are necessary for the self-healing reaction. On the other hand when the crack width passes the threshold the ratio of self-healing ability starts to decrease. It was also proven that the border line of high strength concrete mixes is lower than that of normal concrete mixes; this is mainly due to the fact that there are fewer un-hydrated cementitious particles in high strength concrete (Zhong and Yao 2007).

The self-healing ability of concrete affects the concrete's permeability. It was proven that as concrete is given time to heal and with higher temperature concrete's permeability decreases which leads to better protection of reinforcement (Reinhardt and Joos 2003). These results were concluded by causing cracks on concrete with widths of 0.05 to 0.2 mm and curing them for 28 days at RH of 65%. Samples were then tested at temperatures of 20 °c, 50 °c and 80 °c.

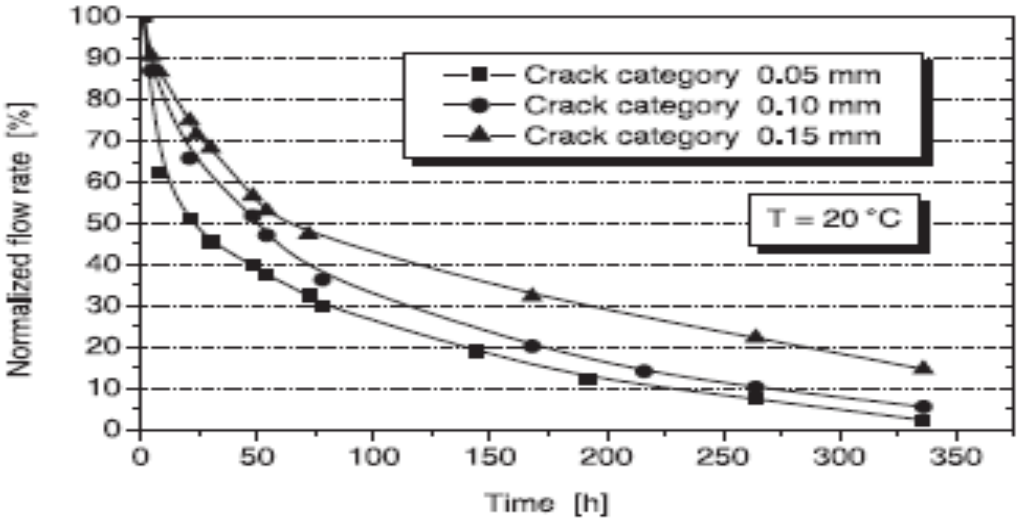

Figure 2-2Decrease in flow rate resulting from self-healing for different crack widths (Reinhardt and Joos 2003)

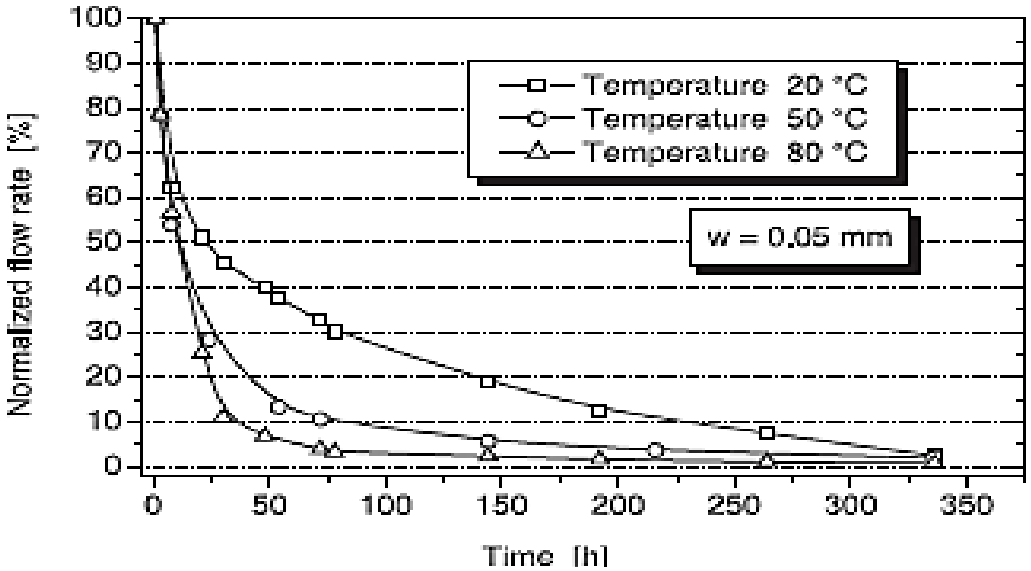

Figure 2-3 Decrease in flow rate resulting from self-healing for different temperatures (Reinhardt and Joos 2003)

2.2 Enhancing Self-healing Of Concrete Using Bacteria

The first research that aimed to enhance the self-healing ability of concrete adopted the concept of using micro-organisms in microbial enhanced oil recovery that is used in oil industry in order to close the pores in the rocks. The idea was to add micro-organisms (bacteria) in a solution and pour it onto the rock layers in the ground; these bacteria caused microbial calcium carbonate precipitation which sealed the pores. Bacteria have also been used in removing chemicals from waste water (Gross et al. 2007) and green-house gases from landfills (Jungio et al. 2008).

The first challenge was to find a type of bacteria that can survive both the highly alkaline nature of the concrete matrix that results from the formation of calcium hydroxide during the cement hydration process and that can also survive un-favorable weather conditions for long years through the lifetime of the structure (Rmachandran et al. 2001). Bacillus Pasterii bacteria was selected for its ability of spore forming. Two sets of mortar specimen were prepared for testing. Bacteria were added to the first set while the other set consisted of control specimens for comparison. The microbial calcium carbonate precipitation was examined using both the x-ray diffraction (XRD) and the scanning electron microscopy (SEM) Figure 2-4.

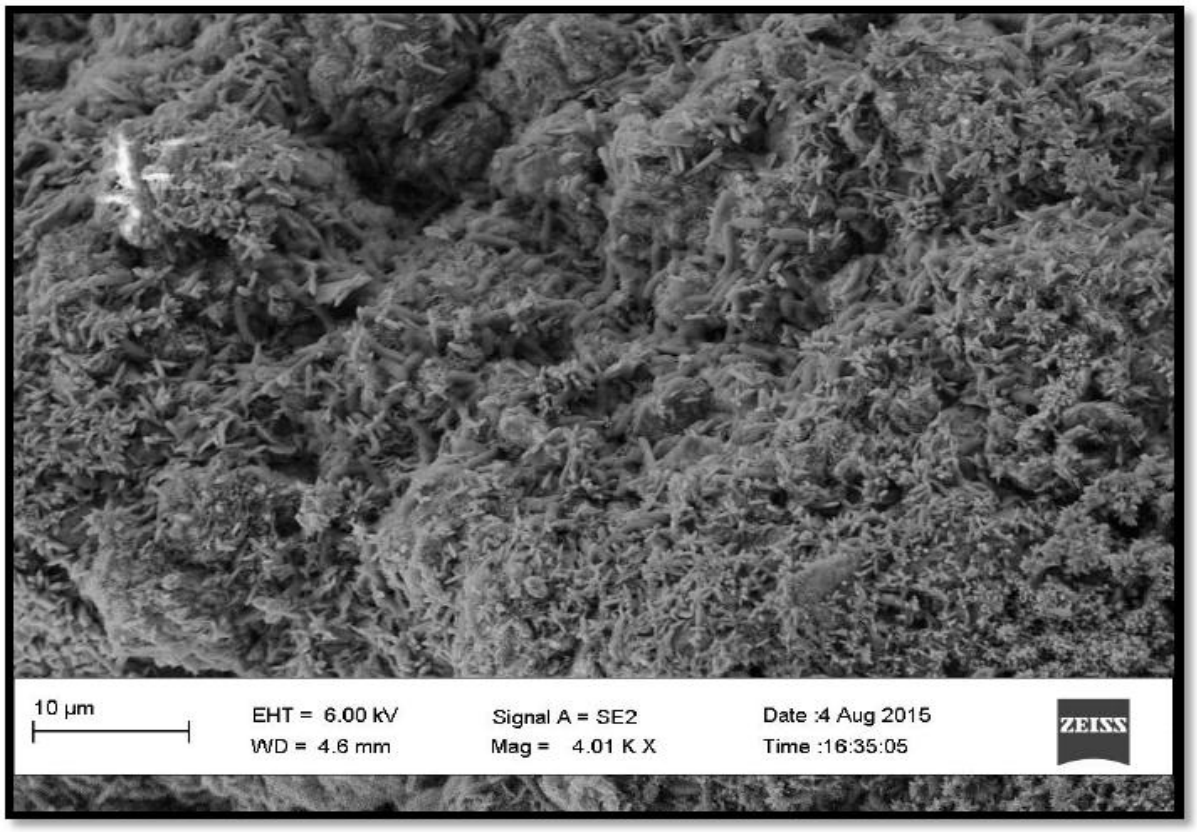

Figure 2-4 SEM of bacteria on the surface of mortar specimen (AlBughdadi 2016)

The Bacillus Pasterii bacteria used in the experiment was grown in yeast extract and then suspended in phosphate buffer solution with different concentrations that was added to the mix replacing 100 ml of the water. Ten mortar beams of each type were prepared and cured for 28 days.

Samples initial compressive strength was tested and there was no difference in the initial compressive strengths upon comparing the control samples with the samples containing the bacterial solution. Another set of samples were cracked to a width of cut of 3.175 mm and a depth of cut ranging from 3.175 to 9.525 mm. Samples were tested for both stiffness "Figure 2-5" and compressive strength and bacteria containing samples showed higher results in both cases but the results were a little inconclusive, as the results showed that samples with lower bacterial

concentration showed better recovery, this was probably as a result of the reaction between the biomass and the concrete matrix that started to affect strength with time. Another problem was that SEM showed that a large portion of the bacteria was dead during the mixing process. Another observation was that smaller cracks healed at a higher rate than the bigger ones. (Rmachandran et al. 2001).

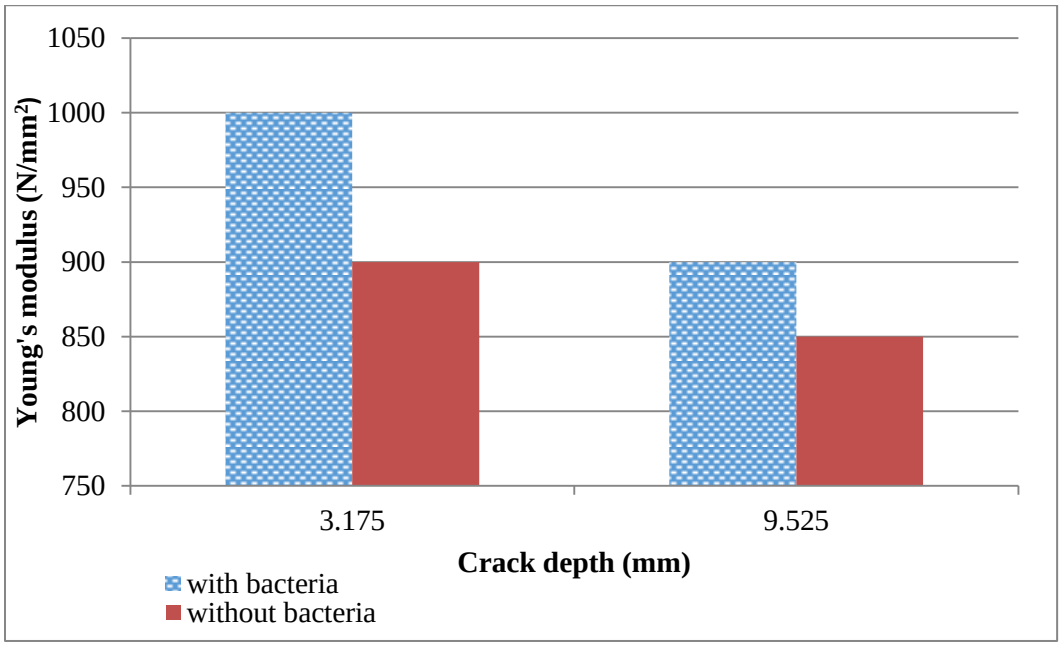

Figure 2-5 Comparison of Young's modulus for mortar beams with different crack depths (Rmachandran et al. 2001)

Since any type of bacteria that can form spores, withstand the highly alkaline nature of concrete and can start a reaction to produce a sealant is a potential candidate for being used as a healing agent, therefore the entire genus Bacillus seems promising (Jonkers et al. 2008). Two other types of bacterial spores were tested for survival (Bacillus Pseudofirmus and Bacillus Cohnii) at ages (9, 2, 42 and 153) days. Most of the bacterial spores did not survive till the end; this is mainly

due to the fact that they were added to the concrete directly without being enclosed in any protective casing. Bacillus pasterii bacteria was also tested as a healing agent for its ability to produce calcium carbonate which acts as a sealant but this time enclosed inside polyurethane capsules. The test results showed a reduction of mean expansion due to alkali-aggregate reactions by 20%, a reduction of sulphate effects by 38% and a reduction in the mean of expansion resulting from the freezing and thawing cycle by 45%.

Albughdadi (2016) investigated the usage of Bacillus Pseudofirmus bacteria and replaced 15% of the cement's weight by silica fumes in an attempt to decrease the alkalinity of concrete. This resulted in higher rate of spore forming bacteria surviving within the concrete mix.

Bacillus cohnii bacteria and calcium lactate were also investigated as a healing agent. The ability of bacteria to form spores was clearly visualized by ESEM. Upon testing the initial compressive strength control samples showed higher strength, but after cracking the concrete samples and curing them for 7 days, the bacteria containing samples showed bigger formations of mineral like particles (20-80 µm) compared to control samples (1-5 µm) (Jonkers et al. 2008).

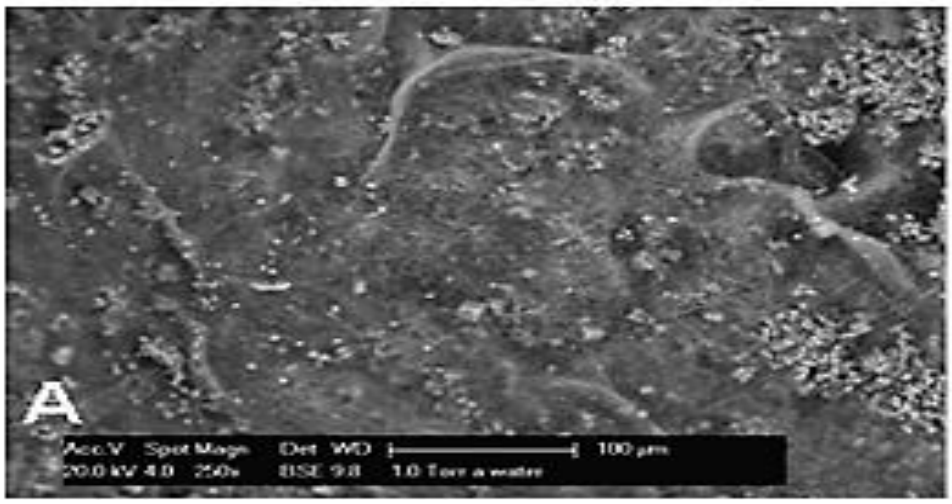

Figure 2-6 Mortar control specimens after 28 days of healing (Jonkers et al. 2008)

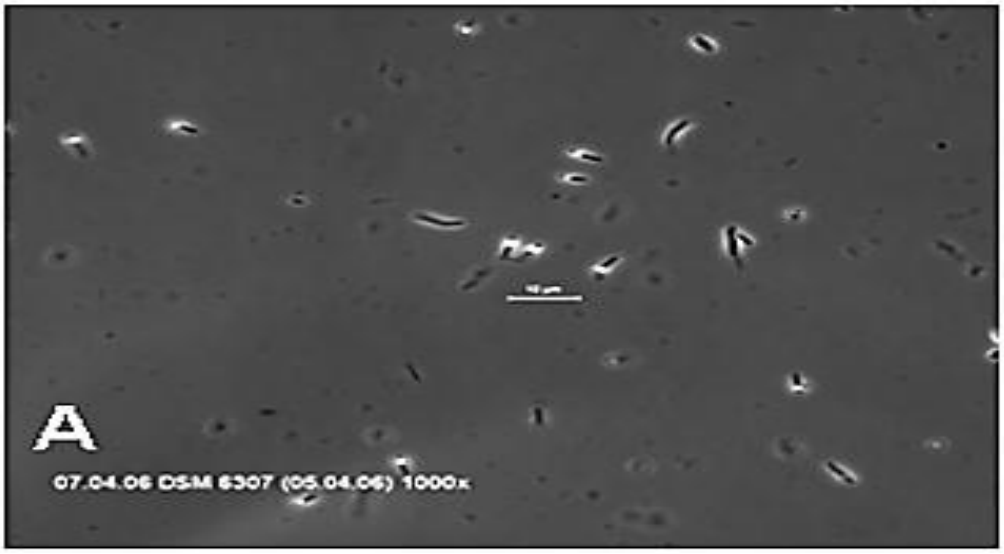

Figure 2-7 Optical photomicrograph of Bacillus Cohnii spores (Jonkers et al .2008*)*

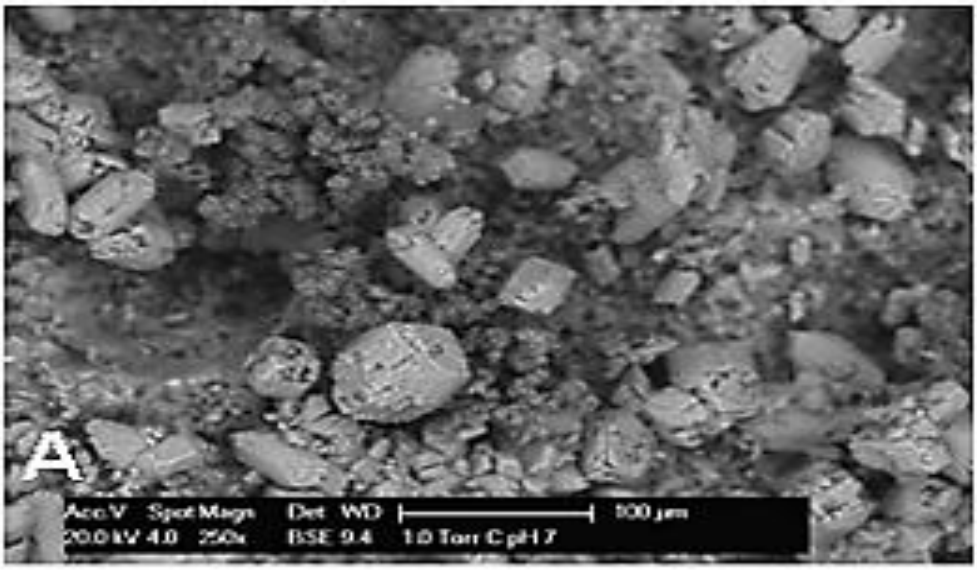

Figure 2-8 Mortar samples with healing agent after 28 days (Jonkers et al. 2008)

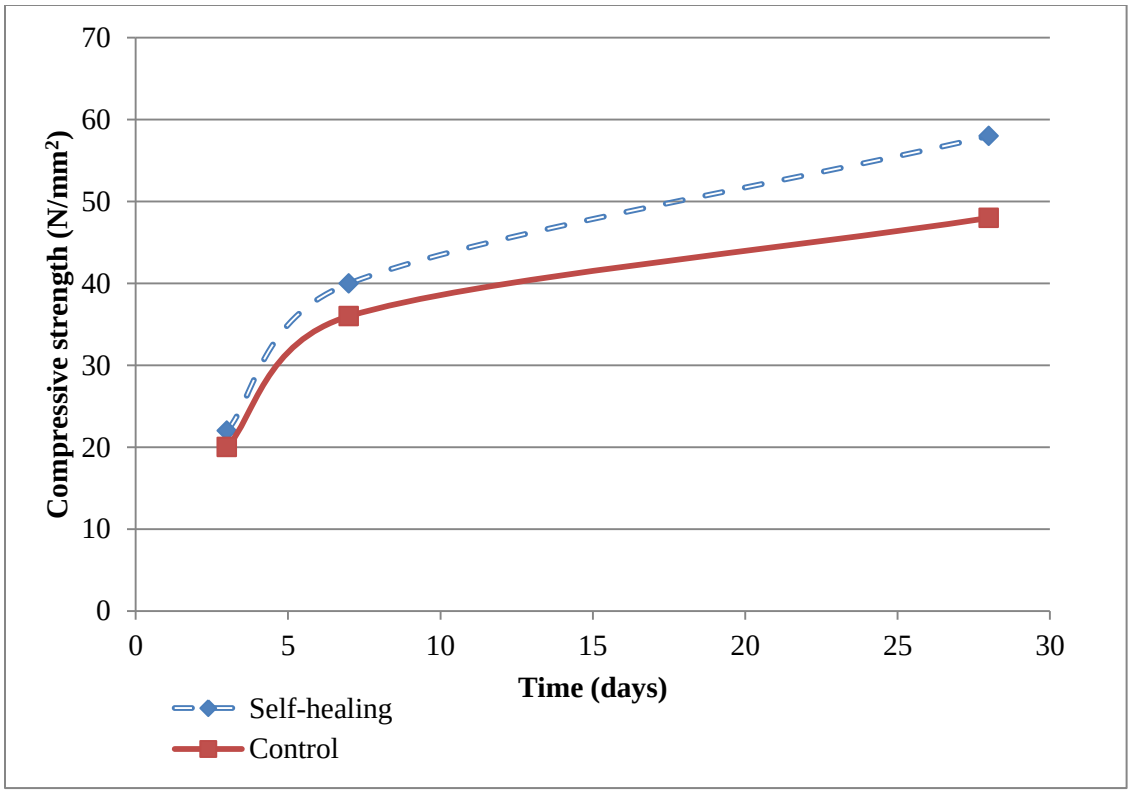

Figure 2-9 Development of compressive strength with time (Jonkers et al. 2010)

Maes et al. (2014) studied the effect of adding self-healing capsules to concrete on the chloride penetration on cracks of widths of 100 µm up to 300 µm. The experimental results showed lower chloride penetration by 83% in case of 100 µm cracks and 67% penetration in case of 300 µm cracks compared to the control samples.

2.2.1 Using the Bacterial Enhanced Self-healing Concept for Protection and Repair

Organic coatings are usually used for the aim of protecting concrete; the problem with organic coatings is that they contain volatile organic compounds which cause air pollution during their manufacturing process.

De Muynck et al. (2008) adopted the concept of using bacteria to precipitate calcium carbonate for the aim of crack repairing and protection of concrete. A solution containing microorganisms was applied by a brush on cracked concrete and then samples were tested compared to untreated samples and on the samples treated with organic coatings for permeability, carbonation rate and freezing and thawing showing promising results.

2.3 Enhancing Self-healing Using Sodium Silicate Solution

Sodium silicate solution was proven effective as a healing agent in several researches as upon adding polyurethane capsules containing sodium silicate solution to concrete and comparing flexural strength of cracked sections to conventional concrete it showed a recovery of about 25% after a period of 7 days (Reinke 2012).

Bhattacharyya (2011) results for using sodium silicate as a healing agent can be noticed in Table 2-1. The first comparison was carried out initially and it was clear that the addition of capsules had no apparent effect on the concrete during the cracking; however it can be observed that after allowing 7 days for healing and retesting the compressive strength there was an apparent recovery compared to control samples.

Table 2-1 Effect of addition of capsules to concrete initially and after 7 days (Bhattacharyya 2011)

Samples	Max load until damage (N)	Compressive strength (MPa)	Load until failure (N)	Compressive strength (MPa)
Control 1	46684	18.3	15486	6.09
Control 2	49645	19.5	19324	7.5
Control 3	38327	15.1	12427	4.9
Capsule sample 1	48262	19.0	21724	8.5
Capsule sample 2	41436	16.3	15827	6.2
Capsule sample 3	44164	17.4	18994	7.5

2.4 Enhancing Self-healing Using Other Methods

Using mineral admixture for self-healing was tested by (Ahn and Kishi 2010). Cracks widths of up to 0.15 mm were completely healed in a period of 3 days, while crack widths of 0.22 mm were diminished to 0.16 mm in 7 days and completely healed within a period of 33 days.

Using crystalline additives can be another efficient way to enhance self-healing and decrease permeability (Ferrara and Krelani 2014) Crystalline additives can react with un-hydrated cement to produce calcium silicate hydrates, but this reaction needs water to take place, this means that the reaction will take place upon crack formation as rain water can penetrate through the cracks.

The effectiveness of this method was tested as 2 sets of specimens were prepared (control samples and samples with crystalline additives). Samples were cracked using 3 points bending test to widths of 130 µm and 270 µm, samples were then exposed to accelerated temperature and humidity cycles. Upon comparing the two sets after a four week period control samples showed an average of 62% recovery only while samples containing crystalline additives showed a recovery percentage of 70% for crack widths of 130 µm. As for the 270 µm cracks the average recovery was only 55% for control sample compared to 82% in case of crystalline additives. It was also proven that there was a recovery in the load bearing capacity (Ferrara and Krelani 2014).

The influence of the addition of minerals (Silica based materials, chemical expansive agents, swelling minerals and crystalline components) was further tested on specimens of Mortar that were compressed to 90% of their ultimate loads causing distributed micro-cracks (0.05 mm) average width. The results showed that most of the self-healing took place during the first 7 days and that higher PH values and temperatures speeded up the healing process. (Jiang et al. 2005)

Calcium nitrite could also be added inside capsules to act as a corrosion protector that upon being released it forms a protective layer around the reinforcement bars in the cracked area, this prevents air and humidity form reacting with the reinforcement steel (Reinke 2012). The effect reinforcement steel members can be observed in Figure 2-10Figure 2-11

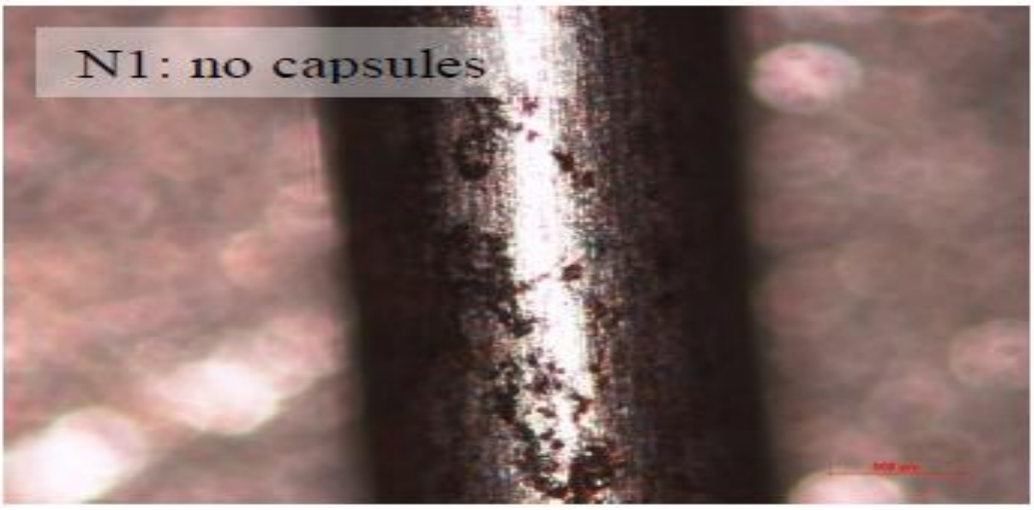

Figure 2-10 Reflective microscope image showing steel wire condition in mortar after corrosion test for control sample (Reinke 2012)

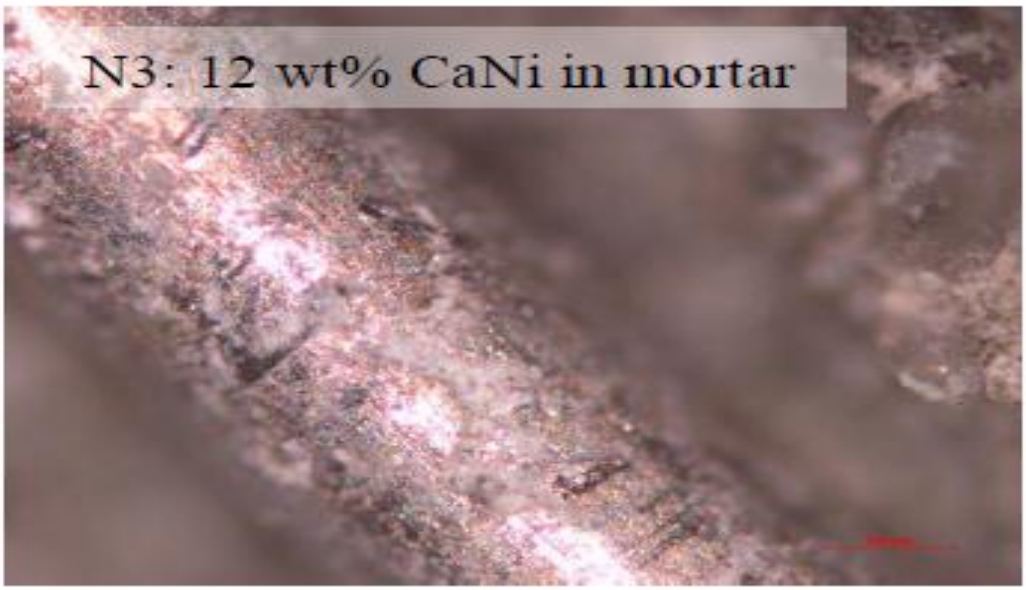

Figure 2-11 Reflective microscope image showing steel wire condition in mortar after corrosion test for capsule containing sample (Reinke 2012)

The electromechanical method for repair of concrete cracks was also proven effective. The concept of this method is using the steel reinforcement as a cathode and using another insoluble electrode like titanium as an anode and passing a weak current through them in an electrolyte solution as shown in Figure 2-12. Upon testing this method cracks of width of up to 0.35mm were healed by a percentage of 86% in case of using $MgSO_4$ as an electrolyte solution, and the percentage even increased to 100% upon using $ZnSO_4$ solution (Hongqiang et al. 2014).

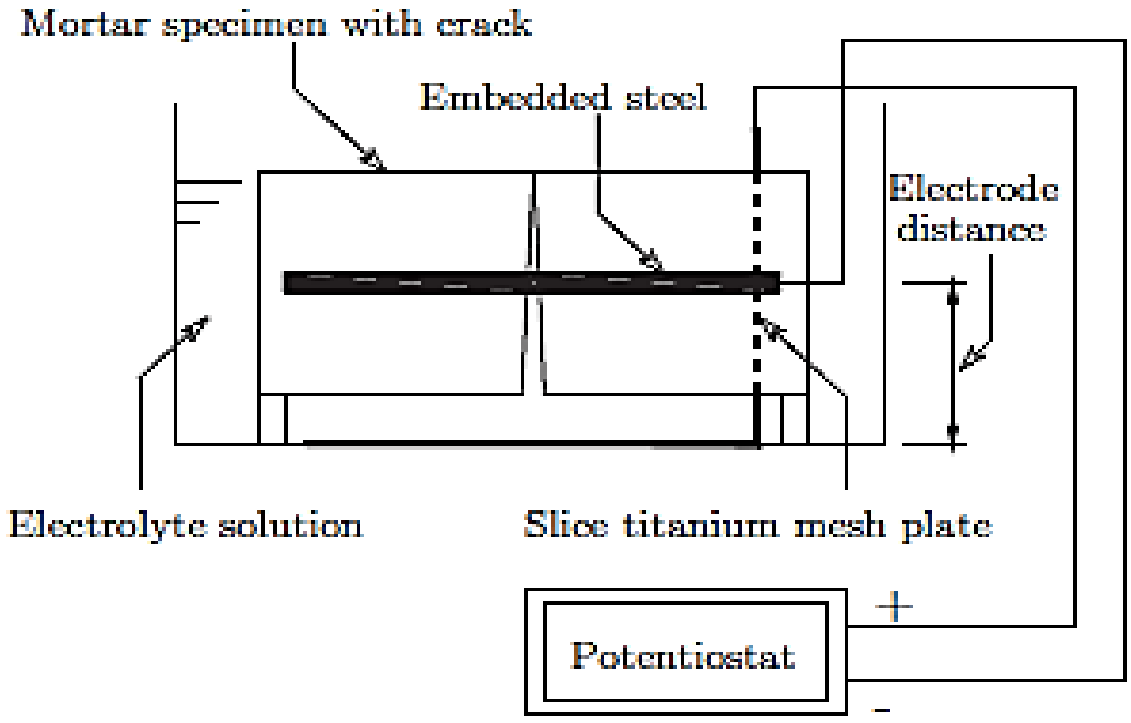

Figure 2-12 Electro-mechanical self-healing (Hongqiang et al. 2014)

2.5 Design of Protective Capsules

In earlier research glass capsules or tubes were used for the containment of the healing agent (Dry 2000). As it was proven that glass capsules cannot resist the mixing process if their thickness was less than 2mm and thicker glass capsules will not break to release the healing agent upon crack propagation (Hilloulin et al. 2015). Therefore several research using different types of polymeric capsules or expanded clay particles was carried out. Glass, Ceramic and polyurethane's ability to withstand mixing inside a cement mixer was investigated by (Tittelboom et al. 2015) with the polyurethane capsules showing the highest resistance and glass showing the lowest.

The usage of polylactic acid extracted from sugar cane, which is a totally biodegradable material, polysterene which is a byproduct of plastic industry and polymethyl-methacrylate (PMMA) was investigated using different diameters.

The compatibility of each with both the healing agent was tested for 14 days making sure that no change in colour or hardening took place. Hot (boiling water) and cold (room temperature) mixes were prepared for testing so as to consider the influence of temperature on the results. Some of the capsules were filled with water or dye only to prove their breakage upon crack formation.

Samples were cracked using 3 point bending tests and the crack widths were measured using LVDT. The results showed brittle behavior similar to that of glass at room temperature but hot mixes showed much better results. Bond strength results were also similar to that of glass so the mechanical properties of the concrete mix will not be affected. (Hilloulin et al. 2015) argued that although that using boiling water would increase the initial cost but on the long run it will be more economic as better results will be achieved.

