University of Southern Queensland

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Rehabilitation of Timber Bridge Piles with Splitting Failure Mechanism

A dissertation Submitted by

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Abstract

Fibre composites such a Fibre Reinforced Polymer (FRP) laminates inherent properties that can be seen to offer great tensile strength benefits than that of steel, timber and concrete in vast varieties of environmental conditions. These conditions can range from tidal/splash waves, high moisture environments and fluctuating thermal conditions. The combination of FRP laminate with an infill annulus material offers deteriorated timber sections greater axial and lateral confinement, resulting in larger axial load capacities. Not only does the FRP laminate offer high tensile strength, but also offers a protection from biological attack for submerged timber pile cases.

This research project, focuses on a repair method for decayed timber piles, for bridges, boardwalks and jetties using FRP jacketing technology. Due to durability, pumpability, workability and compressive strength requirements, Crane Rail Grout (CRG) (new product) and Underwater Cementitious Grout (UCG) development was preferred. The combination of material offers an all-round (360 degree) confining pressure. This significantly increases the strength of the pile. Therefore, this repair method will be tested and validated throughout this paper.

Several objectives were considered to examine the maximum load capacities using the novel repair timber pile rehabilitation technique. The first is the comparison of several defects of FRP laminate wrapped timber pile sample with two types of infill material. This will be compared to a normalised defected timber pile section with no repair method. The defect levels follow the split depth method. Critical depth is the radius of the timber section. 2/3 radius and 1/3 radius defects will also be validated against unwrapped control samples.

The second object, testing and analysing results to confirm the repair method technique. Linear deformation was achieved for all rehabilitated samples without the samples deforming. Meaning no failure was achieved. Lateral confinement had a reduction of approximately 66 % to that of the unwrapped samples. This result validated the objectives and expected outcomes of lateral confinement enhancements. Lateral confinement was seen to have the greatest impact on the unwrapped samples, resulting in failure at relatively low strain values. Lower axial strain improvements, obtained through infill material strength properties.

Certification

I certify that the ideas, designs and experimental work, results, analyses and conclusions set out in this dissertation are entirely my own effort, except where otherwise indicated and acknowledged.

I further certify that the work is original and has not been previously submitted for assessment in any other course or institution, except where specifically stated.

Rahmin Borzou

Student Number: [redacted]

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Nomenclature

Term	**Definition**
NSW	New South Wales
QLD	Queensland
VIC	Victoria
WA	Western Australia
TAS	Tasmania
USA	United States of America
FRP	Fibre-Reinforced Polymer
GFRP	Glass Fibre-Reinforced Polymers
USQ	University of Southern Queensland
PPE	Personal Protective Equipment
UCG	Underwater Cementitious Grout
CRG	Crane Rail Grout
Subscripts	
I	moment of inertia (mm^4)
Z	section modulus (mm^3)
Rad	radius of gyration (mm)
l	length of specimen (mm)
A	area (mm^2)
r	radius of specimen (mm)
D1	defect depth 1 (mm)
D2	defect depth 2 (mm)
DC	defect depth critical (mm)
C	Control sample
SG	Strain gauge
P	load (kN)
P_{MAX}	Maximum point load (kN)
P`	proportional point load (kN)
ε	strain (m/m)
σ_c	stress (MPa)
$\sigma_c{}'$	proportional stress (MPa)
E_{AXIAL}	axial modulus of elasticity (MPa)

Chapter 1 INTRODUCTION

1.1 Scope

"Rehabilitation of deteriorated timber bridges"

Majority of the thousands of timber bridges around Australia are more than 50 years old and strengthening and rehabilitation of deteriorated timber bridges is a strong financial commitment. The maintenance cost of timber bridges is affected significantly by several deterioration mechanisms which require a systematic approach for diagnosis and treatment. The approaches used to rehabilitate timber bridges vary depending on the deterioration mechanism and location.

Currently older bridges incorporate timber piles as its primary structural support. These older bridge quantities can be found in Table 1-1. New age materials such as concreate is becoming the basis for new bridge construction material for its structural properties and benefits. Dismantling older timber bridges and replacing those with concrete is timely and costly to the economy. Therefore, rehabilitation techniques are being researched, manufactured and implemented on bridges around Australia. These rehabilitation techniques will be spoken about and investigated into greater detail throughout the dissertation.

In 2001, a study was conducted showing the number of bridges per state that require on-going maintenance and rehabilitation (Scott 2001). Majority of bridges found in Table 1-1 show an extremely high amount of locally owned bridges. Furthermore, the ongoing maintenance cost can be found in Table 1-2. Timber shows a high annual maintenance cost value per year compared to that of steel and concrete. This goes to show the dire need of a cost effective, strength maximising and lifelong rehabilitation repair method to save on such high maintenance costs.

State	Local Council Owned	State Road Authority Owned	State Rail Authority Owned
NSW	4000	150	700
QLD	3000	500	
VIC	600	25	
WA	3000		
TAS	100		
TOTAL	10700	675	700

Table 1-1 - Australian bridge population (Scott 2001)

Bridge Type	Local Councils	RTA	RIC
Timber	$6m	$8m	$5m
Steel	$0.35m	$1.3m	$5m
Concrete	$1.5m	$9m	$0.5m

Table 1-2 - Approximate annual maintenance cost of bridges (Scott 2001)

These overwhelming facts show just exactly how many bridges across the country need maintenance because of defects within timber that cause pile deterioration.

Figure 1-1 - Examples of observed damages in timber piles in Nebraska (Mohammadi et al. 2014)

Pile deterioration examples can be seen in Figure 1-1. Biological and physical damages to timber piles reduce the structural integrity and axial loads. Therefore, repair methods are sort after to reinstate design axial loads.

There is no a comprehensive research on timber pile with eccentric compression load available. A study by (Borello et al. 2009) shows current rating method is not conservative while it only takes account concentric compressive load, and the results could lead to an overestimate capacity while the pile strength was significantly reduced under eccentric load compared to concentric load.

Currently information about splitting due to thermal expansion is lacking and in dire need of research and testing. New piles can be cut and posted onto the old piles but this solution can often be costly. Therefore, a new technique currently on the market offer a helpful solution. Wrapping the deteriorated pile while still under axial load reduces time and cost of the project. This solution consists of a GFRP wrap spaced approximately 20 mm with PileMedic corner bar spacers that are attached to the existing pile. The wrap is sealed with an underwater resin that will eliminate any moisture from entering the fill material and ultimately to the existing pile. Usually an underwater cementitious grout is used to fill the 20-mm annular space as its material properties are extremely high. After 7 days the fill material will reach approximately 90% of its maximum 28 days strength. After 7 days the compressive strength should be approximately 100 MPa. This is just one example of rehabilitation that can be seen dominating the market for its ease of use, strength benefits and cost effectiveness.

1.2 Organisational Report

This report is divided into four main chapters.

Chapter 2 is a literature review that describes the diverse types of damage levels that can be seen from bridge inspections in the field. These damage levels are broken down into two main categories which are biological damage and physical damage. This chapter also outlines gaps in literatures for the given defect of physical splitting. A brief description of each damage and rehabilitation technique is provided in this chapter.

Chapter 3 reviews the methodology for research, sample preparation, materials used, testing and data analysis. This chapter sets up the testing procedure for the giving scope of the dissertation. Calculations for preparation are also noted in this chapter. Three splitting defects have been incorporated and the guidelines for this repair technique are outlined throughout this chapter. FRP laminate jacketing and grout injection are the two main steps incorporated into this repair method and will be discussed in greater detail in this chapter.

Chapter 4 outlines the results obtained from the compression testing machine and the strain gauge data collecting machine. 16 samples with dimensions 150 mm diameter and 300 mm length were used with three damage levels to validate the effectiveness of the repair method. Two filler materials were utilised and subjected to axial loads recording lateral and axial strain. Test results indicate a failure of the control samples but no failure of the repair method.

1.3 Project Aims

This project aim is to complete many objectives listed below starting from the initial background or research phase to completing testing while incorporating testing for a better understanding and for future development of the dissertation.

1. Conduct extensive research and complete a comprehensive literature review to gain an understanding of deterioration defects in timber piles specifically.
2. Gain an understanding of rehabilitation techniques for timber bridges around Australia.
3. Apply splitting defects several samples for repair method.
4. Apply/incorporate rehabilitation techniques to samples to validate capacity improvements.
5. Analysed data obtained for an in-depth analysis and comment on effectiveness.

1.4 Expected Outcomes

The expected outcomes that will come from this dissertation can be broken down in two stages. Research and testing. Research is vital in gaining information about the given topic and areas in which need further research. This research will then be used to create test parameters for testing.

1.4.1 Research

1. Completing a comprehensive literature review
2. Obtain adequate testing parameters

1.4.2 Testing

1. Obtain failure from the unwrapped samples – defects
2. Crushing of fibres at the ends of unwrapped samples
3. Determine maximum axial capacity of unwrapped timber samples
4. Compressive strength increase in wrapped samples

1.5 Publications

Publications at international conferences:

1. **Borzou Rahmin, Lokuge Weena**, “Rehabilitation of timber bridge piles using a wrapping system”, 9th International Conference on Bridge Maintenance, Safety and Management (IABMAS 2018), Melbourne, Australia, 9-13 July 2018

Chapter 2 LITERATURE REVIEW

This section presents a review of published timber pile rehabilitation techniques currently being used in today's day and age. Timber piles age with time and many defects will form over the life of the pile.

Weathering is the main cause of deterioration as moisture can inhibit the pile causing thermal expansion to occur. The result of this is cracking along the fibres, opening the timber for fungal decay to start breeding.

The two most commonly used techniques are splicing and GFRP wrapping of deteriorated piles. Splicing is a semi-permanent solution that should be used as a desperate measure. GFRP wrapping is a permanent solution providing adequate increase in strength. The advantage of using a GFRP wrap is high tensile strength resulting in high confining pressure.

These rehabilitation techniques will be researched in-depth throughout the literature review with one technique being adopted for the testing phase of this paper.

2.1 Weathering

The weathering process causes defects within the timber. Weathering is classified by a combination of light, water and heat. Originally smooth surfaces become rough and raised. Checks develop which results in cracks which can cause warping to occur. The surface of the timber pile change colour, mildews, and splinters or fragments separate.

Weathering is the main cause in the deterioration of timber piles.

2.1.1 Moisture Content

The principal cause of weathering is the excessive exposure of moisture content. When wood is unprotected from external factors, moisture can be absorbed in both the cell walls and the cell cavities of the timber. This results in tremendous swelling of the pile. Austroads (2009) reported that freshly cut (green) timber has a moisture content ranging from 50 to 200% then dries to approximately 25-30% then dries even further to about 15%. And where there is some difference or disagreement: Mohammadi. et. Al (2014) suggests that a moisture content greater than 20% decay will start taking place whereby Austroads (2009) believes that decay will start taking place at 15%. A 5% difference can be noted between the two sources.

Consequent shrinkage and swelling encourages stresses due to moisture gradients between surface and interior. In Figure 2-1 it can be noticed that moisture content variations have caused shrinkage resulting in splitting, cracking or tensile failure. Light is another factor which can also lead to the degradation of timber but on a smaller scale. The action of light can degrade through photochemical process. Visible and infrared light can cause the decomposition of cell material at shallow depths. A combination of thermal expansion and moisture content are considered highly for timber degradation.

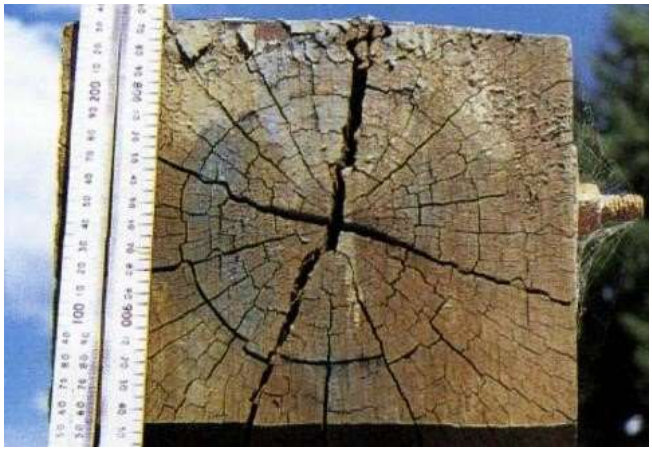

Figure 2-1 - Splitting due to thermal expansion (Bridge Inspection and Maintenance Manual 2001)

2.1.2 Fungal Decay

Fungal decay is the primary type of deterioration in timber piles. Austroads (2009) reported that decay is the rotting of timber because of fungal attacks. Timber piles are subjected to weathering conditions such as water and temperature. As a result, the nature of the pile is to shrink. This shrinkage results in large internal stresses. The outcome of this action causes splits to form in the timber pile. These splits are a pathway for fungal decay to take effect. The fungal decay will make its way to the centre of the untreated timber pile. Therefore, it can be noted that weathering is the main cause of fungal decay as the fungus attacks the timber internally. It has been noted that fungal decay present in timber piles creates a lower load rating.

Decay is associated with a biochemical attack on individual cells of wood tissue (Avent 1985, 328-342). Attacking organisms require oxygen, temperature and moisture too thrive. These organisms use wood as food. From a structural standpoint decaying timber isn't ideal and by controlling or preventing moisture content will sequentially minimize the effect. Wood fungi can be noted grows quite well in conditions whereby the moisture content is between 30 and 100%. Mould will often grow in air-dry environments where humidity levels are constantly greater than 80%.

Both Austroads (2009) and Avent (1985) suggest that fungal decay within submerged timber piles.

2.1.3 Termites

Termites is another means that a pile can deteriorate rapidly. Termites are generally found in the northern tropical belt of Australia (Austroads 2009). The environmental conditions need to satisfy that of termites which require contact with soil and a constant source of moisture. The Damage caused by termites is much more rapid growing than that of fungi (Mohammadi. et al 2014). It's less common to see termite attack to occur in durable hardwoods without some sort of pre-existing fungal decay. This is due to the fact moisture is present which is excellent conditions for termite growth (Main Roads 2014).