Polyuretahne could also be used as a protective casing for its inert nature and also its strength and ability to resist the mixing process (Patil 2008). Polyurethane was tested as a protective casing by (Reinke 2012) and (Jiang et al. 2015).

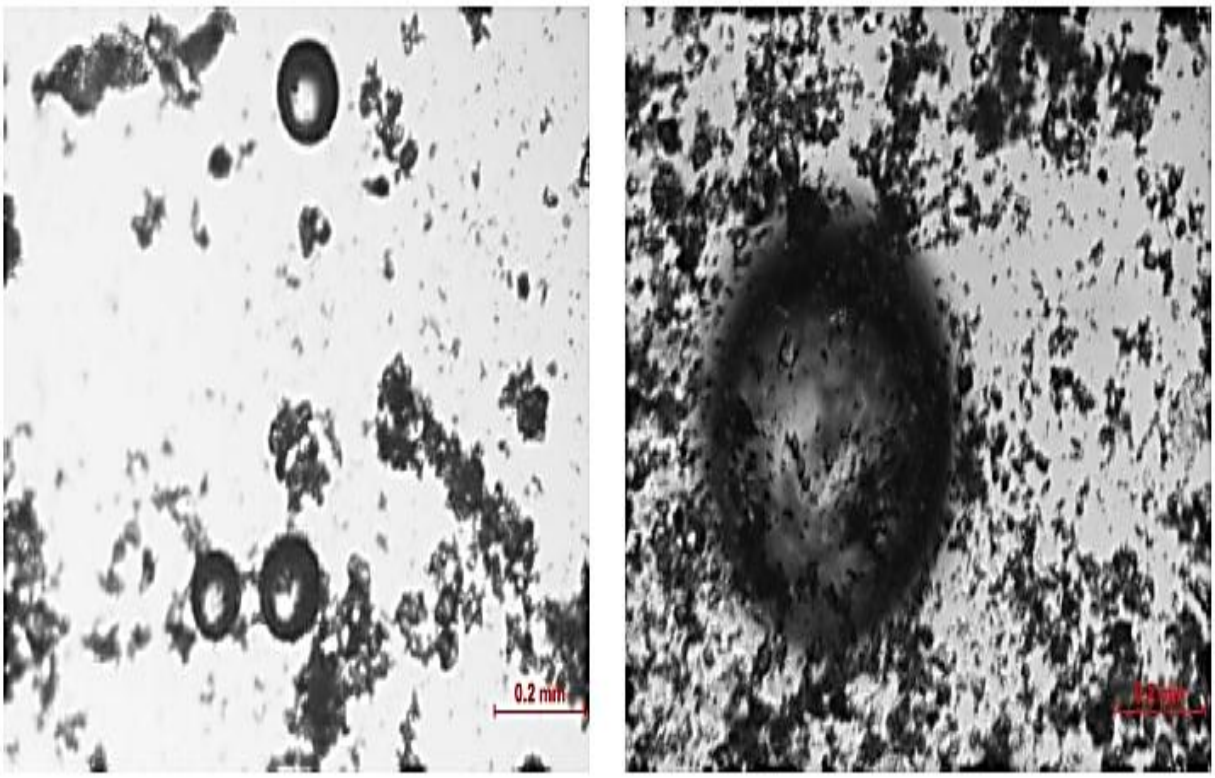

Figure 2-13 Optical microscopy images of capsules inside mortar specimens (Reinke 2012)

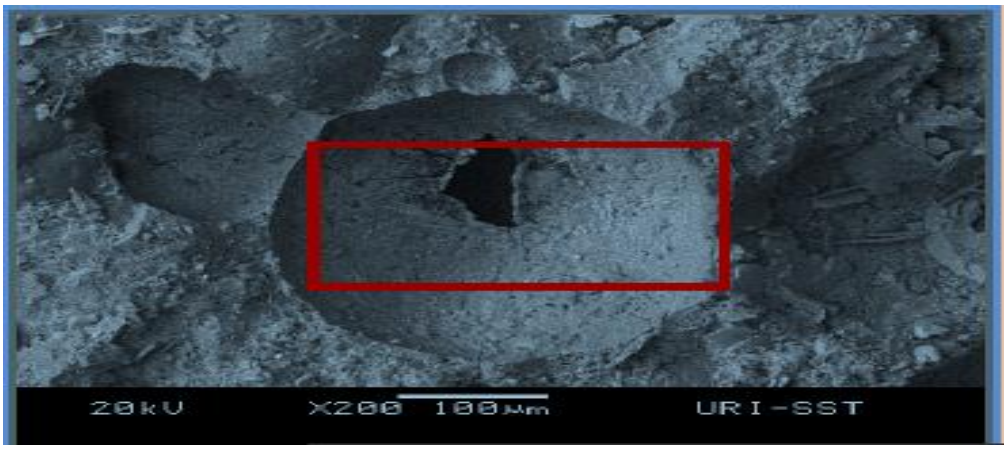

Figure 2-14 SEM images of a broken capsule after crack passes through it (Reinke 2012)

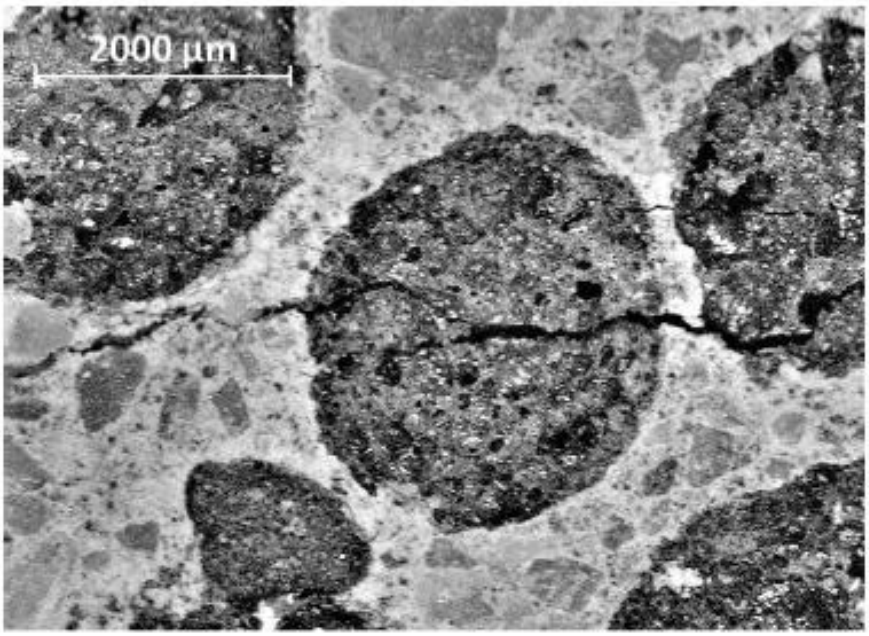

Figure 2-15 Broken capsules filled with water after cracking (Reinke 2012)

Diatomaceous earth "Figure 2-16" and burnt bentonite were both tested as protective mediums for the Bacillus Pseudofirmus and calcium lactate. Although the usage of Diatomaceous earth gave very promising results on the other hand the burnt bentonite sample results were not good this was a result of the bentonite's expansive nature that caused internal stresses inside the concrete matrix (Albughdadi 2016)

Figure 2-16 Diatomaceous earth under SEM (AlBughdadi 2016)

Shape memory alloys which are alloys made form materials that can recover their un-deformed shape and return back to their normal shape are an ideal choice for making of protective capsules

as they will recover from mixing but their main disadvantage is their very high cost (Jiang et al. 2015).

2.6 Dosage of Self-healing Capsules

Adding the right dosage of self-healing capsules to the concrete mix is one of the most challenging things during the design of the mix, as adding a higher dosage than needed would cause a negative effect on the initial strength of the concrete while on the other hand if a smaller dosage than needed is added the probability of a crack passing through a capsule and opening it decreases. Also the proper capsule distribution inside the mix is considered an important factor. In order to decrease the effect of adding capsules on the initial strength, capsules can be distributed only in the areas where cracking is more likely to occur, like the areas exposed to tensile forces (Reinke 2012).

Zenskov et al. (2104) developed a mathematical method that aims to estimate the influence of some parameters (crack width, capsule size) on the rate and quality on the crack healing process, in order to find the optimal conditions for healing to occur with minimal influence on the concrete's mechanical properties.

2.7 Effect of Adding Self-healing Capsules on Concrete

2.7.1 Increase in Compressive Strength

Improvement of Compressive strength upon addition of self-healing capsules was proven in different research. Albughdadi (2016) proved an increase of 12% in the compressive strength compared to control samples after a period of 28 days. Patil et a.l (2008) observed a recovery in compressive strength ranging from (25% to 47%). Bhattacharyya (2012) also found the percentage of recovery in compressive strength compared to control samples to be 32% within a

7 day time frame. Krishnapriya et al. (2015) recorded a percentage of recovery in compressive strength of 20%.

2.7.2 Increase in Flexural Strength

Reinke (2012) tested the amount of recovery in flexural strength which was recorded to range from (22%-30%). Wang et al .(2012) also observed a recovery percentage of 65% within 7 days only, while Bhattacharyya (2012) found the recovery in flexural strength to range from (24%-34%).

2.7.3 Decrease in Water Permeability

Bhattacharyya (2011) proved that the addition of capsules had a positive effect as it noticeably decreases the concrete permeability initially "Table 2-2" after submersing the samples in water just after hardening and curing. After concrete cracking it was clear that an even further decrease in permeability and a slower rate of water absorption took place upon being compared to control samples "Table 2-2Table 2-3".

Table 2-2 Water absorbed after samples are immersed in water

Samples	Initial mass (gm)	Final mass (gm)	Change in mass (gm)
Control 1	265.3	280.1	14.8
Control 2	269.6	285.9	16.3
Capsule sample 1	227.9	239.6	11.7
Capsule sample 2	247.5	259.4	11.9

Table 2-3 water absorbed after samples are cracked, healed for 7 days then immersed in water

Samples	Initial mass (gm)	Final mass (gm)	Change in mass (gm)
Control 1	262.3	277.1	14.8
Control 2	236.4	248.3	11.9
Capsule sample 1	256.4	262.3	5.9
Capsule sample 2	255.2	263.2	8

2.7.4 Decrease in Chloride Permeability

AlBughdadi (2016) proved a noticeable decrease in chloride permeability in 3 different self-healing mixes compared to the control mix as the charges passed in the control specimen were around 2600 coulombs while for different self-healing concrete mixes the charges passed ranged between1200 and 2100 coloumbs as shown in Figure 2-17.

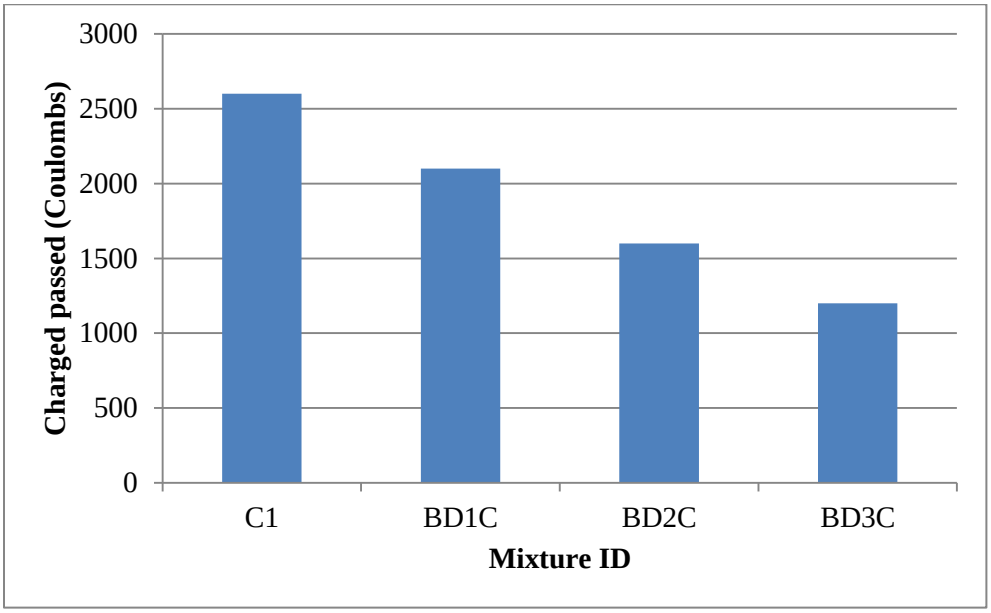

Figure 2-17 Results for rapid chloride permeability test (AlBughdadi 2016)

2.8 Conventional Concrete Repair Methods

There are some conventional methods that are generally used for repairing of concrete cracks. Each of these methods has their advantages and disadvantages. However all of the methods share the same drawback which is that they are not sustainable methods and even some of them are hazardous to human health.

2.8.1 Repairing Cracks with Epoxy-resin Infiltration

The main procedures of repairing concrete cracks using epoxy-resin infiltration require covering the crack mouth with hot melted glue at the beginning and then injecting the epoxy from beneath the seal using syringes. Felicetti (2009) tested this method on concrete beams with crack ranges of (0.1-0.8 mm) and it was found effective as after the crack repairing process, the repaired samples were tested by loading till failure. It was noticed that for all samples the crack propagation that caused failure started from other points away from the repaired cracks. However the main disadvantages of this method are the long setting time of the epoxy, the need for a high degree of skilled workers working on the repair process in order to achieve a sufficient level of execution and that this method is limited within a certain level of temperature. (ACI 224, 2007)

Figure 2-18 Cracked concrete repair with epoxy resin infiltration (Felicetti 2009)

2.8.2 Drilling and Plugging with Grout

This method is carried out by drilling down the length of the crack and then filling it with epoxy. The drilled hole range should be of a diameter ranging from 50-75 mm. The main drawback of this method is that is only applicable when the cracks are propagating into straight lines. (ACI 224, 2007).

2.8.3 Gravity Filling

This method depends on using low viscosity monomers and resins to seal the cracks with surface widths ranging from 0.03mm to 2mm (Rodler et al. 1989). The finer the cracks are the lower the viscosity of the material selected should be. The cracked surface should be cleaned at the beginning by air-blasting and then the sealant is spread using a roller or a broom. The main disadvantages of this method are that if any contaminants or silts are present inside the cracks they will not be sealed properly and also that if the cracks are on the bottom of an elevated slab this method will not be effective.

2.8.4 Grouting

2.8.4.1 Portland Cement Grouting

This method is usually used in wide cracks where grout is injected through grout nipples fixed along the crack width at intervals after cleaning the surface. The W/C ratio should be kept as low as possible to minimize shrinkage and maximize strength. This method is only suitable for sealing cracks to stop water leakage but it will not recover strength and structurally bond the cracked section (Warner 2004).

2.8.4.2 Chemical Grouting

Same as cement grouting this method is just to stop water leakage and decrease permeability but the recovery in structural bond strength is low. Chemical grouts used like urethanes or acrylamides are activated by a catalyst that could be foam, a gel or water in some cases. Chemical grouting can seal cracks as fine as 0.05mm in width and they are suitable to be used in environments with high humidity and moisture but they require a very high level of skill. (ACI 224, 2007).

2.9 Drawbacks of using Conventional Methods for Repairing Cracks:

There are some major disadvantages that cause the conventional crack repair methods to be considered undesirable. The first and main disadvantage that is shared by all these methods is accessibility as in order to apply or inject the cracked concrete section with a material that would seal the cracks this section should be accessible for human beings and a suitable environment for work should be available. Unfortunately this is not the case in most of the structures that possess a strategic value (dams, bridges, nuclear reactors,..).

Another main disadvantage is that most of the conventional repair materials is that they are chemical based, which means that they are hazardous to human health and to the environments. (Krishnapriya et al. 2105). For instance liquid epoxies evaporate and this speeds up with poor ventilation and high temperature and it takes epoxies almost two weeks until they dry up for evaporation to stop. The respairable epoxy vapors get trapped in the respiratory systems affecting the nose, throat and tongue and causes asthma. Epoxy solvents absorbed through skin can also lead to negative effects on the nervous system causing headaches and nausea.

3 Chapter III: Methodology

3.1 Effect of Crack Growth on Structures

When cracks are left unattended to with time they expand and start forming networks and the rate of crack propagation tend to increase. Obviously this has an adverse effect on the structure's durability and serviceability and decreases its life time.

3.2 Factors Affecting Self-healing

From literature it can be concluded that there are several factors that affect the self-healing process including the dosage of the capsules, the used healing agent, the material used as the protective casing, the diameter of the capsules, both the width and the depth of the crack, the mix design of concrete or mortar, the cause of cracking, the temperature, the humidity and finally the time of healing.

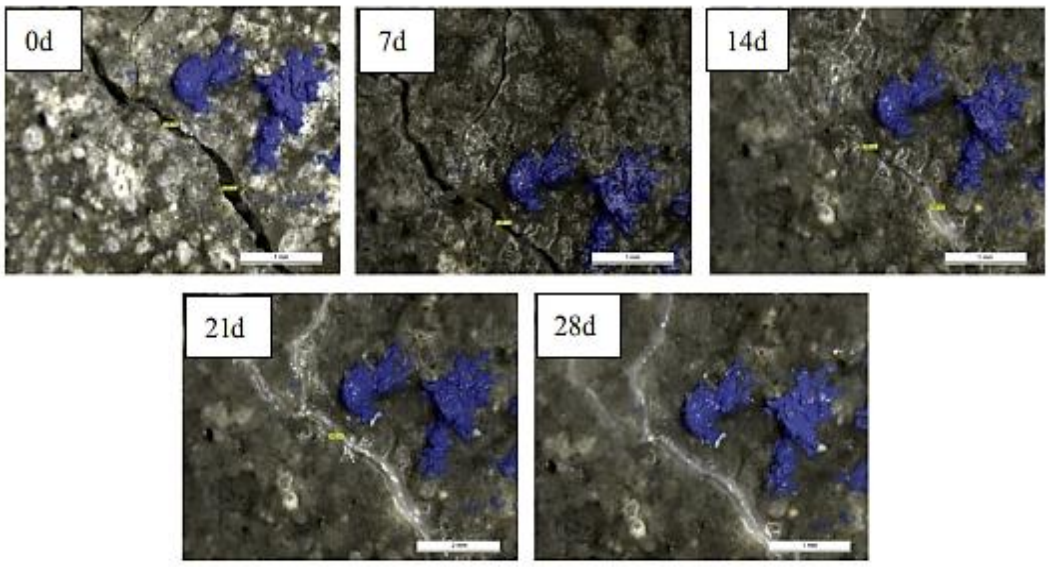

Figure 3-1the evolution of crack healing process (Wang et al. 2014)

3.3 Simulation Model

A simple excel model was created to simulate the behavior of conventional concrete versus self-healing concrete after cracking starts and through a 5 year period based on an initial crack length ranging from (5 to 40mm) and width ranging from (0.25 to 1 mm) . The model aims to:

- Compare the crack dimensions of both conventional concrete and self-healing concrete through a 5 year period if no repair takes place
- Compare the cost of inspection and repair in both case taking the additional initial cost of self-healing concrete into consideration.

3.3.1 Model Assumptions:

In order to overcome the lack of information facing the authors in such a new field of research and to be able to successfully obtain results some assumptions were made:

1. Assumption of crack propagation within active crack propagation rate and less than severely deteriorated structures

2. The rate of crack propagation was assumed to be a 0.3mm increase in width and 5mm increase in length every 3 months. This particular assumption is based on field experience and discussions and assuming a worst case scenario, rather than documented results and previous research work. However, the authors believe that an arbitrary value needs to be set despite the fact that it can be challenged later on.

3. The percentages of healing values are based on literature review as scarce as it is. Nevertheless, one has to realize the difficulty in getting accurate values for percentage of healing in sight of diverse materials and conditions in each case.

4. Beyond a certain crack length, the crack moves form the stage of hypothetically linear elastic fracture behavior into non-linear non-elastic fracture behavior. This is accompanied by a doubled rate of crack propagation

3.3.2 Calculations

3.3.2.1 Initial Cracks Dimensions

Healing percentage through a period of 3 months was calculated based on previous research based on 12 different initial crack lengths ranging between 5 and 40 mm and widths ranging between 0.25 and 1 mm as shown in Table 3-1.

Table 3-1 Initial crack dimensions

Crack width(mm)	Crack length (mm)
0.25	5.0
0.25	7.5
0.25	10.0
0.5	10.0
0.5	15.0
0.5	20.0
0.75	15.0
0.75	22.5
0.75	30.0
1	20.0
1	30.0
1	40.0

3.3.2.2 Cost of Self-healing Capsules:

The cost of 1 m^3 of self-healing capsules is estimated to be around 5760 USD (Silva eat al. 2015). A dosage of 4% was assumed to be added to the concrete mix. This dosage was selected as this is the average added dosage in the research used to predict the healing percentage. This dosage is considered convenient as it will not have any negative impact on the concrete's mechanical properties and at the same time the probability of a crack passing through and

breaking a capsule is high. This means that the cost of adding self-healing capsules to the concrete mix is estimated to be 230.4 USD/m^3.

3.3.2.3 Repair Decision

The decision to interfere and repair a structure in the model was based on a crack limit. This crack limit was selected to be when the crack length is equal to or exceeds 100mm and the crack width is equivalent to or exceeds 5mm. Based on the inspection if the length and width of a crack exceed the safe limit this means that an intervention to carry out repair works should take place.

3.3.2.4 Cost of Repair:

The inspection and repair cost of conventional concrete was compared to the cost of using self-healing concrete while taking the initial cost induced as a result of adding the self-healing capsules during the production of concrete into consideration.

In order for the comparison to be on fair basis the time value for money should be taken into account, accordingly an interest rate of 8% per year (2% every three months period) was added to the initial cost of concrete. The model anticipated the cost of repair in both cases over three different time intervals. The first is in case cracks appear immediately after concrete pouring or secondly if cracking starts after 5 years of the concrete pouring occurred or finally if cracking starts after a period of 10 years after concrete pouring

As it will not be logic to repair only the biggest crack in the section and leave the other smaller cracks till they exceed the safe limit and do the repair procedure again causing new disruptions, thus the repair should be done for all structure or cracked section at once including the smaller cracks. This means that the cost comparison should be made for 1 m^3 of concrete. The cost of concrete repairing 1m^3 of cracked concrete was estimated to be 100USD in case of surface

treatment, 147 USD in case of partial in depth repair and 200 USD in case of in depth repair. These values were based on previous research and on the experience of the authors.

Both the 3 values will be taken into account in the comparison, as for the same cracked section where a crack has exceeded the safe limit surface repair the crack density itself might be low so a surface repair would be done and as the crack density gets higher the decision to do a more in depth repair should be taken.

3.3.2.5 Inspection and Disruption Cost

Inspection cost for strategic buildings was estimated to be equivalent to 0.25 of the partial in depth repair cost. Periodical Inspection was scheduled to be carried out once every three months in case of using conventional concrete. A periodical inspection taking place every 6 months was also scheduled in case of self-healing concrete and their cost was taken into account in calculations as this is still a new field; however the inspection periods can be further increased upon gaining a sufficient confidence level in self-healing concrete's performance.

Disruption cost was estimated to be equal to 3 times the cost of partial in depth repair this cost is considered convincing by the authors as shutting down a strategic building even if it was partial would result in high financial impacts on the economy.

4 Chapter IV: Results and Discussion

4.1 Crack propagation and deterioration

12 initial crack widths were assumed as shown in the table to be the dimensions at which the crack will begin with and using the predicted percentage of healing the crack dimensions after a period of 3 months was calculated “Table 4-1”.

Table 4-1 Expected crack dimensions after healing

Crack width(mm)	Crack length (mm)	Percentage of healing	Crack width (after healing)	Crack length (after healing)
0.25	5	100%	0.00	0.00
0.25	7.5	100%	0.00	0.00
0.25	10	100%	0.00	0.00
0.5	10	98%	0.01	0.20
0.5	15	93%	0.04	1.05
0.5	20	88%	0.06	2.40
0.75	15	70%	0.23	4.50
0.75	22.5	66%	0.26	7.65
0.75	30	58%	0.32	12.60
1	20	45%	0.55	11.00
1	30	38%	0.62	18.60
1	40	30%	0.70	28.00

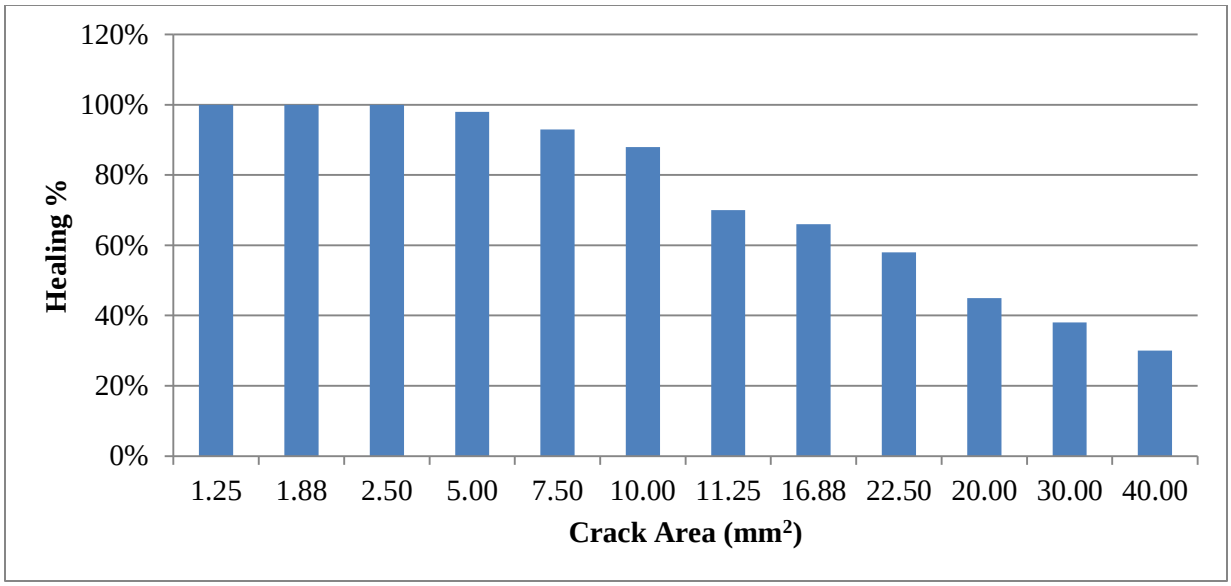

Figure 4-1 Expected percentage of healing for each crack area

From Figure 4-1 it is obvious that the effect of encapsulated bacteria on concrete is much higher for smaller crack areas as the healing percentage is 100% for smaller cracks resulting in complete sealing, while in larger cracks the healing percentage drops to 30% only.

4.2 Crack Propagation Comparison

Crack propagation was monitored every three months and over a period of 5 years. It was observed that two cracks exceeded the safe limit in case of conventional concrete after 42 months followed by another one in the following time period (after 45 months) and then 3 other cracks exceeded the safe limit after only 48 months have passed. On the other hand in the case of self-healing concrete the first crack to exceed the safe limit was after 48 months and the next one to exceed the safe limit was not until 54 months have passed.

The calculated final crack dimensions after a 60 months period "Table 4-2" showed that all the cracks in case of the conventional concrete have exceeded the safe limit with the biggest crack width reaching 8.8 mm and length reaching 170 mm while on the other hand only four cracks exceeded the safe limit and still they were in a better condition as the biggest crack width was 7.65mm and biggest length was 143 mm.

It is also clear that cracks with width of 0.25 mm have been healed completely after the first three months and no crack propagation occurred in case of using self-healing capsules.

Table 4-2 Final crack dimensions for each crack area after 60 months

Initial crack		Self-healing concrete		Conventional concrete	
Crack width(mm)	Crack length (mm)	Final width	Final length	Final width	Final length
0.25	5	0.00	0.00	6.55	110
0.25	7.5	0.00	0.00	6.55	112.5
0.25	10	0.00	0.00	6.85	120
0.5	10	5.71	95.20	7.10	120
0.5	15	5.74	96.05	7.40	130
0.5	20	5.76	97.40	7.70	140
0.75	15	5.93	99.50	7.65	130
0.75	22.5	5.97	102.65	7.95	142.5
0.75	30	6.31	112.60	8.25	155
1	20	6.63	111.00	8.20	140
1	30	6.97	123.60	8.80	160
1	40	7.65	143.00	8.80	170

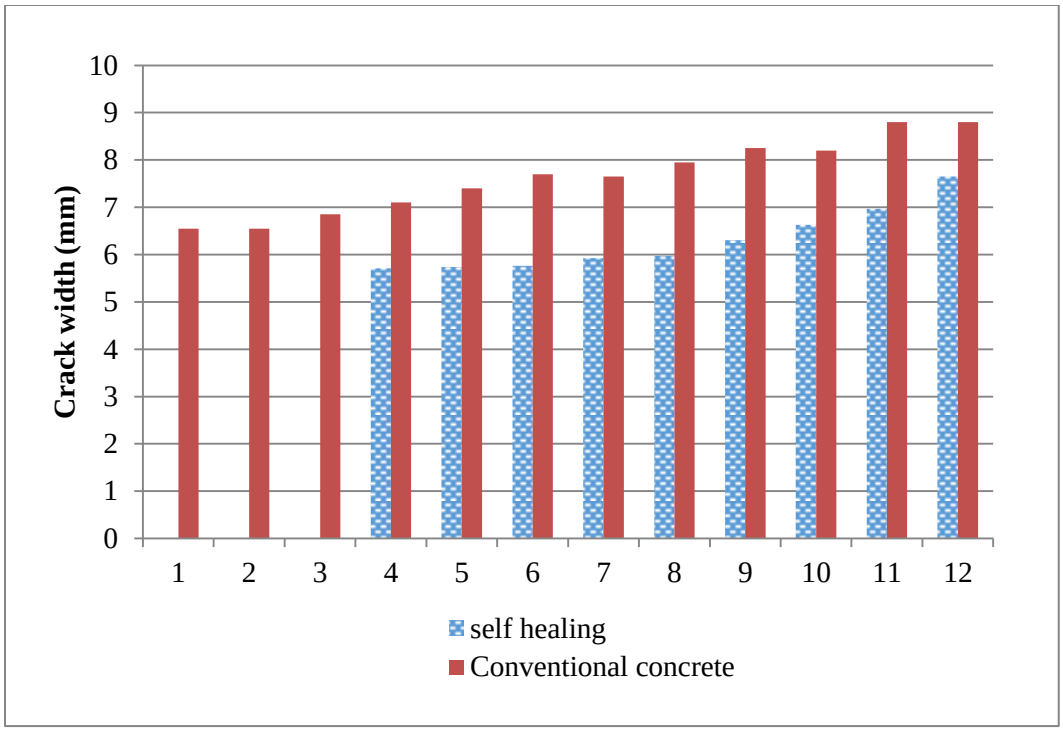

Figure 4-2 Final expected crack widths

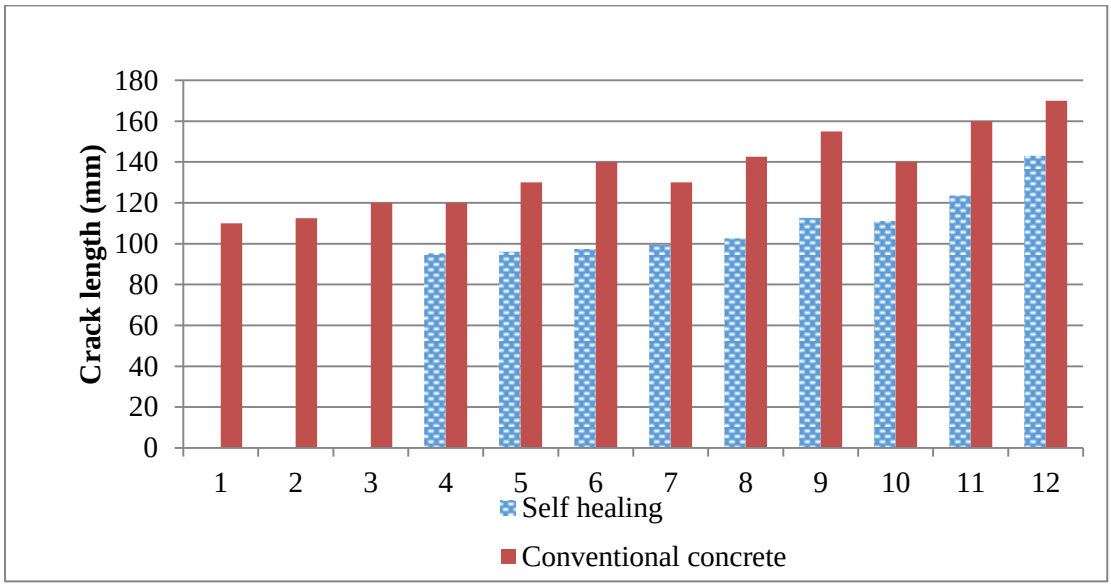

Figure 4-3 Final expected crack lengths

Figure 4-2 and Figure 4-3 highlight the final crack lengths and widths for each of the 12 cracks where the positive impact of adding self-healing capsules can be observed.

Since the smallest cracks are expected to heal completely in case of the addition of the self-healing capsules but will keep deteriorating in the scenario of using conventional concrete mixes. Figure 4-4 shows the expected rate of crack deterioration of the crack areas of the 4^{th} crack (0.5 mm width, 10 mm length) as this is the smallest crack that will not be completely healed. From the graph it can be observed that the final area of the crack in case of using the conventional mix will be much bigger (852 mm^2) compared to (95.2 mm^2) in case of self-healing.

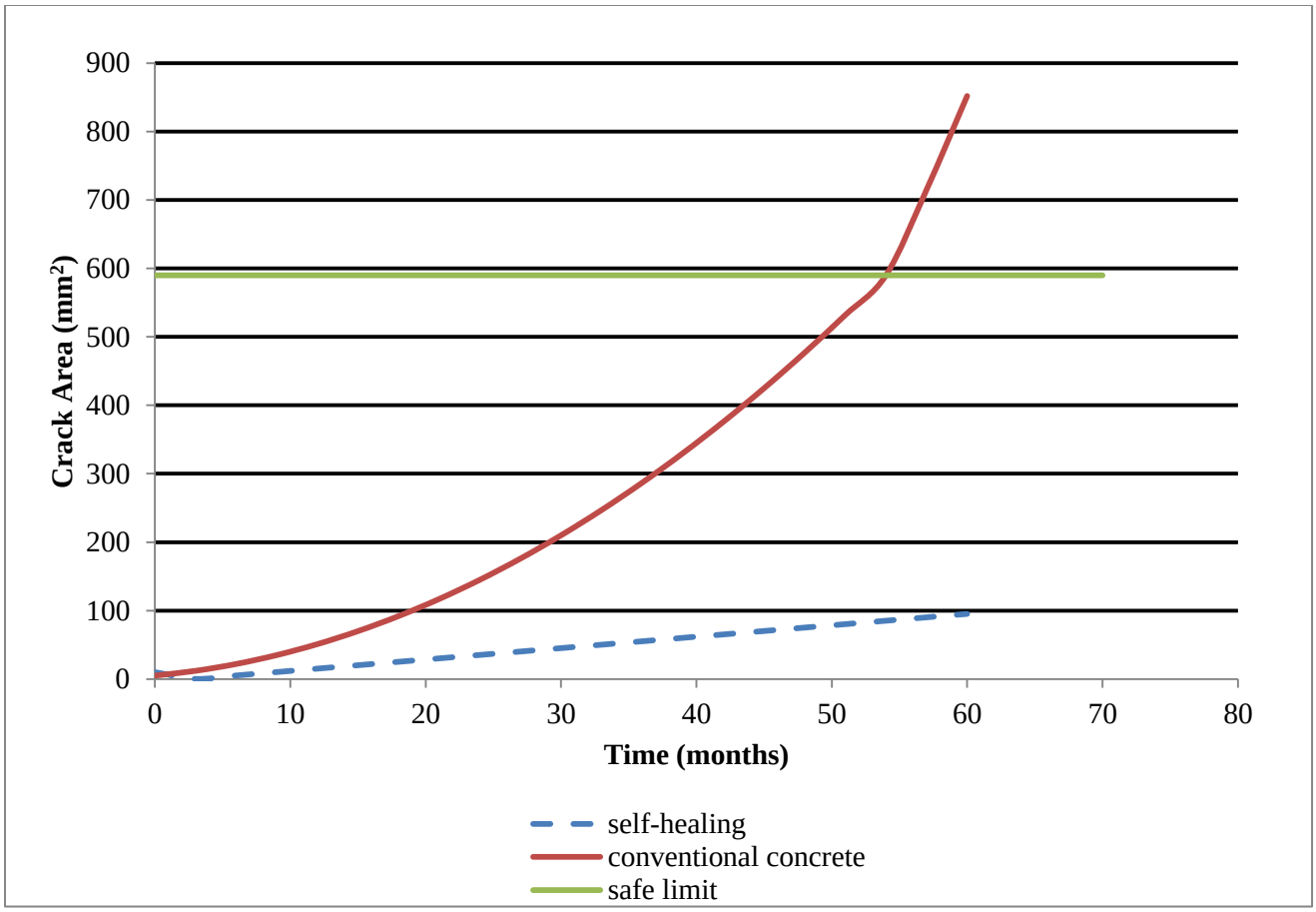

Figure 4-4 Rate of crack deterioration for crack 4 (self-healing VS conventional)

Figure 4-5 shows rate of increase in crack areas for the 8th crack with an initial width of 0.75 mm and initial length of 22.5 mm. it can be observed that the area exceeded the safe limit in case of conventional concrete after 48 months while as a result of recovery in the first three months the crack remained in the safe zone throughout the whole 60 months period.

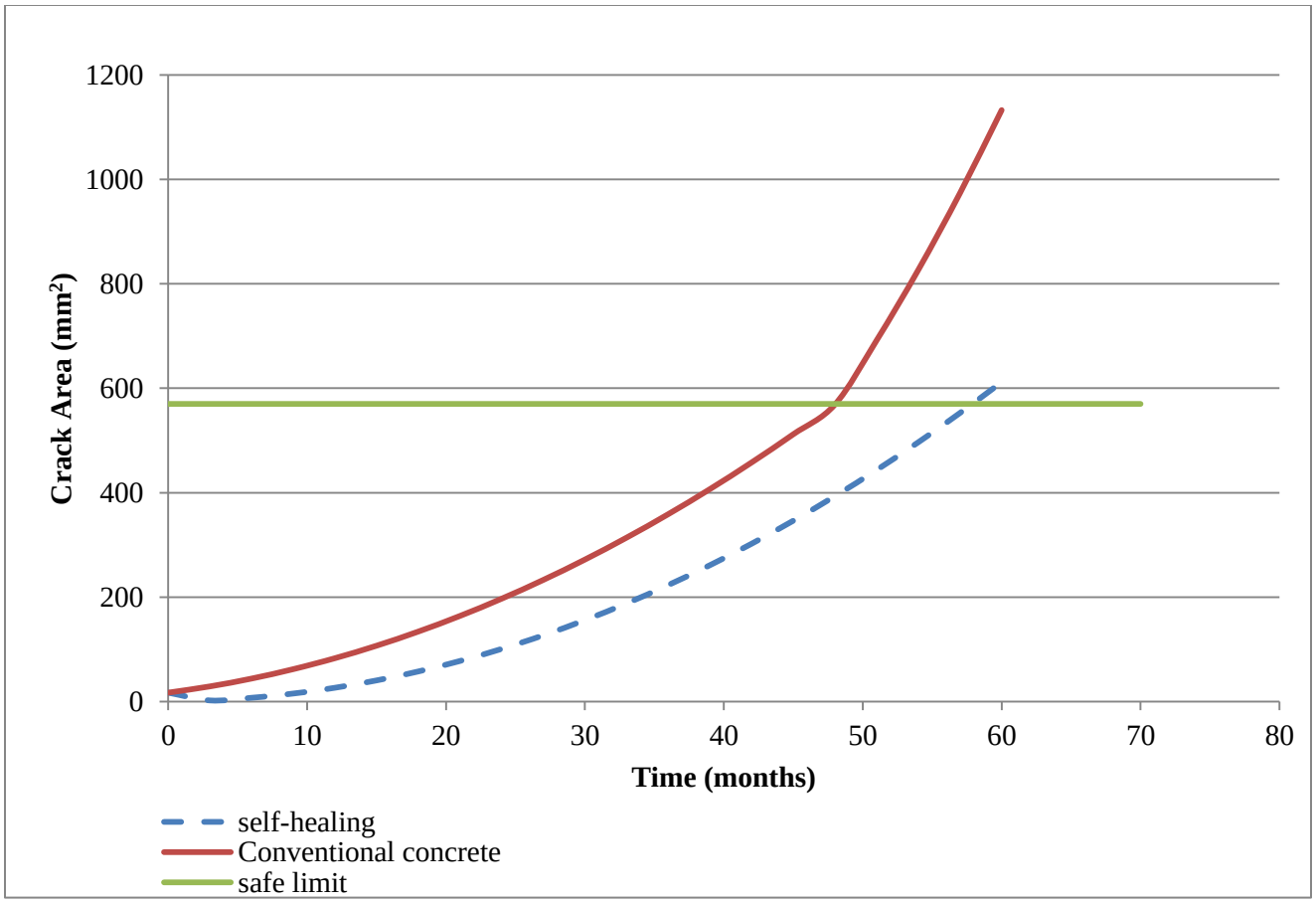

Figure 4-5 Rate of crack deterioration for crack 8 (self-healing VS conventional)

Figure 4-6 shows the simulated deterioration in crack area for the biggest crack with initial width of 1mm and initial length of 40 mm. Although both cracks exceeded the safe limit it is apparent that in case of the conventional mix the safe limit was exceeded at 42 months which is 6 months earlier than the self-healing mix. Also it is clear that the final crack area in the case of conventional mix was 1469 mm^2 while it was 1109.25 mm^2 in case of self-healing.

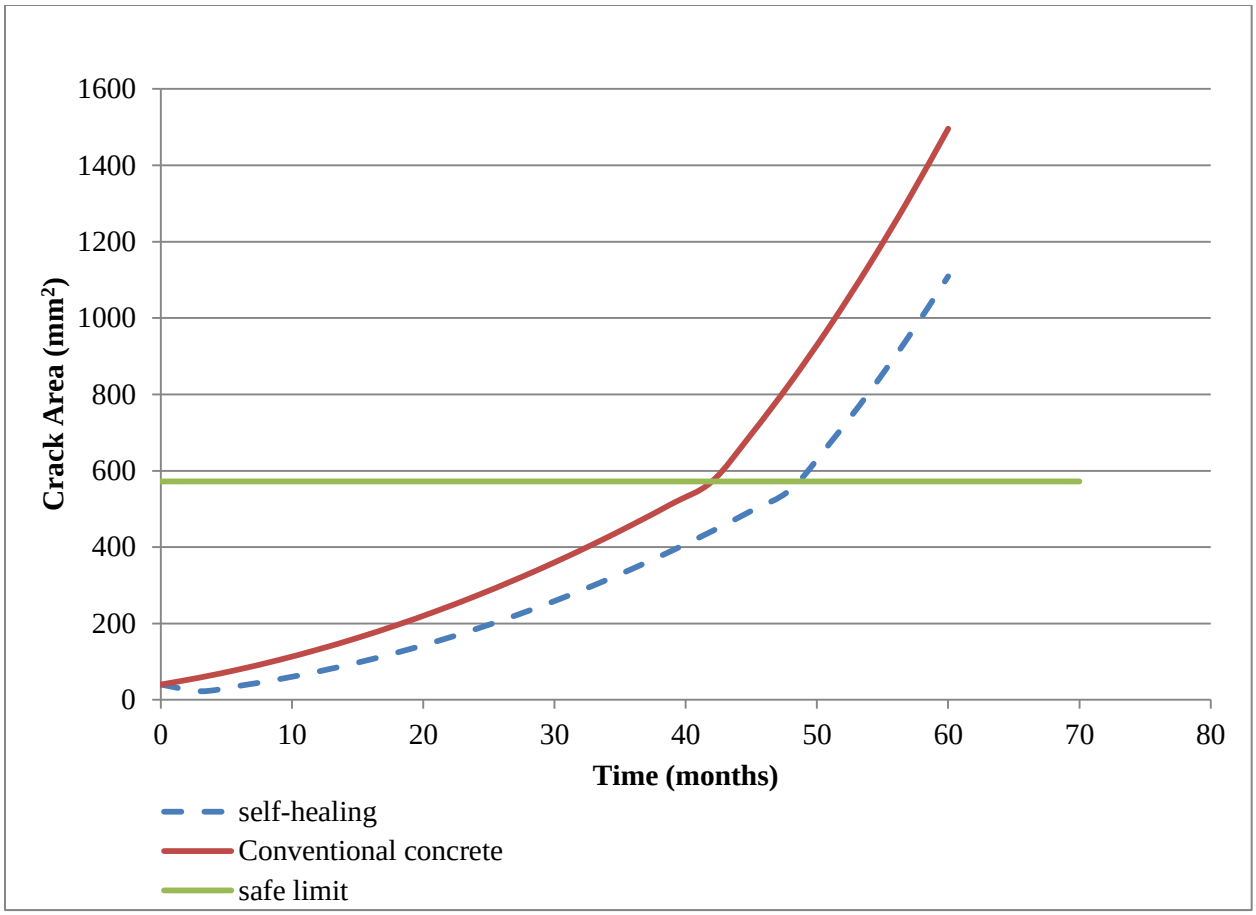

Figure 4-6 Rate of crack deterioration for crack 12 (self-healing VS conventional)

4.3 Cost Comparison

The results of the cost comparison in the first time period where cracking started directly after concrete pouring for strategic buildings "Table 4-3" including the costs of repair, inspection, disruption and adding the interest rate show that Although the initial cost of self-healing capsules is higher but by the end of the 5 years it was found cheaper in all cracks.

4.3.1 Results for the First Time Period

Table 4-3 Final cost in case of surface repair for first time period

Crack width(mm)	Crack length (mm)	Total cost (self-healing) USD	Total cost (conventional) USD
0.25	5	703.15	1276.00
0.25	7.5	703.15	1276.00
0.25	10	703.15	1286.82
0.5	10	703.15	1287.04
0.5	15	703.15	1297.86
0.5	20	703.15	1309.11
0.75	15	703.15	1308.68
0.75	22.5	703.15	1309.11
0.75	30	1244.15	1320.60
1	20	1244.15	1309.11
1	30	1254.97	1332.31
1	40	1277.26	1332.31

Figure 4-7 shows a comparison of the final costs in case of doing a surface repair it can be noticed that the cost is always higher in case of conventional concrete as the cost for $1m^3$ ranged between 1276 USD to 1332 USD while for self-healing concrete the cost per 1 m^3 ranged between 703.15 USD to 1277.26 USD. This can be contributed to two reasons; firstly that the number of

inspections required for self-healing concrete is half the number of inspections required for conventional concrete and secondly is that repair is always required earlier in case of conventional concrete which means that the interest rate on the repair cost starts to pile up earlier.

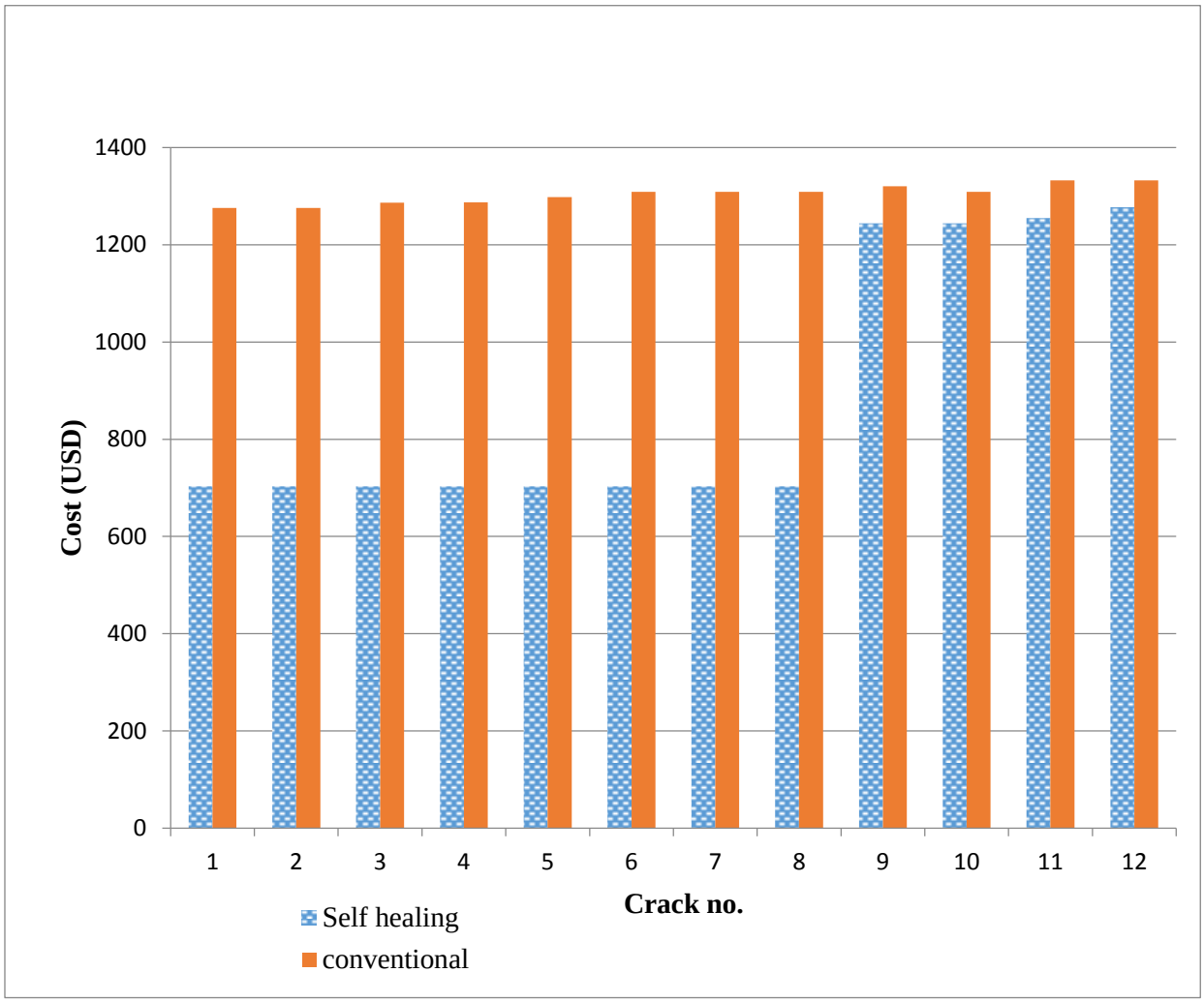

Figure 4-7 Final cost after 60 months (surface repair)

The results of the partial in depth repair and in depth repair showed in Table 4-4 show the same trend as the cost of conventional concrete is always higher (1323-1384.2 USD) compared to self-healing concrete (703.15-1327.14) USD.

Table 4-4 Final cost for partial in depth repair for first time period

Crack width(mm)	Crack length (mm)	Total cost (self-healing) USD	Total cost (conventional) USD
0.25	5	703.15	1323.00
0.25	7.5	703.15	1323.00
0.25	10	703.15	1334.76
0.5	10	703.15	1335.00
0.5	15	703.15	1346.76
0.5	20	703.15	1358.99
0.75	15	703.15	1358.52
0.75	22.5	703.15	1358.99
0.75	30	1291.15	1371.47
1	20	1291.15	1358.99
1	30	1302.91	1384.20
1	40	1327.14	1384.20

The result of comparison for in depth repair also show that the final total cost of self-healing concrete ranged between (703.15-1442.72) USD and remained lower than that of conventional concrete (1376-1442.72)USD “Table 4-5”.

Table 4-5 Final cost for in depth repair for first time period

Crack width(mm)	Crack length (mm)	Total cost (self-healing) USD	Total cost (Conventional) USD
0.25	5	703.15	1376.00
0.25	7.5	703.15	1376.00
0.25	10	703.15	1388.82
0.5	10	703.15	1389.08
0.5	15	703.15	1401.90
0.5	20	703.15	1415.23
0.75	15	703.15	1414.72
0.75	22.5	703.15	1415.23
0.75	30	1344.15	1428.84
1	20	1344.15	1415.23
1	30	1356.97	1442.72
1	40	1383.38	1442.72

4.4 Second Time Period (5-10 years):

From the Table 4-6, Table 4-7 ,Table 4-8and Figure 4-8 it can be concluded that the difference in cost gets even bigger when cracking starts to appear after longer periods of time as the range for surface repair for conventional concrete was found to be (1974.25-2030.56) USD , for partial in depth repair (2021.25-2082.45) USD and for in depth repair. For the self-healing concrete the ranges were (1205.6-1757.42), (1205.6-1829.59) and (1205.6-1885.84) respectively.

Table 4-6 Final cost for surface repair for second time period

Crack width(mm)	Crack length (mm)	Total cost (self-healing) USD	Total cost (conventional) USD
0.25	5	1205.60	1974.25
0.25	7.5	1205.60	1974.25
0.25	10	1205.60	1985.07
0.5	10	1205.60	1985.29
0.5	15	1205.60	1996.11
0.5	20	1205.60	2007.36
0.75	15	1205.60	2006.93
0.75	22.5	1205.60	2007.36
0.75	30	1746.60	2018.85
1	20	1746.60	2007.36
1	30	1757.42	2030.56
1	40	1779.72	2030.56

Table 4-7 Final cost for partial in depth repair for second time period

Crack width(mm)	Crack length (mm)	Total cost (self-healing) USD	Total cost (conventional) USD
0.25	5	1205.60	2021.25
0.25	7.5	1205.60	2021.25
0.25	10	1205.60	2033.01
0.5	10	1205.60	2033.25
0.5	15	1205.60	2045.01
0.5	20	1205.60	2057.24
0.75	15	1205.60	2056.77
0.75	22.5	1205.60	2057.24
0.75	30	1793.60	2069.72
1	20	1793.60	2057.24
1	30	1805.36	2082.45
1	40	1829.59	2082.45

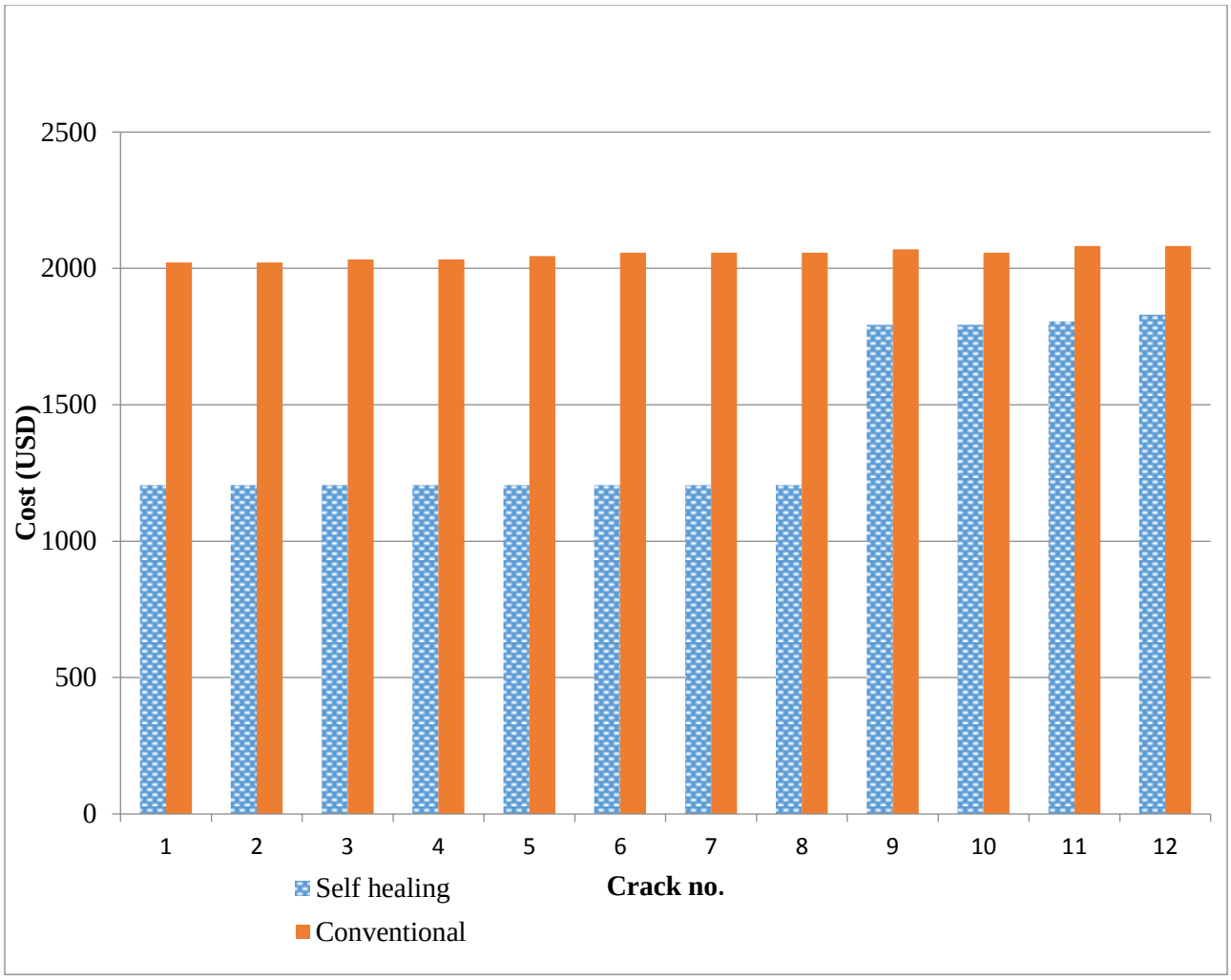

Figure 4-8 Final cost for partial in depth repair for the second time period

Table 4-8 Final cost for in depth repair for second time period

Crack width(mm)	Crack length (mm)	Total cost (self-healing) USD	Total cost (conventional) USD
0.25	5	1205.60	2074.25
0.25	7.5	1205.60	2074.25
0.25	10	1205.60	2087.07
0.5	10	1205.60	2087.33
0.5	15	1205.60	2100.15
0.5	20	1205.60	2113.48
0.75	15	1205.60	2112.97
0.75	22.5	1205.60	2113.48
0.75	30	1846.60	2127.09
1	20	1846.60	2113.48
1	30	1859.42	2140.97
1	40	1885.84	2140.97

4.5 Third Time Period (10-15) years

The final simulated period where cracking starts after a 10 year period still proves the same trend as the first and second cracking periods as the cost per 1 m^3 of self-healing concrete is still lower than that of conventional concrete as shown in Table 4-9, Table 4-10, Table 4-11 and Figure 4-9.

Table 4-9 Final cost for surface repair for third time period

Crack width(mm)	Crack length (mm)	Total cost (self-healing) USD	Total cost (conventional) USD
0.25	5	1796.48	2709.25
0.25	7.5	1796.48	2709.25
0.25	10	1796.48	2720.07
0.5	10	1796.48	2720.29
0.5	15	1796.48	2731.11
0.5	20	1796.48	2742.36
0.75	15	1796.48	2741.93
0.75	22.5	1796.48	2742.36
0.75	30	2337.48	2753.85
1	20	2337.48	2742.36
1	30	2348.30	2765.56
1	40	2370.59	2765.56

Table 4-10 Final cost for partial in depth repair for third time period

Crack width(mm)	Crack length (mm)	Total cost (self-healing) USD	Total cost (conventional) USD
0.25	5	1796.48	2756.25
0.25	7.5	1796.48	2756.25
0.25	10	1796.48	2768.01
0.5	10	1796.48	2768.25
0.5	15	1796.48	2780.01
0.5	20	1796.48	2792.24
0.75	15	1796.48	2791.77
0.75	22.5	1796.48	2792.24
0.75	30	2384.48	2804.72
1	20	2384.48	2792.24
1	30	2396.24	2817.45
1	40	2420.47	2817.45

Table 4-11 Final cost for in depth repair for third time period

Crack width(mm)	Crack length (mm)	Total cost (self-healing) USD	Total cost (conventional) USD
0.25	5	1796.48	2809.25
0.25	7.5	1796.48	2809.25
0.25	10	1796.48	2822.07
0.5	10	1796.48	2822.33
0.5	15	1796.48	2835.15
0.5	20	1796.48	2848.48
0.75	15	1796.48	2847.97
0.75	22.5	1796.48	2848.48
0.75	30	2437.48	2862.09
1	20	2437.48	2848.48
1	30	2450.30	2875.97
1	40	2476.71	2875.97

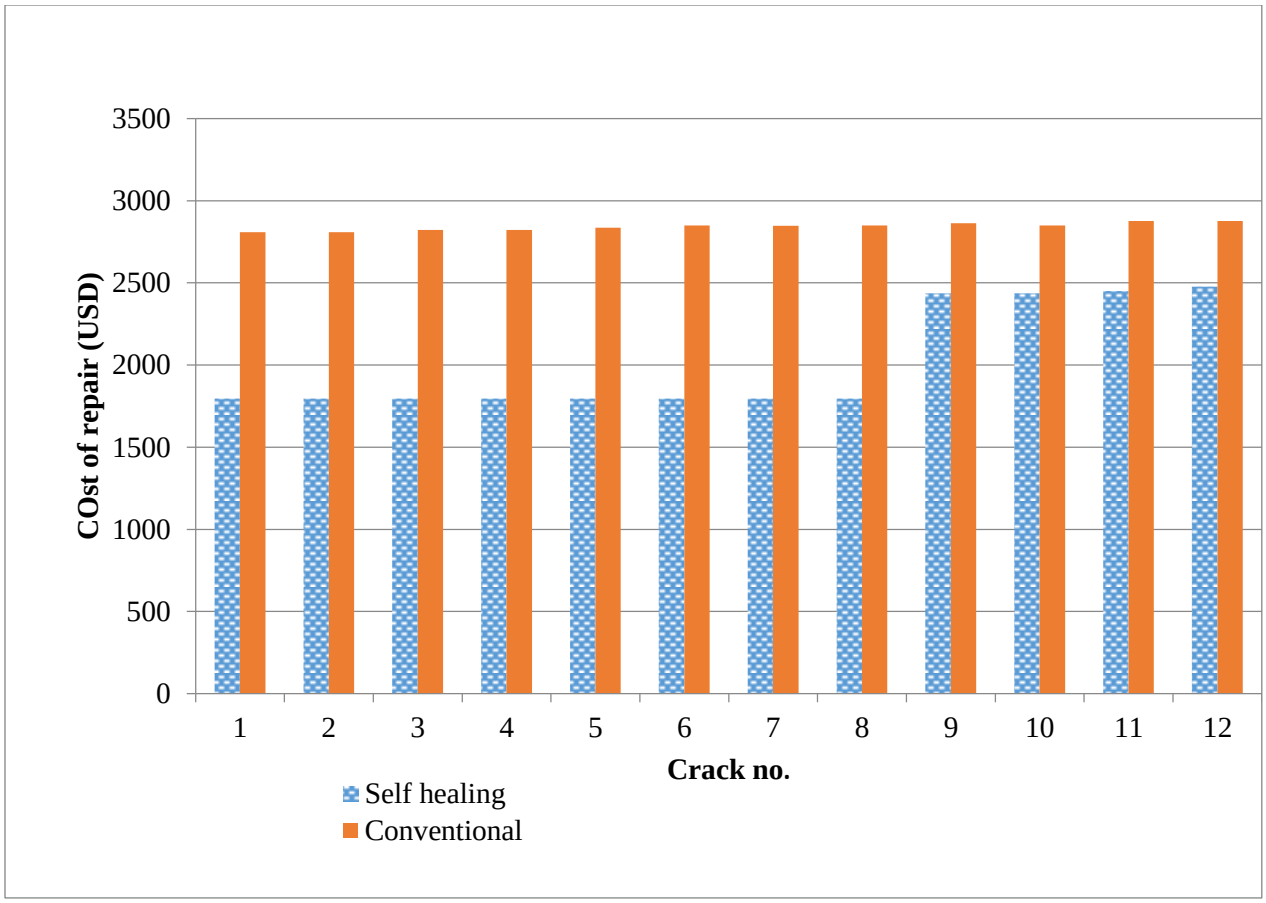

Figure 4-9 Final cost for in depth repair for third time period

5 Chapter V: Summary, Conclusions and Recommendations

It is evident that cracking in cementitious materials is a complex issue due to the variations in causes of cracking, mix proportions and material types, rate of cracking and service conditions. Hence, while this work attempts to consider many of the above parameters , yet care needs to be taken in future studies to consider such complexity and to question the findings of this work in light of that.

This chapter provides a summary of work conducted, work limitations, key conclusions as well as recommendations of future work and recommendations for applicators.

5.1 Work Limitations

Upon investigation of the previous research it was clear that there are several factors affecting the effectiveness and performance of self-healing capsules on rate of crack healing including but not limited to the dosage, the types of the healing agent and the protective casing, the temperature and the humidity. However the authors had to use the scarce amount of research to try and average a healing percentage expected in order to complete their work, as a result of not inducing these factors in the prediction of the healing percentages these percentages may vary upon experimentation either by increasing or decreasing.

Since the prediction of how a crack would exactly propagate and what could alter its rate of propagation is really hard, thus the predicted rate of crack propagation was based on experience and assuming a worst case scenario. The actual rate of crack propagation might be slower or the point where the rate starts to increase might be different, also the rate might not be doubled or it might even be tripled but however and in all cases the rate will be the same in both scenarios which makes the model results valid.

The exact cost of repair, inspection and disruption and the interest rate will vary form one structure to another and from one country to another. The costs used in this work are averaged from literature and based on experience; however the exact costs for each project can be adjusted in the model separately to get very specific results.

5.2 Summary and Findings

The addition of self-healing capsules to the concrete for the aim of crack repair is a promising field. Despite the fact that a fairly good amount of research was conducted to prove that the addition of self-healing capsules has the ability to repair cracks no work has been carried out to prove the economic feasibility of this process. This work was carried out to compare the rate of crack propagation in case of using self-healing capsules with conventional concrete in case no repair takes place and also to compare the cost of inspection, repair and disruption for strategic buildings in both cases. In order to take the time value of money into account three what if scenarios were assumed expecting that:

1. Cracks will start immediately after concrete is poured and starts to harden
2. Cracks will appear after 5 years
3. Cracks will appear after 10 years.

Based on the parameters associated with this study the following can be concluded:

- The percentage of healing in case of the addition of the self-healing capsules decreases with the increase in the initial crack area which means that cracks with an initial width of 0.25 mm or less and length of 10 mm or less will completely be sealed.

- The expected percentages of healings are calculated taking into account that the concrete used in strategic buildings should be of high quality. If the quality of the concrete mix is not good the healing percentages will be lower.
- Cracks with bigger widths and lengths will not be completely sealed and the cracks will further propagate with time, thus periodical inspections still need to be carried out and cannot be omitted completely.
- The duration for the self-healing process to reach its maximum potential is around 3 months. This means that after 3 months have passed no more healing will take place even if the crack is not completely sealed.
- If no inspection or repair was carried out and for all cracks the final crack area at the end of the 5 year period is expected to be smaller in self-healing concrete compared to conventional concrete.
- Even for the cracks that exceed the safe limit in both cases and require a repair intervention the period for exceeding the crack limit will always be longer in case of self-healing concrete.
- As the disruption cost is always the highest cost to be incurred upon the repair of a strategic structure, so the repair process after any crack exceeds the safe limit should be carried out for all cracks and the type of repair (surface, partial or in depth) should be selected based on the crack density.
- Although the initial cost of the adding self-healing capsules to concrete is high, the final cost at the end of the 5 years for the first time period shows an expected saving compared to conventional concrete within 4% and up to 45%

- For the second time period (5-10) years the expected cost saving in case of using self-healing concrete is expected to be in a range of 12% to 40%
- For the third time period (10-15) years the expected cost saving in case of using self-healing concrete is expected to range between 14% to 33%
- The above trend shows that the percentage of cost saving increases when concrete cracking starts to happen after longer periods have passed if the initial crack area is bigger and the saving decreases with time for small initial crack areas.