2.1.4 Marine Organisms

There are many marine borer species, and each species has a different habit and ability to attack timber piles in different coastal regions (Cookson LJ, 1986).

Timber piles that are submerged beneath the water's surface can be inhabited by marine organisms. It has been noted that these organisms become more severe in subtropical waters than in colder waters (Bootle 1983). These marine organisms are categorized into two groups, these groups are:

- Molluscs (Teredinidae) – When fully gown these organisms develop a pair of boring shells on the head.

- The organisms grow larger as the boring progresses which can be seen in Figure 2-2

  According to Bootle (1983) greatest intensity of attack seems to occur in the zone between 300 mm above and 600 mm below low tide level. This organism cause significant structural problems as visual inspection cannot determine the extent of damage.

- Crustaceans – This group attacks wood on the surface creating shorter and narrower tunnels than that of the Molluscs group. Tidal waves steadily erode the exterior affected area giving the pile an "hourglass" look. Sphaeroma is a species within the crustaceans group. This species cannot survive in water containing less than 1.0 to 1.5 % salinity (Bootle 1983). Accelerated damage is noted to be approximately half tidal level. Figure 2-3 is the effect of Sphaeroma boring which decreases strength cross sectional area of the timber pile resulting in a reduced load capacity.

Figure 2-2 - Molluscs boring (Isopod stock photo 2017

Figure 2-3 - Sphaeroma boring (Isopod stock photo 2017)

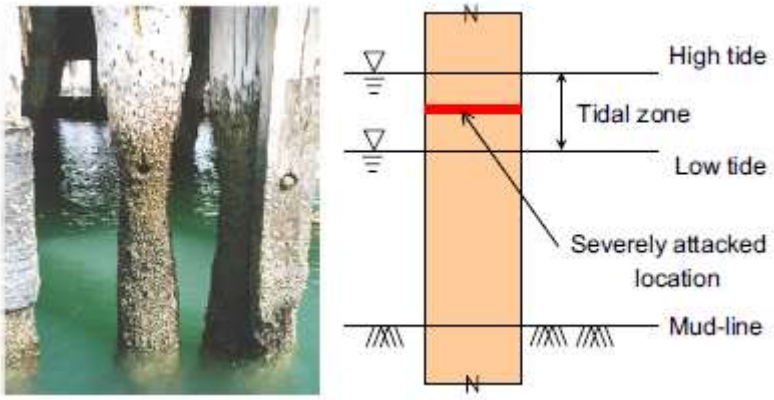

Figure 2-4 - Marine Bore Attack locations (M. N. Nguyen et al. 2007)

M. N. Nguyen et al. 2007 suggests and has illustrated in Figure 2-4 the critical locations of bore attack in coastal locations. This information shows similarities between Bootle (1983) and M. N. Nguyen et al. 2007, Both commenting on the specific locations of bore attack on submerged timber piles.

These marine organisms are proving to cause drastic cross-sectional area reductions thus reducing the axial and flexural capacity of the timber pile. This can be confirmed with Bootle (1983), Cookson LJ (1986) and M. N. Nguyen et al. 2007 all gaining the supportive evidence.

2.2 Splitting

Austroads (2009) defines a timber pile split as the separation along the grain extending right through the member. Splitting is caused by thermal expansion, fluctuations of moisture content and overloading. As identified by Chow et al. (1987) most splitting and checking is due to wet and dry cycles. It can be noted that Austroads (2009) and Chow et al. (1987) agree that moisture content and thermal expansion is the main cause for splitting or checking along the grain of the timber pile. Overloading simply adds to the problem accelerating the splitting process, reducing the life of the pile.

Previous testing illustrates two main failure modes under axial compression. The timber fibres split along the grain and in more severe cases, crushing of the fibres.

Overloading is another contributing factor for the cracking or splitting of timber piles. Queensland timber bridge maintenance manual (Main Roads, 2004) stipulates that cracks may be aggravated by overloading vehicular collision. Overloading cause splitting to start from the bearing area and travels upwards to the timber girder. Once again, the splitting can be seen to run along the grain.

Literature obtained from Main Roads Western Australia: Timber Bridge Detail Inspection Guidelines states "a severe vertical split would be ≥ 5 mm in width and extending > 1 m. Some splits may be wider than 5 mm but have shorter length or vice versa". This was the only information found about the splitting measurements found through inspection of deteriorated timber piles.

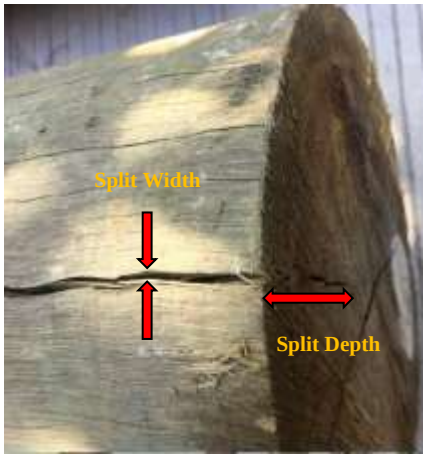

Figure 2-5 - Splitting along the grain

In Figure 2-5 splitting along the grain of the timber can be seen. This timber section will be used for the testing phase of the thesis. The split depth, width and length measurements were and compared to that of literature gained from Main Roads Western Australia: Timber Bridge Detail Inspection Guidelines. Split width was measured at 6 mm, the length extended approximately 0.9 meters. Therefore, this literature can be found is deemed to be true and validated. The depth had also been recorded to gain greater knowledge about splitting depth for further development into this specific defect.

From inspection gain from the sample found in Figure 2-5, a vertical split would be approximately 6 mm in width extending 0.9 m in length and approximately 50 mm in depth. Finding relevant data on splitting depth was hard to find creating a good basis for testing parameters and a solid foundation for further development.

2.3 Testing

2.3.1 Destructive Testing

Axial and flexural bending test are the two most important test that need to be undertaken. Piles are mainly under axial compression but can be subject too slight bending but is considered less important. The minimum test specimens allowable for cylindrical sections is 150 mm diameter and with a 300-mm length. The length measurement goes by the rule L = 2D. Vertical and horizontal strain gauges can and are used to measure the strain of the pile during testing for later analysis. During the tests procedure K-H. E Kim. et al. (2016) records two stages of failure: 1) Splitting along the grain of the timber and 2) crushing or bucking of the fibres. Figure 2-6 shows the two failure modes described above.

Figure 2-6 - Crushing and splitting during testing (K-HE Kim. et al. 2016)

2.3.2 Non-Destructive Testing

2.3.2.1 Lixi Profiler

The “Lixi Profiler” is a very useful tool in establishing the inner content makeup of a timber section. This is done by It uses a radioactive isotope, Gadolinium-153 (Gd-153) and generates a highly collimated beam of radiation that penetrates through the timber section.

Whether it be a pile, girder or corbel. This method of investigation can identify locations of deterioration that may not be seen from an external investigation. It’s a non-invasive technology that has significant advantages over the conventional “Resistograph” drilling method.

The "Lixi Profiler" is required to be calibrated for the inspection of each member section. Calibration of the "Lixi Profiler" is dependent on the outside dimension of the member and density of the section. The "Lixi Profiler" may be calibrated against a sample section of material in the laboratory or based on material densities stated in the Australian Standard for Timber Structures AS1720 (Timber Bridge Maintenance Manual 2005).

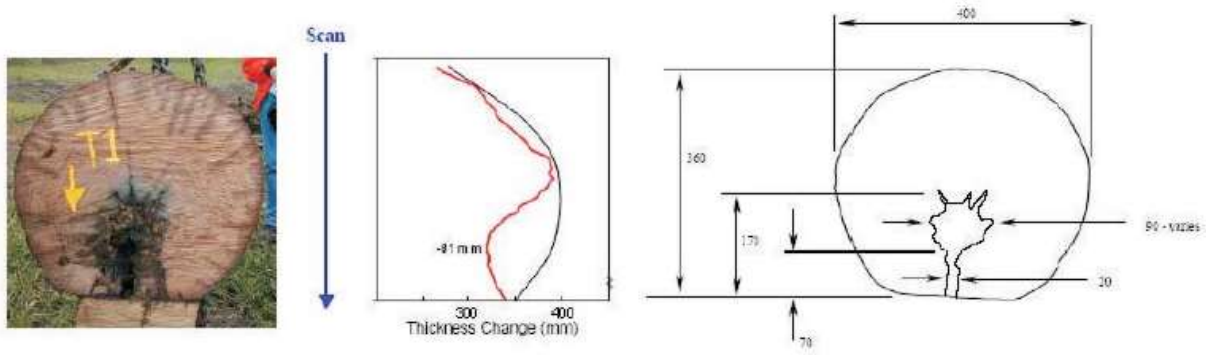

Figure 2-7 - "Lixi Profiler" scan

In the above Figure 2-7 shows a real-time scan using a modelling program called “Intico”. As you can see the san produces a cross sectional view showing voids which directly correlate to defects within the pile.

2.3.2.2 Resistograph

The “Resistograph” is an invasive non-destructive drilling method measuring the resistance through a 1.4 mm diameter drill bit. The way in which it works is by drilling at a constant speed and measuring resistance as the drill penetrates the timber. This procedure will obtain a measure of density throughout the cross section of the timber section.

Timber Bridge Maintenance Manual (2005) states that the "Resistograph" produces a real-time graph of the relative magnitude of the torque required by the drill to keep the bit moving at a constant speed, against the depth of penetration. From this information gathered a real-time graph is produced showing the amplitude (%) or resistance on the y-axis and depth of penetration (cm) on the x-axis. This can be seen visually in Figure 2-8 and Figure 2-9.

This procedure provides significant advantages over other traditional drilling methods. the drill bit of 1.4 mm is much smaller than the standards 12 mm drill bit. Thus, creating a negligible effect with regards to structural integrity.

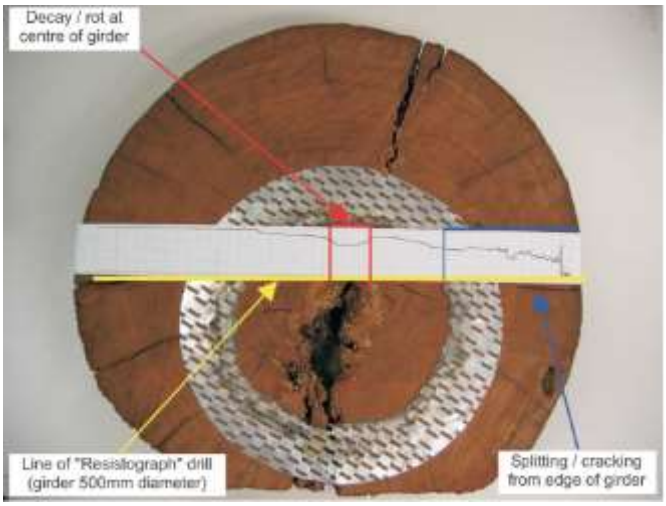

Figure 2-8 – Resistograph scan (a) (Timber Bridge Maintenance Manual 2005)

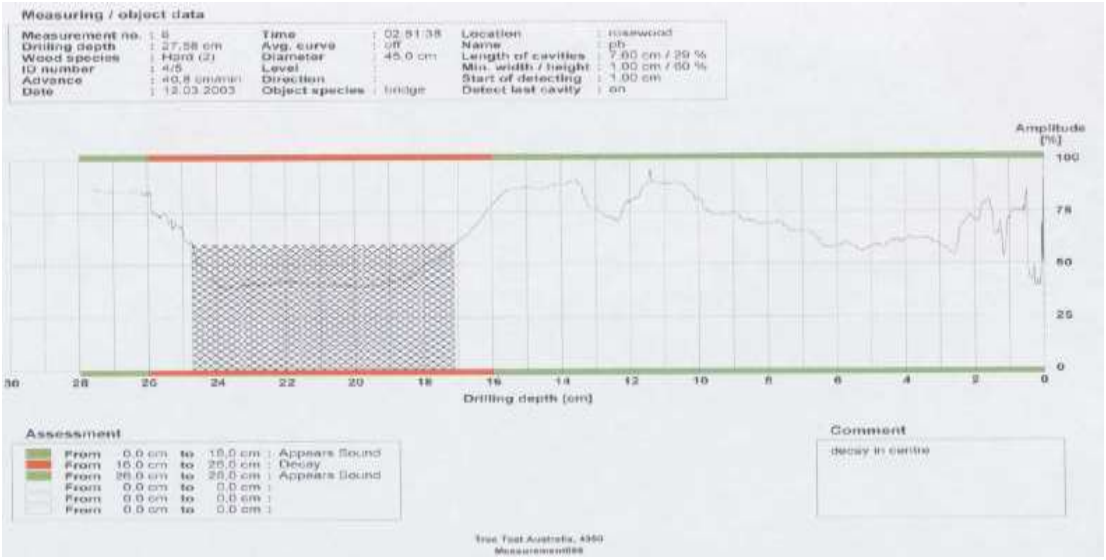

Figure 2-9 - Resistograph scan (b) (Timber Bridge Maintenance Manual 2005)

2.4 Timber Grades/Species

In Australia only, a select few species of timbers are being adopted for the construction of timber bridges that require strength and durability. According to Austroads (2009) older bridges in New Zealand were constructed of Australian hardwoods or New Zealand heart native timbers. Treated Radiata Pine is now being used for timber bridge construction.

Hardwood Species	Strength Group	Stress Grade	In-ground Durability
Blackbutt	S2	F27	2
Forest Red Gum	S3	F22	1
Grey Coast Box	S1	F34	1
Grey Ironbark	S1	F34	1
Red Ironbark	S2	F27	1
Spotted Gum	S2	F27	2
Tallow wood	S2	F27	1
Turpentine	S3	F22	1
White Mahogany	S2	F27	1
Yellow Stringybark	S3	F22	2

Table 2-1 - Timber pile species and stress grades (Australian Hardware Network 2017)

Structural component	Species	
	Preferred	Others suitable
Piles – unprotected in tidal waters	Turpentine (with bark left on)	-
Piles (other) Sills	Grey box Ironbark Tallow wood Wandoo Jarrah	White mahogany* WA blackbutt Yellow tingle

Table 2-2 - Timber pile species (Austroads 2009)

In Table 2-1 and Table 2-2 similarities can be seen with several hardwood species crossing over. Austroads (2009) and Australian Hardware Network (2017) conclude that Turpentine is most commonly used timber pile for unprotected tidal waters. The minimum strength used for hardwood piles is F22 grade.

Red Oak is another timber used for pile foundation but can commonly be seen in the United States of America (USA). Many case studies and documents have been produced about pile deterioration and for timber species natively harvested. K-H. E Kim. et al. (2016) released a paper on the compression behaviour of FRP strengthened bridge timber piles subjected to accelerated aging. The species that was used in this paper was Red Oak as this species in the United States of America has been in service for a considerable amount of time.

TABLE 6.1

ROUND TIMBERS GRADED TO AS 3818.3 or AS 3818.11— RELATIONSHIP BETWEEN STRENGTH GROUPS AND F-GRADES

Strength group	Stress grade
S1	F34
S2	F27
S3	F22
S4	F17
S5	F14
S6	F11
S7	F8

NOTE: The equivalence expressed is based on the assumption that all poles or logs are cut from mature trees. Factors for immaturity are given in Clause 6.4.1.

Table 2-3 - Stress grade timber (Australian Standards 2010)

TABLE 2.4

STRUCTURAL DESIGN PROPERTIES FOR F-GRADES

Stress-grade	Characteristic strength, MPa					Characteristic short duration average modulus of elasticity* parallel to the grain, MPa (E)	Characteristic short duration average modulus of rigidity for beams, MPa (G)
	Bending (f'_b)	Tension parallel to grain (f'_t)		Shear in beam (f'_s)	Compression parallel to grain (f'_c)		
		Hardwood	Softwood				
F34	100	603	50	7.2	75	21 500	1 430
F27	80	50	40	6.1	60	18 500	1 230
F22	65	50	40	6.1	60	16 000	1 070
F17	50	30	26	4.3	40	14 000	930
F14	40	25	21	3.7	30	12 000	800
F11	35	20	17	3.1	25	10 500	700
F8	25	15	13	2.5	20	9 100	610
F7	20	12	10	2.1	15	7 900	530
F5	16	9.7	8.2	1.8	12	6 900	460
F4	13	7.7	6.5	1.5	9.7	6 100	410

* The average modulus of elasticity, ($\overline{E}$), includes an allowance of about 5 percent for shear deformation (see Clause 2.1.3 and Appendix B).

Table 2-4 - Design properties for F- grade timber (Australian Standards 2010)

In Table 2-4 from the grade of timber many properties can be used for analysing data. This was taken from the Australian Standards 1720.1.

2.5 Rehabilitation Techniques

2.5.1 Posting Repair Method

In 1989, a posting repair method was developed. This procedure meant the deteriorated affected pile was removed completely and replaced with a new surface treated pile to stop weathering or decaying issues. Epoxy grouting is used to join the new section to that of the old section. In some cases, the repair methodology required shoring to support the pile from becoming weak or unstable. This method of repair was tested under axial compression loading. The results were credible with maintaining ultimate strength and axial stiffness after the repair had taken place. These tests did not evaluate combined axial and lateral loads on the repair procedure.

2.5.2 Splicing

Splicing is a simple and cost-effective solution for the rehabilitation of deteriorated timber piles. This process entails cutting and posting a new section replacing the old deteriorated pile. The material used in splicing can either be timber or steal straps approximately 6 inches or 15 cm in length (Mohammadi et. al 2014). This section is connected by long metal screws 0.5 by 12 in. in diameter (13 mm by 300 mm) (Mohammadi. et al 2014). This technique can be seen in Figure 2-10

Mohammadi. et al. (2014) suggests approximately 70% axial compression was restored whereas the bending capacity was significantly reduced. Lap splicing is extremely low cost, effective but will not last the test of time. This is a short-term fix with the intentions of implementing a better repair technique in the coming years. Austroads (2009), Mohammadi et al (2014) and Transport and Main Roads (2017) all agree that lap splicing should be avoided where possible. In addition, K-H.E Kim. et al. (2016) states that this method will have catastrophic consequences if the pile is subjected to a bending moment. This was evident in a bridge collapse in Illinois, USA 2008. Below in Figure 2-10 and Figure 2-11 shows a schematic diagram of a splicing repair technique. Figure 2-11 outlines three main steps involved in rehabilitating the effected timber pile.

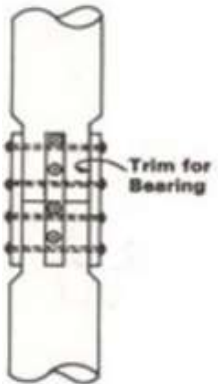

Figure 2-10 - Splicing with bolts (Mohammadi et al. 2014)

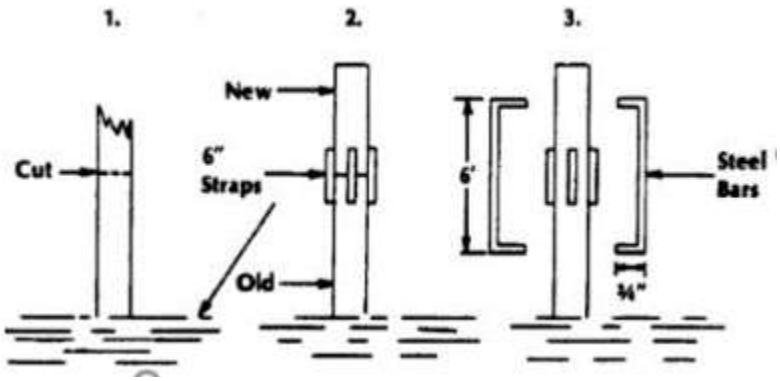

Figure 2-11 - Step - by - Step splicing procedure (Mohammadi et al. 2014)

This method of splicing from a cost analysis perspective is extremely cheap but will not last the test of time. In rural areas, splicing is more commonly used as resources, machinery and equipment isn't always readily available.

2.5.3 Grout/Epoxy Resin Injection

Another effective low cost and durable repair is grout or epoxy injection. Simply gaps or large voids due to decay can be filled using epoxy resin or grout. This technique leaves a proportion of the timber exposed. Emerson (2004) has shown that when using epoxy injection some sort of confinement needs to be incorporated. For example, using a FRP wrap in conjunction with an epoxy will suffice. According to Railway and Track Structures, grout injection has the strength capabilities to increase the service life of the timber piles to approximately 15 – 20 years. And where there is some difference or disagreement: Emerson (2016) and Mohammadi. et al. (2014) shows a difference in literature. Emerson (2016) states that if epoxy injection is used that some sort of confinement is necessary. Whereas Mohammadi. et al. (2014) states epoxy injection can be substituted for grout without any literature about necessary confinement. K-H.E Kim. et al. (2016) suggests that surface condition of the piles did not have any major influence in bonding.

Epoxy injection according to Avent. et al. (1985) requires approximately 30 min to 5 hours drying time. Then the injection ports can be sanded smooth then painted for aesthetics purposes. Avent. et al. (1985) suggests that this injection method can be used for both structural and semi structural components of timber bridges. Similarities can be noted between literature from Avent. et al. (1985) and Austroads (2009) about epoxy injection being utilized for structural and semi structural repairs. But in saying that, if the decay is quite severe then splicing and epoxy repair will not suffice as a repair method.

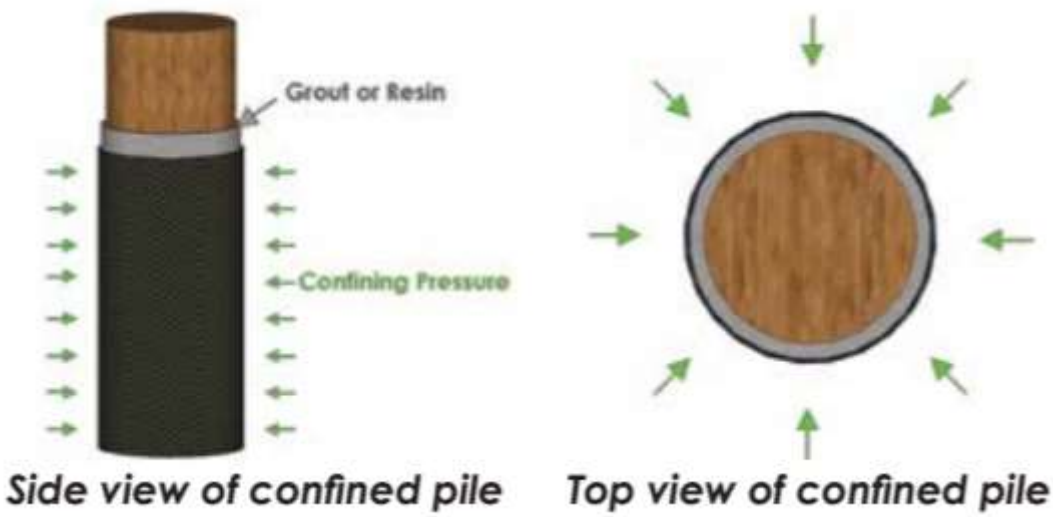

Figure 2-12 - Schematic view of rehabilitation technique

Figure 2-12 illustrates this technique explained above of GFRP with annular filler material. As you can see this technique incorporating GFRP and filler material creates a confining lateral pressure. Grout or epoxy resin is becoming more widely used for it strength characteristics.

2.5.4 Concrete Jackets

Concrete jackets are another method of rehabilitating a deteriorated timber piles. A steel cage is placed around effected area of the existing timber pile. Jackets can be formed using 25 – 50 mm (Mohammadi. et al. 2014) thick coat shotcrete reinforced with steel caging. This method has its downfall as concrete can likely be subjected to external factors such as acids, alkalise or salt in ground water. This may cause drastic effects such as cracking and spalling (Mohammadi. et al. 2014). This will cause exposure of the steel cage resulting in corrosion and loss of cross sectional area. If cross sectional area has been reduced then strength and durability will be reduced.

Austroads (2009) also suggests concrete jacketing as a pile damage repair method but does not go into detail about how the repair should be carried out or implemented.

2.5.5 FRP Wrapping

Fibre-Reinforced Polymer is another method of rehabilitating defected or decayed timber piles. According to Mohammadi. et al. (2014), FRP material consists of a matrix and carbon reinforcement. The carbon reinforcement is where how the FRP gains its strength and rigidity. Polymer resins plays as the matrix which helps bind carbon fibre reinforcements together. FRP wrapping can be seen to have many advantageous effects on a defected timber pile cause by the defects outlined in Section 1. Another advantage of using the FRP wrapping technique is that the resin used to bind the material can eliminate future deterioration.

One matrix combination study conducted at the University of Manitoba used Glass Fibre-Reinforcement Polymers (GFRP) and grout shells to restore axial loads. This technique places a grout shell approximately 50 mm thick around the affected area. Then the GFRP is wrapped around the grout to create a seal. When tested the pile showed positive results restoring and in some cases increasing the compressive strength. It was also noted that the flexural strength had not been restored completely. In Figure 2-13 is GFRP wet wrapping schematic diagram.

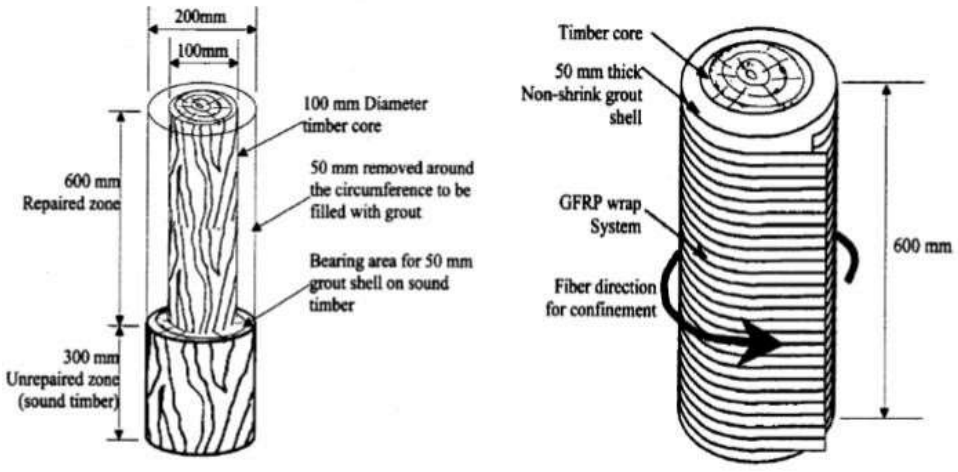

Figure 2-13 - GFRP wet wrapping (Mohammadi. et al. 2014)

Another study done by K-H. E Kim. et al. (2016) uses the FRP wrapping method but altering the number of layers used (5 and 10) with a thickness of 0.635 mm. Under axial loading the timber piles with 5 layers of FRP wrap had an increase of approximately 70%. Furthermore with 10 layers of FRP wrap the pile had a strength of 82%. From this data, you can determine that using more layers of FRP wrap isn't very cost effective of feasible for a difference of 12%. The number of layers used doesn't result in a linear pattern for axial compressive strength.

Another study by Caiz. et al. (2012) utilizes the cut and post technique. This is where the rotten or deteriorated section is cut and reposted with a new timber section. A FRP wrap and grout shell completes the retrofit when the old timber section meets the new. Results shows that this technique will reach or increase the compressive strength of the timber pile. These results were compared to a specimen that had no defects present. Caiz. et al. 2012 tested the flexural bending capacity of timber piles with this cut and posting FRP wrapping method. In this document Caiz. et al. (2012) states that insufficient literature by relevant authors have tested the flexural strength of rehabilitated timber piles. But concluded that on average a 10% increase in strength was recorded when flexural tests were carried out.

Recent technology such as FRP wrapping is becoming more and more frequent because of its strength improvements. Alongside this, FRP can be easily installed/fitted on site without and need for machinery. Therefore, this method seems to be the best method of rehabilitating timber piles. Percentage strength increase can be seen in the literature above with many case and testing studies that have been completed.