5.3 Recommendations for Future Work

Similar to every work, there are several recommendations that could be taken into account for future work, some of the recommendations for future works would include:

- Coming up with more accurate expected percentages of healing can be more achievable upon carrying out more research in the field of self-healing and inducing the factors that affect the self-healing effectiveness in the model.
- Introducing crack depth as a factor in the geometry of the crack as although it is well established that there is a correlation between the crack depth and length but introducing the crack depth as a factor will still give more accurate results.
- A separate study carried out for more accurate simulation of rate of crack propagation instead of the linear rate assumed in this research would help in achieving more accurate results.
- A case study carried out using self-healing concrete would be of great help in gaining of a high confidence level in the performance in different weather conditions (temperature, humidity) and will accordingly give a more accurate insight on how frequent inspections should be carried out.

- A study for quantifying the environmental merits of using self-healing concrete could be carried out to highlight its benefits as a type of green concrete and would give other reasons for choosing it in addition to cost savings.
- Further study can be carried out to investigate the feasibility of using self-healing in repair of existing structures to find out if this would be cost effective.

5.4 Recommendations for Applicators

Self-healing concrete is to be recommended for usage in strategic structures susceptible to cracking and damage as it was found to be a cost saving technique for most of the applications. It is also recommended for codes of practice as well as repair guides to start addressing self-healing concrete technique as one of the tools that applicators can resort to for construction and repair works. Hence, it is critical to emphasize that applicators should exercise caution in the selection of the dosage of the capsules to be added to the concrete mixes in order to avoid any adverse effects that might impact the concrete's properties. Needless to stress on the fact that if the mixing and pouring process was not carried out properly this might result in bad distribution of capsules which would affect the probability of cracks passing through capsules and lack of homogeneity of the mix, or may result in breakage of capsules during mixing and pouring. As a result applicators should rely on skilled labor and high level of supervision and quality control measurements during the production of self-healing concrete to attain the required output and to ensure that it will function efficiently upon cracking.

6 References

1. ACI committee 224 “Control of cracking in concrete structures” ACI 224 R-01 (2006)
2. ACI committee 224 “ Causes, evaluation and repair of cracks in concrete structures” ACI 224.1 R-07 (2007)
3. Ahn T. and Kishsi T., “Crack Self-healing behavior of cementitious composites incorporating various mineral admixtures” Advanced concrete technology Volume 8 (2010)
4. AlBughdadi A.J .“Assessment of performance of bio self-healing mortar using diatomaceous earth and silica fumes” The American university in Cairo (2016).
5. Bang, Sookie S., Johnna K. Galinat, and V. Ramakrishnan. "Calcite precipitation induced by polyurethane-immobilized Bacillus pasteurii."Enzyme and microbial technology 28.4 (2001): 404-409.
6. Bang, Sookie S. and V. Ramakrishnan “Microbiologically enhanced crack remediation” (2003).
7. Bhattacharyya, T . “Self-healing in concrete materials”(2011)
8. De Muynck, W., et al. "Bacterial carbonate precipitation improves the durability of cementitious materials” Cement and concrete research 38 (2008)
9. Fathy, Amr, et al. "Properties of Bacteria-Induced Self-Healing Mortar." GEN 56: 1.
10. Feiteira J., Gruyaert E., and De Belie N., “Self-healing of dynamic concrete cracks using polymer precursors as encapsulated healing agents”. Concrete solutions (2014).
11. Felicetti R., and De Dominico V.H.”Cracked concrete repair with epoxy resin infiltration” Concrete repair, rehabilitation and retrofitting ii (2009).

12. Ferrara L.and Krelani V. “ A fracture testing based approach to assess the self-healing capacity of cementitious composites” VIII international conference on fracture mechanics of concrete and concrete structures, (2013)
13. Ferrara L.and Krelani V. “Self-healing capacity of concrete: a mechanical approach” the new boundaries of structural concrete session C, (2013)
14. Guadalupe Sierra-Beltran, M., Jomkers, H.M and Shlangen, E. “Characterization of sustainable bio based mortar for concrete repair” Construction and building materials 67 (2014).
15. Hilloulin et al., “Design of polymeric capsules for self-healing concrete” Cement and concrete composites 55 (2015)
16. Hongqiang C. et al “Use of electrochemical method for repair of concrete cracks”. Construction and building materials 73 (2014)
17. Krishnapriya S., Venkatesh Babu D.L, Prince Arulraj G. “isolation and identification of bacteria to improve strength of concrete” Microbilogical research 174 (2015).
18. Jiang Z., Li W., and Yuan Z., “influence of mineral additives and environmental conditions on the slef-healing capabilities of cementitious materials” Cement and concrete composites 57 (2015)
19. Jonkers, H. M. "Bacteria-based self-healing concrete." Heron, 56 (1/2)(2011).
20. Jonkers, H. M. "Self-healing concrete: a biological approach." Self-Healing Materials. Springer Netherlands, (2007). 195-204.
21. Jonkers, Henk M., and Arjan Thijssen. "Bacteria mediated remediation of concrete structures." Proceedings of the second international symposium on service life design for

infrastructures. Delft, The Netherlands. Eds. K. van Breugel, Guang Ye, and Yong Yuan.(2010)

22. Jonkers, Henk M., and Mors R. “Full scale application of bacteria based self-healing concrete for repair of structures”. Concrete repair, rehabilitation and retrolifting iii (2012)
23. Jonkers, Henk M., and E. Schlangen. "Self-healing of cracked concrete: a bacterial approach." Proceedings of FRACOS6: fracture mechanics of concrete and concrete structures. Catania, Italy (2007): 1821-1826.
24. Jonkers, Henk M., and Erik Schlangen. "Development of a bacteria-based self-healing concrete." Proc. int. FIB symposium. Vol. 1. (2008).
25. Jonkers, Hnek M et al. “Application of bacteria as self-healing agent for the development of sustainable concrete” Ecological engineering 36 (2010)
26. Luo M., Qian C., Li R., “Factors affecting crack repairing capacity of bacteria based self-healing concrete” Construction and building materials 87 (2015)
27. Meyer C., “ The greening of the concrete industry” Cement and concrete composites 31 (2009)
28. Meyer D. et al, “Control of cracking in concrete” Transportation research E-C107 (2006)
29. Nawy E.G., and Nassif H., “Long term effects and serviceability” (2001)
30. Patil H.S et al “Bacterial concrete – a self-healing concrete” international journal of applied engineering research Volume 3 (2008)
31. Rajiwala D., Hingwe P. and Babhor K. “Bacterial concrete- an ideal concrete for historic structures” (2009)
32. Ramachandran, Santhosh K., V. Ramakrishnan, and Sookie S. Bang. "Remediation of concrete using micro-organisms." ACI Materials journal 98.1 (2001): 3-9.

33. Ramakrishnan, V., et al. "SEM investigation of microbial calcite precipitation in cement." Proceedings of the International Conference on Cement Microscopy. Vol. 21. International Cement Microscopy Association, (1999)
34. Reinhardt, Hans-Wolf, and Martin Jooss. "Permeability and self-healing of cracked concrete as a function of temperature and crack width." Cement and Concrete Research 33.7 (2003): 981-985.
35. Reinke S.K "Polyurea/Polyurethane microcapsules based self-healing concrete" University of Rhpde island (2012)
36. Schlangen E., and Sangadji S., "Addressing infrastructure durability by self-healing mechanisms" Procedia engineering 54 (2013).
37. Sefian M., Samani A.k., Berenjian A., "Bioconcrete: next generation of self-healing concrete" Appl Microbial biotechnol (2016)
38. Simon D., "Self-healing concrete : a sustainable future" Cardiff university (2008)
39. Tittelboom V., et al. "Use of bacteria to repair cracks in concrete", Cement and Concrete Research 40.1 (2010): 157-166.
40. Tittelbom V., et al. "Comparison of different approaches for self-healing concrete in a large scale lab test" Construction and building materials 107 (2016)
41. Tittelboom V., et al. "The efficiency of self-healing concrete using alternative manufacturing procedures and more realistic crack patterns" Cement and concrete composites 57 (201
42. Wang et al. "Characteristics of concrete cracks and their influence on chloride penetration." Construction and building materials 107 (2016)

43. Wang et al. “Use of silica gel or polyurethane immobilized bacteria for self-healing concrete”, Construction and building materials 26 (2012)
44. Wang et al. “Application of hydrogel encapsulated carbonate precipitating bacteria for approaching a realistic self-healing in concrete” Construction and building materials 68 (2014)
45. Wang el al. “ X-ray computed tomography proof of bacterial based self-healing in concrete” Cement and concrete composites 53 (2014).
46. Wiktor V and Jonkers H.M “Quantification of crack healing in novel bacteria based self-healing concrete”, Cement and concrete composites 33 (2011).
47. Yang Z., Brown H., and Cheney A., “influence of Moisture conditions on freeze and thaw durability of Portland cement pervious concrete” Middle Tenessee State University (2005)
48. Yuan H., and Chen H., “Quantitative solution of size and dosage of capsules foe self-healing of cracks in cemintitious composites” Computers and concrete volume 11 (2013)
49. Zemskov S., Jonkers Henk M., and Vermolen Fred J. “ A mathematical model for bacterial self-healing of cracks in concrete” Intellegent material systems and structures volume 25 (2012)
50. Zhong Lv. And Huisu C. “Analytical models for determining the dosage of capsules embedded in self-healing materials” Computational material sciences 68 (2013).
51. Zhong W., and Yao W. “influence of damage degree on self-healing of concrete” Construction and building materials 22 (2008)

7 Appendix

Calculations for first time period (0-5) years

duration(months)	Crack width(mm)	Crack length (mm)	Self healing cost	Percentage of healing	Decision	Width after healing	Length after healing	No repair Width	No repair length	Inspection cost	Surface repair	Partial in depth repair	In depth repair	disruption cost	interest "surface"
3	0.25	5	230.40	100%	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.25	7.5	230.40	100%	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.25	10	230.40	100%	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.5	10	230.40	98%	no repair	0.01	0.20	0.01	0.20	18.375	0	0	0	0	0.00
	0.5	15	230.40	93%	no repair	0.04	1.05	0.04	1.05	18.375	0	0	0	0	0.00
	0.5	20	230.40	88%	no repair	0.06	2.40	0.06	2.40	18.375	0	0	0	0	0.00
	0.75	15	230.40	70%	no repair	0.23	4.50	0.23	4.50	18.375	0	0	0	0	0.00
	0.75	22.5	230.40	66%	no repair	0.26	7.65	0.27	8.10	18.375	0	0	0	0	0.00
	0.75	30	230.40	58%	no repair	0.32	12.60	0.31	12.30	18.375	0	0	0	0	0.00
	1	20	230.40	45%	no repair	0.55	11.00	0.63	12.60	18.375	0	0	0	0	0.00
	1	30	230.40	38%	no repair	0.62	18.60	0.67	20.10	18.375	0	0	0	0	0.00
	1	40	230.40	30%	no repair	0.70	28.00	0.75	30.00	18.375	0	0	0	0	0.00
6	0.00	0.00	235.01	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	235.01	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	235.01	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.01	0.20	235.01	N/A	no repair	0.31	5.20	0.31	5.20	18.375	0	0	0	0	0.00
	0.04	1.05	235.01	N/A	no repair	0.34	6.05	0.34	6.05	18.375	0	0	0	0	0.00
	0.06	2.40	235.01	N/A	no repair	0.36	7.40	0.36	7.40	18.375	0	0	0	0	0.00
	0.23	4.50	235.01	N/A	no repair	0.53	9.50	0.53	9.50	18.375	0	0	0	0	0.00
	0.26	7.65	235.01	N/A	no repair	0.56	12.65	0.57	13.10	18.375	0	0	0	0	0.00
	0.32	12.60	235.01	N/A	no repair	0.62	17.60	0.61	17.30	18.375	0	0	0	0	0.00
	0.55	11.00	235.01	N/A	no repair	0.85	16.00	0.93	17.60	18.375	0	0	0	0	0.00
	0.62	18.60	235.01	N/A	no repair	0.92	23.60	0.97	25.10	18.375	0	0	0	0	0.00
	0.70	28.00	235.01	N/A	no repair	1.00	33.00	1.05	35.00	18.375	0	0	0	0	0.00
9	0.00	0.00	239.71	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	239.71	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	239.71	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.31	5.20	239.71	N/A	no repair	0.61	10.20	0.61	10.20	18.375	0	0	0	0	0.00
	0.34	6.05	239.71	N/A	no repair	0.64	11.05	0.64	11.05	18.375	0	0	0	0	0.00
	0.36	7.40	239.71	N/A	no repair	0.66	12.40	0.66	12.40	18.375	0	0	0	0	0.00
	0.53	9.50	239.71	N/A	no repair	0.83	14.50	0.83	14.50	18.375	0	0	0	0	0.00
	0.56	12.65	239.71	N/A	no repair	0.86	17.65	0.87	18.10	18.375	0	0	0	0	0.00
	0.62	17.60	239.71	N/A	no repair	0.92	22.60	0.91	22.30	18.375	0	0	0	0	0.00
	0.85	16.00	239.71	N/A	no repair	1.15	21.00	1.23	22.60	18.375	0	0	0	0	0.00
	0.92	23.60	239.71	N/A	no repair	1.22	28.60	1.27	30.10	18.375	0	0	0	0	0.00
	1.00	33.00	239.71	N/A	no repair	1.30	38.00	1.35	40.00	18.375	0	0	0	0	0.00
12	0.00	0.00	244.50	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	244.50	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	244.50	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.61	10.20	244.50	N/A	no repair	0.91	15.20	0.91	15.20	18.375	0	0	0	0	0.00
	0.64	11.05	244.50	N/A	no repair	0.94	16.05	0.94	16.05	18.375	0	0	0	0	0.00
	0.66	12.40	244.50	N/A	no repair	0.96	17.40	0.96	17.40	18.375	0	0	0	0	0.00
	0.83	14.50	244.50	N/A	no repair	1.13	19.50	1.13	19.50	18.375	0	0	0	0	0.00
	0.86	17.65	244.50	N/A	no repair	1.16	22.65	1.17	23.10	18.375	0	0	0	0	0.00
	0.92	22.60	244.50	N/A	no repair	1.22	27.60	1.21	27.30	18.375	0	0	0	0	0.00
	1.15	21.00	244.50	N/A	no repair	1.45	26.00	1.53	27.60	18.375	0	0	0	0	0.00
	1.22	28.60	244.50	N/A	no repair	1.52	33.60	1.57	35.10	18.375	0	0	0	0	0.00
	1.30	38.00	244.50	N/A	no repair	1.60	43.00	1.65	45.00	18.375	0	0	0	0	0.00
15	0.00	0.00	249.39	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	249.39	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	249.39	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.91	15.20	249.39	N/A	no repair	1.21	20.20	1.21	20.20	18.375	0	0	0	0	0.00
	0.94	16.05	249.39	N/A	no repair	1.24	21.05	1.24	21.05	18.375	0	0	0	0	0.00
	0.96	17.40	249.39	N/A	no repair	1.26	22.40	1.26	22.40	18.375	0	0	0	0	0.00
	1.13	19.50	249.39	N/A	no repair	1.43	24.50	1.43	24.50	18.375	0	0	0	0	0.00
	1.16	22.65	249.39	N/A	no repair	1.46	27.65	1.47	27.65	18.375	0	0	0	0	0.00
	1.22	27.60	249.39	N/A	no repair	1.52	32.60	1.51	32.60	18.375	0	0	0	0	0.00
	1.45	26.00	249.39	N/A	no repair	1.75	31.00	1.83	31.00	18.375	0	0	0	0	0.00
	1.52	33.60	249.39	N/A	no repair	1.82	38.60	1.87	38.60	18.375	0	0	0	0	0.00
	1.60	43.00	249.39	N/A	no repair	1.90	48.00	1.95	48.00	18.375	0	0	0	0	0.00
18	0.00	0.00	254.38	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	254.38	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	254.38	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	1.21	20.20	254.38	N/A	no repair	1.51	25.20	1.51	25.20	18.375	0	0	0	0	0.00
	1.24	21.05	254.38	N/A	no repair	1.54	26.05	1.54	26.05	18.375	0	0	0	0	0.00
	1.26	22.40	254.38	N/A	no repair	1.56	27.40	1.56	27.40	18.375	0	0	0	0	0.00
	1.43	24.50	254.38	N/A	no repair	1.73	29.50	1.73	29.50	18.375	0	0	0	0	0.00
	1.46	27.65	254.38	N/A	no repair	1.76	32.65	1.77	32.65	18.375	0	0	0	0	0.00
	1.52	32.60	254.38	N/A	no repair	1.82	37.60	1.81	37.60	18.375	0	0	0	0	0.00
	1.75	31.00	254.38	N/A	no repair	2.05	36.00	2.13	36.00	18.375	0	0	0	0	0.00
	1.82	38.60	254.38	N/A	no repair	2.12	43.60	2.17	43.60	18.375	0	0	0	0	0.00
	1.90	48.00	254.38	N/A	no repair	2.20	53.00	2.25	53.00	18.375	0	0	0	0	0.00
21	0.00	0.00	259.47	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	259.47	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	259.47	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	1.51	25.20	259.47	N/A	no repair	1.81	30.20	1.81	30.20	18.375	0	0	0	0	0.00
	1.54	26.05	259.47	N/A	no repair	1.84	31.05	1.84	31.05	18.375	0	0	0	0	0.00
	1.56	27.40	259.47	N/A	no repair	1.86	32.40	1.86	32.40	18.375	0	0	0	0	0.00
	1.73	29.50	259.47	N/A	no repair	2.03	34.50	2.03	34.50	18.375	0	0	0	0	0.00
	1.76	32.65	259.47	N/A	no repair	2.06	37.65	2.07	37.65	18.375	0	0	0	0	0.00
	1.82	37.60	259.47	N/A	no repair	2.12	42.60	2.11	42.60	18.375	0	0	0	0	0.00
	2.05	36.00	259.47	N/A	no repair	2.35	41.00	2.43	41.00	18.375	0	0	0	0	0.00
	2.12	43.60	259.47	N/A	no repair	2.42	48.60	2.47	48.60	18.375	0	0	0	0	0.00
	2.20	53.00	259.47	N/A	no repair	2.50	58.00	2.55	58.00	18.375	0	0	0	0	0.00
24	0.00	0.00	264.66	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	264.66	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	264.66	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	1.81	30.20	264.66	N/A	no repair	2.11	35.20	2.11	35.20	18.375	0	0	0	0	0.00
	1.84	31.05	264.66	N/A	no repair	2.14	36.05	2.14	36.05	18.375	0	0	0	0	0.00
	1.86	32.4	264.66	N/A	no repair	2.16	37.4	2.16	37.4	18.375	0	0	0	0	0.00
	2.03	34.50	264.66	N/A	no repair	2.33	39.50	2.33	39.50	18.375	0	0	0	0	0.00
	2.06	37.65	264.66	N/A	no repair	2.36	42.65	2.37	42.65	18.375	0	0	0	0	0.00
	2.115	42.6	264.66	N/A	no repair	2.415	47.6	2.4075	47.6	18.375	0	0	0	0	0.00
	2.35	41.00	264.66	N/A	no repair	2.65	46.00	2.73	46.00	18.375	0	0	0	0	0.00
	2.42	48.60	264.66	N/A	no repair	2.72	53.60	2.77	53.60	18.375	0	0	0	0	0.00
	2.50	58.00	264.66	N/A	no repair	2.80	63.00	2.85	63.00	18.375	0	0	0	0	0.00

	0.00	0.00	269.95	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	269.95	N/A	no reair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	269.95	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	2.11	35.20	269.95	N/A	no repair	2.41	40.20	2.41	40.20	18.375	0	0	0	0	0.00
	2.14	36.05	269.95	N/A	no repair	2.44	41.05	2.44	41.05	18.375	0	0	0	0	0.00
27	2.16	37.4	269.95	N/A	no repair	2.46	42.4	2.46	42.4	18.375	0	0	0	0	0.00
	2.33	39.50	269.95	N/A	no repair	2.63	44.50	2.63	44.50	18.375	0	0	0	0	0.00
	2.36	42.65	269.95	N/A	no repair	2.66	47.65	2.67	47.65	18.375	0	0	0	0	0.00
	2.415	47.6	269.95	N/A	no repair	2.715	52.6	2.7075	52.6	18.375	0	0	0	0	0.00
	2.65	46.00	269.95	N/A	no repair	2.95	51.00	3.03	51.00	18.375	0	0	0	0	0.00
	2.72	53.60	269.95	N/A	no repair	3.02	58.60	3.07	58.60	18.375	0	0	0	0	0.00
	2.80	63.00	269.95	N/A	no repair	3.10	68.00	3.15	68.00	18.375	0	0	0	0	0.00
	0.00	0.00	275.35	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	275.35	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	275.35	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	2.41	40.20	275.35	N/A	no repair	2.71	45.20	2.71	45.20	18.375	0	0	0	0	0.00
	2.44	41.05	275.35	N/A	no repair	2.74	46.05	2.74	46.05	18.375	0	0	0	0	0.00
30	2.46	42.4	275.35	N/A	no repair	2.76	47.4	2.76	47.4	18.375	0	0	0	0	0.00
	2.63	44.50	275.35	N/A	no repair	2.93	49.50	2.93	49.50	18.375	0	0	0	0	0.00
	2.66	47.65	275.35	N/A	no repair	2.96	52.65	2.97	52.65	18.375	0	0	0	0	0.00
	2.715	52.6	275.35	N/A	no repair	3.015	57.6	3.0075	57.6	18.375	0	0	0	0	0.00
	2.95	51.00	275.35	N/A	no repair	3.25	56.00	3.33	56.00	18.375	0	0	0	0	0.00
	3.02	58.60	275.35	N/A	no repair	3.32	63.60	3.37	63.60	18.375	0	0	0	0	0.00
	3.10	68.00	275.35	N/A	no repair	3.40	73.00	3.45	73.00	18.375	0	0	0	0	0.00
	0.00	0.00	280.86	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	280.86	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	280.86	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	2.71	45.20	280.86	N/A	no repair	3.01	50.20	3.01	50.20	18.375	0	0	0	0	0.00
	2.74	46.05	280.86	N/A	no repair	3.04	51.05	3.04	51.05	18.375	0	0	0	0	0.00
33	2.76	47.4	280.86	N/A	no repair	3.06	52.4	3.06	52.4	18.375	0	0	0	0	0.00
	2.93	49.50	280.86	N/A	no repair	3.23	54.50	3.23	54.50	18.375	0	0	0	0	0.00
	2.96	52.65	280.86	N/A	no repair	3.26	57.65	3.27	57.65	18.375	0	0	0	0	0.00
	3.015	57.6	280.86	N/A	no repair	3.315	62.6	3.3075	62.6	18.375	0	0	0	0	0.00
	3.25	56.00	280.86	N/A	no repair	3.55	61.00	3.63	61.00	18.375	0	0	0	0	0.00
	3.32	63.60	280.86	N/A	no repair	3.62	68.60	3.67	68.60	18.375	0	0	0	0	0.00
	3.40	73.00	280.86	N/A	no repair	3.70	78.00	3.75	78.00	18.375	0	0	0	0	0.00
	0.00	0.00	286.47	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	286.47	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	286.47	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	3.01	50.20	286.47	N/A	no repair	3.31	55.20	3.31	55.20	18.375	0	0	0	0	0.00
	3.04	51.05	286.47	N/A	no repair	3.34	56.05	3.34	56.05	18.375	0	0	0	0	0.00
36	3.06	52.4	286.47	N/A	no repair	3.36	57.4	3.36	57.4	18.375	0	0	0	0	0.00
	3.23	54.50	286.47	N/A	no repair	3.53	59.50	3.53	59.50	18.375	0	0	0	0	0.00
	3.26	57.65	286.47	N/A	no repair	3.56	62.65	3.57	62.65	18.375	0	0	0	0	0.00
	3.315	62.6	286.47	N/A	no repair	3.615	67.6	3.6075	67.6	18.375	0	0	0	0	0.00
	3.55	61.00	286.47	N/A	no repair	3.85	66.00	3.93	66.00	18.375	0	0	0	0	0.00
	3.62	68.60	286.47	N/A	no repair	3.92	73.60	3.97	73.60	18.375	0	0	0	0	0.00
	3.70	78.00	286.47	N/A	no repair	4.00	83.00	4.05	83.00	18.375	0	0	0	0	0.00
	0.00	0.00	292.20	N/A	no reair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	292.20	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	292.20	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	3.31	55.20	292.20	N/A	no repair	3.61	60.20	3.61	60.20	18.375	0	0	0	0	0.00
	3.34	56.05	292.20	N/A	no repair	3.64	61.05	3.64	61.05	18.375	0	0	0	0	0.00
39	3.36	57.4	292.20	N/A	no repair	3.66	62.4	3.66	62.4	18.375	0	0	0	0	0.00
	3.53	59.50	292.20	N/A	no repair	3.83	64.50	3.83	64.50	18.375	0	0	0	0	0.00
	3.56	62.65	292.20	N/A	no repair	3.86	67.65	3.87	67.65	18.375	0	0	0	0	0.00
	3.615	67.6	292.20	N/A	no repair	3.915	72.6	3.9075	72.6	18.375	0	0	0	0	0.00
	3.85	66.00	292.20	N/A	no repair	4.15	71.00	4.23	71.00	18.375	0	0	0	0	0.00
	3.92	73.60	292.20	N/A	no repair	4.22	78.60	4.27	78.60	18.375	0	0	0	0	0.00
	4.00	83.00	292.20	N/A	no repair	4.30	88.00	4.35	88.00	18.375	0	0	0	0	0.00
	0.00	0.00	298.05	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	298.05	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	298.05	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	3.61	60.20	298.05	N/A	no repair	3.91	65.20	3.91	65.20	18.375	0	0	0	0	0.00
	3.64	61.05	298.05	N/A	no repair	3.94	66.05	3.94	66.05	18.375	0	0	0	0	0.00
42	3.66	62.4	298.05	N/A	no repair	3.96	67.4	3.96	67.4	18.375	0	0	0	0	0.00
	3.83	64.50	298.05	N/A	no repair	4.13	69.50	4.13	69.50	18.375	0	0	0	0	0.00
	3.86	67.65	298.05	N/A	no repair	4.16	72.65	4.17	72.65	18.375	0	0	0	0	0.00
	3.915	72.6	298.05	N/A	no repair	4.215	77.6	4.2075	77.6	18.375	0	0	0	0	0.00
	4.15	71.00	298.05	N/A	no repair	4.45	76.00	4.53	76.00	18.375	0	0	0	0	0.00
	4.22	78.60	298.05	N/A	no repair	4.52	83.60	4.57	83.60	18.375	0	0	0	0	0.00
	4.30	88.00	298.05	N/A	no repair	4.60	93.00	4.65	93.00	18.375	0	0	0	0	0.00
	0.00	0.00	304.01	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	304.01	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	304.01	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	3.91	65.20	304.01	N/A	no repair	4.21	70.20	4.21	70.20	18.375	0	0	0	0	0.00
	3.94	66.05	304.01	N/A	no repair	4.24	71.05	4.24	71.05	18.375	0	0	0	0	0.00
45	3.96	67.4	304.01	N/A	no repair	4.26	72.4	4.26	72.4	18.375	0	0	0	0	0.00
	4.13	69.50	304.01	N/A	no repair	4.43	74.50	4.43	74.50	18.375	0	0	0	0	0.00
	4.16	72.65	304.01	N/A	no repair	4.46	77.65	4.47	77.65	18.375	0	0	0	0	0.00
	4.215	77.6	304.01	N/A	no repair	4.515	82.6	4.5075	82.6	18.375	0	0	0	0	0.00
	4.45	76.00	304.01	N/A	no repair	4.75	81.00	4.83	81.00	18.375	0	0	0	0	0.00
	4.52	83.60	304.01	N/A	no repair	4.82	88.60	4.87	88.60	18.375	0	0	0	0	0.00
	4.60	93.00	304.01	N/A	no repair	4.90	98.00	4.95	98.00	18.375	0	0	0	0	0.00
	0.00	0.00	310.09	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00

	0.00	0.00	310.09	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	310.09	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	4.21	70.20	310.09	N/A	no repair	4.51	75.20	4.51	75.20	18.375	0	0	0	0	0.00
	4.24	71.05	310.09	N/A	no repair	4.54	76.05	4.54	76.05	18.375	0	0	0	0	0.00
48	4.26	72.4	310.09	N/A	no repair	4.56	77.4	4.56	77.4	18.375	0	0	0	0	0.00
	4.43	74.50	310.09	N/A	no repair	4.73	79.50	4.73	79.50	18.375	0	0	0	0	0.00
	4.46	77.65	310.09	N/A	no repair	4.76	82.65	4.77	82.65	18.375	0	0	0	0	0.00
	4.515	82.6	310.09	N/A	no repair	4.815	87.6	4.8075	87.6	18.375	0	0	0	0	0.00
	4.75	81.00	310.09	N/A	no repair	5.05	86.00	5.13	86.00	18.375	0	0	0	0	0.00
	4.82	88.60	310.09	N/A	no repair	5.12	93.60	5.17	93.60	18.375	0	0	0	0	0.00
	4.90	98.00	310.09	N/A	no repair	5.20	103.00	5.25	103.00	18.375	0	0	0	0	0.00
	0.00	0.00	316.29	N/A	no reair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	316.29	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	316.29	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	4.51	75.20	316.29	N/A	no repair	4.81	80.20	4.81	80.20	18.375	0	0	0	0	0.00
	4.54	76.05	316.29	N/A	no repair	4.84	81.05	4.84	81.05	18.375	0	0	0	0	0.00
51	4.56	77.4	316.29	N/A	no repair	4.86	82.4	4.86	82.4	18.375	0	0	0	0	0.00
	4.73	79.50	316.29	N/A	no repair	5.03	84.50	5.03	84.50	18.375	0	0	0	0	0.00
	4.76	82.65	316.29	N/A	no repair	5.06	87.65	5.07	87.65	18.375	0	0	0	0	0.00
	4.815	87.6	316.29	N/A	no repair	5.115	92.6	5.1075	92.6	18.375	0	0	0	0	0.00
	5.05	86.00	316.29	N/A	no repair	5.35	91.00	5.43	91.00	18.375	0	0	0	0	0.00
	5.12	93.60	316.29	N/A	no repair	5.42	98.60	5.47	98.60	18.375	0	0	0	0	0.00
	5.20	103.00	316.29	N/A	repair	0.00	0.00	5.85	113.00	18.375	100	147	200	441	0.00
	0.00	0.00	322.62	N/A	no reair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	322.62	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	322.62	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	4.81	80.20	322.62	N/A	no repair	5.11	85.20	5.11	85.20	18.375	0	0	0	0	0.00
	4.84	81.05	322.62	N/A	no repair	5.14	86.05	5.14	86.05	18.375	0	0	0	0	0.00
54	4.86	82.4	322.62	N/A	no repair	5.16	87.4	5.16	87.4	18.375	0	0	0	0	0.00
	5.03	84.50	322.62	N/A	no repair	5.33	89.50	5.33	89.50	18.375	0	0	0	0	0.00
	5.06	87.65	322.62	N/A	no repair	5.36	92.65	5.37	92.65	18.375	0	0	0	0	0.00
	5.115	92.6	322.62	N/A	no repair	5.415	97.6	5.4075	97.6	18.375	0	0	0	0	0.00
	5.35	91.00	322.62	N/A	no repair	5.65	96.00	5.73	96.00	18.375	0	0	0	0	0.00
	5.42	98.60	322.62	N/A	no repair	5.72	103.60	5.77	103.60	18.375	0	0	0	0	0.00
	0.00	0.00	322.62	N/A	no repair	0.00	0.00	6.45	123.00	18.375	0	0	0	0	551.82
	0.00	0.00	329.07	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	329.07	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	329.07	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	5.11	85.20	329.07	N/A	no repair	5.41	90.20	5.41	90.20	18.375	0	0	0	0	0.00
	5.14	86.05	329.07	N/A	no repair	5.44	91.05	5.44	91.05	18.375	0	0	0	0	0.00
57	5.16	87.4	329.07	N/A	no repair	5.46	92.4	5.46	92.4	18.375	0	0	0	0	0.00
	5.33	89.50	329.07	N/A	no repair	5.63	94.50	5.63	94.50	18.375	0	0	0	0	0.00
	5.36	92.65	329.07	N/A	no repair	5.66	97.65	5.67	97.65	18.375	0	0	0	0	0.00
	5.42	97.60	329.07	N/A	no repair	5.72	102.60	5.71	102.60	18.375	0	0	0	0	0.00
	5.65	96	329.07	N/A	no repair	5.95	101	6.03	101	18.375	0	0	0	0	0.00
	5.72	103.60	329.07	N/A	repair	0.00	0.00	6.37	113.60	18.375	100	147	200	441	0.00
	0.00	0.00	329.07	N/A	no repair	0.00	0.00	7.05	133.00	18.375	0	0	0	0	562.86
	0.00	0.00	335.65	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0.00	0.00	335.65	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00
	0	0	335.65	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00
	5.41	90.20	335.65	N/A	no repair	5.71	95.20	5.71	95.20	18.375	0	0	0	0	0.00
	5.44	91.05	335.65	N/A	no repair	5.74	96.05	5.74	96.05	18.375	0	0	0	0	0.00
60	5.46	92.4	335.65	N/A	no repair	5.76	97.4	5.76	97.4	18.375	0	0	0	0	0.00
	5.63	94.50	335.65	N/A	no repair	5.93	99.50	5.93	99.50	18.375	0	0	0	0	0.00
	5.66	97.65	335.65	N/A	no repair	5.96	102.65	5.97	102.65	18.375	0	0	0	0	0.00
	5.715	102.6	335.65	N/A	repair	0	0	6.3075	112.6	18.375	100	147	200	441	0.00
	5.95	101.00	335.65	N/A	repair	0.00	0.00	6.63	111.00	18.375	100	147	200	441	0.00
	0.00	0.00	335.65	N/A	no repair	0.00	0.00	6.97	123.60	18.375	0	0	0	0	0.00
	0.00	0.00	335.65	N/A	no repair	0.00	0.00	7.65	143.00	18.375	0	0	0	0	574.11