2.6 Conclusion

From the results of previous studies, it is evident that rehabilitation of timber piles around Australia is a necessity in maintaining the structural integrity of timber bridges. There is approximately 12, 075 timber bridges that currently or in future need maintaining for the given defects outlined above.

The splicing technique that had previously been used more readily is now deemed to be a very short-term fix as flexural capacity is reduced significantly. Other methods such as FRP wrapping should be used in conjunction with an infill material.

FRP wrapping is modern technology that is taking over old technologies such as splicing. Incorporating this modern technology has many advantageous affects. One being that this method does not require an abundance of heavy machinery which can be dealt with onsite. Previous attempts and testing has been achieved in this field but more data is required to gain a defined method of procedure. Results vary in what percentage axial compression will increase when using the FRP wrapping method. Therefore, further testing is essential in accurately proving how FRP wrapping can increase the structural integrity to that of a normalized defected pile.

A gap in literature has been noted with split depth not incorporated into the bridge maintenance and inspection guidelines or tested for reduction in axial strength. Therefore, adopting this analysis of assessment will provide the foundation for further development and research into this failure mechanism. Pile rehabilitation proves to be a great non-invasive pile repair method.

Chapter 3 METHODOLOGY

Through a detailed literature review, grey areas can be seen with splitting not proving to have a lot of information or testing documented. With all literature documented a methodology can be finalised with testing parameters and control samples.

The project proposal will be broken up into five phases then broken down into smaller phases of construction and testing. These tasks need to be carried out in order so that wait times will be kept to a minimum and that the project can run smoothly without delays.

Below in Table 3-1, tasks are broken down into several phases that needed to be completed in order so that the project can flow smoothly without delays. These phases listed below will be expanded upon to gain a concise methodology.

Phase 1	**Start-up Phase**
1A	Resources check – ensure any outstanding resources and the availability of labs are confirmed with USQ and the Brisbane City Council. Sourced literature on the topic can be found using Science Direct, Google Scholar and so forth.
1B	Construction Planning - Ensure that materials can be sourced (materials and adequate sampling sizes)
Phase 2	**Small Scale – Sample Sourcing/Construction Phase**
2A	Sample Sizes – Source approximately 150 mm x 300 mm cylindrical test specimens (compression testing for small scale testing. -16 samples will be tested)
2B	**Wrapping Defected Piles** Type of timber: 1 type – F27 Hardwood Damage length: 300 mm Damage depth: 1/3r, 2/3r and r Filler type: 2 types – grout, resin Duplicate twice for accuracy **Unwrapped Control Sample** Without damage: 1 sample **With Damage:** Type of timber: 1 type - F27 Hardwood Damage length: 300 mm Damage depth: 1/3r, 2/3r and r Duplicate twice for accuracy Total Samples: 16

Phase 3	**Testing Phase**
3A	Initial testing: SANS Compression (axial) testing machine will be used on the original timber cylinders with no defects etc. (1 sample)
3B	Initial testing: SANS Compression (axial) testing machine will be used on the defected wrapped cylinder samples. (12 samples)
3C	Initial testing: SANS Compression (axial) testing machine will be used on the defected cylinder samples. (3 samples)
Phase 4	**Data Analysis Phase**
4A	Prepare plots of the compression (axial) data to compare the optimum rehabilitation technique. Identify from the graph the optimal rehabilitation technique for maximum compressive strength used for future development.
4B	Compare pile splitting sample to that of standardised pile without splitting too that of the rehabilitated pile gaining maximum strength. Compare these results with that obtained in the literature review. The sample tests will provide feedback about strength characteristics.
Phase 5	**Data Analysis (graphing)**
5A	Comparison: Compare the 16 samples put forward in this proposal. Outline any strength increases or decreases if present.
Phase 6	**Write-up**
6A	Draft Dissertation – prepare a draft submission for allocated USQ supervisor for review and feedback.
6B	Final Dissertation – make any necessary adjustments on the draft and finalise for submission

Table 3-1 - Methodology task phases

3.1 Resource Requirements

All resources displayed in Table 3-2 the resource requirements are calculated estimates of the resources needed for research, testing and carrying out the write up phase of the project. This table can be later refined, whereby future resources might need to be added so that the project can flow smoothly and according to guidelines shown throughout this proposal. QuakeWrap will be supplying the materials required and can be found listed in the table below. Hardwood (F27) has been sourced by the student which can be seen in later chapters.

Task	Item	Quantity	Source	Cost
2A	150 mm x 300 mm samples	4.8 m	Home Timber/Student	$38 p/m
2B	FRP PLG60.6 laminate	7.5 m^2	QuakeWrap	Nil
2B	Underwater Resin 220UR	2.2 L	QuakeWrap	Nil
2B	Crane Rail Grout	50 L	QuakeWrap	Nil
2B	Underwater Cementitious Grout	50 L	QuakeWrap	Nil
2B	Standard pile specimen	1	Student	Nil
2B	3 type splitting standard specimen	3	Student	Nil
2B	2 type wrapped splitting specimen	12	Student	Nil
3A	SANS Compression machine	One (1)	USQ Lab	Nil
3A	Strain Gauges	38	Dr. Weena Lokuge	Nil
NA	AS – 1720.2 - 2006	One (1)	SAI Global/student	Nil
NA	AS- 1720.1 - 2010	One (1)	SAI Global/student	Nil
NA	AS – 1170.0: 2002	One (1)	SAI Global/student	Nil
NA	AS – 1170.1: 2002	One (1)	SAI Global/student	Nil
NA	AS – 1170.2: 2002	One (1)	SAI Global/student	Nil
NA	AS – 1170.3: 2003	One (1)	SAI Global/student	Nil
NA	AS – 1170.4: 1993	One (1)	SAI Global/student	Nil
3A/B/C	ASTMD198	One (1)	ASTM/student	Nil
NA	AS-2209	One (1)	SAI Global/student	Nil
4A -B/ 5A	Excel Spreadsheet Software	One (1)	Student	Nil
6A – B	Word Software	One (1)	Student	Nil
6A – B	Access Software	One (1)	Student	Nil

Table 3-2 - Resource requirements

3.2 Dissertation Phasing

Utilising Table 3-1 shows the steps involved in completing the dissertation with gathering literature, data collection, testing and analysing results. This methodology will be followed precisely and accurately so that all controls are being monitored and adjusted accordingly.

These phases will be discussed in detail below.

3.2.1 Phase 1 – Start Up

The start-up phase involves activities set up whereby resources and equipment for the proposed construction. Compiling all literature about the given topic has been collaborated so that a testing methodology can be achieved. Firstly, establishing through literature areas of timber pile deterioration that has not yet been research or tested.

Working closely with QuakeWrap has widened the knowledge about timber piles, rehabilitation techniques and technology surrounding material advancement. This one on one experience along with hands on experience proves positive gaining practical onsite experience.

3.2.2 Phase 2A - Sample Preparation

3.2.2.1 Slenderness Ratio

According to the Australian Standards compression testing samples must follow the approximate rule $L = 2D$. Resulting in an aspect ratio of approximately 2.0.

According to the ASTM D198-15, “specimens taken from the structural members when such a specimen has a slenderness ratio (length to least radius of gyration) of less than 17. This method is intended primarily for structural members with rectangular cross sections, but is also applicable to irregularly shaped studs, braces, chords round poles, or special sections”. In Table 3-2 the moment of inertia, section modulus and radius of gyration have been calculated to check specimen dimensions so that it complies with compression testing requirements found in ASTM D198-15.

$$I = \frac{\pi d^4}{64}\ (mm^4) \qquad Z = \frac{\pi d^3}{32}\ (mm^3) \qquad Rad = \frac{d}{4}\ (mm) \qquad l/rad < 17 \qquad A = \frac{\pi d^2}{4}$$

The equations above were used to find the most critical slenderness ratio.

Slenderness Ratio	
I (mm^4)	57027243.81
Z (mm^3)	617780.587
Rad (mm)	46.1549335
A(mm^2)	26769.86143
l (mm)	298
l/r < 17	6.46

Table 3-3 - Slenderness ratio

The smallest specimen diameter will gain the largest value for slenderness ratio. The slenderness ratio will comply with *l*/r < 17. In Table 3-3 the slenderness ratio calculated is 6.46 < 17. This is the most critical case of slenderness with the other samples resulting in a lower slenderness ratio value.

3.2.2.2 Split Depth Method

No literature can be found about split depth because usually these piles are inspected on site making it hard to view the cross section. Therefore, split depth was entirely in the hands of the student using good judgement and practicality. The method adopted for testing requires the timber to have a split depth of radius, 2/3 radius and 1/3 radius. The calculations of these split depth can be found in Appendix A1.

Each of the specimens was not entirely round (varying radius) making it hard to gain an accurate radius. Therefore, finding the circumference top and bottom then finding the average radius was the most accurate way of reflecting an average radius for each specimen.

Once the value of radius is found, using the split depth method (r, 2/3 r and 1/3 r) these can be applied to each radius calculated.

$$radius\ (r) = \frac{1}{2}\left(\frac{\tilde{C}}{\pi}\right)\ (mm) \qquad D1\ (1/3) = \frac{r}{3}\ \ (mm) \qquad D2\ (2/3) = \frac{r}{2}\ \ (mm)$$

Sample No.	Circumference Top (mm)	Circumference Bot (mm)	Radius (r) (mm)	Defect Depth 1/3 (D1) (mm)	Defect Depth 2/3 (D2) (mm)	Defect Depth Critical (DC) (mm)
1	575	585	92.30987	31	61	92
2	590	586	93.58311	31	63	94
3	583	585	92.94649	31	62	93
4	589	599	94.53804	32	63	95

Table 3-4 - Splitting depths for sample No. 1-4

Table 3-4 shows the calculation of radius using the equations above. In this example all four samples had incorporated the depth shown at DC – Depth critical (shown in red).

Figure 3-1 - Measuring circumference (a)

Figure 3-2 - Measuring circumference (b)

3.2.2.3 Labelling Samples

So that accuracy is maintained throughout the preparation and testing phase, the labelling of samples is vital. Each sample incorporates different measurements, defects and different infill material. Therefore, labelling samples with a number and stating top and bottom will aid in preparation, testing and analysis of results.

3.2.3 Phase 2B – Construction Phase

3.2.3.1 Student Requirement

Literature obtained from Main Roads Western Australia: Timber Bridge Detail Inspection Guidelines states "a severe vertical split would be ≥ 5 mm in width and extending > 1 m. Some splits may be wider than 5 mm but have shorter length or vice versa". This was the only information found about the splitting measurements through inspection of deteriorated timber piles. The length of split gained from inspection extends greater than 1m. Therefore, the split will run the entire length of the sample (≈300 mm). This information obtained will be used for the testing phase of this dissertation. These two parameters will be maintained throughout experimental procedure.

Split depth will be adopted at depths of radius, 2/3 radius and 1/3 radius. This has been brought forward from section Split Depth Method. Applying a duplicate will aid in accuracy throughout the data analysis phase of this dissertation.

Testing parameters for rehabilitation technique:

In Table 3-5 there will be six wrapped samples combining underwater cementitious grout and crane rail grout. For accuracy, these samples will be doubled so that a more accurate understanding of capacity can be graphed and compared.

Split Width (mm)	Split Length (mm)	Split Depth (mm)	No. Samples
5	300	1/3 r	2
5	300	2/3 r	2
5	300	r	2
-	-	Total	6
-	-	Total x 2	12

Table 3-5 - No. of wrapped samples to be tested

* r is defined as the radius of a cylindrical sample section

* Split length and width are approximated, exact values can be seen in APPENDIX D

Figure 3-3 – Three different split depth defects

Figure 3-3 illustrates the final product incorporating defects before the samples are sent to QuakeWrap for wrapping and applying the infill material.

Schematic diagram – 1 control sample and 3 split depths with no rehabilitation technique applied.

Figure 3-4 - Control sample

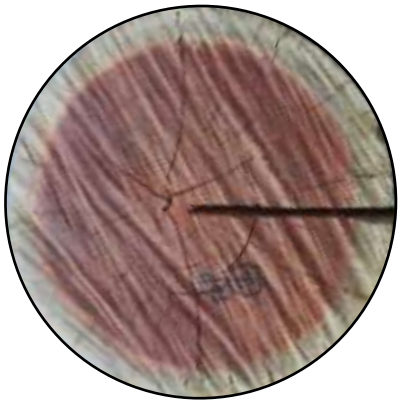

Figure 3-5 - Radius

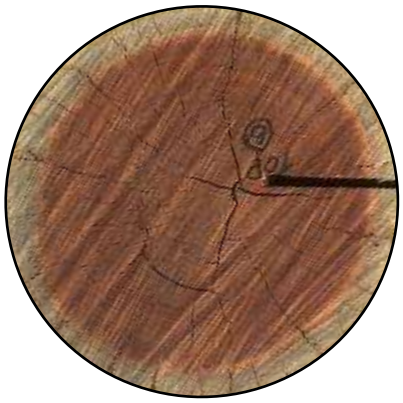

Figure 3-6 - 2/3 Radius

Figure 3-7 - 1/3 Radius

Figure 3.4 will be a control sample that will replicate a new timber pile without defects or wrapping. This sample will be the basis of what can be seen in the field.

As you can see from Figures 3.5, 3.6 and 3.7 the splitting that will be incorporated into the timber pile sections. This is illustrated by the dark split section seen in the above figures. This is the basis of the dissertation as it will test the severity of split depth which in turn will directly relate to load capacities.

The construction phase can be broken down into 3 stages. Stage 1: utilising one control sample as a basis for the maximum load capacity for comparative results. Stage 2 is incorporating three levels of defects. And stage 3 will address these defects but incorporating rehabilitation technique of wrapping with FRP and utilizing underwater cementitious grout and crane rail grout as a filler material. The specifications for the fill material can be found in the APPENDIX.

Fill Material/Exterior Casing	**Annulus thickness (mm)**	**Max strength (MPa)**
Underwater cementitious grout	≈ 20	48.3- compression
Crane rail grout	≈ 20	110 - compression
Fibre Reinforced Polymer (FRP) (PLG60.6)	≈ 3	3.8 – tension
Underwater Resin 220UR	≈ 2	418 – tension

Table 3-6 - Fill material and exterior casing

Below in Figure 3-8, Figure 3-9 and Figure 3-10 shows crane rail grout annulus (20 mm) encased in the FRP wrapping. The key below shows the fill material, timber section and FRP laminate.

Figure 3-8 - Radius defect with crane rail grout and FRP wrapping

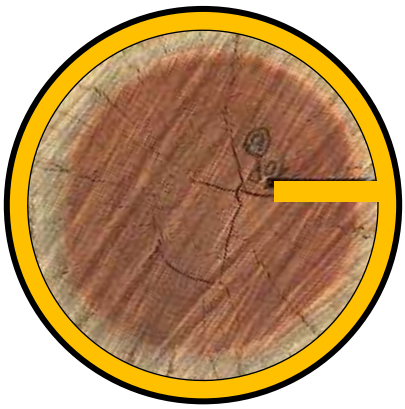

Figure 3-9 - 2/3 Radius defect with crane rail grout and FRP wrapping

Figure 3-10 - 1/3 Radius defect with crane rail grout and FRP wrapping

Key	
	Crane rail grout
	FRP laminate
	F27 hardwood

Table 3-7 - Key for crane rail grout

Below in Figure 3-11, Figure 3-12 and Figure 3-13 shows the underwater cementitious grout annulus encased in the FRP wrapping. The key below shows the fill material, timber section and FRP wrap.

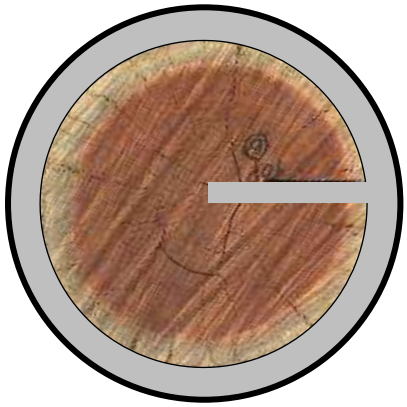

Figure 3-11 - Radius defect with underwater cementitious grout and FRP wrapping

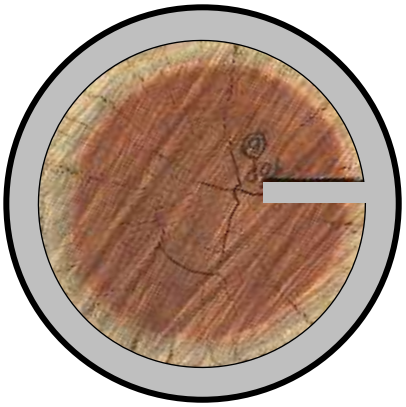

Figure 3-12 - 2/3 Radius defect with underwater cementitious grout and FRP wrapping

Figure 3-13 - 1/3 Radius with underwater cementitious grout and FRP wrapping

Key	
	Underwater cementitious grout
	FRP laminate
	F27 hardwood

Table 3-8 - Key for underwater cementitious grout

3.2.4 QuakeWrap

With the timber sections cut to length and incorporated defects the next step is getting the pile rehabilitated using QuakeWrap Australia. Figure 3-14 to **Error! Reference source not found.** illustrates what the piles will look like once the rehabilitation technique has been incorporated. Below are images of the steps involved in completing the sample ready for testing.

Figure 3-14 - Applying 220UR to FRP

Figure 3-15 - 20 mm annular spacers utilised

Figure 3-16 - FRP wrap incorporated

Figure 3-17 - Top view before annulus filled

Figure 3-18 - Crane rail grout filler material

Figure 3-19 - Underwater cementitious grout filler material

3.2.4.1 Material Properties

The two filler materials used was Crane Rail Grout and Underwater Cementitious Grout. The compressive strength can be seen in the tables below. Both filler materials will reach approximately 90% of its compressive strength after 7 days

Underwater Cementitious Grout

Compressive Strength	ASTM C 109
1 Day	17.3 MPa
7 Day	41.4 MPa
28 Days	48.3 MPa

Crane Rail Grout

Compressive Strength	ASTM C 579 B*
1 Day	90 MPa
7 Day	103 MPa
28 Days	110 MPa

3.2.4.2 Sample Pour dates

Underwater Cementitious Grout	Crane Rail Grout
Start - 07/09/2017 15:00 initial set	Start - 07/09/2017 15:00 initial set
Day 1 - 09/09/2017 15:00 – 17.3 MPa	Day 1 - 09/09/2017 15:00 – 90 MPa
Day 7 – 14/09/2017 15:00 – 41.4 MPa	Day 7 – 14/09/2017 15:00 – 103 MPa
Day 27 – 04/10/2016 09:00 – 47.8 MPa	Day 27 – 04/10/2016 09:00 – 109 MPa
Day 28 – 05/10/2017 15:00 – 48.3 MPa	Day 28 – 05/10/2017 15:00 – 110 MPa

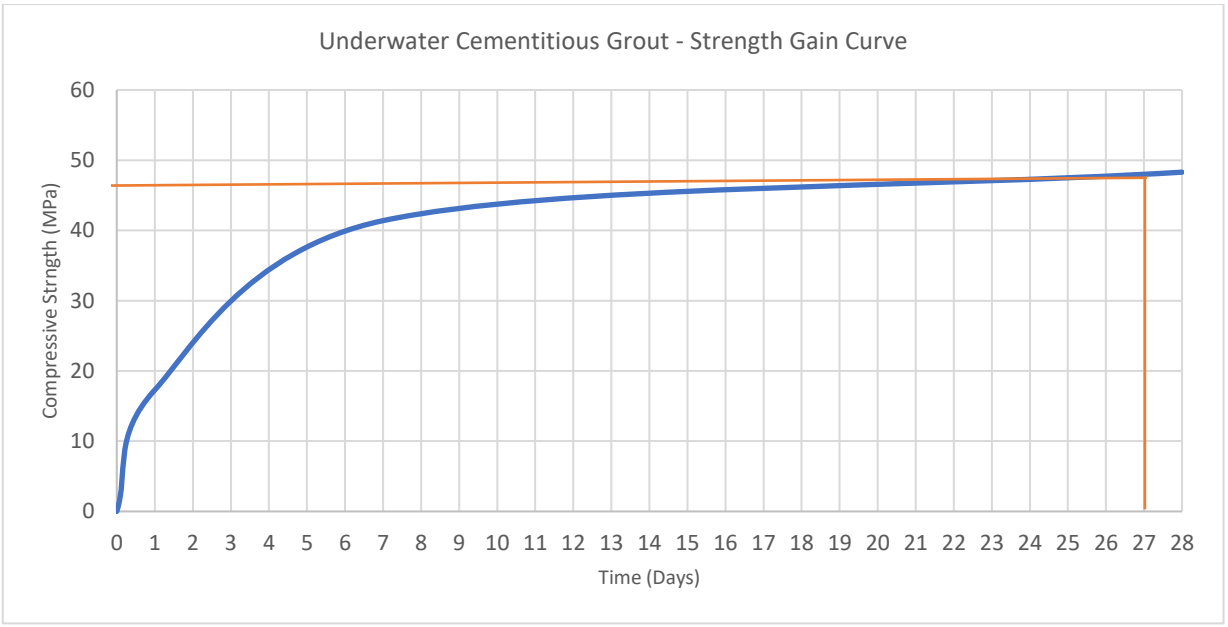

Figure 3-20 - Typical strength gain curve

The orange line shown in both Figure 3-20 and Figure 3-21 illustrates the date in which the samples were tested. The Crane Rail Grout double the Underwater Cementitious Grout compressive strength value. Going to show the modern technology providing outstanding strength increases.

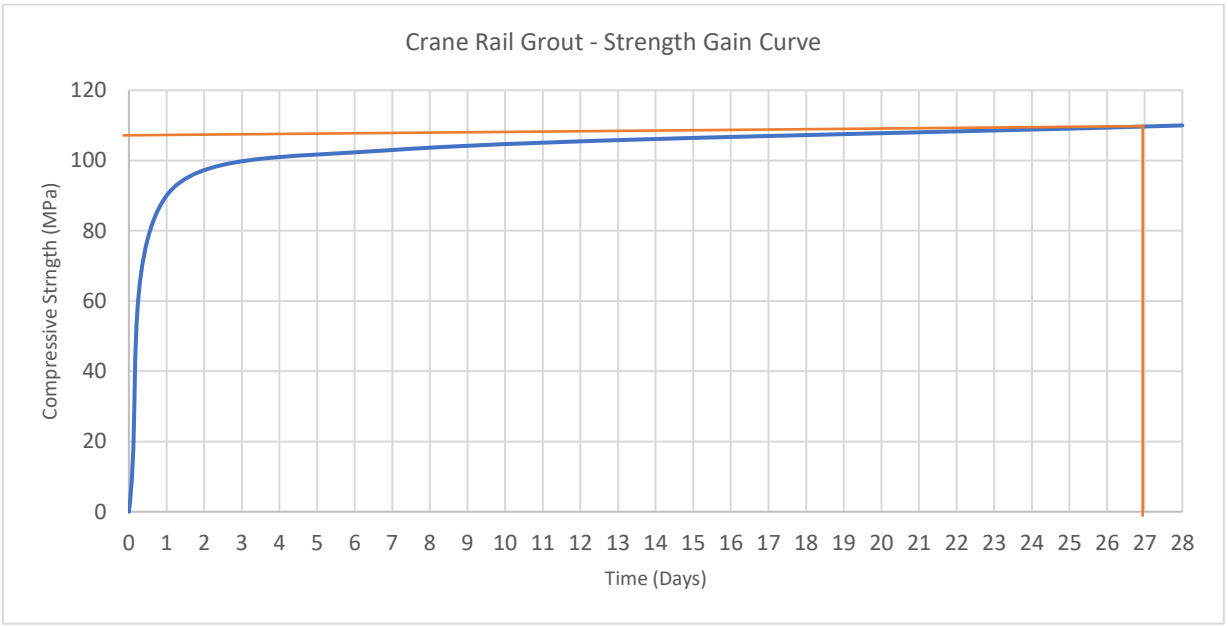

Figure 3-21 - Typical strength gain curve

3.2.4.3 Strain Gauges

38 strain gauges will be used for analysing the vertical and lateral strain of the unwrapped and wrapped samples. Because this dissertation aims to validate the confining pressure of the FRP laminate 6 samples will have 2 horizontal strain gauges and 1 vertical strain gauge.

Figure 3-22 - Tokyo Sokki Kenkyujo strain gauge

The strain gauge illustrated above in Figure 3-22 will be used to calculate strain (vertical and horizontal) throughout the testing procedure. The units this strain gauge will produce is in micro millimetres which will have to be converted to meters so that SI units are constant during the data analysis phase of this dissertation.

Four control samples will be tested (unwrapped), 3 damage levels and one without damage.

Unwrapped samples				
	D1	D2	DC	C
Horizontal SG	1	1	1	1
Vertical SG	1	1	1	1
Sub -Total	2	2	2	2

Total	8

Table 3-9 - Unwrapped sample strain gauge quantities

Below is a visual interpretation of the orientation and positioning of the strain gauges.

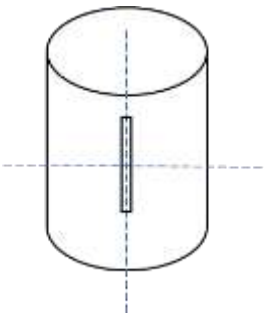

Figure 3-23 - Vertical strain gauge orientation

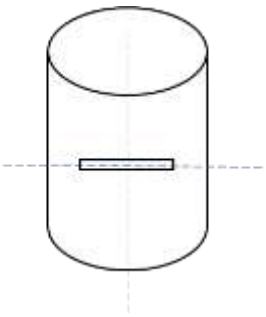

Figure 3-24 - Horizontal strain gauge orientation

It's imperative that strain gauges are levelled horizontally and vertically. This will ensure accurate strain results. The dotted lines shown in Figure 3-23 and Figure 3-24 show the centre lines for both the vertical and horizontal strain gauges. The strain gauge shows a cross hair whereby the vertical and horizontal markings will line up. This will ensure accuracy of results.

Wrapped samples						
	UCG - D1	CRG – D1	UCG - D2	CRG – D2	UCG – D3	CRG – D3
Horizontal SG	2	2	2	2	2	2
Vertical SG	1	1	1	1	1	1
Sub -Total	3	3	3	3	3	3

Total	18

Table 3-10 - Wrapped sample strain gauge quantities for 2 types of filler material

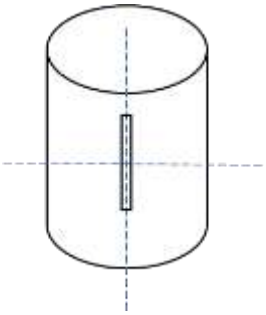

Figure 3-25 - Wrapped vertical strain gauge

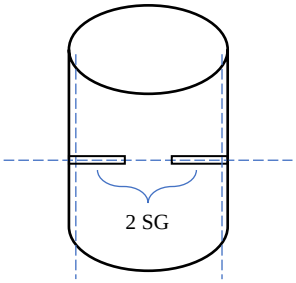

Figure 3-26 - Wrapped horizontal strain gauges

The wrapped samples will incorporate an extra horizontal strain gauge to gain an additional reading of lateral confinement. This will help with gaining an average of confinement.

Wrapped duplicate samples						
	UCG - D1	CRG – D1	UCG - D2	CRG – D2	UCG – D3	CRG – D3
Horizontal SG	1	1	1	1	1	1
Vertical SG	1	1	1	1	1	1
Sub -Total	2	2	2	2	2	2

Total	12

Table 3-11 - Wrapped duplicate sample strain gauge quantities for 2 types of filler material

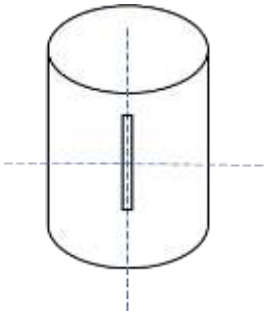

Figure 3-27 - Wrapped duplicate sample vertical strain gauge

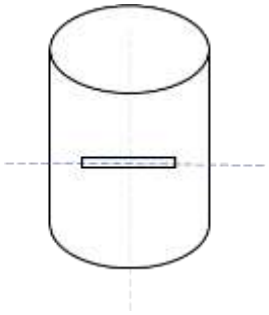

Figure 3-28 - Wrapped duplicate sample horizontal strain gauge

3.2.5 Phase 3A/B/C - Testing

Testing will be undertaken using a SANS compression testing machine. The testing procedure will comply with ASTMD198 -15 and Test Methods D4442.