Difference "surface"	interest "partial"	Difference"partial"	interest "in depth"	Difference" in depth"	Total cost "surface"	Total cost "partial"	Total cost "in depth"	initial Crack width(mm)	initialCrack length (mm)	Inspection cost	Decision	repair cost (surface treatment)	Repair cost Partial in depth
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	0.25	5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	0.25	7.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	0.25	10	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	0.5	10	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	0.5	15	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	0.5	20	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	0.75	15	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	0.75	22.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	0.75	30	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	1	20	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	1	30	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	248.78	248.78	248.78	1	40	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	0.55	10	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	0.55	12.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	0.55	15	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	0.8	15	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	0.8	20	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	0.8	25	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	1.05	20	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	1.05	27.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	1.05	35	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	1.3	25	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	1.3	35	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	271.76	271.76	271.76	1.3	45	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	0.85	15	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	0.85	17.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	0.85	20	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	1.1	20	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	1.1	25	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	1.1	30	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	1.35	25	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	1.35	32.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	1.35	40	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	1.6	30	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	1.6	40	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	294.83	294.83	294.83	1.6	50	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.15	20	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.15	22.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.15	25	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.4	25	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.4	30	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.4	35	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.65	30	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.65	37.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.65	45	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.9	35	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.9	45	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	318.00	318.00	318.00	1.9	55	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	1.45	25	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	1.45	27.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	1.45	30	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	1.7	30	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	1.7	35	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	1.7	40	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	1.95	35	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	1.95	42.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	1.95	50	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	2.2	40	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	2.2	50	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	341.27	341.27	341.27	2.2	60	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	1.75	30	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	1.75	32.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	1.75	35	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	2	35	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	2	40	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	2	45	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	2.25	40	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	2.25	47.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	2.25	55	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	2.5	45	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	2.5	55	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	364.63	364.63	364.63	2.5	65	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.05	35	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.05	37.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.05	40	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.3	40	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.3	45	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.3	50	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.55	45	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.55	52.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.55	60	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.8	50	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.8	60	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	388.09	388.09	388.09	2.8	70	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	2.35	40	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	2.35	42.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	2.35	45	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	2.6	45	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	2.6	50	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	2.6	55	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	2.85	50	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	2.85	57.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	2.85	65	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	3.1	55	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	3.1	65	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	411.66	411.66	411.66	3.1	75	36.75	no repair	0	0

0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	2.65	45	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	2.65	47.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	2.65	50	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	2.9	50	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	2.9	55	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	2.9	60	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	3.15	55	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	3.15	62.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	3.15	70	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	3.4	60	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	3.4	70	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	435.33	435.33	435.33	3.4	80	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	2.95	50	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	2.95	52.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	2.95	55	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	3.2	55	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	3.2	60	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	3.2	65	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	3.45	60	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	3.45	67.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	3.45	75	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	3.7	65	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	3.7	75	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	459.10	459.10	459.10	3.7	85	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	3.25	55	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	3.25	57.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	3.25	60	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	3.5	60	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	3.5	65	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	3.5	70	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	3.75	65	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	3.75	72.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	3.75	80	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	4	70	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	4	80	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	482.98	482.98	482.98	4	90	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	3.55	60	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	3.55	62.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	3.55	65	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	3.8	65	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	3.8	70	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	3.8	75	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	4.05	70	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	4.05	77.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	4.05	85	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	4.3	75	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	4.3	85	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	506.97	506.97	506.97	4.3	95	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	3.85	65	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	3.85	67.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	3.85	70	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	4.1	70	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	4.1	75	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	4.1	80	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	4.35	75	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	4.35	82.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	4.35	90	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	4.6	80	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	4.6	90	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	531.08	531.08	531.08	4.6	100	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.15	70	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.15	72.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.15	75	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.4	75	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.4	80	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.4	85	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.65	80	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.65	87.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.65	95	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.9	85	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.9	95	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	555.30	555.30	555.30	4.9	105	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	4.45	75	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	4.45	77.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	4.45	80	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	4.7	80	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	4.7	85	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	4.7	90	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	4.95	85	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	4.95	92.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	4.95	100	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	5.2	90	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	5.2	100	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	579.63	579.63	579.63	5.2	110	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	4.75	80	36.75	no repair	0	0

0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	4.75	82.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	4.75	85	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	5	85	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	5	90	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	5	95	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	5.25	90	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	5.25	97.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	5.25	105	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	5.5	95	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	604.09	604.09	604.09	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	628.66	628.66	628.66	5.05	85	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	628.66	628.66	628.66	5.05	87.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	628.66	628.66	628.66	5.05	90	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	628.66	628.66	628.66	5.3	90	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	628.66	628.66	628.66	5.3	95	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	628.66	628.66	628.66	5.3	100	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	628.66	628.66	628.66	5.55	95	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	628.66	628.66	628.66	5.55	102.5	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	628.66	628.66	628.66	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	628.66	628.66	628.66	5.8	100	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	628.66	628.66	628.66	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	1169.66	1216.66	1269.66	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	653.37	653.37	653.37	5.35	90	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	653.37	653.37	653.37	5.35	92.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	653.37	653.37	653.37	5.35	95	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	653.37	653.37	653.37	5.6	95	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	653.37	653.37	653.37	5.6	100	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	653.37	653.37	653.37	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	653.37	653.37	653.37	5.85	100	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	653.37	653.37	653.37	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	653.37	653.37	653.37	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	653.37	653.37	653.37	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	653.37	653.37	653.37	0	0	36.75	no repair	0	0
10.82	599.76	11.76	653.82	12.82	1205.19	1253.13	1307.19	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	678.19	678.19	678.19	5.65	95	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	678.19	678.19	678.19	5.65	97.5	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	678.19	678.19	678.19	5.65	100	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	678.19	678.19	678.19	5.9	100	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	678.19	678.19	678.19	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	678.19	678.19	678.19	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	678.19	678.19	678.19	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	678.19	678.19	678.19	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	678.19	678.19	678.19	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	678.19	678.19	678.19	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	1219.19	1266.19	1319.19	0	0	36.75	no repair	0	0
11.04	611.76	12.00	666.90	13.08	1241.05	1289.95	1345.09	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	703.15	703.15	703.15	5.95	100	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	703.15	703.15	703.15	5.95	102.5	36.75	repair	100	147
0.00	0.00	0.00	0.00	0.00	703.15	703.15	703.15	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	703.15	703.15	703.15	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	703.15	703.15	703.15	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	703.15	703.15	703.15	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	703.15	703.15	703.15	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	703.15	703.15	703.15	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	1244.15	1291.15	1344.15	0	0	36.75	no repair	0	0
0.00	0.00	0.00	0.00	0.00	1244.15	1291.15	1344.15	0	0	36.75	no repair	0	0
10.82	0.00	11.76	0.00	12.82	1254.97	1302.91	1356.97	0	0	36.75	no repair	0	0
11.26	623.99	12.24	680.23	13.34	1277.26	1327.14	1383.38	0	0	36.75	no repair	0	0

In depth repair	Disruption cost	repair,disruption interst "surface"	Difference	Repair, disruption interest "partial"	Difference	Repair, disruption interest "in depth"	Difference	Total cost surface treatment	Total cost partial in depth	Total cost in depth repair	final Crack width	final Crack length	width (no repair)	Lenght(no repair)
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	0.55	10	0.55	10
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	0.55	12.5	0.55	12.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	0.55	15	0.55	15
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	0.8	15	0.8	15
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	0.8	20	0.8	20
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	0.8	25	0.8	25
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	1.05	20	1.05	20
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	1.05	27.5	1.05	27.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	1.05	35	1.05	35
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	1.3	25	1.3	25
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	1.3	35	1.3	35
0	0	0.00	0.00	0.00	0.00	0.00	0.00	36.75	36.75	36.75	1.3	45	1.3	45
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	0.85	15	0.85	15
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	0.85	17.5	0.85	17.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	0.85	20	0.85	20
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	1.1	20	1.1	20
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	1.1	25	1.1	25
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	1.1	30	1.1	30
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	1.35	25	1.35	25
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	1.35	32.5	1.35	32.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	1.35	40	1.35	40
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	1.6	30	1.6	30
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	1.6	40	1.6	40
0	0	0.00	0.00	0.00	0.00	0.00	0.00	73.50	73.50	73.50	1.6	50	1.6	50
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.15	20	1.15	20
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.15	22.5	1.15	22.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.15	25	1.15	25
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.4	25	1.4	25
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.4	30	1.4	30
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.4	35	1.4	35
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.65	30	1.65	30
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.65	37.5	1.65	37.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.65	45	1.65	45
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.9	35	1.9	35
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.9	45	1.9	45
0	0	0.00	0.00	0.00	0.00	0.00	0.00	110.25	110.25	110.25	1.9	55	1.9	55
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	1.45	25	1.45	25
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	1.45	27.5	1.45	27.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	1.45	30	1.45	30
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	1.7	30	1.7	30
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	1.7	35	1.7	35
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	1.7	40	1.7	40
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	1.95	35	1.95	35
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	1.95	42.5	1.95	42.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	1.95	50	1.95	50
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	2.2	40	2.2	40
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	2.2	50	2.2	50
0	0	0.00	0.00	0.00	0.00	0.00	0.00	147.00	147.00	147.00	2.2	60	2.2	60
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	1.75	30	1.75	30
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	1.75	32.5	1.75	32.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	1.75	35	1.75	35
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	2	35	2	35
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	2	40	2	40
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	2	45	2	45
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	2.25	40	2.25	40
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	2.25	47.5	2.25	47.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	2.25	55	2.25	55
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	2.5	45	2.5	45
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	2.5	55	2.5	55
0	0	0.00	0.00	0.00	0.00	0.00	0.00	183.75	183.75	183.75	2.5	65	2.5	65
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.05	35	2.05	35
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.05	37.5	2.05	37.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.05	40	2.05	40
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.3	40	2.3	40
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.3	45	2.3	45
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.3	50	2.3	50
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.55	45	2.55	45
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.55	52.5	2.55	52.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.55	60	2.55	60
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.8	50	2.8	50
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.8	60	2.8	60
0	0	0.00	0.00	0.00	0.00	0.00	0.00	220.50	220.50	220.50	2.8	70	2.8	70
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	2.35	40	2.35	40
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	2.35	42.5	2.35	42.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	2.35	45	2.35	45
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	2.6	45	2.6	45
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	2.6	50	2.6	50
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	2.6	55	2.6	55
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	2.85	50	2.85	50
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	2.85	57.5	2.85	57.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	2.85	65	2.85	65
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	3.1	55	3.1	55
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	3.1	65	3.1	65
0	0	0.00	0.00	0.00	0.00	0.00	0.00	257.25	257.25	257.25	3.1	75	3.1	75
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	2.65	45	2.65	45
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	2.65	47.5	2.65	47.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	2.65	50	2.65	50
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	2.9	50	2.9	50
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	2.9	55	2.9	55
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	2.9	60	2.9	60
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	3.15	55	3.15	55
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	3.15	62.5	3.15	62.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	3.15	70	3.15	70
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	3.4	60	3.4	60
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	3.4	70	3.4	70
0	0	0.00	0.00	0.00	0.00	0.00	0.00	294.00	294.00	294.00	3.4	80	3.4	80

0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	2.95	50	2.95	50
0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	2.95	52.5	2.95	52.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	2.95	55	2.95	55
0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	3.2	55	3.2	55
0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	3.2	60	3.2	60
0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	3.2	65	3.2	65
0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	3.45	60	3.45	60
0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	3.45	67.5	3.45	67.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	3.45	75	3.45	75
0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	3.7	65	3.7	65
0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	3.7	75	3.7	75
0	0	0.00	0.00	0.00	0.00	0.00	0.00	330.75	330.75	330.75	3.7	85	3.7	85
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	3.25	55	3.25	55
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	3.25	57.5	3.25	57.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	3.25	60	3.25	60
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	3.5	60	3.5	60
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	3.5	65	3.5	65
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	3.5	70	3.5	70
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	3.75	65	3.75	65
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	3.75	72.5	3.75	72.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	3.75	80	3.75	80
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	4	70	4	70
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	4	80	4	80
0	0	0.00	0.00	0.00	0.00	0.00	0.00	367.50	367.50	367.50	4	90	4	90
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	3.55	60	3.55	60
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	3.55	62.5	3.55	62.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	3.55	65	3.55	65
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	3.8	65	3.8	65
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	3.8	70	3.8	70
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	3.8	75	3.8	75
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	4.05	70	4.05	70
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	4.05	77.5	4.05	77.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	4.05	85	4.05	85
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	4.3	75	4.3	75
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	4.3	85	4.3	85
0	0	0.00	0.00	0.00	0.00	0.00	0.00	404.25	404.25	404.25	4.3	95	4.3	95
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	3.85	65	3.85	65
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	3.85	67.5	3.85	67.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	3.85	70	3.85	70
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	4.1	70	4.1	70
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	4.1	75	4.1	75
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	4.1	80	4.1	80
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	4.35	75	4.35	75
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	4.35	82.5	4.35	82.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	4.35	90	4.35	90
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	4.6	80	4.6	80
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	4.6	90	4.6	90
0	0	0.00	0.00	0.00	0.00	0.00	0.00	441.00	441.00	441.00	4.6	100	4.6	100
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.15	70	4.15	70
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.15	72.5	4.15	72.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.15	75	4.15	75
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.4	75	4.4	75
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.4	80	4.4	80
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.4	85	4.4	85
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.65	80	4.65	80
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.65	87.5	4.65	87.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.65	95	4.65	95
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.9	85	4.9	85
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.9	95	4.9	95
0	0	0.00	0.00	0.00	0.00	0.00	0.00	477.75	477.75	477.75	4.9	105	4.9	105
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	4.45	75	4.45	75
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	4.45	77.5	4.45	77.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	4.45	80	4.45	80
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	4.7	80	4.7	80
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	4.7	85	4.7	85
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	4.7	90	4.7	90
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	4.95	85	4.95	85
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	4.95	92.5	4.95	92.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	4.95	100	4.95	100
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	5.2	90	5.2	90
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	5.2	100	5.2	100
0	0	0.00	0.00	0.00	0.00	0.00	0.00	514.50	514.50	514.50	5.2	110	5.2	110
0	0	0.00	0.00	0.00	0.00	0.00	0.00	551.25	551.25	551.25	4.75	80	4.75	80
0	0	0.00	0.00	0.00	0.00	0.00	0.00	551.25	551.25	551.25	4.75	82.5	4.75	82.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	551.25	551.25	551.25	4.75	85	4.75	85
0	0	0.00	0.00	0.00	0.00	0.00	0.00	551.25	551.25	551.25	5	85	5	85
0	0	0.00	0.00	0.00	0.00	0.00	0.00	551.25	551.25	551.25	5	90	5	90
0	0	0.00	0.00	0.00	0.00	0.00	0.00	551.25	551.25	551.25	5	95	5	95
0	0	0.00	0.00	0.00	0.00	0.00	0.00	551.25	551.25	551.25	5.25	90	5.25	90
0	0	0.00	0.00	0.00	0.00	0.00	0.00	551.25	551.25	551.25	5.25	97.5	5.25	97.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	551.25	551.25	551.25	5.25	105	5.25	105
0	0	0.00	0.00	0.00	0.00	0.00	0.00	551.25	551.25	551.25	5.5	95	5.5	95
200	441	0.00	0.00	0.00	0.00	0.00	0.00	1092.25	1139.25	1192.25	0	0	5.8	110
200	441	0.00	0.00	0.00	0.00	0.00	0.00	1092.25	1139.25	1192.25	0	0	5.8	120
0	0	0.00	0.00	0.00	0.00	0.00	0.00	588.00	588.00	588.00	5.05	85	5.05	85

0	0	0.00	0.00	0.00	0.00	0.00	0.00	588.00	588.00	588.00	5.05	87.5	5.05	87.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	588.00	588.00	588.00	5.05	90	5.05	90
0	0	0.00	0.00	0.00	0.00	0.00	0.00	588.00	588.00	588.00	5.3	90	5.3	90
0	0	0.00	0.00	0.00	0.00	0.00	0.00	588.00	588.00	588.00	5.3	95	5.3	95
0	0	0.00	0.00	0.00	0.00	0.00	0.00	588.00	588.00	588.00	5.3	100	5.3	100
0	0	0.00	0.00	0.00	0.00	0.00	0.00	588.00	588.00	588.00	5.55	95	5.55	95
0	0	0.00	0.00	0.00	0.00	0.00	0.00	588.00	588.00	588.00	5.55	102.5	5.55	102.5
200	441	0.00	0.00	0.00	0.00	0.00	0.00	1129.00	1176.00	1229.00	0	0	5.85	115
0	0	0.00	0.00	0.00	0.00	0.00	0.00	588.00	588.00	588.00	5.8	100	5.8	100
0	0	551.82	10.82	599.76	11.76	653.82	12.82	1139.82	1187.76	1241.82	0	0	6.4	120
0	0	551.82	10.82	599.76	11.76	653.82	12.82	1139.82	1187.76	1241.82	0	0	6.4	130
0	0	0.00	0.00	0.00	0.00	0.00	0.00	624.75	624.75	624.75	5.35	90	5.35	90
0	0	0.00	0.00	0.00	0.00	0.00	0.00	624.75	624.75	624.75	5.35	92.5	5.35	92.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	624.75	624.75	624.75	5.35	95	5.35	95
0	0	0.00	0.00	0.00	0.00	0.00	0.00	624.75	624.75	624.75	5.6	95	5.6	95
0	0	0.00	0.00	0.00	0.00	0.00	0.00	624.75	624.75	624.75	5.6	100	5.6	100
200	441	0.00	0.00	0.00	0.00	0.00	0.00	1165.75	1212.75	1265.75	0	0	5.9	110
0	0	0.00	0.00	0.00	0.00	0.00	0.00	624.75	624.75	624.75	5.85	100	5.85	100
200	441	0.00	0.00	0.00	0.00	0.00	0.00	1165.75	1212.75	1265.75	0	0	6.15	112.5
0	0	551.82	10.82	599.76	11.76	653.82	12.82	1176.57	1224.51	1278.57	0	0	6.45	125
200	441	0.00	0.00	0.00	0.00	0.00	0.00	1165.75	1212.75	1265.75	0	0	6.4	110
0	0	562.86	11.04	611.76	12.00	666.90	13.08	1187.61	1236.51	1291.65	0	0	7	130
0	0	562.86	11.04	611.76	12.00	666.90	13.08	1187.61	1236.51	1291.65	0	0	7	140
0	0	0.00	0.00	0.00	0.00	0.00	0.00	661.50	661.50	661.50	5.65	95	5.65	95
0	0	0.00	0.00	0.00	0.00	0.00	0.00	661.50	661.50	661.50	5.65	97.5	5.65	97.5
0	0	0.00	0.00	0.00	0.00	0.00	0.00	661.50	661.50	661.50	5.65	100	5.65	100
0	0	0.00	0.00	0.00	0.00	0.00	0.00	661.50	661.50	661.50	5.9	100	5.9	100
200	441	0.00	0.00	0.00	0.00	0.00	0.00	1202.50	1249.50	1302.50	0	0	6.2	110
0	0	551.82	10.82	599.76	11.76	653.82	12.82	1213.32	1261.26	1315.32	0	0	6.5	120
200	441	551.82	10.82	599.76	11.76	653.82	12.82	1213.32	1261.26	1315.32	0	0	6.45	110
0	0	551.82	10.82	599.76	11.76	653.82	12.82	1213.32	1261.26	1315.32	0	0	6.75	122.5
0	0	562.86	11.04	611.76	12.00	666.90	13.08	1224.36	1273.26	1328.40	0	0	7.05	135
0	0	551.82	10.82	599.76	11.76	653.82	12.82	1213.32	1261.26	1315.32	0	0	7	120
0	0	574.11	11.26	623.99	12.24	680.23	13.34	1235.61	1285.49	1341.73	0	0	7.6	140
0	0	574.11	11.26	623.99	12.24	680.23	13.34	1235.61	1285.49	1341.73	0	0	7.6	150
0	0	0.00	0.00	0.00	0.00	0.00	0.00	698.25	698.25	698.25	5.95	100	5.95	100
0	0	0.00	0.00	0.00	0.00	0.00	0.00	698.25	698.25	698.25	5.95	102.5	5.95	102.5
200	441	0.00	0.00	0.00	0.00	0.00	0.00	1239.25	1286.25	1339.25	0	0	6.25	110
200	441	0.00	0.00	0.00	0.00	0.00	0.00	1239.25	1286.25	1339.25	0	0	6.5	110
0	0	551.82	10.82	599.76	11.76	653.82	12.82	1250.07	1298.01	1352.07	0	0	6.8	120
0	0	562.86	11.04	611.76	12.00	666.90	13.08	1261.11	1310.01	1365.15	0	0	7.1	130
0	0	551.82	10.82	599.76	11.76	653.82	12.82	1260.89	1309.77	1364.89	0	0	7.05	120
0	0	562.86	11.04	611.76	12.00	666.90	13.08	1261.11	1310.01	1365.15	0	0	7.35	132.5
0	0	574.11	11.26	623.99	12.24	680.23	13.34	1272.36	1322.24	1378.48	0	0	7.65	145
0	0	562.86	11.04	611.76	12.00	666.90	13.08	1261.11	1310.01	1365.15	0	0	7.6	130
0	0	585.60	11.48	636.47	12.48	693.84	13.60	1283.85	1334.72	1392.09	0	0	8.2	150
0	0	585.60	11.48	636.47	12.48	693.84	13.60	1283.85	1334.72	1392.09	0	0	8.2	160
200	441	0.00	0.00	0.00	0.00	0.00	0.00	1276.00	1323.00	1376.00	0	0	6.55	110
200	441	0.00	0.00	0.00	0.00	0.00	0.00	1276.00	1323.00	1376.00	0	0	6.55	112.5
0	0	551.82	10.82	599.76	11.76	653.82	12.82	1286.82	1334.76	1388.82	0	0	6.85	120
0	0	551.82	11.04	599.76	12.00	653.82	13.08	1287.04	1335.00	1389.08	0	0	7.1	120
0	0	562.86	11.04	611.76	12.00	666.90	13.08	1297.86	1346.76	1401.90	0	0	7.4	130
0	0	574.11	11.26	623.99	12.24	680.23	13.34	1309.11	1358.99	1415.23	0	0	7.7	140
0	0	562.86	11.04	611.76	12.00	666.90	13.08	1308.68	1358.52	1414.72	0	0	7.65	130
0	0	574.11	11.26	623.99	12.24	680.23	13.34	1309.11	1358.99	1415.23	0	0	7.95	142.5
0	0	585.60	11.48	636.47	12.48	693.84	13.60	1320.60	1371.47	1428.84	0	0	8.25	155
0	0	574.11	11.26	623.99	12.24	680.23	13.34	1309.11	1358.99	1415.23	0	0	8.2	140
0	0	597.31	11.71	649.20	12.73	707.72	13.88	1332.31	1384.20	1442.72	0	0	8.8	160
0	0	597.31	11.71	649.20	12.73	707.72	13.88	1332.31	1384.20	1442.72	0	0	8.8	170

Calculations for second time period (5-10) years

duration(months)	Crack width(mm)	Crack length (mm)	Self healing cost	Percentage of healing	Decision	Crack width (after healing)	Crack length (after healing)	No repair Width	No repair length	Inspection cost	Surface repair	Partial in depth repair	In depth repair	disruption cost	interest on repair "surface"	Difference "surface"	interest on repair"partial"
3	0.25	5	335.65	100%	no repair	0.00	0.00	0.00	0.00	367.5	0	0	0	0	0.00	0.00	0.00
	0.25	7.5	335.65	100%	no repair	0.00	0.00	0.00	0.00	367.5	0	0	0	0	0.00	0.00	0.00
	0.25	10	335.65	100%	no repair	0.00	0.00	0.00	0.00	367.5	0	0	0	0	0.00	0.00	0.00
	0.5	10	335.65	98%	no repair	0.01	0.20	0.01	0.20	367.5	0	0	0	0	0.00	0.00	0.00
	0.5	15	335.65	93%	no repair	0.04	1.05	0.04	1.05	367.5	0	0	0	0	0.00	0.00	0.00
	0.5	20	335.65	88%	no repair	0.06	2.40	0.06	2.40	367.5	0	0	0	0	0.00	0.00	0.00
	0.75	15	335.65	70%	no repair	0.23	4.50	0.23	4.50	367.5	0	0	0	0	0.00	0.00	0.00
	0.75	22.5	335.65	66%	no repair	0.26	7.65	0.27	8.10	367.5	0	0	0	0	0.00	0.00	0.00
	0.75	30	335.65	58%	no repair	0.32	12.60	0.31	12.30	367.5	0	0	0	0	0.00	0.00	0.00
	1	20	335.65	45%	no repair	0.55	11.00	0.63	12.60	367.5	0	0	0	0	0.00	0.00	0.00
	1	30	335.65	38%	no repair	0.62	18.60	0.67	20.10	367.5	0	0	0	0	0.00	0.00	0.00
	1	40	335.65	30%	no repair	0.70	28.00	0.75	30.00	367.5	0	0	0	0	0.00	0.00	0.00
6	0.00	0.00	342.36	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	342.36	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	342.36	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.01	0.20	342.36	N/A	no repair	0.31	5.20	0.31	5.20	18.375	0	0	0	0	0.00	0.00	0.00
	0.04	1.05	342.36	N/A	no repair	0.34	6.05	0.34	6.05	18.375	0	0	0	0	0.00	0.00	0.00
	0.06	2.40	342.36	N/A	no repair	0.36	7.40	0.36	7.40	18.375	0	0	0	0	0.00	0.00	0.00
	0.23	4.50	342.36	N/A	no repair	0.53	9.50	0.53	9.50	18.375	0	0	0	0	0.00	0.00	0.00
	0.26	7.65	342.36	N/A	no repair	0.56	12.65	0.57	13.10	18.375	0	0	0	0	0.00	0.00	0.00
	0.32	12.60	342.36	N/A	no repair	0.62	17.60	0.61	17.30	18.375	0	0	0	0	0.00	0.00	0.00
	0.55	11.00	342.36	N/A	no repair	0.85	16.00	0.93	17.60	18.375	0	0	0	0	0.00	0.00	0.00
	0.62	18.60	342.36	N/A	no repair	0.92	23.60	0.97	25.10	18.375	0	0	0	0	0.00	0.00	0.00
	0.70	28.00	342.36	N/A	no repair	1.00	33.00	1.05	35.00	18.375	0	0	0	0	0.00	0.00	0.00
9	0.00	0.00	349.21	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	349.21	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	349.21	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.31	5.20	349.21	N/A	no repair	0.61	10.20	0.61	10.20	18.375	0	0	0	0	0.00	0.00	0.00
	0.34	6.05	349.21	N/A	no repair	0.64	11.05	0.64	11.05	18.375	0	0	0	0	0.00	0.00	0.00
	0.36	7.40	349.21	N/A	no repair	0.66	12.40	0.66	12.40	18.375	0	0	0	0	0.00	0.00	0.00
	0.53	9.50	349.21	N/A	no repair	0.83	14.50	0.83	14.50	18.375	0	0	0	0	0.00	0.00	0.00
	0.56	12.65	349.21	N/A	no repair	0.86	17.65	0.87	18.10	18.375	0	0	0	0	0.00	0.00	0.00
	0.62	17.60	349.21	N/A	no repair	0.92	22.60	0.91	22.30	18.375	0	0	0	0	0.00	0.00	0.00
	0.85	16.00	349.21	N/A	no repair	1.15	21.00	1.23	22.60	18.375	0	0	0	0	0.00	0.00	0.00
	0.92	23.60	349.21	N/A	no repair	1.22	28.60	1.27	30.10	18.375	0	0	0	0	0.00	0.00	0.00
	1.00	33.00	349.21	N/A	no repair	1.30	38.00	1.35	40.00	18.375	0	0	0	0	0.00	0.00	0.00
12	0.00	0.00	356.19	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	356.19	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	356.19	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.61	10.20	356.19	N/A	no repair	0.91	15.20	0.91	15.20	18.375	0	0	0	0	0.00	0.00	0.00
	0.64	11.05	356.19	N/A	no repair	0.94	16.05	0.94	16.05	18.375	0	0	0	0	0.00	0.00	0.00
	0.66	12.40	356.19	N/A	no repair	0.96	17.40	0.96	17.40	18.375	0	0	0	0	0.00	0.00	0.00
	0.83	14.50	356.19	N/A	no repair	1.13	19.50	1.13	19.50	18.375	0	0	0	0	0.00	0.00	0.00
	0.86	17.65	356.19	N/A	no repair	1.16	22.65	1.17	23.10	18.375	0	0	0	0	0.00	0.00	0.00
	0.92	22.60	356.19	N/A	no repair	1.22	27.60	1.21	27.30	18.375	0	0	0	0	0.00	0.00	0.00
	1.15	21.00	356.19	N/A	no repair	1.45	26.00	1.53	27.60	18.375	0	0	0	0	0.00	0.00	0.00
	1.22	28.60	356.19	N/A	no repair	1.52	33.60	1.57	35.10	18.375	0	0	0	0	0.00	0.00	0.00
	1.30	38.00	356.19	N/A	no repair	1.60	43.00	1.65	45.00	18.375	0	0	0	0	0.00	0.00	0.00
15	0.00	0.00	363.32	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	363.32	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	363.32	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.91	15.20	363.32	N/A	no repair	1.21	20.20	1.21	20.20	18.375	0	0	0	0	0.00	0.00	0.00
	0.94	16.05	363.32	N/A	no repair	1.24	21.05	1.24	21.05	18.375	0	0	0	0	0.00	0.00	0.00
	0.96	17.40	363.32	N/A	no repair	1.26	22.40	1.26	22.40	18.375	0	0	0	0	0.00	0.00	0.00
	1.13	19.50	363.32	N/A	no repair	1.43	24.50	1.43	24.50	18.375	0	0	0	0	0.00	0.00	0.00
	1.16	22.65	363.32	N/A	no repair	1.46	27.65	1.47	27.65	18.375	0	0	0	0	0.00	0.00	0.00
	1.22	27.60	363.32	N/A	no repair	1.52	32.60	1.51	32.60	18.375	0	0	0	0	0.00	0.00	0.00
	1.45	26.00	363.32	N/A	no repair	1.75	31.00	1.83	31.00	18.375	0	0	0	0	0.00	0.00	0.00
	1.52	33.60	363.32	N/A	no repair	1.82	38.60	1.87	38.60	18.375	0	0	0	0	0.00	0.00	0.00
	1.60	43.00	363.32	N/A	no repair	1.90	48.00	1.95	48.00	18.375	0	0	0	0	0.00	0.00	0.00
18	0.00	0.00	370.58	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	370.58	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	370.58	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	1.21	20.20	370.58	N/A	no repair	1.51	25.20	1.51	25.20	18.375	0	0	0	0	0.00	0.00	0.00
	1.24	21.05	370.58	N/A	no repair	1.54	26.05	1.54	26.05	18.375	0	0	0	0	0.00	0.00	0.00
	1.26	22.40	370.58	N/A	no repair	1.56	27.40	1.56	27.40	18.375	0	0	0	0	0.00	0.00	0.00
	1.43	24.50	370.58	N/A	no repair	1.73	29.50	1.73	29.50	18.375	0	0	0	0	0.00	0.00	0.00
	1.46	27.65	370.58	N/A	no repair	1.76	32.65	1.77	32.65	18.375	0	0	0	0	0.00	0.00	0.00
	1.52	32.60	370.58	N/A	no repair	1.82	37.60	1.81	37.60	18.375	0	0	0	0	0.00	0.00	0.00
	1.75	31.00	370.58	N/A	no repair	2.05	36.00	2.13	36.00	18.375	0	0	0	0	0.00	0.00	0.00
	1.82	38.60	370.58	N/A	no repair	2.12	43.60	2.17	43.60	18.375	0	0	0	0	0.00	0.00	0.00
	1.90	48.00	370.58	N/A	no repair	2.20	53.00	2.25	53.00	18.375	0	0	0	0	0.00	0.00	0.00
21	0.00	0.00	378.00	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	378.00	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	378.00	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	1.51	25.20	378.00	N/A	no repair	1.81	30.20	1.81	30.20	18.375	0	0	0	0	0.00	0.00	0.00
	1.54	26.05	378.00	N/A	no repair	1.84	31.05	1.84	31.05	18.375	0	0	0	0	0.00	0.00	0.00
	1.56	27.40	378.00	N/A	no repair	1.86	32.40	1.86	32.40	18.375	0	0	0	0	0.00	0.00	0.00
	1.73	29.50	378.00	N/A	no repair	2.03	34.50	2.03	34.50	18.375	0	0	0	0	0.00	0.00	0.00
	1.76	32.65	378.00	N/A	no repair	2.06	37.65	2.07	37.65	18.375	0	0	0	0	0.00	0.00	0.00
	1.82	37.60	378.00	N/A	no repair	2.12	42.60	2.11	42.60	18.375	0	0	0	0	0.00	0.00	0.00
	2.05	36.00	378.00	N/A	no repair	2.35	41.00	2.43	41.00	18.375	0	0	0	0	0.00	0.00	0.00
	2.12	43.60	378.00	N/A	no repair	2.42	48.60	2.47	48.60	18.375	0	0	0	0	0.00	0.00	0.00
	2.20	53.00	378.00	N/A	no repair	2.50	58.00	2.55	58.00	18.375	0	0	0	0	0.00	0.00	0.00
24	0.00	0.00	385.56	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	385.56	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	385.56	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	1.81	30.20	385.56	N/A	no repair	2.11	35.20	2.11	35.20	18.375	0	0	0	0	0.00	0.00	0.00
	1.84	31.05	385.56	N/A	no repair	2.14	36.05	2.14	36.05	18.375	0	0	0	0	0.00	0.00	0.00
	1.86	32.4	385.56	N/A	no repair	2.16	37.4	2.16	37.4	18.375	0	0	0	0	0.00	0.00	0.00
	2.03	34.50	385.56	N/A	no repair	2.33	39.50	2.33	39.50	18.375	0	0	0	0	0.00	0.00	0.00
	2.06	37.65	385.56	N/A	no repair	2.36	42.65	2.37	42.65	18.375	0	0	0	0	0.00	0.00	0.00
	2.115	42.6	385.56	N/A	no repair	2.415	47.6	2.4075	47.6	18.375	0	0	0	0	0.00	0.00	0.00
	2.35	41.00	385.56	N/A	no repair	2.65	46.00	2.73	46.00	18.375	0	0	0	0	0.00	0.00	0.00
	2.42	48.60	385.56	N/A	no repair	2.72	53.60	2.77	53.60	18.375	0	0	0	0	0.00	0.00	0.00
	2.50	58.00	385.56	N/A	no repair	2.80	63.00	2.85	63.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	393.27	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	393.27	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00

	0	0	393.27	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	2.11	35.20	393.27	N/A	no repair	2.41	40.20	2.41	40.20	18.375	0	0	0	0	0.00	0.00	0.00
	2.14	36.05	393.27	N/A	no repair	2.44	41.05	2.44	41.05	18.375	0	0	0	0	0.00	0.00	0.00
27	2.16	37.4	393.27	N/A	no repair	2.46	42.4	2.46	42.4	18.375	0	0	0	0	0.00	0.00	0.00
	2.33	39.50	393.27	N/A	no repair	2.63	44.50	2.63	44.50	18.375	0	0	0	0	0.00	0.00	0.00
	2.36	42.65	393.27	N/A	no repair	2.66	47.65	2.67	47.65	18.375	0	0	0	0	0.00	0.00	0.00
	2.415	47.6	393.27	N/A	no repair	2.715	52.6	2.7075	52.6	18.375	0	0	0	0	0.00	0.00	0.00
	2.65	46.00	393.27	N/A	no repair	2.95	51.00	3.03	51.00	18.375	0	0	0	0	0.00	0.00	0.00
	2.72	53.60	393.27	N/A	no repair	3.02	58.60	3.07	58.60	18.375	0	0	0	0	0.00	0.00	0.00
	2.80	63.00	393.27	N/A	no repair	3.10	68.00	3.15	68.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	401.13	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	401.13	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	401.13	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	2.41	40.20	401.13	N/A	no repair	2.71	45.20	2.71	45.20	18.375	0	0	0	0	0.00	0.00	0.00
	2.44	41.05	401.13	N/A	no repair	2.74	46.05	2.74	46.05	18.375	0	0	0	0	0.00	0.00	0.00
30	2.46	42.4	401.13	N/A	no repair	2.76	47.4	2.76	47.4	18.375	0	0	0	0	0.00	0.00	0.00
	2.63	44.50	401.13	N/A	no repair	2.93	49.50	2.93	49.50	18.375	0	0	0	0	0.00	0.00	0.00
	2.66	47.65	401.13	N/A	no repair	2.96	52.65	2.97	52.65	18.375	0	0	0	0	0.00	0.00	0.00
	2.715	52.6	401.13	N/A	no repair	3.015	57.6	3.0075	57.6	18.375	0	0	0	0	0.00	0.00	0.00
	2.95	51.00	401.13	N/A	no repair	3.25	56.00	3.33	56.00	18.375	0	0	0	0	0.00	0.00	0.00
	3.02	58.60	401.13	N/A	no repair	3.32	63.60	3.37	63.60	18.375	0	0	0	0	0.00	0.00	0.00
	3.10	68.00	401.13	N/A	no repair	3.40	73.00	3.45	73.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	409.15	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	409.15	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	409.15	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	2.71	45.20	409.15	N/A	no repair	3.01	50.20	3.01	50.20	18.375	0	0	0	0	0.00	0.00	0.00
	2.74	46.05	409.15	N/A	no repair	3.04	51.05	3.04	51.05	18.375	0	0	0	0	0.00	0.00	0.00
33	2.76	47.4	409.15	N/A	no repair	3.06	52.4	3.06	52.4	18.375	0	0	0	0	0.00	0.00	0.00
	2.93	49.50	409.15	N/A	no repair	3.23	54.50	3.23	54.50	18.375	0	0	0	0	0.00	0.00	0.00
	2.96	52.65	409.15	N/A	no repair	3.26	57.65	3.27	57.65	18.375	0	0	0	0	0.00	0.00	0.00
	3.015	57.6	409.15	N/A	no repair	3.315	62.6	3.3075	62.6	18.375	0	0	0	0	0.00	0.00	0.00
	3.25	56.00	409.15	N/A	no repair	3.55	61.00	3.63	61.00	18.375	0	0	0	0	0.00	0.00	0.00
	3.32	63.60	409.15	N/A	no repair	3.62	68.60	3.67	68.60	18.375	0	0	0	0	0.00	0.00	0.00
	3.40	73.00	409.15	N/A	no repair	3.70	78.00	3.75	78.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	417.34	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	417.34	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	417.34	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	3.01	50.20	417.34	N/A	no repair	3.31	55.20	3.31	55.20	18.375	0	0	0	0	0.00	0.00	0.00
	3.04	51.05	417.34	N/A	no repair	3.34	56.05	3.34	56.05	18.375	0	0	0	0	0.00	0.00	0.00
36	3.06	52.4	417.34	N/A	no repair	3.36	57.4	3.36	57.4	18.375	0	0	0	0	0.00	0.00	0.00
	3.23	54.50	417.34	N/A	no repair	3.53	59.50	3.53	59.50	18.375	0	0	0	0	0.00	0.00	0.00
	3.26	57.65	417.34	N/A	no repair	3.56	62.65	3.57	62.65	18.375	0	0	0	0	0.00	0.00	0.00
	3.315	62.6	417.34	N/A	no repair	3.615	67.6	3.6075	67.6	18.375	0	0	0	0	0.00	0.00	0.00
	3.55	61.00	417.34	N/A	no repair	3.85	66.00	3.93	66.00	18.375	0	0	0	0	0.00	0.00	0.00
	3.62	68.60	417.34	N/A	no repair	3.92	73.60	3.97	73.60	18.375	0	0	0	0	0.00	0.00	0.00
	3.70	78.00	417.34	N/A	no repair	4.00	83.00	4.05	83.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	425.68	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	425.68	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	425.68	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	3.31	55.20	425.68	N/A	no repair	3.61	60.20	3.61	60.20	18.375	0	0	0	0	0.00	0.00	0.00
	3.34	56.05	425.68	N/A	no repair	3.64	61.05	3.64	61.05	18.375	0	0	0	0	0.00	0.00	0.00
39	3.36	57.4	425.68	N/A	no repair	3.66	62.4	3.66	62.4	18.375	0	0	0	0	0.00	0.00	0.00
	3.53	59.50	425.68	N/A	no repair	3.83	64.50	3.83	64.50	18.375	0	0	0	0	0.00	0.00	0.00
	3.56	62.65	425.68	N/A	no repair	3.86	67.65	3.87	67.65	18.375	0	0	0	0	0.00	0.00	0.00
	3.615	67.6	425.68	N/A	no repair	3.915	72.6	3.9075	72.6	18.375	0	0	0	0	0.00	0.00	0.00
	3.85	66.00	425.68	N/A	no repair	4.15	71.00	4.23	71.00	18.375	0	0	0	0	0.00	0.00	0.00
	3.92	73.60	425.68	N/A	no repair	4.22	78.60	4.27	78.60	18.375	0	0	0	0	0.00	0.00	0.00
	4.00	83.00	425.68	N/A	no repair	4.30	88.00	4.35	88.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	434.20	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	434.20	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	434.20	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	3.61	60.20	434.20	N/A	no repair	3.91	65.20	3.91	65.20	18.375	0	0	0	0	0.00	0.00	0.00
	3.64	61.05	434.20	N/A	no repair	3.94	66.05	3.94	66.05	18.375	0	0	0	0	0.00	0.00	0.00
42	3.66	62.4	434.20	N/A	no repair	3.96	67.4	3.96	67.4	18.375	0	0	0	0	0.00	0.00	0.00
	3.83	64.50	434.20	N/A	no repair	4.13	69.50	4.13	69.50	18.375	0	0	0	0	0.00	0.00	0.00
	3.86	67.65	434.20	N/A	no repair	4.16	72.65	4.17	72.65	18.375	0	0	0	0	0.00	0.00	0.00
	3.915	72.6	434.20	N/A	no repair	4.215	77.6	4.2075	77.6	18.375	0	0	0	0	0.00	0.00	0.00
	4.15	71.00	434.20	N/A	no repair	4.45	76.00	4.53	76.00	18.375	0	0	0	0	0.00	0.00	0.00
	4.22	78.60	434.20	N/A	no repair	4.52	83.60	4.57	83.60	18.375	0	0	0	0	0.00	0.00	0.00
	4.30	88.00	434.20	N/A	no repair	4.60	93.00	4.65	93.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	442.88	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	442.88	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	442.88	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	3.91	65.20	442.88	N/A	no repair	4.21	70.20	4.21	70.20	18.375	0	0	0	0	0.00	0.00	0.00
	3.94	66.05	442.88	N/A	no repair	4.24	71.05	4.24	71.05	18.375	0	0	0	0	0.00	0.00	0.00
45	3.96	67.4	442.88	N/A	no repair	4.26	72.4	4.26	72.4	18.375	0	0	0	0	0.00	0.00	0.00
	4.13	69.50	442.88	N/A	no repair	4.43	74.50	4.43	74.50	18.375	0	0	0	0	0.00	0.00	0.00
	4.16	72.65	442.88	N/A	no repair	4.46	77.65	4.47	77.65	18.375	0	0	0	0	0.00	0.00	0.00
	4.215	77.6	442.88	N/A	no repair	4.515	82.6	4.5075	82.6	18.375	0	0	0	0	0.00	0.00	0.00
	4.45	76.00	442.88	N/A	no repair	4.75	81.00	4.83	81.00	18.375	0	0	0	0	0.00	0.00	0.00
	4.52	83.60	442.88	N/A	no repair	4.82	88.60	4.87	88.60	18.375	0	0	0	0	0.00	0.00	0.00
	4.60	93.00	442.88	N/A	no repair	4.90	98.00	4.95	98.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	451.74	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	451.74	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	451.74	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	4.21	70.20	451.74	N/A	no repair	4.51	75.20	4.51	75.20	18.375	0	0	0	0	0.00	0.00	0.00
	4.24	71.05	451.74	N/A	no repair	4.54	76.05	4.54	76.05	18.375	0	0	0	0	0.00	0.00	0.00
48	4.26	72.4	451.74	N/A	no repair	4.56	77.4	4.56	77.4	18.375	0	0	0	0	0.00	0.00	0.00
	4.43	74.50	451.74	N/A	no repair	4.73	79.50	4.73	79.50	18.375	0	0	0	0	0.00	0.00	0.00
	4.46	77.65	451.74	N/A	no repair	4.76	82.65	4.77	82.65	18.375	0	0	0	0	0.00	0.00	0.00
	4.515	82.6	451.74	N/A	no repair	4.815	87.6	4.8075	87.6	18.375	0	0	0	0	0.00	0.00	0.00
	4.75	81.00	451.74	N/A	no repair	5.05	86.00	5.13	86.00	18.375	0	0	0	0	0.00	0.00	0.00
	4.82	88.60	451.74	N/A	no repair	5.12	93.60	5.17	93.60	18.375	0	0	0	0	0.00	0.00	0.00

	4.90	98.00	451.74	N/A	no repair	5.20	103.00	5.25	103.00	18.375	0	0	0	0	0.00	0.00	0.00
51	0.00	0.00	460.77	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	460.77	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	460.77	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	4.51	75.20	460.77	N/A	no repair	4.81	80.20	4.81	80.20	18.375	0	0	0	0	0.00	0.00	0.00
	4.54	76.05	460.77	N/A	no repair	4.84	81.05	4.84	81.05	18.375	0	0	0	0	0.00	0.00	0.00
	4.56	77.4	460.77	N/A	no repair	4.86	82.4	4.86	82.4	18.375	0	0	0	0	0.00	0.00	0.00
	4.73	79.50	460.77	N/A	no repair	5.03	84.50	5.03	84.50	18.375	0	0	0	0	0.00	0.00	0.00
	4.76	82.65	460.77	N/A	no repair	5.06	87.65	5.07	87.65	18.375	0	0	0	0	0.00	0.00	0.00
	4.815	87.6	460.77	N/A	no repair	5.115	92.6	5.1075	92.6	18.375	0	0	0	0	0.00	0.00	0.00
	5.05	86.00	460.77	N/A	no repair	5.35	91.00	5.43	91.00	18.375	0	0	0	0	0.00	0.00	0.00
	5.12	93.60	460.77	N/A	no repair	5.42	98.60	5.47	98.60	18.375	0	0	0	0	0.00	0.00	0.00
	5.20	103.00	460.77	N/A	repair	0.00	0.00	5.85	113.00	18.375	100	147	200	441	0.00	0.00	0.00
54	0.00	0.00	469.99	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	469.99	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	469.99	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	4.81	80.20	469.99	N/A	no repair	5.11	85.20	5.11	85.20	18.375	0	0	0	0	0.00	0.00	0.00
	4.84	81.05	469.99	N/A	no repair	5.14	86.05	5.14	86.05	18.375	0	0	0	0	0.00	0.00	0.00
	4.86	82.4	469.99	N/A	no repair	5.16	87.4	5.16	87.4	18.375	0	0	0	0	0.00	0.00	0.00
	5.03	84.50	469.99	N/A	no repair	5.33	89.50	5.33	89.50	18.375	0	0	0	0	0.00	0.00	0.00
	5.06	87.65	469.99	N/A	no repair	5.36	92.65	5.37	92.65	18.375	0	0	0	0	0.00	0.00	0.00
	5.115	92.6	469.99	N/A	no repair	5.415	97.6	5.4075	97.6	18.375	0	0	0	0	0.00	0.00	0.00
	5.35	91.00	469.99	N/A	no repair	5.65	96.00	5.73	96.00	18.375	0	0	0	0	0.00	0.00	0.00
	5.42	98.60	469.99	N/A	no repair	5.72	103.60	5.77	103.60	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	469.99	N/A	no repair	0.00	0.00	6.45	123.00	18.375	0	0	0	0	551.82	10.82	599.76
57	0.00	0.00	479.39	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	479.39	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	479.39	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	5.11	85.20	479.39	N/A	no repair	5.41	90.20	5.41	90.20	18.375	0	0	0	0	0.00	0.00	0.00
	5.14	86.05	479.39	N/A	no repair	5.44	91.05	5.44	91.05	18.375	0	0	0	0	0.00	0.00	0.00
	5.16	87.4	479.39	N/A	no repair	5.46	92.4	5.46	92.4	18.375	0	0	0	0	0.00	0.00	0.00
	5.33	89.50	479.39	N/A	no repair	5.63	94.50	5.63	94.50	18.375	0	0	0	0	0.00	0.00	0.00
	5.36	92.65	479.39	N/A	no repair	5.66	97.65	5.67	97.65	18.375	0	0	0	0	0.00	0.00	0.00
	5.42	97.60	479.39	N/A	no repair	5.72	102.60	5.71	102.60	18.375	0	0	0	0	0.00	0.00	0.00
	5.65	96	479.39	N/A	no repair	5.95	101	6.03	101	18.375	0	0	0	0	0.00	0.00	0.00
	5.72	103.60	479.39	N/A	repair	0.00	0.00	6.37	113.60	18.375	100	147	200	441	0.00	0.00	0.00
	0.00	0.00	479.39	N/A	no repair	0.00	0.00	7.05	133.00	18.375	0	0	0	0	562.86	11.04	611.76
60	0.00	0.00	488.98	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	488.98	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	488.98	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	5.41	90.20	488.98	N/A	no repair	5.71	95.20	5.71	95.20	18.375	0	0	0	0	0.00	0.00	0.00
	5.44	91.05	488.98	N/A	no repair	5.74	96.05	5.74	96.05	18.375	0	0	0	0	0.00	0.00	0.00
	5.46	92.4	488.98	N/A	no repair	5.76	97.4	5.76	97.4	18.375	0	0	0	0	0.00	0.00	0.00
	5.63	94.50	488.98	N/A	no repair	5.93	99.50	5.93	99.50	18.375	0	0	0	0	0.00	0.00	0.00
	5.66	97.65	488.98	N/A	no repair	5.96	102.65	5.97	102.65	18.375	0	0	0	0	0.00	0.00	0.00
	5.715	102.6	488.98	N/A	repair	0	0	6.3075	112.6	18.375	100	147	200	441	0.00	0.00	0.00
	5.95	101.00	488.98	N/A	repair	0.00	0.00	6.63	111.00	18.375	100	147	200	441	0.00	0.00	0.00
	0.00	0.00	488.98	N/A	no repair	0.00	0.00	6.97	123.60	18.375	0	0	0	0	0.00	10.82	0.00
	0.00	0.00	488.98	N/A	no repair	0.00	0.00	7.65	143.00	18.375	0	0	0	0	574.11	11.26	623.99

Difference"partial"	interest on repair "in depth"	Difference" in depth"	Total cost "surface"	Total cost "partial"	Total cost "in depth"		initial Crack width(mm)	initialCrack length (mm)	Inspection cost	Decision	repair cost (surface treatment	Repair cost Partial in depth	In depth repair	Disruption cost	repair,disruption interst "surface"	Difference	Repair, disruption interest "partial"
0.00	0.00	0.00	703.15	703.15	703.15		0.25	5	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	703.15	703.15	703.15		0.25	7.5	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	703.15	703.15	703.15		0.25	10	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	703.15	703.15	703.15		0.5	10	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	703.15	703.15	703.15		0.5	15	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	703.15	703.15	703.15		0.5	20	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	703.15	703.15	703.15		0.75	15	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	703.15	703.15	703.15		0.75	22.5	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	703.15	703.15	703.15		0.75	30	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	703.15	703.15	703.15		1	20	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	703.15	703.15	703.15		1	30	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	703.15	703.15	703.15		1	40	735	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		0.55	10	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		0.55	12.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		0.55	15	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		0.8	15	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		0.8	20	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		0.8	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		1.05	20	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		1.05	27.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		1.05	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		1.3	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		1.3	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	728.24	728.24	728.24		1.3	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		0.85	15	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		0.85	17.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		0.85	20	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		1.1	20	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		1.1	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		1.1	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		1.35	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		1.35	32.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		1.35	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		1.6	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		1.6	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	753.46	753.46	753.46		1.6	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.15	20	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.15	22.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.15	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.4	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.4	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.4	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.65	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.65	37.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.65	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.9	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.9	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	778.82	778.82	778.82		1.9	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		1.45	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		1.45	27.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		1.45	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		1.7	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		1.7	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		1.7	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		1.95	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		1.95	42.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		1.95	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		2.2	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		2.2	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	804.32	804.32	804.32		2.2	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		1.75	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		1.75	32.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		1.75	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		2	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		2	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		2	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		2.25	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		2.25	47.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		2.25	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		2.5	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		2.5	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	829.96	829.96	829.96		2.5	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.05	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.05	37.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.05	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.3	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.3	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.3	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.55	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.55	52.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.55	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.8	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.8	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	855.75	855.75	855.75		2.8	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		2.35	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		2.35	42.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		2.35	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		2.6	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		2.6	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		2.6	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		2.85	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		2.85	57.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		2.85	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		3.1	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		3.1	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	881.68	881.68	881.68		3.1	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	907.77	907.77	907.77		2.65	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	907.77	907.77	907.77		2.65	47.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00

0.00	0.00	0.00	907.77	907.77	907.77		2.65	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	907.77	907.77	907.77		2.9	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	907.77	907.77	907.77		2.9	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	907.77	907.77	907.77		2.9	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	907.77	907.77	907.77		3.15	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	907.77	907.77	907.77		3.15	62.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	907.77	907.77	907.77		3.15	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	907.77	907.77	907.77		3.4	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	907.77	907.77	907.77		3.4	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	907.77	907.77	907.77		3.4	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		2.95	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		2.95	52.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		2.95	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		3.2	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		3.2	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		3.2	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		3.45	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		3.45	67.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		3.45	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		3.7	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		3.7	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	934.01	934.01	934.01		3.7	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		3.25	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		3.25	57.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		3.25	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		3.5	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		3.5	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		3.5	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		3.75	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		3.75	72.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		3.75	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		4	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		4	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	960.40	960.40	960.40		4	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		3.55	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		3.55	62.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		3.55	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		3.8	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		3.8	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		3.8	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		4.05	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		4.05	77.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		4.05	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		4.3	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		4.3	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	986.96	986.96	986.96		4.3	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		3.85	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		3.85	67.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		3.85	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		4.1	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		4.1	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		4.1	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		4.35	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		4.35	82.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		4.35	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		4.6	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		4.6	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1013.68	1013.68	1013.68		4.6	100	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.15	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.15	72.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.15	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.4	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.4	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.4	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.65	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.65	87.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.65	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.9	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.9	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1040.57	1040.57	1040.57		4.9	105	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		4.45	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		4.45	77.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		4.45	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		4.7	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		4.7	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		4.7	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		4.95	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		4.95	92.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		4.95	100	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		5.2	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		5.2	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1067.63	1067.63	1067.63		5.2	110	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1094.86	1094.86	1094.86		4.75	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1094.86	1094.86	1094.86		4.75	82.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1094.86	1094.86	1094.86		4.75	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1094.86	1094.86	1094.86		5	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1094.86	1094.86	1094.86		5	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1094.86	1094.86	1094.86		5	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1094.86	1094.86	1094.86		5.25	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1094.86	1094.86	1094.86		5.25	97.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1094.86	1094.86	1094.86		5.25	105	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1094.86	1094.86	1094.86		5.5	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1094.86	1094.86	1094.86		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76

0.00	0.00	0.00	1094.86	1094.86	1094.86		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1122.27	1122.27	1122.27		5.05	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1122.27	1122.27	1122.27		5.05	87.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1122.27	1122.27	1122.27		5.05	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1122.27	1122.27	1122.27		5.3	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1122.27	1122.27	1122.27		5.3	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1122.27	1122.27	1122.27		5.3	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1122.27	1122.27	1122.27		5.55	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1122.27	1122.27	1122.27		5.55	102.5	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1122.27	1122.27	1122.27		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1122.27	1122.27	1122.27		5.8	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1122.27	1122.27	1122.27		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1663.27	1710.27	1763.27		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1149.87	1149.87	1149.87		5.35	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1149.87	1149.87	1149.87		5.35	92.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1149.87	1149.87	1149.87		5.35	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1149.87	1149.87	1149.87		5.6	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1149.87	1149.87	1149.87		5.6	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1149.87	1149.87	1149.87		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1149.87	1149.87	1149.87		5.85	100	36.75	repair	100	147	200	441	551.82	10.82	599.76
0.00	0.00	0.00	1149.87	1149.87	1149.87		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1149.87	1149.87	1149.87		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1149.87	1149.87	1149.87		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1149.87	1149.87	1149.87		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
11.76	653.82	12.82	1701.69	1749.63	1803.69		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
0.00	0.00	0.00	1177.64	1177.64	1177.64		5.65	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1177.64	1177.64	1177.64		5.65	97.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1177.64	1177.64	1177.64		5.65	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1177.64	1177.64	1177.64		5.9	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1177.64	1177.64	1177.64		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1177.64	1177.64	1177.64		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1177.64	1177.64	1177.64		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1177.64	1177.64	1177.64		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1177.64	1177.64	1177.64		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
0.00	0.00	0.00	1177.64	1177.64	1177.64		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1718.64	1765.64	1818.64		0	0	36.75	no repair	0	0	0	0	585.60	11.48	636.47
12.00	666.90	13.08	1740.50	1789.40	1844.54		0	0	36.75	no repair	0	0	0	0	585.60	11.48	636.47
0.00	0.00	0.00	1205.60	1205.60	1205.60		5.95	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1205.60	1205.60	1205.60		5.95	102.5	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1205.60	1205.60	1205.60		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1205.60	1205.60	1205.60		0	0	36.75	no repair	0	0	0	0	551.82	11.04	599.76
0.00	0.00	0.00	1205.60	1205.60	1205.60		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1205.60	1205.60	1205.60		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
0.00	0.00	0.00	1205.60	1205.60	1205.60		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1205.60	1205.60	1205.60		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
0.00	0.00	0.00	1746.60	1793.60	1846.60		0	0	36.75	no repair	0	0	0	0	585.60	11.48	636.47
0.00	0.00	0.00	1746.60	1793.60	1846.60		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
11.76	0.00	12.82	1757.42	1805.36	1859.42		0	0	36.75	no repair	0	0	0	0	597.31	11.71	649.20
12.24	680.23	13.34	1779.72	1829.59	1885.84		0	0	36.75	no repair	0	0	0	0	597.31	11.71	649.20

Difference	Repair, disruption interest "in depth"	Difference	Total cost surface treatment	Total cost partial in depth	Total cost in depth repair	final Crack width	final Crack length	Crack width (no repair)	Crack width(no repair)
0.00	0.00	0.00	735.00	735	735	0.55	10	0.55	10
0.00	0.00	0.00	735.00	735	735	0.55	12.5	0.55	12.5
0.00	0.00	0.00	735.00	735	735	0.55	15	0.55	15
0.00	0.00	0.00	735.00	735	735	0.8	15	0.8	15
0.00	0.00	0.00	735.00	735	735	0.8	20	0.8	20
0.00	0.00	0.00	735.00	735	735	0.8	25	0.8	25
0.00	0.00	0.00	735.00	735	735	1.05	20	1.05	20
0.00	0.00	0.00	735.00	735	735	1.05	27.5	1.05	27.5
0.00	0.00	0.00	735.00	735	735	1.05	35	1.05	35
0.00	0.00	0.00	735.00	735	735	1.3	25	1.3	25
0.00	0.00	0.00	735.00	735	735	1.3	35	1.3	35
0.00	0.00	0.00	735.00	735	735	1.3	45	1.3	45
0.00	0.00	0.00	771.75	771.75	771.75	0.85	15	0.85	15
0.00	0.00	0.00	771.75	771.75	771.75	0.85	17.5	0.85	17.5
0.00	0.00	0.00	771.75	771.75	771.75	0.85	20	0.85	20
0.00	0.00	0.00	771.75	771.75	771.75	1.1	20	1.1	20
0.00	0.00	0.00	771.75	771.75	771.75	1.1	25	1.1	25
0.00	0.00	0.00	771.75	771.75	771.75	1.1	30	1.1	30
0.00	0.00	0.00	771.75	771.75	771.75	1.35	25	1.35	25
0.00	0.00	0.00	771.75	771.75	771.75	1.35	32.5	1.35	32.5
0.00	0.00	0.00	771.75	771.75	771.75	1.35	40	1.35	40
0.00	0.00	0.00	771.75	771.75	771.75	1.6	30	1.6	30
0.00	0.00	0.00	771.75	771.75	771.75	1.6	40	1.6	40
0.00	0.00	0.00	771.75	771.75	771.75	1.6	50	1.6	50
0.00	0.00	0.00	808.50	808.50	808.50	1.15	20	1.15	20
0.00	0.00	0.00	808.50	808.50	808.50	1.15	22.5	1.15	22.5
0.00	0.00	0.00	808.50	808.50	808.50	1.15	25	1.15	25
0.00	0.00	0.00	808.50	808.50	808.50	1.4	25	1.4	25
0.00	0.00	0.00	808.50	808.50	808.50	1.4	30	1.4	30
0.00	0.00	0.00	808.50	808.50	808.50	1.4	35	1.4	35
0.00	0.00	0.00	808.50	808.50	808.50	1.65	30	1.65	30
0.00	0.00	0.00	808.50	808.50	808.50	1.65	37.5	1.65	37.5
0.00	0.00	0.00	808.50	808.50	808.50	1.65	45	1.65	45
0.00	0.00	0.00	808.50	808.50	808.50	1.9	35	1.9	35
0.00	0.00	0.00	808.50	808.50	808.50	1.9	45	1.9	45
0.00	0.00	0.00	808.50	808.50	808.50	1.9	55	1.9	55
0.00	0.00	0.00	845.25	845.25	845.25	1.45	25	1.45	25
0.00	0.00	0.00	845.25	845.25	845.25	1.45	27.5	1.45	27.5
0.00	0.00	0.00	845.25	845.25	845.25	1.45	30	1.45	30
0.00	0.00	0.00	845.25	845.25	845.25	1.7	30	1.7	30
0.00	0.00	0.00	845.25	845.25	845.25	1.7	35	1.7	35
0.00	0.00	0.00	845.25	845.25	845.25	1.7	40	1.7	40
0.00	0.00	0.00	845.25	845.25	845.25	1.95	35	1.95	35
0.00	0.00	0.00	845.25	845.25	845.25	1.95	42.5	1.95	42.5
0.00	0.00	0.00	845.25	845.25	845.25	1.95	50	1.95	50
0.00	0.00	0.00	845.25	845.25	845.25	2.2	40	2.2	40
0.00	0.00	0.00	845.25	845.25	845.25	2.2	50	2.2	50
0.00	0.00	0.00	845.25	845.25	845.25	2.2	60	2.2	60
0.00	0.00	0.00	882.00	882.00	882.00	1.75	30	1.75	30
0.00	0.00	0.00	882.00	882.00	882.00	1.75	32.5	1.75	32.5
0.00	0.00	0.00	882.00	882.00	882.00	1.75	35	1.75	35
0.00	0.00	0.00	882.00	882.00	882.00	2	35	2	35
0.00	0.00	0.00	882.00	882.00	882.00	2	40	2	40
0.00	0.00	0.00	882.00	882.00	882.00	2	45	2	45
0.00	0.00	0.00	882.00	882.00	882.00	2.25	40	2.25	40
0.00	0.00	0.00	882.00	882.00	882.00	2.25	47.5	2.25	47.5
0.00	0.00	0.00	882.00	882.00	882.00	2.25	55	2.25	55
0.00	0.00	0.00	882.00	882.00	882.00	2.5	45	2.5	45
0.00	0.00	0.00	882.00	882.00	882.00	2.5	55	2.5	55
0.00	0.00	0.00	882.00	882.00	882.00	2.5	65	2.5	65
0.00	0.00	0.00	918.75	918.75	918.75	2.05	35	2.05	35
0.00	0.00	0.00	918.75	918.75	918.75	2.05	37.5	2.05	37.5
0.00	0.00	0.00	918.75	918.75	918.75	2.05	40	2.05	40
0.00	0.00	0.00	918.75	918.75	918.75	2.3	40	2.3	40
0.00	0.00	0.00	918.75	918.75	918.75	2.3	45	2.3	45
0.00	0.00	0.00	918.75	918.75	918.75	2.3	50	2.3	50
0.00	0.00	0.00	918.75	918.75	918.75	2.55	45	2.55	45
0.00	0.00	0.00	918.75	918.75	918.75	2.55	52.5	2.55	52.5
0.00	0.00	0.00	918.75	918.75	918.75	2.55	60	2.55	60
0.00	0.00	0.00	918.75	918.75	918.75	2.8	50	2.8	50
0.00	0.00	0.00	918.75	918.75	918.75	2.8	60	2.8	60
0.00	0.00	0.00	918.75	918.75	918.75	2.8	70	2.8	70
0.00	0.00	0.00	955.50	955.50	955.50	2.35	40	2.35	40
0.00	0.00	0.00	955.50	955.50	955.50	2.35	42.5	2.35	42.5
0.00	0.00	0.00	955.50	955.50	955.50	2.35	45	2.35	45
0.00	0.00	0.00	955.50	955.50	955.50	2.6	45	2.6	45
0.00	0.00	0.00	955.50	955.50	955.50	2.6	50	2.6	50
0.00	0.00	0.00	955.50	955.50	955.50	2.6	55	2.6	55
0.00	0.00	0.00	955.50	955.50	955.50	2.85	50	2.85	50
0.00	0.00	0.00	955.50	955.50	955.50	2.85	57.5	2.85	57.5
0.00	0.00	0.00	955.50	955.50	955.50	2.85	65	2.85	65
0.00	0.00	0.00	955.50	955.50	955.50	3.1	55	3.1	55
0.00	0.00	0.00	955.50	955.50	955.50	3.1	65	3.1	65
0.00	0.00	0.00	955.50	955.50	955.50	3.1	75	3.1	75
0.00	0.00	0.00	992.25	992.25	992.25	2.65	45	2.65	45
0.00	0.00	0.00	992.25	992.25	992.25	2.65	47.5	2.65	47.5
0.00	0.00	0.00	992.25	992.25	992.25	2.65	50	2.65	50
0.00	0.00	0.00	992.25	992.25	992.25	2.9	50	2.9	50
0.00	0.00	0.00	992.25	992.25	992.25	2.9	55	2.9	55
0.00	0.00	0.00	992.25	992.25	992.25	2.9	60	2.9	60
0.00	0.00	0.00	992.25	992.25	992.25	3.15	55	3.15	55
0.00	0.00	0.00	992.25	992.25	992.25	3.15	62.5	3.15	62.5
0.00	0.00	0.00	992.25	992.25	992.25	3.15	70	3.15	70
0.00	0.00	0.00	992.25	992.25	992.25	3.4	60	3.4	60
0.00	0.00	0.00	992.25	992.25	992.25	3.4	70	3.4	70
0.00	0.00	0.00	992.25	992.25	992.25	3.4	80	3.4	80
0.00	0.00	0.00	1029.00	1029.00	1029.00	2.95	50	2.95	50
0.00	0.00	0.00	1029.00	1029.00	1029.00	2.95	52.5	2.95	52.5