All testing in a laboratory work space should cover the personal risk assessment and PPE practices.

3.2.5.1 Bearing Blocks

Bearing blocks are used within the testing apparatus to apply a uniform load across the cross section of the specimen (ASTMD1980-15).

3.2.5.2 Centering

First geometrically centre the specimens on the bearing plates and then adjust the spherical seats so that the specimen is loaded uniformly and axially (ASTMD1980-15).

3.2.5.3 Speed of Testing

The loading shall progress at a constant deformation rate such that the average time to maximum load for the test series shall be at least 4 min. It is permissible to initially test a few random specimens from a series at an alternate rate as the test rate is refined. Otherwise, the selected rate shall be held constant for the test series (ASTMD1980-15). The Sans testing machine was running at 2 mm per minute for the wrapped samples and 1.5 mm for the unwrapped samples.

3.2.6 Phase 4A/B/C – Data Analysis

3.2.6.1 Data Collection

The SANS compression testing data logger will be connected to the vertical strain gauges attached to each sample that is being tested. A time step will need to be established so that strain readings are taken at reasonable intervals while maintaining accuracy. A reasonably time step of 0.3 second will suffice for this testing procedure. The data logger will output the data to a file that will then need to be analysed and sorted ready for analysis. The strain gauge data logger will produce a time step at 1 second intervals. Therefore, the data will need to be adjusted to accommodate for the difference in time step.

Data that will be recoded while testing is:

1. Time (seconds)

2. Strain (m/m)

3. Load (kN)

3.2.6.2 Data Analysis

All data obtained from results will be analysed in accordance with ASTMD198-15 section 19.1. Calculating stress at proportional limit (1), compressive strength (2) and the modulus of elasticity (3) are vital in comparing load capacities from the control sample to that of the rehabilitated pile. The equations that will be used throughout for analysis and graphing are listed below:

$$Stress\ at\ proportional\ limit,\quad \sigma'_c = P'/A \qquad (MPa) \ldots\ldots\ldots\ldots (1)$$

$$Compressive\ strength,\quad \sigma_c = P_{MAX}/A \qquad (MPa) \ldots\ldots\ldots\ldots (2)$$

$$Modulus\ of\ elasticity,\quad E_{AXIAL} = P'/A\varepsilon \qquad (MPa) \ldots\ldots\ldots\ldots (3)$$

$$Strain,\quad \varepsilon = \Delta L/L \qquad (m/m) \ldots\ldots\ldots\ldots (4)$$

3.2.7 Phase 5A – Graphing

3.2.7.1 Graphing Conditions

Graphs will be used to gain a visual understanding of the difference in load capacities. This will be done by changing line colour, weight and style. Multiple graphs will be produced comparing the various levels of defects. Three types of graphs will be produced for comparison. These types of graphs are:

1. Line graph computing stress vs strain

2. Line graph computing proportional stress vs strain

3. Column graph computing load vs sample no.

3.2.7.2 Stress vs Strain

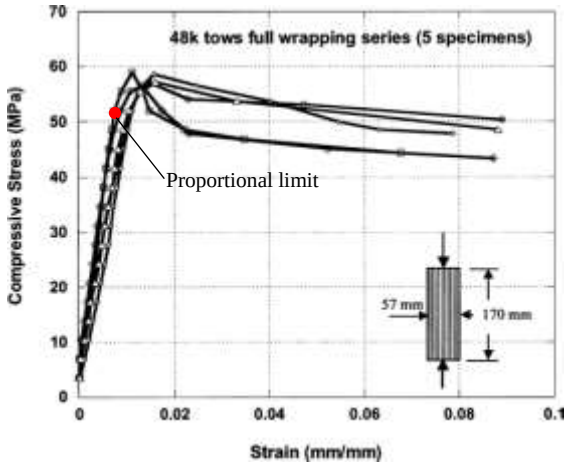

Figure 3-29 – Example of stress vs strain graph (Najm et al. 2007)

In Figure 3 -13 illustrates what the stress vs strain graph will look like when the data is analysed and computed. Strain gauges attached to the samples will give readings at intervals.

The proportional limit (P') is defined on the graph by the highest stress at which is directly proportional to strain. This value can be obtained from the last value on the elastic curve. Proportional stress (σ'_c) is simply a horizontal line draw to the x-axis from the proportional limit. These two values will be used in the graphing phase of the dissertation.

3.2.7.3 Load vs Sample No.

The load vs sample will be a column graph with sample No. displayed on the x axis and Load (kN) on the y axis. This will provide a vertical comparison of load capacities between the various samples no.

Chapter 4 RESULTS AND DISCUSSION

Through testing of the sixteen samples results were obtained. These results have been analysed using graphs to show visually elastic and plastic deformation of each samples. Most of the graphs that have been produced show a comparison of each filler material to that of the control samples. Observations throughout the test procedure were noticed and will be spoken about throughout this section of results. Three scenarios of results will be discussed and compared.

1. Comparison of unwrapped control samples
    a. D1
    b. D2
    c. DC
    d. C
2. Defect Critical comparison
    a. Underwater Cementitious Grout
    b. Crane Rail Grout
3. Defect 1 comparison
    a. Underwater Cementitious Grout
    b. Crane Rail Grout
4. Defect 2 comparison
    a. Underwater Cementitious Grout
    b. Crane Rail Grout

Sample No	CH 12	CH 14	CH 15	Remarks
1	H1	V1	H2	1 mm /min
2	H1	V1	-	2 mm / min
3	H1	V1	H2	2 mm / min
4	H1	V1	-	2 mm / min
5	H1	V1	-	1 mm / min
6	H1	V1	H2	2 mm / min
7	H1	V1	-	2 mm / min
8	H1	V1	H2	2 mm / min
9	H1	V1	-	2 mm / min
10	H1	V1	-	1.5 mm / min
11	H1	V1	H2	2 mm / min
12	H1	V1	-	2 mm / min
13	H1	V1	-	2 mm / min
14	H1	V1	H2	2 mm / min
15	H1	V1	-	1.5 mm / min
16	H1	V1	-	1.5 mm / min

Table 4-1 - Strain gauge channels and deflection increments

4.1 Experimental Setup

The experimental setup for this test was conducted at the University of Southern Queensland, Toowoomba campus using the SANS compression testing machine. The deflection increments for each sample number is documented in APPENDIX O. Two sets of results were obtained from the experimental procedure.

1. SANS compression testing machine records time step (0.3 seconds), load (N) and deflection (mm)
2. Strain gage recording device for horizontal and vertical strain gauges at a time step of 1 second

To matchup the time step difference between the compression testing matching and the strain gauge data collection device needed to be altered so that correct readings will match up for comparison. Therefore every 3rd data point from the compression testing machine was utilised with its corresponding load value.

Figure 4-1 - SANS compression testing machine (a)

Figure 4-2 - SANS compression testing machine (b)

Figure 4-3 - SANS recording machine

Figure 4-4 - Samples ready for testing

The above figures illustrate the test procedure and setup. This testing procedure complies with the risk management plan outlined in APPENDIX B. Also, a risk assessment can be found in AAPENDIX C

4.2 Data Analysis – Control Samples (5,10,15,16)

4.2.1 Stress Vs Strain

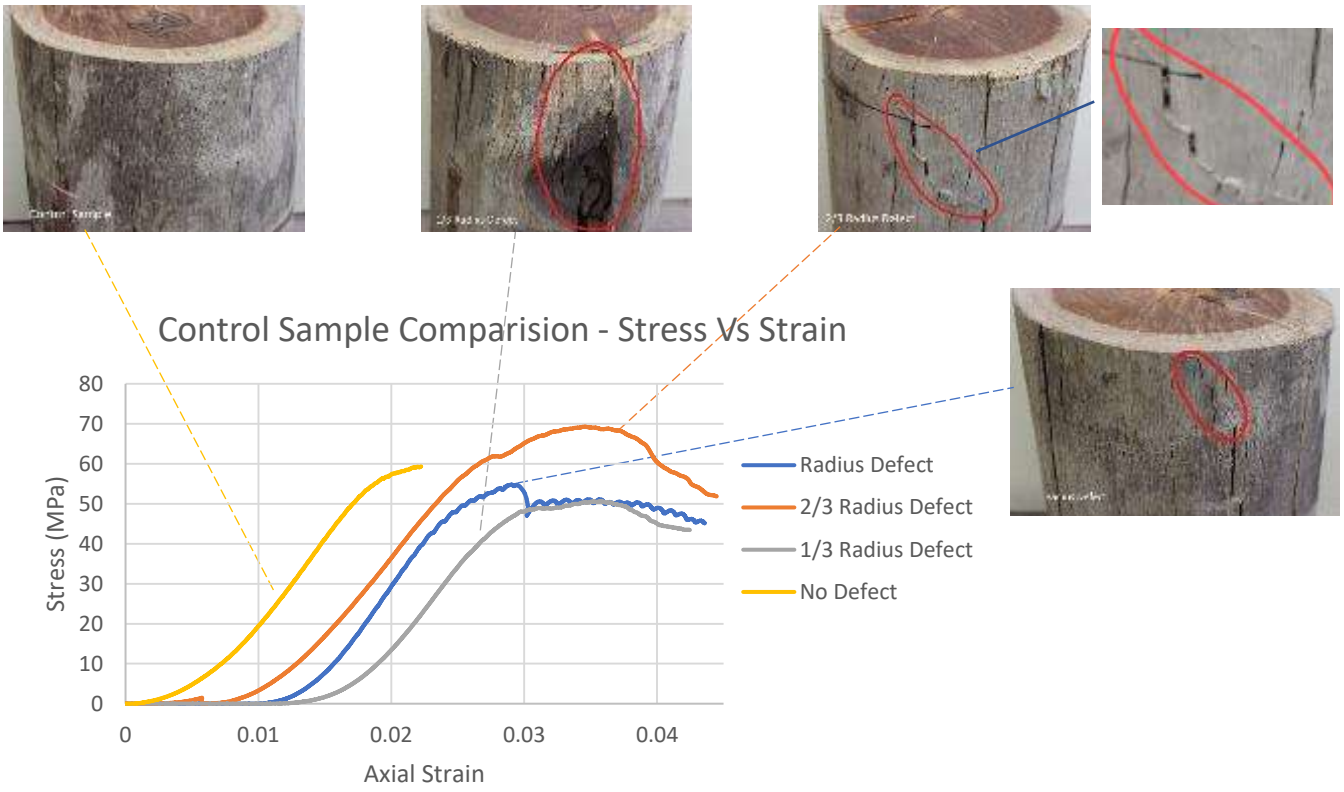

Figure 4-5 - Stress vs strain failure mode specimens

All 4 unwrapped control samples were tested using the SANS compression testing machine to find the maximum load/stress of the timber piles. Many variances/trends can be seen in Figure 4-5 with failure modes for each defect. Without conducting a Lixi Profiler or a Resistograph, the internals of the samples are unknown producing a high degree of variance in strength between the various defects. Typically, the control sample should record the highest stress reading followed by 1/3 radius defect, 2/3 radius defect and radius defect. This isn't the case with the 2/3 radius defect producing the highest stress value of 69.27 MPa.

The correlating photos of each sample specimen can be seen in Figure 4-5. A red circle is placed around visible crushing that had occurred during testing. Crushing of timber fibres is the first stage of failure and at this point strength is decreased while an increase in horizontal strain can be noticed.

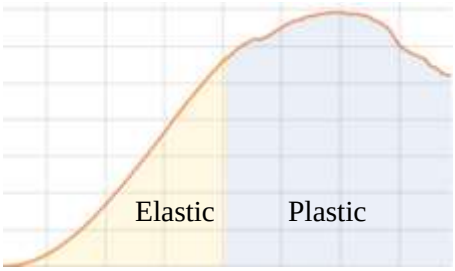

Figure 4-6 - Elastic and plastic deformation regions

Figure 4-6 shows the elastic and plastic deformation regions. Once the sample reaches the plastic deformation a change in shape can be noticed with the circumference increasing and sample height decreasing. Once the sample reaches this region the change in shape is permanent and cannot be reversed.

Area(mm2)	Length (mm)									
27794.89884	302									
1	2	3	4	5	6	7	8	9	10	11
Time (seconds)	Load (N)	Deflection (mm)		Stress (MPa)	Strain	12 (H)	14 (V)		12 (H)	14 (V)
533.437	1522440	8.892612		54.77407955	0.029445735	11037	-2472		-0.011037	0.002472
533.537	1521461	8.892808		54.73885726	0.029446384	11344	-2468		-0.011344	0.002468
533.639	1519112	8.902452		54.65434535	0.029478318	11589	-2467		-0.011589	0.002467
533.738	1518033	8.905208		54.61552527	0.029487444	11779	-2465		-0.011779	0.002465
533.838	1517307	8.911899		54.58940537	0.029509599	11937	-2462		-0.011937	0.002462
533.938	1516694	8.91741		54.56735097	0.029527848	12082	-2460		-0.012082	0.00246
534.038	1516197	8.918		54.54946999	0.029529801	12212	-2454		-0.012212	0.002454
534.139	1515779	8.927644		54.53443126	0.029561735	12349	-2452		-0.012349	0.002452
534.239	1515148	8.930399		54.51172925	0.029570858	12478	-2448		-0.012478	0.002448
534.338	1514546	8.930595		54.4900706	0.029571507	12604	-2446		-0.012604	0.002446
534.439	1513856	8.940239		54.4652459	0.02960344	12722	-2443		-0.012722	0.002443

Table 4-2 - Sample 5 calculations example

Above in Table 4-2 - Sample 5 calculations example is numerical data obtained from the SANS compression testing machine and the strain gauge data recording machine. This data is also highlighted in Figure 4-7 to show visually the point in time this specimen structurally fails. Time, load and deflection data (columns 1,2 & 3) is obtained from the compression testing machine. From these values stress is calculated by using equation 2 found in section 3.2.6.2 - Data Analysis. Column 6 is the strain calculated using the equation 4 found in section 3.2.6.2 - Data Analysis. Columns 7 and 8 is the horizontal and vertical strain gauge readings respectively in micro millimetres (μm). Columns 10 and 11 is horizontal and vertical strain gauge readings converted into SI units of m/m.