0.00	0.00	0.00	1029.00	1029.00	1029.00	2.95	55	2.95	55
0.00	0.00	0.00	1029.00	1029.00	1029.00	3.2	55	3.2	55
0.00	0.00	0.00	1029.00	1029.00	1029.00	3.2	60	3.2	60
0.00	0.00	0.00	1029.00	1029.00	1029.00	3.2	65	3.2	65
0.00	0.00	0.00	1029.00	1029.00	1029.00	3.45	60	3.45	60
0.00	0.00	0.00	1029.00	1029.00	1029.00	3.45	67.5	3.45	67.5
0.00	0.00	0.00	1029.00	1029.00	1029.00	3.45	75	3.45	75
0.00	0.00	0.00	1029.00	1029.00	1029.00	3.7	65	3.7	65
0.00	0.00	0.00	1029.00	1029.00	1029.00	3.7	75	3.7	75
0.00	0.00	0.00	1029.00	1029.00	1029.00	3.7	85	3.7	85
0.00	0.00	0.00	1065.75	1065.75	1065.75	3.25	55	3.25	55
0.00	0.00	0.00	1065.75	1065.75	1065.75	3.25	57.5	3.25	57.5
0.00	0.00	0.00	1065.75	1065.75	1065.75	3.25	60	3.25	60
0.00	0.00	0.00	1065.75	1065.75	1065.75	3.5	60	3.5	60
0.00	0.00	0.00	1065.75	1065.75	1065.75	3.5	65	3.5	65
0.00	0.00	0.00	1065.75	1065.75	1065.75	3.5	70	3.5	70
0.00	0.00	0.00	1065.75	1065.75	1065.75	3.75	65	3.75	65
0.00	0.00	0.00	1065.75	1065.75	1065.75	3.75	72.5	3.75	72.5
0.00	0.00	0.00	1065.75	1065.75	1065.75	3.75	80	3.75	80
0.00	0.00	0.00	1065.75	1065.75	1065.75	4	70	4	70
0.00	0.00	0.00	1065.75	1065.75	1065.75	4	80	4	80
0.00	0.00	0.00	1065.75	1065.75	1065.75	4	90	4	90
0.00	0.00	0.00	1102.50	1102.50	1102.50	3.55	60	3.55	60
0.00	0.00	0.00	1102.50	1102.50	1102.50	3.55	62.5	3.55	62.5
0.00	0.00	0.00	1102.50	1102.50	1102.50	3.55	65	3.55	65
0.00	0.00	0.00	1102.50	1102.50	1102.50	3.8	65	3.8	65
0.00	0.00	0.00	1102.50	1102.50	1102.50	3.8	70	3.8	70
0.00	0.00	0.00	1102.50	1102.50	1102.50	3.8	75	3.8	75
0.00	0.00	0.00	1102.50	1102.50	1102.50	4.05	70	4.05	70
0.00	0.00	0.00	1102.50	1102.50	1102.50	4.05	77.5	4.05	77.5
0.00	0.00	0.00	1102.50	1102.50	1102.50	4.05	85	4.05	85
0.00	0.00	0.00	1102.50	1102.50	1102.50	4.3	75	4.3	75
0.00	0.00	0.00	1102.50	1102.50	1102.50	4.3	85	4.3	85
0.00	0.00	0.00	1102.50	1102.50	1102.50	4.3	95	4.3	95
0.00	0.00	0.00	1139.25	1139.25	1139.25	3.85	65	3.85	65
0.00	0.00	0.00	1139.25	1139.25	1139.25	3.85	67.5	3.85	67.5
0.00	0.00	0.00	1139.25	1139.25	1139.25	3.85	70	3.85	70
0.00	0.00	0.00	1139.25	1139.25	1139.25	4.1	70	4.1	70
0.00	0.00	0.00	1139.25	1139.25	1139.25	4.1	75	4.1	75
0.00	0.00	0.00	1139.25	1139.25	1139.25	4.1	80	4.1	80
0.00	0.00	0.00	1139.25	1139.25	1139.25	4.35	75	4.35	75
0.00	0.00	0.00	1139.25	1139.25	1139.25	4.35	82.5	4.35	82.5
0.00	0.00	0.00	1139.25	1139.25	1139.25	4.35	90	4.35	90
0.00	0.00	0.00	1139.25	1139.25	1139.25	4.6	80	4.6	80
0.00	0.00	0.00	1139.25	1139.25	1139.25	4.6	90	4.6	90
0.00	0.00	0.00	1139.25	1139.25	1139.25	4.6	100	4.6	100
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.15	70	4.15	70
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.15	72.5	4.15	72.5
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.15	75	4.15	75
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.4	75	4.4	75
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.4	80	4.4	80
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.4	85	4.4	85
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.65	80	4.65	80
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.65	87.5	4.65	87.5
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.65	95	4.65	95
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.9	85	4.9	85
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.9	95	4.9	95
0.00	0.00	0.00	1176.00	1176.00	1176.00	4.9	105	4.9	105
0.00	0.00	0.00	1212.75	1212.75	1212.75	4.45	75	4.45	75
0.00	0.00	0.00	1212.75	1212.75	1212.75	4.45	77.5	4.45	77.5
0.00	0.00	0.00	1212.75	1212.75	1212.75	4.45	80	4.45	80
0.00	0.00	0.00	1212.75	1212.75	1212.75	4.7	80	4.7	80
0.00	0.00	0.00	1212.75	1212.75	1212.75	4.7	85	4.7	85
0.00	0.00	0.00	1212.75	1212.75	1212.75	4.7	90	4.7	90
0.00	0.00	0.00	1212.75	1212.75	1212.75	4.95	85	4.95	85
0.00	0.00	0.00	1212.75	1212.75	1212.75	4.95	92.5	4.95	92.5
0.00	0.00	0.00	1212.75	1212.75	1212.75	4.95	100	4.95	100
0.00	0.00	0.00	1212.75	1212.75	1212.75	5.2	90	5.2	90
0.00	0.00	0.00	1212.75	1212.75	1212.75	5.2	100	5.2	100
0.00	0.00	0.00	1212.75	1212.75	1212.75	5.2	110	5.2	110
0.00	0.00	0.00	1249.50	1249.50	1249.50	4.75	80	4.75	80
0.00	0.00	0.00	1249.50	1249.50	1249.50	4.75	82.5	4.75	82.5
0.00	0.00	0.00	1249.50	1249.50	1249.50	4.75	85	4.75	85
0.00	0.00	0.00	1249.50	1249.50	1249.50	5	85	5	85
0.00	0.00	0.00	1249.50	1249.50	1249.50	5	90	5	90
0.00	0.00	0.00	1249.50	1249.50	1249.50	5	95	5	95
0.00	0.00	0.00	1249.50	1249.50	1249.50	5.25	90	5.25	90
0.00	0.00	0.00	1249.50	1249.50	1249.50	5.25	97.5	5.25	97.5
0.00	0.00	0.00	1249.50	1249.50	1249.50	5.25	105	5.25	105
0.00	0.00	0.00	1249.50	1249.50	1249.50	5.5	95	5.5	95
0.00	0.00	0.00	1790.50	1837.50	1890.50	0	0	5.8	110
0.00	0.00	0.00	1790.50	1837.50	1890.50	0	0	5.8	120
0.00	0.00	0.00	1286.25	1286.25	1286.25	5.05	85	5.05	85
0.00	0.00	0.00	1286.25	1286.25	1286.25	5.05	87.5	5.05	87.5
0.00	0.00	0.00	1286.25	1286.25	1286.25	5.05	90	5.05	90
0.00	0.00	0.00	1286.25	1286.25	1286.25	5.3	90	5.3	90
0.00	0.00	0.00	1286.25	1286.25	1286.25	5.3	95	5.3	95
0.00	0.00	0.00	1286.25	1286.25	1286.25	5.3	100	5.3	100
0.00	0.00	0.00	1286.25	1286.25	1286.25	5.55	95	5.55	95
0.00	0.00	0.00	1286.25	1286.25	1286.25	5.55	102.5	5.55	102.5
0.00	0.00	0.00	1827.25	1874.25	1927.25	0	0	5.85	115
0.00	0.00	0.00	1286.25	1286.25	1286.25	5.8	100	5.8	100
11.76	653.82	12.82	1838.07	1886.01	1940.07	0	0	6.4	120

11.76	653.82	12.82	1838.07	1886.01	1940.07	0	0	6.4	130
0.00	0.00	0.00	1323.00	1323.00	1323.00	5.35	90	5.35	90
0.00	0.00	0.00	1323.00	1323.00	1323.00	5.35	92.5	5.35	92.5
0.00	0.00	0.00	1323.00	1323.00	1323.00	5.35	95	5.35	95
0.00	0.00	0.00	1323.00	1323.00	1323.00	5.6	95	5.6	95
0.00	0.00	0.00	1323.00	1323.00	1323.00	5.6	100	5.6	100
0.00	0.00	0.00	1864.00	1911.00	1964.00	0	0	5.9	110
0.00	0.00	0.00	1323.00	1323.00	1323.00	5.85	100	5.85	100
0.00	0.00	0.00	1864.00	1911.00	1964.00	0	0	6.15	112.5
11.76	653.82	12.82	1874.82	1922.76	1976.82	0	0	6.45	125
0.00	0.00	0.00	1864.00	1911.00	1964.00	0	0	6.4	110
12.00	666.90	13.08	1885.86	1934.76	1989.90	0	0	7	130
12.00	666.90	13.08	1885.86	1934.76	1989.90	0	0	7	140
0.00	0.00	0.00	1359.75	1359.75	1359.75	5.65	95	5.65	95
0.00	0.00	0.00	1359.75	1359.75	1359.75	5.65	97.5	5.65	97.5
0.00	0.00	0.00	1359.75	1359.75	1359.75	5.65	100	5.65	100
0.00	0.00	0.00	1359.75	1359.75	1359.75	5.9	100	5.9	100
0.00	0.00	0.00	1900.75	1947.75	2000.75	0	0	6.2	110
11.76	653.82	12.82	1911.57	1959.51	2013.57	0	0	6.5	120
11.76	653.82	12.82	1911.57	1959.51	2013.57	0	0	6.45	110
11.76	653.82	12.82	1911.57	1959.51	2013.57	0	0	6.75	122.5
12.00	666.90	13.08	1922.61	1971.51	2026.65	0	0	7.05	135
11.76	653.82	12.82	1911.57	1959.51	2013.57	0	0	7	120
12.24	680.23	13.34	1933.86	1983.74	2039.98	0	0	7.6	140
12.24	680.23	13.34	1933.86	1983.74	2039.98	0	0	7.6	150
0.00	0.00	0.00	1396.50	1396.50	1396.50	5.95	100	5.95	100
0.00	0.00	0.00	1396.50	1396.50	1396.50	5.95	102.5	5.95	102.5
0.00	0.00	0.00	1937.50	1984.50	2037.50	0	0	6.25	110
0.00	0.00	0.00	1937.50	1984.50	2037.50	0	0	6.5	110
11.76	653.82	12.82	1948.32	1996.26	2050.32	0	0	6.8	120
12.00	666.90	13.08	1959.36	2008.26	2063.40	0	0	7.1	130
11.76	653.82	12.82	1959.14	2008.02	2063.14	0	0	7.05	120
12.00	666.90	13.08	1959.36	2008.26	2063.40	0	0	7.35	132.5
12.24	680.23	13.34	1970.61	2020.49	2076.73	0	0	7.65	145
12.00	666.90	13.08	1959.36	2008.26	2063.40	0	0	7.6	130
12.48	693.84	13.60	1982.10	2032.97	2090.34	0	0	8.2	150
12.48	693.84	13.60	1982.10	2032.97	2090.34	0	0	8.2	160
0.00	0.00	0.00	1974.25	2021.25	2074.25	0	0	6.55	110
0.00	0.00	0.00	1974.25	2021.25	2074.25	0	0	6.55	112.5
11.76	653.82	12.82	1985.07	2033.01	2087.07	0	0	6.85	120
12.00	653.82	13.08	1985.29	2033.25	2087.33	0	0	7.1	120
12.00	666.90	13.08	1996.11	2045.01	2100.15	0	0	7.4	130
12.24	680.23	13.34	2007.36	2057.24	2113.48	0	0	7.7	140
12.00	666.90	13.08	2006.93	2056.77	2112.97	0	0	7.65	130
12.24	680.23	13.34	2007.36	2057.24	2113.48	0	0	7.95	142.5
12.48	693.84	13.60	2018.85	2069.72	2127.09	0	0	8.25	155
12.24	680.23	13.34	2007.36	2057.24	2113.48	0	0	8.2	140
12.73	707.72	13.88	2030.56	2082.45	2140.97	0	0	8.8	160
12.73	707.72	13.88	2030.56	2082.45	2140.97	0	0	8.8	170

Calculations for third time period (10-15) years

duration(months)	Crack width(mm)	Crack length (mm)	Self healing cost	Percentage of healing	Decision	Crack width (after healing)	Crack length (after healing)	No repair Width	No repair length	Inspection cost	Surface repair	Partial In depth repair	In depth repair	disruption cost	interest on repair "surface"	Difference "surface"	interest on repair"partial"
3	0.25	5	488.98	100%	no repair	0.00	0.00	0.00	0.00	735	0	0	0	0	0.00	0.00	0.00
	0.25	7.5	488.98	100%	no repair	0.00	0.00	0.00	0.00	735	0	0	0	0	0.00	0.00	0.00
	0.25	10	488.98	100%	no repair	0.00	0.00	0.00	0.00	735	0	0	0	0	0.00	0.00	0.00
	0.5	10	488.98	98%	no repair	0.01	0.20	0.01	0.20	735	0	0	0	0	0.00	0.00	0.00
	0.5	15	488.98	93%	no repair	0.04	1.05	0.04	1.05	735	0	0	0	0	0.00	0.00	0.00
	0.5	20	488.98	88%	no repair	0.06	2.40	0.06	2.40	735	0	0	0	0	0.00	0.00	0.00
	0.75	15	488.98	70%	no repair	0.23	4.50	0.23	4.50	735	0	0	0	0	0.00	0.00	0.00
	0.75	22.5	488.98	66%	no repair	0.26	7.65	0.27	8.10	735	0	0	0	0	0.00	0.00	0.00
	0.75	30	488.98	58%	no repair	0.32	12.60	0.31	12.30	735	0	0	0	0	0.00	0.00	0.00
	1	20	488.98	45%	no repair	0.55	11.00	0.63	12.60	735	0	0	0	0	0.00	0.00	0.00
	1	30	488.98	38%	no repair	0.62	18.60	0.67	20.10	735	0	0	0	0	0.00	0.00	0.00
	1	40	488.98	30%	no repair	0.70	28.00	0.75	30.00	735	0	0	0	0	0.00	0.00	0.00
6	0.00	0.00	498.76	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	498.76	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	498.76	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.01	0.20	498.76	N/A	no repair	0.31	5.20	0.31	5.20	18.375	0	0	0	0	0.00	0.00	0.00
	0.04	1.05	498.76	N/A	no repair	0.34	6.05	0.34	6.05	18.375	0	0	0	0	0.00	0.00	0.00
	0.06	2.40	498.76	N/A	no repair	0.36	7.40	0.36	7.40	18.375	0	0	0	0	0.00	0.00	0.00
	0.23	4.50	498.76	N/A	no repair	0.53	9.50	0.53	9.50	18.375	0	0	0	0	0.00	0.00	0.00
	0.26	7.65	498.76	N/A	no repair	0.56	12.65	0.57	13.10	18.375	0	0	0	0	0.00	0.00	0.00
	0.32	12.60	498.76	N/A	no repair	0.62	17.60	0.61	17.30	18.375	0	0	0	0	0.00	0.00	0.00
	0.55	11.00	498.76	N/A	no repair	0.85	16.00	0.93	17.60	18.375	0	0	0	0	0.00	0.00	0.00
	0.62	18.60	498.76	N/A	no repair	0.92	23.60	0.97	25.10	18.375	0	0	0	0	0.00	0.00	0.00
	0.70	28.00	498.76	N/A	no repair	1.00	33.00	1.05	35.00	18.375	0	0	0	0	0.00	0.00	0.00
9	0.00	0.00	508.73	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	508.73	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	508.73	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.31	5.20	508.73	N/A	no repair	0.61	10.20	0.61	10.20	18.375	0	0	0	0	0.00	0.00	0.00
	0.34	6.05	508.73	N/A	no repair	0.64	11.05	0.64	11.05	18.375	0	0	0	0	0.00	0.00	0.00
	0.36	7.40	508.73	N/A	no repair	0.66	12.40	0.66	12.40	18.375	0	0	0	0	0.00	0.00	0.00
	0.53	9.50	508.73	N/A	no repair	0.83	14.50	0.83	14.50	18.375	0	0	0	0	0.00	0.00	0.00
	0.56	12.65	508.73	N/A	no repair	0.86	17.65	0.87	18.10	18.375	0	0	0	0	0.00	0.00	0.00
	0.62	17.60	508.73	N/A	no repair	0.92	22.60	0.91	22.30	18.375	0	0	0	0	0.00	0.00	0.00
	0.85	16.00	508.73	N/A	no repair	1.15	21.00	1.23	22.60	18.375	0	0	0	0	0.00	0.00	0.00
	0.92	23.60	508.73	N/A	no repair	1.22	28.60	1.27	30.10	18.375	0	0	0	0	0.00	0.00	0.00
	1.00	33.00	508.73	N/A	no repair	1.30	38.00	1.35	40.00	18.375	0	0	0	0	0.00	0.00	0.00
12	0.00	0.00	518.91	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	518.91	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	518.91	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.61	10.20	518.91	N/A	no repair	0.91	15.20	0.91	15.20	18.375	0	0	0	0	0.00	0.00	0.00
	0.64	11.05	518.91	N/A	no repair	0.94	16.05	0.94	16.05	18.375	0	0	0	0	0.00	0.00	0.00
	0.66	12.40	518.91	N/A	no repair	0.96	17.40	0.96	17.40	18.375	0	0	0	0	0.00	0.00	0.00
	0.83	14.50	518.91	N/A	no repair	1.13	19.50	1.13	19.50	18.375	0	0	0	0	0.00	0.00	0.00
	0.86	17.65	518.91	N/A	no repair	1.16	22.65	1.17	23.10	18.375	0	0	0	0	0.00	0.00	0.00
	0.92	22.60	518.91	N/A	no repair	1.22	27.60	1.21	27.30	18.375	0	0	0	0	0.00	0.00	0.00
	1.15	21.00	518.91	N/A	no repair	1.45	26.00	1.53	27.60	18.375	0	0	0	0	0.00	0.00	0.00
	1.22	28.60	518.91	N/A	no repair	1.52	33.60	1.57	35.10	18.375	0	0	0	0	0.00	0.00	0.00
	1.30	38.00	518.91	N/A	no repair	1.60	43.00	1.65	45.00	18.375	0	0	0	0	0.00	0.00	0.00
15	0.00	0.00	529.29	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	529.29	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	529.29	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.91	15.20	529.29	N/A	no repair	1.21	20.20	1.21	20.20	18.375	0	0	0	0	0.00	0.00	0.00
	0.94	16.05	529.29	N/A	no repair	1.24	21.05	1.24	21.05	18.375	0	0	0	0	0.00	0.00	0.00
	0.96	17.40	529.29	N/A	no repair	1.26	22.40	1.26	22.40	18.375	0	0	0	0	0.00	0.00	0.00
	1.13	19.50	529.29	N/A	no repair	1.43	24.50	1.43	24.50	18.375	0	0	0	0	0.00	0.00	0.00
	1.16	22.65	529.29	N/A	no repair	1.46	27.65	1.47	27.65	18.375	0	0	0	0	0.00	0.00	0.00
	1.22	27.60	529.29	N/A	no repair	1.52	32.60	1.51	32.60	18.375	0	0	0	0	0.00	0.00	0.00
	1.45	26.00	529.29	N/A	no repair	1.75	31.00	1.83	31.00	18.375	0	0	0	0	0.00	0.00	0.00
	1.52	33.60	529.29	N/A	no repair	1.82	38.60	1.87	38.60	18.375	0	0	0	0	0.00	0.00	0.00
	1.60	43.00	529.29	N/A	no repair	1.90	48.00	1.95	48.00	18.375	0	0	0	0	0.00	0.00	0.00
18	0.00	0.00	539.87	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	539.87	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	539.87	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	1.21	20.20	539.87	N/A	no repair	1.51	25.20	1.51	25.20	18.375	0	0	0	0	0.00	0.00	0.00
	1.24	21.05	539.87	N/A	no repair	1.54	26.05	1.54	26.05	18.375	0	0	0	0	0.00	0.00	0.00
	1.26	22.40	539.87	N/A	no repair	1.56	27.40	1.56	27.40	18.375	0	0	0	0	0.00	0.00	0.00
	1.43	24.50	539.87	N/A	no repair	1.73	29.50	1.73	29.50	18.375	0	0	0	0	0.00	0.00	0.00
	1.46	27.65	539.87	N/A	no repair	1.76	32.65	1.77	32.65	18.375	0	0	0	0	0.00	0.00	0.00
	1.52	32.60	539.87	N/A	no repair	1.82	37.60	1.81	37.60	18.375	0	0	0	0	0.00	0.00	0.00
	1.75	31.00	539.87	N/A	no repair	2.05	36.00	2.13	36.00	18.375	0	0	0	0	0.00	0.00	0.00
	1.82	38.60	539.87	N/A	no repair	2.12	43.60	2.17	43.60	18.375	0	0	0	0	0.00	0.00	0.00
	1.90	48.00	539.87	N/A	no repair	2.20	53.00	2.25	53.00	18.375	0	0	0	0	0.00	0.00	0.00
21	0.00	0.00	550.67	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	550.67	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	550.67	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	1.51	25.20	550.67	N/A	no repair	1.81	30.20	1.81	30.20	18.375	0	0	0	0	0.00	0.00	0.00
	1.54	26.05	550.67	N/A	no repair	1.84	31.05	1.84	31.05	18.375	0	0	0	0	0.00	0.00	0.00
	1.56	27.40	550.67	N/A	no repair	1.86	32.40	1.86	32.40	18.375	0	0	0	0	0.00	0.00	0.00
	1.73	29.50	550.67	N/A	no repair	2.03	34.50	2.03	34.50	18.375	0	0	0	0	0.00	0.00	0.00
	1.76	32.65	550.67	N/A	no repair	2.06	37.65	2.07	37.65	18.375	0	0	0	0	0.00	0.00	0.00
	1.82	37.60	550.67	N/A	no repair	2.12	42.60	2.11	42.60	18.375	0	0	0	0	0.00	0.00	0.00
	2.05	36.00	550.67	N/A	no repair	2.35	41.00	2.43	41.00	18.375	0	0	0	0	0.00	0.00	0.00
	2.12	43.60	550.67	N/A	no repair	2.42	48.60	2.47	48.60	18.375	0	0	0	0	0.00	0.00	0.00
	2.20	53.00	550.67	N/A	no repair	2.50	58.00	2.55	58.00	18.375	0	0	0	0	0.00	0.00	0.00
24	0.00	0.00	561.68	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	561.68	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	561.68	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	1.81	30.20	561.68	N/A	no repair	2.11	35.20	2.11	35.20	18.375	0	0	0	0	0.00	0.00	0.00
	1.84	31.05	561.68	N/A	no repair	2.14	36.05	2.14	36.05	18.375	0	0	0	0	0.00	0.00	0.00
	1.86	32.4	561.68	N/A	no repair	2.16	37.4	2.16	37.4	18.375	0	0	0	0	0.00	0.00	0.00
	2.03	34.50	561.68	N/A	no repair	2.33	39.50	2.33	39.50	18.375	0	0	0	0	0.00	0.00	0.00
	2.06	37.65	561.68	N/A	no repair	2.36	42.65	2.37	42.65	18.375	0	0	0	0	0.00	0.00	0.00
	2.115	42.6	561.68	N/A	no repair	2.415	47.6	2.4075	47.6	18.375	0	0	0	0	0.00	0.00	0.00
	2.35	41.00	561.68	N/A	no repair	2.65	46.00	2.73	46.00	18.375	0	0	0	0	0.00	0.00	0.00
	2.42	48.60	561.68	N/A	no repair	2.72	53.60	2.77	53.60	18.375	0	0	0	0	0.00	0.00	0.00
	2.50	58.00	561.68	N/A	no repair	2.80	63.00	2.85	63.00	18.375	0	0	0	0	0.00	0.00	0.00
27	0.00	0.00	572.92	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	572.92	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	572.92	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	2.11	35.20	572.92	N/A	no repair	2.41	40.20	2.41	40.20	18.375	0	0	0	0	0.00	0.00	0.00
	2.14	36.05	572.92	N/A	no repair	2.44	41.05	2.44	41.05	18.375	0	0	0	0	0.00	0.00	0.00
	2.16	37.4	572.92	N/A	no repair	2.46	42.4	2.46	42.4	18.375	0	0	0	0	0.00	0.00	0.00
	2.33	39.50	572.92	N/A	no repair	2.63	44.50	2.63	44.50	18.375	0	0	0	0	0.00	0.00	0.00
	2.36	42.65	572.92	N/A	no repair	2.66	47.65	2.67	47.65	18.375	0	0	0	0	0.00	0.00	0.00
	2.415	47.6	572.92	N/A	no repair	2.715	52.6	2.7075	52.6	18.375	0	0	0	0	0.00	0.00	0.00
	2.65	46.00	572.92	N/A	no repair	2.95	51.00	3.03	51.00	18.375	0	0	0	0	0.00	0.00	0.00
	2.72	53.60	572.92	N/A	no repair	3.02	58.60	3.07	58.60	18.375	0	0	0	0	0.00	0.00	0.00
	2.80	63.00	572.92	N/A	no repair	3.10	68.00	3.15	68.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	584.38	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00

	0.00	0.00	584.38	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	584.38	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	2.41	40.20	584.38	N/A	no repair	2.71	45.20	2.71	45.20	18.375	0	0	0	0	0.00	0.00	0.00
	2.44	41.05	584.38	N/A	no repair	2.74	46.05	2.74	46.05	18.375	0	0	0	0	0.00	0.00	0.00
30	2.46	42.4	584.38	N/A	no repair	2.76	47.4	2.76	47.4	18.375	0	0	0	0	0.00	0.00	0.00
	2.63	44.50	584.38	N/A	no repair	2.93	49.50	2.93	49.50	18.375	0	0	0	0	0.00	0.00	0.00
	2.66	47.65	584.38	N/A	no repair	2.96	52.65	2.97	52.65	18.375	0	0	0	0	0.00	0.00	0.00
	2.715	52.6	584.38	N/A	no repair	3.015	57.6	3.0075	57.6	18.375	0	0	0	0	0.00	0.00	0.00
	2.95	51.00	584.38	N/A	no repair	3.25	56.00	3.33	56.00	18.375	0	0	0	0	0.00	0.00	0.00
	3.02	58.60	584.38	N/A	no repair	3.32	63.60	3.37	63.60	18.375	0	0	0	0	0.00	0.00	0.00
	3.10	68.00	584.38	N/A	no repair	3.40	73.00	3.45	73.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	596.06	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	596.06	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	596.06	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	2.71	45.20	596.06	N/A	no repair	3.01	50.20	3.01	50.20	18.375	0	0	0	0	0.00	0.00	0.00
	2.74	46.05	596.06	N/A	no repair	3.04	51.05	3.04	51.05	18.375	0	0	0	0	0.00	0.00	0.00
33	2.76	47.4	596.06	N/A	no repair	3.06	52.4	3.06	52.4	18.375	0	0	0	0	0.00	0.00	0.00
	2.93	49.50	596.06	N/A	no repair	3.23	54.50	3.23	54.50	18.375	0	0	0	0	0.00	0.00	0.00
	2.96	52.65	596.06	N/A	no repair	3.26	57.65	3.27	57.65	18.375	0	0	0	0	0.00	0.00	0.00
	3.015	57.6	596.06	N/A	no repair	3.315	62.6	3.3075	62.6	18.375	0	0	0	0	0.00	0.00	0.00
	3.25	56.00	596.06	N/A	no repair	3.55	61.00	3.63	61.00	18.375	0	0	0	0	0.00	0.00	0.00
	3.32	63.60	596.06	N/A	no repair	3.62	68.60	3.67	68.60	18.375	0	0	0	0	0.00	0.00	0.00
	3.40	73.00	596.06	N/A	no repair	3.70	78.00	3.75	78.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	607.99	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	607.99	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	607.99	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	3.01	50.20	607.99	N/A	no repair	3.31	55.20	3.31	55.20	18.375	0	0	0	0	0.00	0.00	0.00
	3.04	51.05	607.99	N/A	no repair	3.34	56.05	3.34	56.05	18.375	0	0	0	0	0.00	0.00	0.00
36	3.06	52.4	607.99	N/A	no repair	3.36	57.4	3.36	57.4	18.375	0	0	0	0	0.00	0.00	0.00
	3.23	54.50	607.99	N/A	no repair	3.53	59.50	3.53	59.50	18.375	0	0	0	0	0.00	0.00	0.00
	3.26	57.65	607.99	N/A	no repair	3.56	62.65	3.57	62.65	18.375	0	0	0	0	0.00	0.00	0.00
	3.315	62.6	607.99	N/A	no repair	3.615	67.6	3.6075	67.6	18.375	0	0	0	0	0.00	0.00	0.00
	3.55	61.00	607.99	N/A	no repair	3.85	66.00	3.93	66.00	18.375	0	0	0	0	0.00	0.00	0.00
	3.62	68.60	607.99	N/A	no repair	3.92	73.60	3.97	73.60	18.375	0	0	0	0	0.00	0.00	0.00
	3.70	78.00	607.99	N/A	no repair	4.00	83.00	4.05	83.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	620.14	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	620.14	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	620.14	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	3.31	55.20	620.14	N/A	no repair	3.61	60.20	3.61	60.20	18.375	0	0	0	0	0.00	0.00	0.00
	3.34	56.05	620.14	N/A	no repair	3.64	61.05	3.64	61.05	18.375	0	0	0	0	0.00	0.00	0.00
39	3.36	57.4	620.14	N/A	no repair	3.66	62.4	3.66	62.4	18.375	0	0	0	0	0.00	0.00	0.00
	3.53	59.50	620.14	N/A	no repair	3.83	64.50	3.83	64.50	18.375	0	0	0	0	0.00	0.00	0.00
	3.56	62.65	620.14	N/A	no repair	3.86	67.65	3.87	67.65	18.375	0	0	0	0	0.00	0.00	0.00
	3.615	67.6	620.14	N/A	no repair	3.915	72.6	3.9075	72.6	18.375	0	0	0	0	0.00	0.00	0.00
	3.85	66.00	620.14	N/A	no repair	4.15	71.00	4.23	71.00	18.375	0	0	0	0	0.00	0.00	0.00
	3.92	73.60	620.14	N/A	no repair	4.22	78.60	4.27	78.60	18.375	0	0	0	0	0.00	0.00	0.00
	4.00	83.00	620.14	N/A	no repair	4.30	88.00	4.35	88.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	632.55	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	632.55	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	632.55	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	3.61	60.20	632.55	N/A	no repair	3.91	65.20	3.91	65.20	18.375	0	0	0	0	0.00	0.00	0.00
	3.64	61.05	632.55	N/A	no repair	3.94	66.05	3.94	66.05	18.375	0	0	0	0	0.00	0.00	0.00
42	3.66	62.4	632.55	N/A	no repair	3.96	67.4	3.96	67.4	18.375	0	0	0	0	0.00	0.00	0.00
	3.83	64.50	632.55	N/A	no repair	4.13	69.50	4.13	69.50	18.375	0	0	0	0	0.00	0.00	0.00
	3.86	67.65	632.55	N/A	no repair	4.16	72.65	4.17	72.65	18.375	0	0	0	0	0.00	0.00	0.00
	3.915	72.6	632.55	N/A	no repair	4.215	77.6	4.2075	77.6	18.375	0	0	0	0	0.00	0.00	0.00
	4.15	71.00	632.55	N/A	no repair	4.45	76.00	4.53	76.00	18.375	0	0	0	0	0.00	0.00	0.00
	4.22	78.60	632.55	N/A	no repair	4.52	83.60	4.57	83.60	18.375	0	0	0	0	0.00	0.00	0.00
	4.30	88.00	632.55	N/A	no repair	4.60	93.00	4.65	93.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	645.20	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	645.20	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	645.20	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	3.91	65.20	645.20	N/A	no repair	4.21	70.20	4.21	70.20	18.375	0	0	0	0	0.00	0.00	0.00
	3.94	66.05	645.20	N/A	no repair	4.24	71.05	4.24	71.05	18.375	0	0	0	0	0.00	0.00	0.00
45	3.96	67.4	645.20	N/A	no repair	4.26	72.4	4.26	72.4	18.375	0	0	0	0	0.00	0.00	0.00
	4.13	69.50	645.20	N/A	no repair	4.43	74.50	4.43	74.50	18.375	0	0	0	0	0.00	0.00	0.00
	4.16	72.65	645.20	N/A	no repair	4.46	77.65	4.47	77.65	18.375	0	0	0	0	0.00	0.00	0.00
	4.215	77.6	645.20	N/A	no repair	4.515	82.6	4.5075	82.6	18.375	0	0	0	0	0.00	0.00	0.00
	4.45	76.00	645.20	N/A	no repair	4.75	81.00	4.83	81.00	18.375	0	0	0	0	0.00	0.00	0.00
	4.52	83.60	645.20	N/A	no repair	4.82	88.60	4.87	88.60	18.375	0	0	0	0	0.00	0.00	0.00
	4.60	93.00	645.20	N/A	no repair	4.90	98.00	4.95	98.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	658.10	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	658.10	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	658.10	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	4.21	70.20	658.10	N/A	no repair	4.51	75.20	4.51	75.20	18.375	0	0	0	0	0.00	0.00	0.00
	4.24	71.05	658.10	N/A	no repair	4.54	76.05	4.54	76.05	18.375	0	0	0	0	0.00	0.00	0.00
48	4.26	72.4	658.10	N/A	no repair	4.56	77.4	4.56	77.4	18.375	0	0	0	0	0.00	0.00	0.00
	4.43	74.50	658.10	N/A	no repair	4.73	79.50	4.73	79.50	18.375	0	0	0	0	0.00	0.00	0.00
	4.46	77.65	658.10	N/A	no repair	4.76	82.65	4.77	82.65	18.375	0	0	0	0	0.00	0.00	0.00
	4.515	82.6	658.10	N/A	no repair	4.815	87.6	4.8075	87.6	18.375	0	0	0	0	0.00	0.00	0.00
	4.75	81.00	658.10	N/A	no repair	5.05	86.00	5.13	86.00	18.375	0	0	0	0	0.00	0.00	0.00
	4.82	88.60	658.10	N/A	no repair	5.12	93.60	5.17	93.60	18.375	0	0	0	0	0.00	0.00	0.00
	4.90	98.00	658.10	N/A	no repair	5.20	103.00	5.25	103.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	671.26	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	671.26	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	671.26	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	4.51	75.20	671.26	N/A	no repair	4.81	80.20	4.81	80.20	18.375	0	0	0	0	0.00	0.00	0.00
	4.54	76.05	671.26	N/A	no repair	4.84	81.05	4.84	81.05	18.375	0	0	0	0	0.00	0.00	0.00
51	4.56	77.4	671.26	N/A	no repair	4.86	82.4	4.86	82.4	18.375	0	0	0	0	0.00	0.00	0.00
	4.73	79.50	671.26	N/A	no repair	5.03	84.50	5.03	84.50	18.375	0	0	0	0	0.00	0.00	0.00
	4.76	82.65	671.26	N/A	no repair	5.06	87.65	5.07	87.65	18.375	0	0	0	0	0.00	0.00	0.00
	4.815	87.6	671.26	N/A	no repair	5.115	92.6	5.1075	92.6	18.375	0	0	0	0	0.00	0.00	0.00
	5.05	86.00	671.26	N/A	no repair	5.35	91.00	5.43	91.00	18.375	0	0	0	0	0.00	0.00	0.00
	5.12	93.60	671.26	N/A	no repair	5.42	98.60	5.47	98.60	18.375	0	0	0	0	0.00	0.00	0.00
	5.20	103.00	671.26	N/A	repair	0.00	0.00	5.85	113.00	18.375	100	147	200	441	0.00	0.00	0.00
	0.00	0.00	684.69	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00