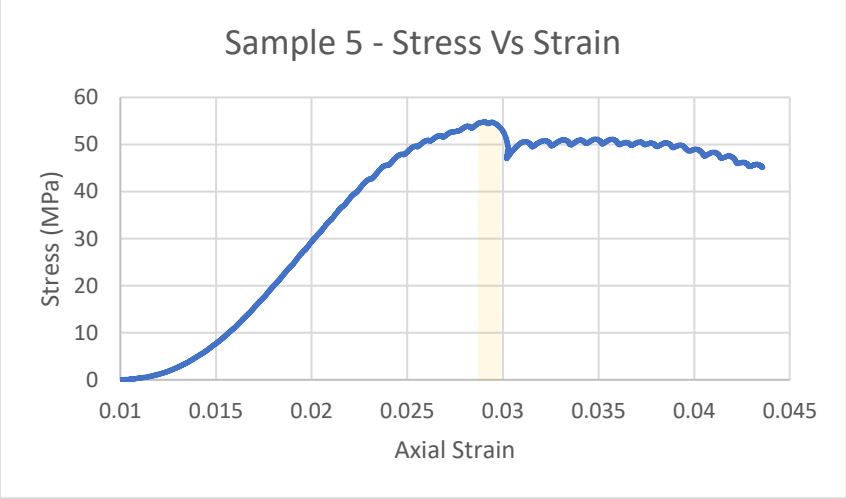

Figure 4-7 - Stress vs strain – Radius defect

Sample No.	Defect	σ (MPa)
5	DC	54.79
10	D2	69.27
15	D1	50.65
16	C	59.32

Table 4-3 - Maximum stress values

Error! Reference source not found. shows the maximum stress values from the unwrapped control samples. These stress values should theoretically flow from largest to smallest. But this is not the case, this is because timber has a high percentage of defects compared to new man made structural members.

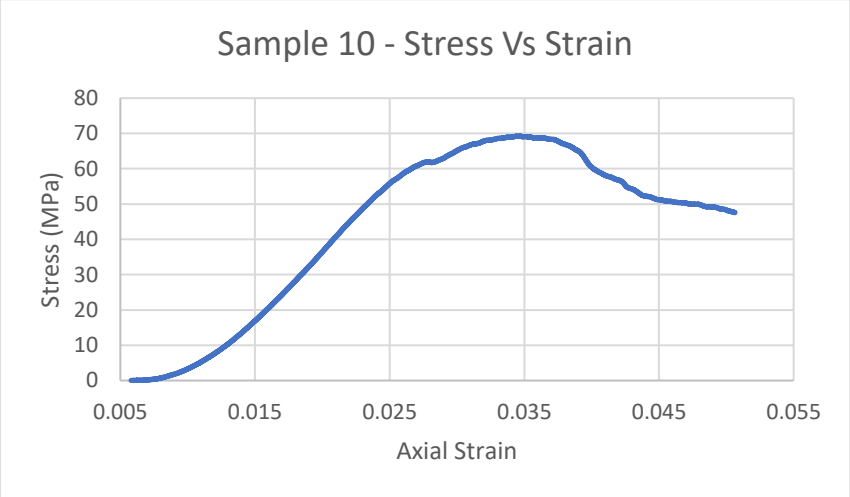

Figure 4-8 - Stress vs strain – 2/3 radius defect

Sample 10 produced a maximum stress of 69.27 MPa proving to have the largest stress reading. This was mainly due to the fact this sample had the least cross-sectional area (A_o). The maximum strength produced by this sample occurred at 0.035 strain.

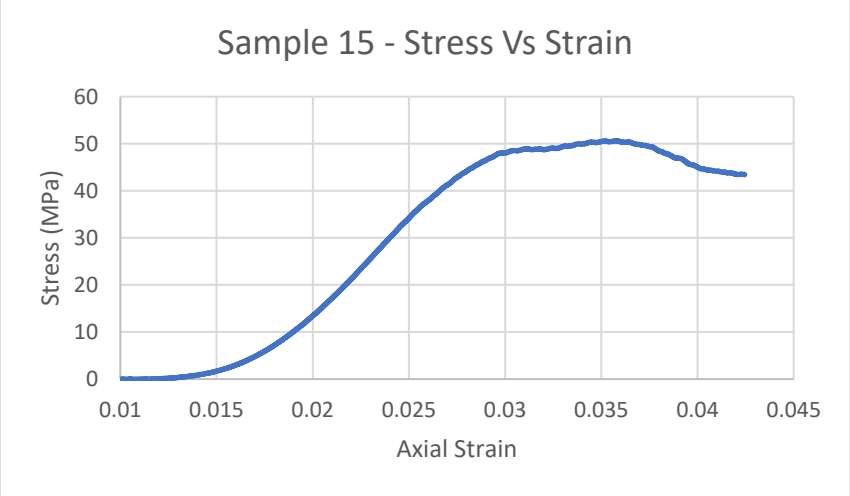

Figure 4-9 - Stress vs strain - 1/3 radius defect

The 1/3 radius defect sample proved to fail at approximately 0.035 strain, nearly identical to that of the 2/3 radius defect. This defect should follow the trend of producing a higher strain value the smaller the defect. This isn't the case in this circumstance as timber can prove to be inconsistent with strength values.

Sample 15 had the smallest incorporated defect of approximately 1/3 radius. Unfortunately, this timber member had a knot close to the end plates decreasing the axial capacity weakening in the lateral direction. Observations of this sample after the sample had been tested showed a split through the decayed knot along the grain approximately 15 mm in width and extending the length. This split can be seen visually in Figure 4-10 - Observed split in 1/3 radius defect sample

Figure 4-10 - Observed split in 1/3 radius defect sample

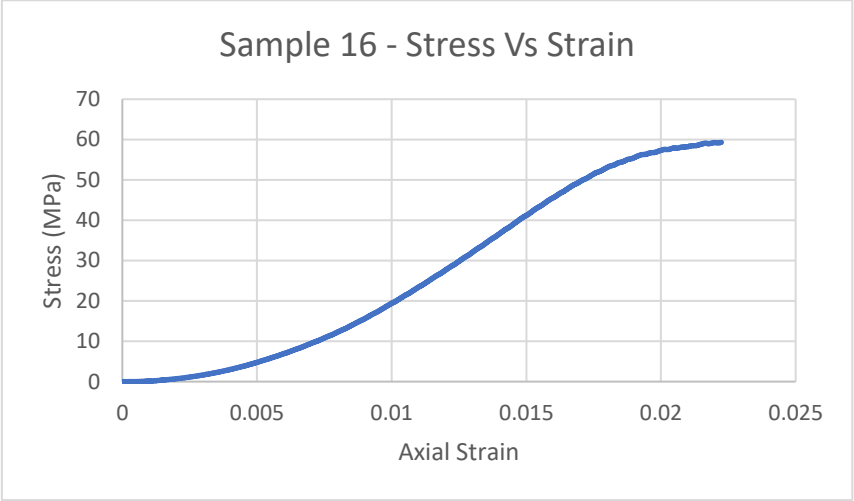

Figure 4-11 - Stress vs strain - Control sample

This sample didn't produce a failure with the graph still climbing. Axial strain was approximately 0.0225 before the machine stopped logging results. Compared with the other samples (5, 10 &15) that obtained an average strain gauge reading of 0.45. Meaning this sample could have possibly climbed higher than the highest recording of 59.32 MPa.

Conclusions can be made about timber and how easily defects can influence axial loading. The control samples were not conclusive in the sense that a trend of defect to compressive strength was not accurate. This was simply because of non-visual defects within the timber. Also, the sample ends need to be cut accurately orthogonal to the grain. This will ensure that the testing machine end plates apply equal pressure across the surface area of the pile.

4.2.2 Strain Gauge – Control samples

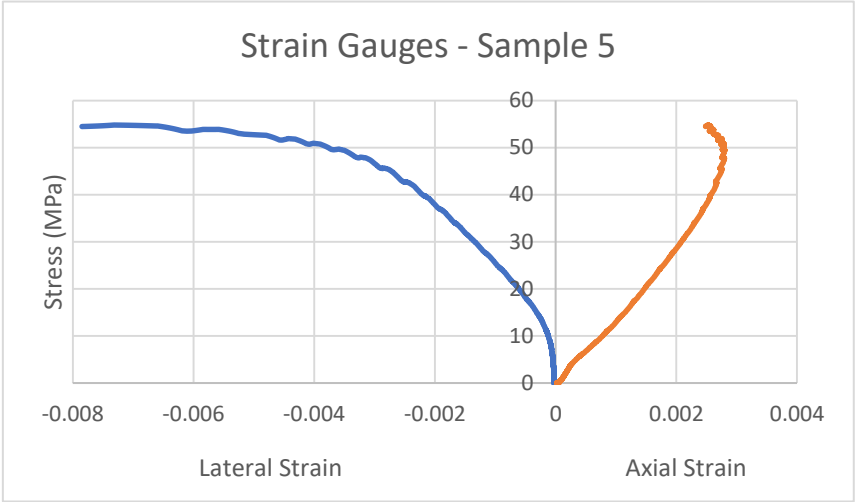

Figure 4-12 - Strain gauge sample 5 – Radius defect

The horizontal and vertical strain across all unwrapped samples are quite consistent. Lateral strain is approximately 3 times that of vertical strain. This strain graph proves the scope of this study. The timber piles fail in the lateral direction. Therefore, implementing lateral confinement will aid and increase the structural integrity of these piles.

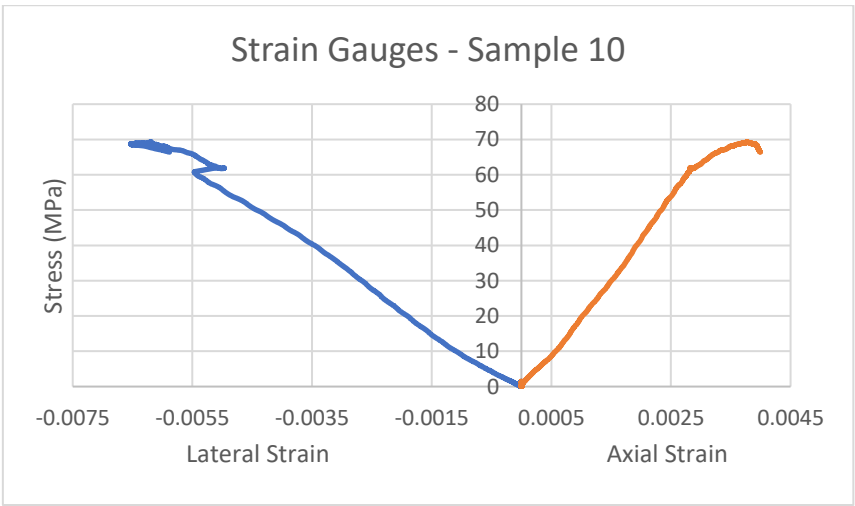

Figure 4-13 - Strain gauge sample 10 – 2/3 radius defect

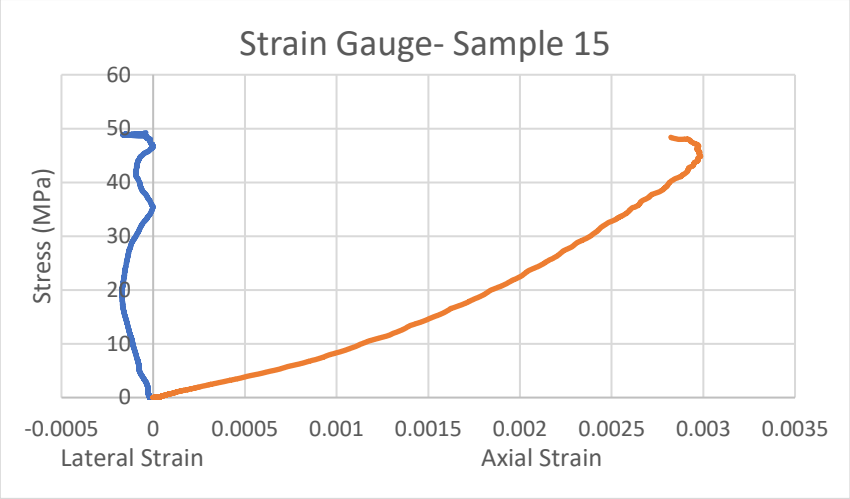

Figure 4-14 - Strain gauge sample 15 – 1/3 radius defect

Sample 15 produced a comprehensive axial strain curve whereas the lateral strain had not registered properly.