	0.00	0.00	684.69	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	684.69	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	4.81	80.20	684.69	N/A	no repair	5.11	85.20	5.11	85.20	18.375	0	0	0	0	0.00	0.00	0.00
	4.84	81.05	684.69	N/A	no repair	5.14	86.05	5.14	86.05	18.375	0	0	0	0	0.00	0.00	0.00
54	4.86	82.4	684.69	N/A	no repair	5.16	87.4	5.16	87.4	18.375	0	0	0	0	0.00	0.00	0.00
	5.03	84.50	684.69	N/A	no repair	5.33	89.50	5.33	89.50	18.375	0	0	0	0	0.00	0.00	0.00
	5.06	87.65	684.69	N/A	no repair	5.36	92.65	5.37	92.65	18.375	0	0	0	0	0.00	0.00	0.00
	5.115	92.6	684.69	N/A	no repair	5.415	97.6	5.4075	97.6	18.375	0	0	0	0	0.00	0.00	0.00
	5.35	91.00	684.69	N/A	no repair	5.65	96.00	5.73	96.00	18.375	0	0	0	0	0.00	0.00	0.00
	5.42	98.60	684.69	N/A	no repair	5.72	103.60	5.77	103.60	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	684.69	N/A	no repair	0.00	0.00	6.45	123.00	18.375	0	0	0	0	551.82	10.82	599.76
	0.00	0.00	698.38	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	698.38	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	698.38	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	5.11	85.20	698.38	N/A	no repair	5.41	90.20	5.41	90.20	18.375	0	0	0	0	0.00	0.00	0.00
	5.14	86.05	698.38	N/A	no repair	5.44	91.05	5.44	91.05	18.375	0	0	0	0	0.00	0.00	0.00
57	5.16	87.4	698.38	N/A	no repair	5.46	92.4	5.46	92.4	18.375	0	0	0	0	0.00	0.00	0.00
	5.33	89.50	698.38	N/A	no repair	5.63	94.50	5.63	94.50	18.375	0	0	0	0	0.00	0.00	0.00
	5.36	92.65	698.38	N/A	no repair	5.66	97.65	5.67	97.65	18.375	0	0	0	0	0.00	0.00	0.00
	5.42	97.60	698.38	N/A	no repair	5.72	102.60	5.71	102.60	18.375	0	0	0	0	0.00	0.00	0.00
	5.65	96	698.38	N/A	no repair	5.95	101	6.03	101	18.375	0	0	0	0	0.00	0.00	0.00
	5.72	103.60	698.38	N/A	repair	0.00	0.00	6.37	113.60	18.375	100	147	200	441	0.00	0.00	0.00
	0.00	0.00	698.38	N/A	no repair	0.00	0.00	7.05	133.00	18.375	0	0	0	0	562.86	11.04	611.76
	0.00	0.00	712.35	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0.00	0.00	712.35	N/A	no repair	0.00	0.00	0.00	0.00	18.375	0	0	0	0	0.00	0.00	0.00
	0	0	712.35	N/A	no repair	0	0	0	0	18.375	0	0	0	0	0.00	0.00	0.00
	5.41	90.20	712.35	N/A	no repair	5.71	95.20	5.71	95.20	18.375	0	0	0	0	0.00	0.00	0.00
	5.44	91.05	712.35	N/A	no repair	5.74	96.05	5.74	96.05	18.375	0	0	0	0	0.00	0.00	0.00
60	5.46	92.4	712.35	N/A	no repair	5.76	97.4	5.76	97.4	18.375	0	0	0	0	0.00	0.00	0.00
	5.63	94.50	712.35	N/A	no repair	5.93	99.50	5.93	99.50	18.375	0	0	0	0	0.00	0.00	0.00
	5.66	97.65	712.35	N/A	no repair	5.96	102.65	5.97	102.65	18.375	0	0	0	0	0.00	0.00	0.00
	5.715	102.6	712.35	N/A	repair	0	0	6.3075	112.6	18.375	100	147	200	441	0.00	0.00	0.00
	5.95	101.00	712.35	N/A	repair	0.00	0.00	6.63	111.00	18.375	100	147	200	441	0.00	0.00	0.00
	0.00	0.00	712.35	N/A	no repair	0.00	0.00	6.97	123.60	18.375	0	0	0	0	0.00	10.82	0.00
	0.00	0.00	712.35	N/A	no repair	0.00	0.00	7.65	143.00	18.375	0	0	0	0	574.11	11.26	623.99

Difference"partial"	interest on repair "in depth"	Difference" in depth"	Total cost "surface"	Total cost "partial"	Total cost "in depth"	initial Crack width(mm)	initialCrack length (mm)	Inspection cost	Decision	repair cost (surface treatment	Repair cost Partial in depth	In depth repair	Disruption cost	repair,disruption interst "surface"	Difference	Repair, disruption interest "partial"
0.00	0.00	0.00	1223.98	1223.98	1223.98	0.25	5	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1223.98	1223.98	1223.98	0.25	7.5	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1223.98	1223.98	1223.98	0.25	10	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1223.98	1223.98	1223.98	0.5	10	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1223.98	1223.98	1223.98	0.5	15	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1223.98	1223.98	1223.98	0.5	20	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1223.98	1223.98	1223.98	0.75	15	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1223.98	1223.98	1223.98	0.75	22.5	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1223.98	1223.98	1223.98	0.75	30	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1223.98	1223.98	1223.98	1	20	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1223.98	1223.98	1223.98	1	30	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1223.98	1223.98	1223.98	1	40	1470	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	0.55	10	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	0.55	12.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	0.55	15	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	0.8	15	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	0.8	20	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	0.8	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	1.05	20	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	1.05	27.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	1.05	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	1.3	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	1.3	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1252.13	1252.13	1252.13	1.3	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	0.85	15	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	0.85	17.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	0.85	20	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	1.1	20	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	1.1	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	1.1	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	1.35	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	1.35	32.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	1.35	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	1.6	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	1.6	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1280.48	1280.48	1280.48	1.6	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.15	20	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.15	22.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.15	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.4	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.4	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.4	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.65	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.65	37.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.65	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.9	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.9	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1309.03	1309.03	1309.03	1.9	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	1.45	25	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	1.45	27.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	1.45	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	1.7	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	1.7	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	1.7	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	1.95	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	1.95	42.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	1.95	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	2.2	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	2.2	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1337.79	1337.79	1337.79	2.2	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	1.75	30	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	1.75	32.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	1.75	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	2	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	2	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	2	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	2.25	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	2.25	47.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	2.25	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	2.5	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	2.5	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1366.75	1366.75	1366.75	2.5	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.05	35	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.05	37.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.05	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.3	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.3	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.3	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.55	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.55	52.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.55	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.8	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.8	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1395.92	1395.92	1395.92	2.8	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	2.35	40	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	2.35	42.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	2.35	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	2.6	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	2.6	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	2.6	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	2.85	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	2.85	57.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	2.85	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	3.1	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	3.1	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1425.31	1425.31	1425.31	3.1	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	2.65	45	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	2.65	47.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	2.65	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	2.9	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	2.9	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	2.9	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	3.15	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	3.15	62.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	3.15	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	3.4	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	3.4	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1454.92	1454.92	1454.92	3.4	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1484.75	1484.75	1484.75	2.95	50	36.75	no repair	0	0	0	0	0.00	0.00	0.00

0.00	0.00	0.00	1484.75	1484.75	1484.75		2.95	52.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1484.75	1484.75	1484.75		2.95	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1484.75	1484.75	1484.75		3.2	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1484.75	1484.75	1484.75		3.2	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1484.75	1484.75	1484.75		3.2	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1484.75	1484.75	1484.75		3.45	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1484.75	1484.75	1484.75		3.45	67.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1484.75	1484.75	1484.75		3.45	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1484.75	1484.75	1484.75		3.7	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1484.75	1484.75	1484.75		3.7	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1484.75	1484.75	1484.75		3.7	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		3.25	55	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		3.25	57.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		3.25	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		3.5	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		3.5	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		3.5	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		3.75	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		3.75	72.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		3.75	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		4	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		4	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1514.81	1514.81	1514.81		4	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		3.55	60	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		3.55	62.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		3.55	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		3.8	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		3.8	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		3.8	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		4.05	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		4.05	77.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		4.05	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		4.3	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		4.3	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1545.11	1545.11	1545.11		4.3	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		3.85	65	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		3.85	67.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		3.85	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		4.1	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		4.1	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		4.1	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		4.35	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		4.35	82.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		4.35	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		4.6	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		4.6	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1575.64	1575.64	1575.64		4.6	100	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.15	70	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.15	72.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.15	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.4	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.4	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.4	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.65	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.65	87.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.65	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.9	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.9	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1606.42	1606.42	1606.42		4.9	105	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.45	75	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.45	77.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.45	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.7	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.7	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.7	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.95	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.95	92.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.7	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.7	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.7	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.95	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.95	92.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		4.95	100	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		5.2	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		5.2	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1637.45	1637.45	1637.45		5.2	110	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1668.73	1668.73	1668.73		4.75	80	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1668.73	1668.73	1668.73		4.75	82.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1668.73	1668.73	1668.73		4.75	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1668.73	1668.73	1668.73		5	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1668.73	1668.73	1668.73		5	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1668.73	1668.73	1668.73		5	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1668.73	1668.73	1668.73		5.25	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1668.73	1668.73	1668.73		5.25	97.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1668.73	1668.73	1668.73		5.25	105	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1668.73	1668.73	1668.73		5.5	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1668.73	1668.73	1668.73		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1668.73	1668.73	1668.73		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1700.26	1700.26	1700.26		5.05	85	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1700.26	1700.26	1700.26		5.05	87.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1700.26	1700.26	1700.26		5.05	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1700.26	1700.26	1700.26		5.3	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1700.26	1700.26	1700.26		5.3	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1700.26	1700.26	1700.26		5.3	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1700.26	1700.26	1700.26		5.55	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1700.26	1700.26	1700.26		5.55	102.5	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1700.26	1700.26	1700.26		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1700.26	1700.26	1700.26		5.8	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1700.26	1700.26	1700.26		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	2241.26	2288.26	2341.26		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1732.07	1732.07	1732.07		5.35	90	36.75	no repair	0	0	0	0	0.00	0.00	0.00

0.00	0.00	0.00	1732.07	1732.07	1732.07		5.35	92.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1732.07	1732.07	1732.07		5.35	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1732.07	1732.07	1732.07		5.6	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1732.07	1732.07	1732.07		5.6	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1732.07	1732.07	1732.07		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1732.07	1732.07	1732.07		5.85	100	36.75	repair	100	147	200	441	551.82	10.82	599.76
0.00	0.00	0.00	1732.07	1732.07	1732.07		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1732.07	1732.07	1732.07		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1732.07	1732.07	1732.07		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1732.07	1732.07	1732.07		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
11.76	653.82	12.82	2283.89	2331.83	2385.89		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
0.00	0.00	0.00	1764.13	1764.13	1764.13		5.65	95	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1764.13	1764.13	1764.13		5.65	97.5	36.75	no repair	0	0	0	0	0.00	0.00	0.00
0.00	0.00	0.00	1764.13	1764.13	1764.13		5.65	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1764.13	1764.13	1764.13		5.9	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1764.13	1764.13	1764.13		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1764.13	1764.13	1764.13		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1764.13	1764.13	1764.13		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1764.13	1764.13	1764.13		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1764.13	1764.13	1764.13		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
0.00	0.00	0.00	1764.13	1764.13	1764.13		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	2305.13	2352.13	2405.13		0	0	36.75	no repair	0	0	0	0	585.60	11.48	636.47
12.00	666.90	13.08	2326.99	2375.89	2431.03		0	0	36.75	no repair	0	0	0	0	585.60	11.48	636.47
0.00	0.00	0.00	1796.48	1796.48	1796.48		5.95	100	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1796.48	1796.48	1796.48		5.95	102.5	36.75	repair	100	147	200	441	0.00	0.00	0.00
0.00	0.00	0.00	1796.48	1796.48	1796.48		0	0	36.75	no repair	0	0	0	0	551.82	10.82	599.76
0.00	0.00	0.00	1796.48	1796.48	1796.48		0	0	36.75	no repair	0	0	0	0	551.82	11.04	599.76
0.00	0.00	0.00	1796.48	1796.48	1796.48		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1796.48	1796.48	1796.48		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
0.00	0.00	0.00	1796.48	1796.48	1796.48		0	0	36.75	no repair	0	0	0	0	562.86	11.04	611.76
0.00	0.00	0.00	1796.48	1796.48	1796.48		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
0.00	0.00	0.00	2337.48	2384.48	2437.48		0	0	36.75	no repair	0	0	0	0	585.60	11.48	636.47
0.00	0.00	0.00	2337.48	2384.48	2437.48		0	0	36.75	no repair	0	0	0	0	574.11	11.26	623.99
11.76	0.00	12.82	2348.30	2396.24	2450.30		0	0	36.75	no repair	0	0	0	0	597.31	11.71	649.20
12.24	680.23	13.34	2370.59	2420.47	2476.71		0	0	36.75	no repair	0	0	0	0	597.31	11.71	649.20

Difference	Repair, disruption interest "in depth"	Difference	Total cost surface treatment	Total cost partial in depth	Total cost in depth repair	final Crack width	final Crack length	Crack width (no repair)	Crack width(no repair)
0.00	0.00	0.00	1470.00	1470	1470	0.55	10	0.55	10
0.00	0.00	0.00	1470.00	1470	1470	0.55	12.5	0.55	12.5
0.00	0.00	0.00	1470.00	1470	1470	0.55	15	0.55	15
0.00	0.00	0.00	1470.00	1470	1470	0.8	15	0.8	15
0.00	0.00	0.00	1470.00	1470	1470	0.8	20	0.8	20
0.00	0.00	0.00	1470.00	1470	1470	0.8	25	0.8	25
0.00	0.00	0.00	1470.00	1470	1470	1.05	20	1.05	20
0.00	0.00	0.00	1470.00	1470	1470	1.05	27.5	1.05	27.5
0.00	0.00	0.00	1470.00	1470	1470	1.05	35	1.05	35
0.00	0.00	0.00	1470.00	1470	1470	1.3	25	1.3	25
0.00	0.00	0.00	1470.00	1470	1470	1.3	35	1.3	35
0.00	0.00	0.00	1470.00	1470	1470	1.3	45	1.3	45
0.00	0.00	0.00	1506.75	1506.75	1506.75	0.85	15	0.85	15
0.00	0.00	0.00	1506.75	1506.75	1506.75	0.85	17.5	0.85	17.5
0.00	0.00	0.00	1506.75	1506.75	1506.75	0.85	20	0.85	20
0.00	0.00	0.00	1506.75	1506.75	1506.75	1.1	20	1.1	20
0.00	0.00	0.00	1506.75	1506.75	1506.75	1.1	25	1.1	25
0.00	0.00	0.00	1506.75	1506.75	1506.75	1.1	30	1.1	30
0.00	0.00	0.00	1506.75	1506.75	1506.75	1.35	25	1.35	25
0.00	0.00	0.00	1506.75	1506.75	1506.75	1.35	32.5	1.35	32.5
0.00	0.00	0.00	1506.75	1506.75	1506.75	1.35	40	1.35	40
0.00	0.00	0.00	1506.75	1506.75	1506.75	1.6	30	1.6	30
0.00	0.00	0.00	1506.75	1506.75	1506.75	1.6	40	1.6	40
0.00	0.00	0.00	1506.75	1506.75	1506.75	1.6	50	1.6	50
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.15	20	1.15	20
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.15	22.5	1.15	22.5
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.15	25	1.15	25
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.4	25	1.4	25
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.4	30	1.4	30
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.4	35	1.4	35
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.65	30	1.65	30
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.65	37.5	1.65	37.5
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.65	45	1.65	45
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.9	35	1.9	35
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.9	45	1.9	45
0.00	0.00	0.00	1543.50	1543.50	1543.50	1.9	55	1.9	55
0.00	0.00	0.00	1580.25	1580.25	1580.25	1.45	25	1.45	25
0.00	0.00	0.00	1580.25	1580.25	1580.25	1.45	27.5	1.45	27.5
0.00	0.00	0.00	1580.25	1580.25	1580.25	1.45	30	1.45	30
0.00	0.00	0.00	1580.25	1580.25	1580.25	1.7	30	1.7	30
0.00	0.00	0.00	1580.25	1580.25	1580.25	1.7	35	1.7	35
0.00	0.00	0.00	1580.25	1580.25	1580.25	1.7	40	1.7	40
0.00	0.00	0.00	1580.25	1580.25	1580.25	1.95	35	1.95	35
0.00	0.00	0.00	1580.25	1580.25	1580.25	1.95	42.5	1.95	42.5
0.00	0.00	0.00	1580.25	1580.25	1580.25	1.95	50	1.95	50
0.00	0.00	0.00	1580.25	1580.25	1580.25	2.2	40	2.2	40
0.00	0.00	0.00	1580.25	1580.25	1580.25	2.2	50	2.2	50
0.00	0.00	0.00	1580.25	1580.25	1580.25	2.2	60	2.2	60
0.00	0.00	0.00	1617.00	1617.00	1617.00	1.75	30	1.75	30
0.00	0.00	0.00	1617.00	1617.00	1617.00	1.75	32.5	1.75	32.5
0.00	0.00	0.00	1617.00	1617.00	1617.00	1.75	35	1.75	35
0.00	0.00	0.00	1617.00	1617.00	1617.00	2	35	2	35
0.00	0.00	0.00	1617.00	1617.00	1617.00	2	40	2	40
0.00	0.00	0.00	1617.00	1617.00	1617.00	2	45	2	45
0.00	0.00	0.00	1617.00	1617.00	1617.00	2.25	40	2.25	40
0.00	0.00	0.00	1617.00	1617.00	1617.00	2.25	47.5	2.25	47.5
0.00	0.00	0.00	1617.00	1617.00	1617.00	2.25	55	2.25	55
0.00	0.00	0.00	1617.00	1617.00	1617.00	2.5	45	2.5	45
0.00	0.00	0.00	1617.00	1617.00	1617.00	2.5	55	2.5	55
0.00	0.00	0.00	1617.00	1617.00	1617.00	2.5	65	2.5	65
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.05	35	2.05	35
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.05	37.5	2.05	37.5
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.05	40	2.05	40
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.3	40	2.3	40
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.3	45	2.3	45
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.3	50	2.3	50
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.55	45	2.55	45
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.55	52.5	2.55	52.5
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.55	60	2.55	60
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.8	50	2.8	50
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.8	60	2.8	60
0.00	0.00	0.00	1653.75	1653.75	1653.75	2.8	70	2.8	70
0.00	0.00	0.00	1690.50	1690.50	1690.50	2.35	40	2.35	40
0.00	0.00	0.00	1690.50	1690.50	1690.50	2.35	42.5	2.35	42.5
0.00	0.00	0.00	1690.50	1690.50	1690.50	2.35	45	2.35	45
0.00	0.00	0.00	1690.50	1690.50	1690.50	2.6	45	2.6	45
0.00	0.00	0.00	1690.50	1690.50	1690.50	2.6	50	2.6	50
0.00	0.00	0.00	1690.50	1690.50	1690.50	2.6	55	2.6	55
0.00	0.00	0.00	1690.50	1690.50	1690.50	2.85	50	2.85	50
0.00	0.00	0.00	1690.50	1690.50	1690.50	2.85	57.5	2.85	57.5
0.00	0.00	0.00	1690.50	1690.50	1690.50	2.85	65	2.85	65
0.00	0.00	0.00	1690.50	1690.50	1690.50	3.1	55	3.1	55
0.00	0.00	0.00	1690.50	1690.50	1690.50	3.1	65	3.1	65
0.00	0.00	0.00	1690.50	1690.50	1690.50	3.1	75	3.1	75
0.00	0.00	0.00	1727.25	1727.25	1727.25	2.65	45	2.65	45
0.00	0.00	0.00	1727.25	1727.25	1727.25	2.65	47.5	2.65	47.5
0.00	0.00	0.00	1727.25	1727.25	1727.25	2.65	50	2.65	50
0.00	0.00	0.00	1727.25	1727.25	1727.25	2.9	50	2.9	50
0.00	0.00	0.00	1727.25	1727.25	1727.25	2.9	55	2.9	55
0.00	0.00	0.00	1727.25	1727.25	1727.25	2.9	60	2.9	60
0.00	0.00	0.00	1727.25	1727.25	1727.25	3.15	55	3.15	55
0.00	0.00	0.00	1727.25	1727.25	1727.25	3.15	62.5	3.15	62.5
0.00	0.00	0.00	1727.25	1727.25	1727.25	3.15	70	3.15	70
0.00	0.00	0.00	1727.25	1727.25	1727.25	3.4	60	3.4	60
0.00	0.00	0.00	1727.25	1727.25	1727.25	3.4	70	3.4	70
0.00	0.00	0.00	1727.25	1727.25	1727.25	3.4	80	3.4	80
0.00	0.00	0.00	1764.00	1764.00	1764.00	2.95	50	2.95	50
0.00	0.00	0.00	1764.00	1764.00	1764.00	2.95	52.5	2.95	52.5
0.00	0.00	0.00	1764.00	1764.00	1764.00	2.95	55	2.95	55
0.00	0.00	0.00	1764.00	1764.00	1764.00	3.2	55	3.2	55
0.00	0.00	0.00	1764.00	1764.00	1764.00	3.2	60	3.2	60
0.00	0.00	0.00	1764.00	1764.00	1764.00	3.2	65	3.2	65
0.00	0.00	0.00	1764.00	1764.00	1764.00	3.45	60	3.45	60
0.00	0.00	0.00	1764.00	1764.00	1764.00	3.45	67.5	3.45	67.5
0.00	0.00	0.00	1764.00	1764.00	1764.00	3.45	75	3.45	75
0.00	0.00	0.00	1764.00	1764.00	1764.00	3.7	65	3.7	65
0.00	0.00	0.00	1764.00	1764.00	1764.00	3.7	75	3.7	75
0.00	0.00	0.00	1764.00	1764.00	1764.00	3.7	85	3.7	85
0.00	0.00	0.00	1800.75	1800.75	1800.75	3.25	55	3.25	55

0.00	0.00	0.00	1800.75	1800.75	1800.75	3.25	57.5	3.25	57.5
0.00	0.00	0.00	1800.75	1800.75	1800.75	3.25	60	3.25	60
0.00	0.00	0.00	1800.75	1800.75	1800.75	3.5	60	3.5	60
0.00	0.00	0.00	1800.75	1800.75	1800.75	3.5	65	3.5	65
0.00	0.00	0.00	1800.75	1800.75	1800.75	3.5	70	3.5	70
0.00	0.00	0.00	1800.75	1800.75	1800.75	3.75	65	3.75	65
0.00	0.00	0.00	1800.75	1800.75	1800.75	3.75	72.5	3.75	72.5
0.00	0.00	0.00	1800.75	1800.75	1800.75	3.75	80	3.75	80
0.00	0.00	0.00	1800.75	1800.75	1800.75	4	70	4	70
0.00	0.00	0.00	1800.75	1800.75	1800.75	4	80	4	80
0.00	0.00	0.00	1800.75	1800.75	1800.75	4	90	4	90
0.00	0.00	0.00	1837.50	1837.50	1837.50	3.55	60	3.55	60
0.00	0.00	0.00	1837.50	1837.50	1837.50	3.55	62.5	3.55	62.5
0.00	0.00	0.00	1837.50	1837.50	1837.50	3.55	65	3.55	65
0.00	0.00	0.00	1837.50	1837.50	1837.50	3.8	65	3.8	65
0.00	0.00	0.00	1837.50	1837.50	1837.50	3.8	70	3.8	70
0.00	0.00	0.00	1837.50	1837.50	1837.50	3.8	75	3.8	75
0.00	0.00	0.00	1837.50	1837.50	1837.50	4.05	70	4.05	70
0.00	0.00	0.00	1837.50	1837.50	1837.50	4.05	77.5	4.05	77.5
0.00	0.00	0.00	1837.50	1837.50	1837.50	4.05	85	4.05	85
0.00	0.00	0.00	1837.50	1837.50	1837.50	4.3	75	4.3	75
0.00	0.00	0.00	1837.50	1837.50	1837.50	4.3	85	4.3	85
0.00	0.00	0.00	1837.50	1837.50	1837.50	4.3	95	4.3	95
0.00	0.00	0.00	1874.25	1874.25	1874.25	3.85	65	3.85	65
0.00	0.00	0.00	1874.25	1874.25	1874.25	3.85	67.5	3.85	67.5
0.00	0.00	0.00	1874.25	1874.25	1874.25	3.85	70	3.85	70
0.00	0.00	0.00	1874.25	1874.25	1874.25	4.1	70	4.1	70
0.00	0.00	0.00	1874.25	1874.25	1874.25	4.1	75	4.1	75
0.00	0.00	0.00	1874.25	1874.25	1874.25	4.1	80	4.1	80
0.00	0.00	0.00	1874.25	1874.25	1874.25	4.35	75	4.35	75
0.00	0.00	0.00	1874.25	1874.25	1874.25	4.35	82.5	4.35	82.5
0.00	0.00	0.00	1874.25	1874.25	1874.25	4.35	90	4.35	90
0.00	0.00	0.00	1874.25	1874.25	1874.25	4.6	80	4.6	80
0.00	0.00	0.00	1874.25	1874.25	1874.25	4.6	90	4.6	90
0.00	0.00	0.00	1874.25	1874.25	1874.25	4.6	100	4.6	100
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.15	70	4.15	70
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.15	72.5	4.15	72.5
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.15	75	4.15	75
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.4	75	4.4	75
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.4	80	4.4	80
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.4	85	4.4	85
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.65	80	4.65	80
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.65	87.5	4.65	87.5
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.65	95	4.65	95
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.9	85	4.9	85
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.9	95	4.9	95
0.00	0.00	0.00	1911.00	1911.00	1911.00	4.9	105	4.9	105
0.00	0.00	0.00	1947.75	1947.75	1947.75	4.45	75	4.45	75
0.00	0.00	0.00	1947.75	1947.75	1947.75	4.45	77.5	4.45	77.5
0.00	0.00	0.00	1947.75	1947.75	1947.75	4.45	80	4.45	80
0.00	0.00	0.00	1947.75	1947.75	1947.75	4.7	80	4.7	80
0.00	0.00	0.00	1947.75	1947.75	1947.75	4.7	85	4.7	85
0.00	0.00	0.00	1947.75	1947.75	1947.75	4.7	90	4.7	90
0.00	0.00	0.00	1947.75	1947.75	1947.75	4.95	85	4.95	85
0.00	0.00	0.00	1947.75	1947.75	1947.75	4.95	92.5	4.95	92.5
0.00	0.00	0.00	1947.75	1947.75	1947.75	4.95	100	4.95	100
0.00	0.00	0.00	1947.75	1947.75	1947.75	5.2	90	5.2	90
0.00	0.00	0.00	1947.75	1947.75	1947.75	5.2	100	5.2	100
0.00	0.00	0.00	1947.75	1947.75	1947.75	5.2	110	5.2	110
0.00	0.00	0.00	1984.50	1984.50	1984.50	4.75	80	4.75	80
0.00	0.00	0.00	1984.50	1984.50	1984.50	4.75	82.5	4.75	82.5
0.00	0.00	0.00	1984.50	1984.50	1984.50	4.75	85	4.75	85
0.00	0.00	0.00	1984.50	1984.50	1984.50	5	85	5	85
0.00	0.00	0.00	1984.50	1984.50	1984.50	5	90	5	90
0.00	0.00	0.00	1984.50	1984.50	1984.50	5	95	5	95
0.00	0.00	0.00	1984.50	1984.50	1984.50	5.25	90	5.25	90
0.00	0.00	0.00	1984.50	1984.50	1984.50	5.25	97.5	5.25	97.5
0.00	0.00	0.00	1984.50	1984.50	1984.50	5.25	105	5.25	105
0.00	0.00	0.00	1984.50	1984.50	1984.50	5.5	95	5.5	95
0.00	0.00	0.00	2525.50	2572.50	2625.50	0	0	5.8	110
0.00	0.00	0.00	2525.50	2572.50	2625.50	0	0	5.8	120
0.00	0.00	0.00	2021.25	2021.25	2021.25	5.05	85	5.05	85
0.00	0.00	0.00	2021.25	2021.25	2021.25	5.05	87.5	5.05	87.5
0.00	0.00	0.00	2021.25	2021.25	2021.25	5.05	90	5.05	90
0.00	0.00	0.00	2021.25	2021.25	2021.25	5.3	90	5.3	90
0.00	0.00	0.00	2021.25	2021.25	2021.25	5.3	95	5.3	95
0.00	0.00	0.00	2021.25	2021.25	2021.25	5.3	100	5.3	100
0.00	0.00	0.00	2021.25	2021.25	2021.25	5.55	95	5.55	95
0.00	0.00	0.00	2021.25	2021.25	2021.25	5.55	102.5	5.55	102.5
0.00	0.00	0.00	2562.25	2609.25	2662.25	0	0	5.85	115
0.00	0.00	0.00	2021.25	2021.25	2021.25	5.8	100	5.8	100
11.76	653.82	12.82	2573.07	2621.01	2675.07	0	0	6.4	120
11.76	653.82	12.82	2573.07	2621.01	2675.07	0	0	6.4	130
0.00	0.00	0.00	2058.00	2058.00	2058.00	5.35	90	5.35	90
0.00	0.00	0.00	2058.00	2058.00	2058.00	5.35	92.5	5.35	92.5
0.00	0.00	0.00	2058.00	2058.00	2058.00	5.35	95	5.35	95
0.00	0.00	0.00	2058.00	2058.00	2058.00	5.6	95	5.6	95
0.00	0.00	0.00	2058.00	2058.00	2058.00	5.6	100	5.6	100
0.00	0.00	0.00	2599.00	2646.00	2699.00	0	0	5.9	110
0.00	0.00	0.00	2058.00	2058.00	2058.00	5.85	100	5.85	100
0.00	0.00	0.00	2599.00	2646.00	2699.00	0	0	6.15	112.5
11.76	653.82	12.82	2609.82	2657.76	2711.82	0	0	6.45	125
0.00	0.00	0.00	2599.00	2646.00	2699.00	0	0	6.4	110
12.00	666.90	13.08	2620.86	2669.76	2724.90	0	0	7	130
12.00	666.90	13.08	2620.86	2669.76	2724.90	0	0	7	140
0.00	0.00	0.00	2094.75	2094.75	2094.75	5.65	95	5.65	95

0.00	0.00	0.00	2094.75	2094.75	2094.75	5.65	97.5	5.65	97.5
0.00	0.00	0.00	2094.75	2094.75	2094.75	5.65	100	5.65	100
0.00	0.00	0.00	2094.75	2094.75	2094.75	5.9	100	5.9	100
0.00	0.00	0.00	2635.75	2682.75	2735.75	0	0	6.2	110
11.76	653.82	12.82	2646.57	2694.51	2748.57	0	0	6.5	120
11.76	653.82	12.82	2646.57	2694.51	2748.57	0	0	6.45	110
11.76	653.82	12.82	2646.57	2694.51	2748.57	0	0	6.75	122.5
12.00	666.90	13.08	2657.61	2706.51	2761.65	0	0	7.05	135
11.76	653.82	12.82	2646.57	2694.51	2748.57	0	0	7	120
12.24	680.23	13.34	2668.86	2718.74	2774.98	0	0	7.6	140
12.24	680.23	13.34	2668.86	2718.74	2774.98	0	0	7.6	150
0.00	0.00	0.00	2131.50	2131.50	2131.50	5.95	100	5.95	100
0.00	0.00	0.00	2131.50	2131.50	2131.50	5.95	102.5	5.95	102.5
0.00	0.00	0.00	2672.50	2719.50	2772.50	0	0	6.25	110
0.00	0.00	0.00	2672.50	2719.50	2772.50	0	0	6.5	110
11.76	653.82	12.82	2683.32	2731.26	2785.32	0	0	6.8	120
12.00	666.90	13.08	2694.36	2743.26	2798.40	0	0	7.1	130
11.76	653.82	12.82	2694.14	2743.02	2798.14	0	0	7.05	120
12.00	666.90	13.08	2694.36	2743.26	2798.40	0	0	7.35	132.5
12.24	680.23	13.34	2705.61	2755.49	2811.73	0	0	7.65	145
12.00	666.90	13.08	2694.36	2743.26	2798.40	0	0	7.6	130
12.48	693.84	13.60	2717.10	2767.97	2825.34	0	0	8.2	150
12.48	693.84	13.60	2717.10	2767.97	2825.34	0	0	8.2	160
0.00	0.00	0.00	2709.25	2756.25	2809.25	0	0	6.55	110
0.00	0.00	0.00	2709.25	2756.25	2809.25	0	0	6.55	112.5
11.76	653.82	12.82	2720.07	2768.01	2822.07	0	0	6.85	120
12.00	653.82	13.08	2720.29	2768.25	2822.33	0	0	7.1	120
12.00	666.90	13.08	2731.11	2780.01	2835.15	0	0	7.4	130
12.24	680.23	13.34	2742.36	2792.24	2848.48	0	0	7.7	140
12.00	666.90	13.08	2741.93	2791.77	2847.97	0	0	7.65	130
12.24	680.23	13.34	2742.36	2792.24	2848.48	0	0	7.95	142.5
12.48	693.84	13.60	2753.85	2804.72	2862.09	0	0	8.25	155
12.24	680.23	13.34	2742.36	2792.24	2848.48	0	0	8.2	140
12.73	707.72	13.88	2765.56	2817.45	2875.97	0	0	8.8	160
12.73	707.72	13.88	2765.56	2817.45	2875.97	0	0	8.8	170