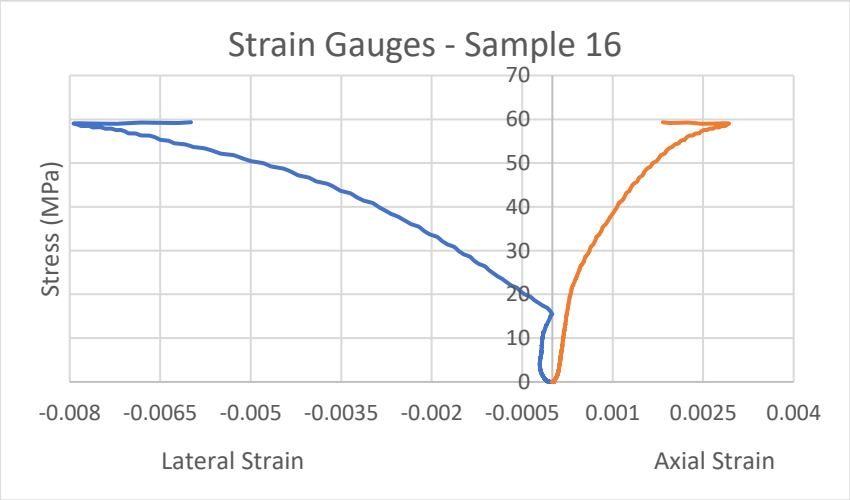

Figure 4-15 - Strain gauge sample 16 – Control

4.3 Defect Critical

4.3.1 Underwater Cementitious Grout

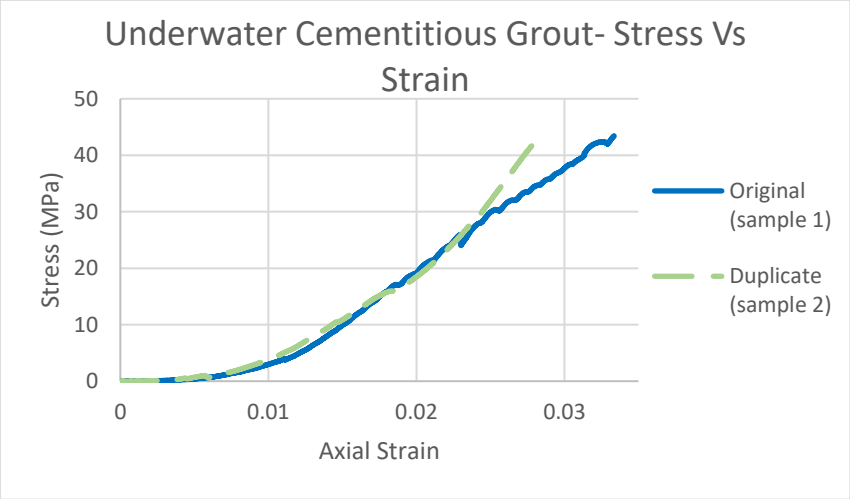

Figure 4-16 - Underwater Cementitious Grout - Radius defect

The SANS compression testing machine produced a deflection of 1 mm per minute. This was found to be too slow so therefore the duplicate was increased to 2 mm per minute. By adjusting this setting, the duplicate sample produced a more proportionate graph for analysis. Overall both samples produced strong results for compressive stress. The samples didn't fracture, crack or neck in the testing procedure. Recommendations for further development will be discussed later in the dissertation.

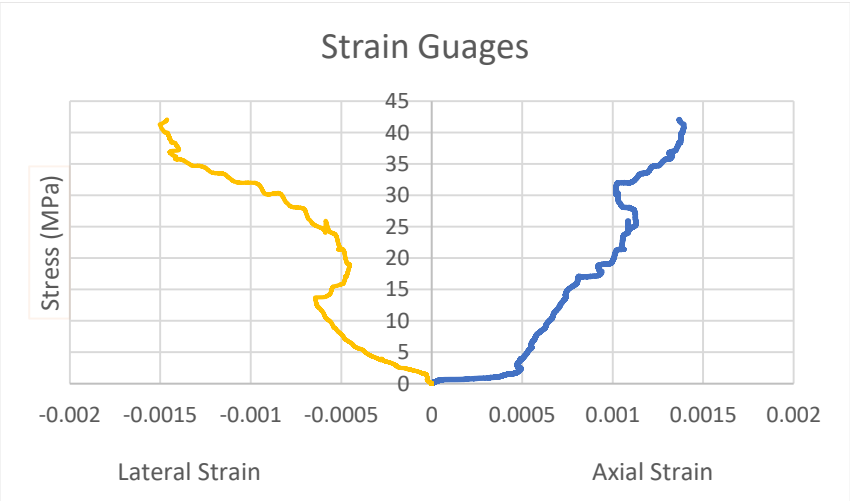

Figure 4-17 - Strain gauges sample 1 - Radius defect

Lateral and axial strain for sample 1 was quite small in comparison to the control sample with a radius defect. The filler material provides higher strain resistance while the FRP laminate provides higher lateral confinement. In turn this reduces the axial strain in both directions.

4.3.2 Crane Rail Grout

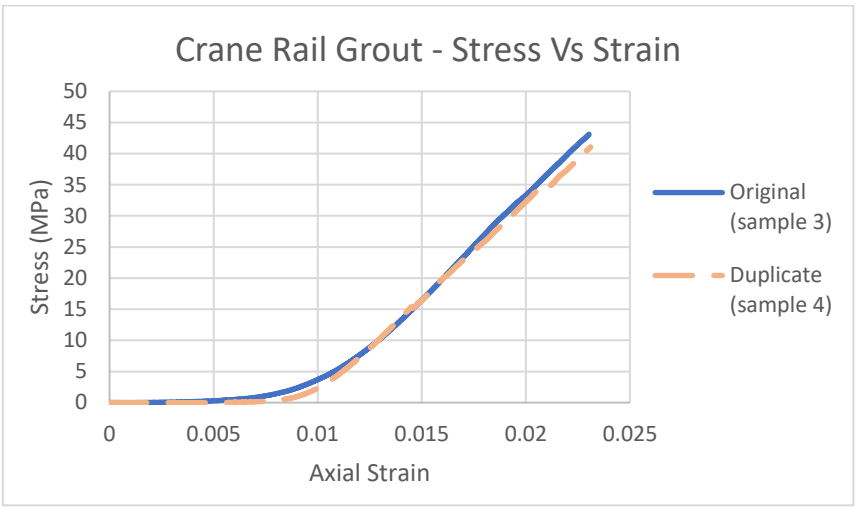

Figure 4-18 - Crane Rail Grout - Radius defect

As you can see from Figure 4-18 both the original and duplicate sample follow the same trend in graph. Also, the SANS compression testing machine adopted the same incremental deflection of 2 mm per minute hence why the graphs look identical. Once again, a failure isn't noticed with this sample limiting the machine of 1800 kN. To eliminate such a slow start to the testing the deflection increments could possibly be increase to 2.5 mm per minute.

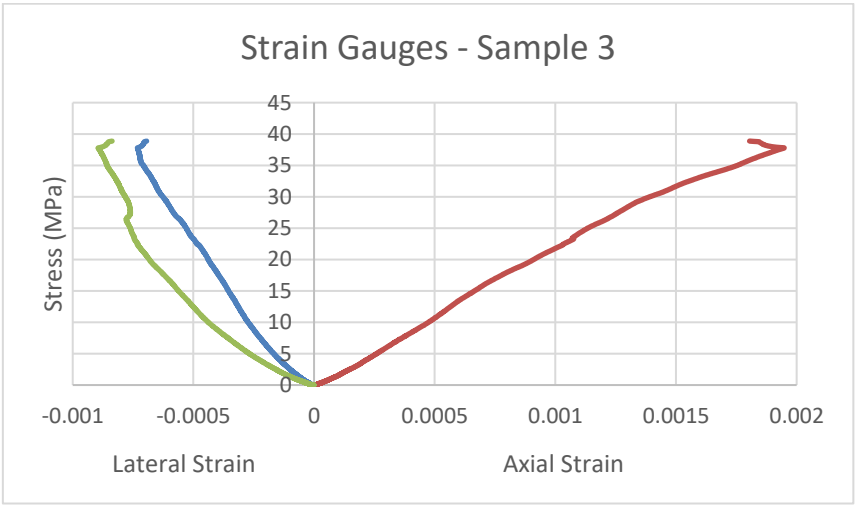

Figure 4-19 - Strain gauges sample 3 - Radius defect

The three strain gauges used for sample 3 can be seen in Figure 4-19. Lateral confinement is very comprehensive offering a small value of -0.000889. Both lateral strain gauges offered comparable results gaining adequate accuracy for this sample.

4.4 Defect Critical – Comparison (1,2,3,4,5)

4.4.1 Stress Vs Strain

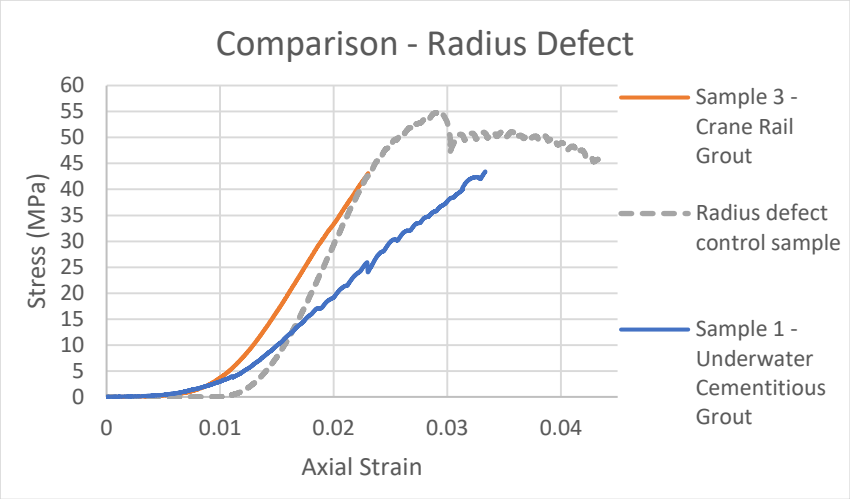

Figure 4-20 - Comparison - Radius defect

Figure 4-20 shows a comparison between UCG, CRG and the control sample all with a radius defect. The unwrapped sample failed at approximately 55 MPa. Both wrapped samples recorded approximately the same stress value of 42 MPa. These two sample have a lower stress value. This is because of the cross-sectional area difference. The wrapped samples gained an extra 20 mm radius of annulus material as well as a 3-mm thickness of FRP per radius.

The UCG and CRG have 48 MPa and 110 MPa respectively, strength characteristics. These values are quite high especially the FRP having a tensile strength of 418 MPa in the transverse direction (90˚). Therefore, the graph above isn't a fair reflection of the strength that can be achieved from these wrapped samples. We expect to see these results double if correct preparation and practices were carried out during the construction phase of this rehabilitation technique.

4.4.2 Strain Gauge - Radius Critical Defect

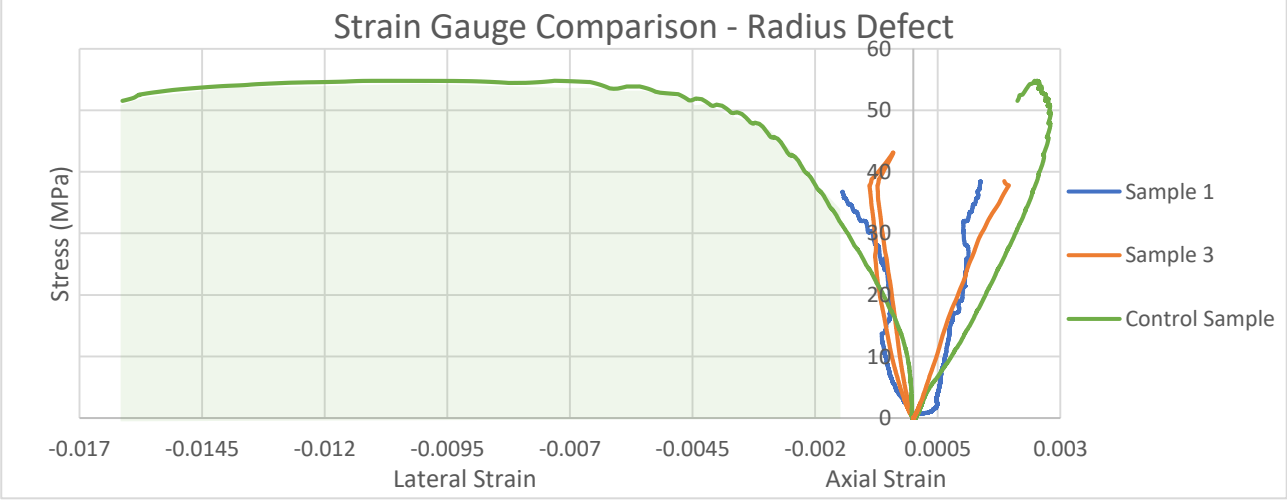

Figure 4-21 - Strain gauge comparison - Radius defect

The above graph shows a comparison between the UCG, CRG and radius defected control sample. The green shaded area illustrates the difference in lateral strain from the unwrapped control sample. Both the UCG and CRG prove to have much smaller strain values than that of the control sample. The rehabilitation technique acquired proves to aid and decrease lateral and axial strain.

4.5 Defect 1

4.5.1 Underwater Cementitious Grout

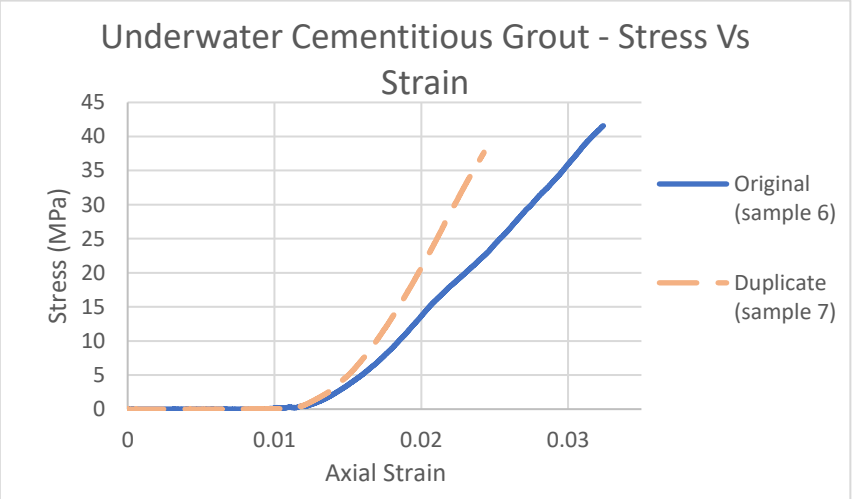

Figure 4-22 - Underwater Cementitious Grout - 2/3 radius defect

Both the UCG original sample and UCG duplicate sample nearly produce identical curves once again. These two-line graphs verify strength and strain values and can be deemed to be an accurate representation of the strength gained from UCG at a 2/3 radius defect. The deflection incrementation from the compression testing machine were both set at 2 mm per minute. The dotted line shows a steeper linear curve, this result is healthier as the lateral confinement (strain) value is smaller than that of the original sample. This result is ideal as the scope of this dissertation was to increase strength with lateral confinement on the forefoot of this experiment.

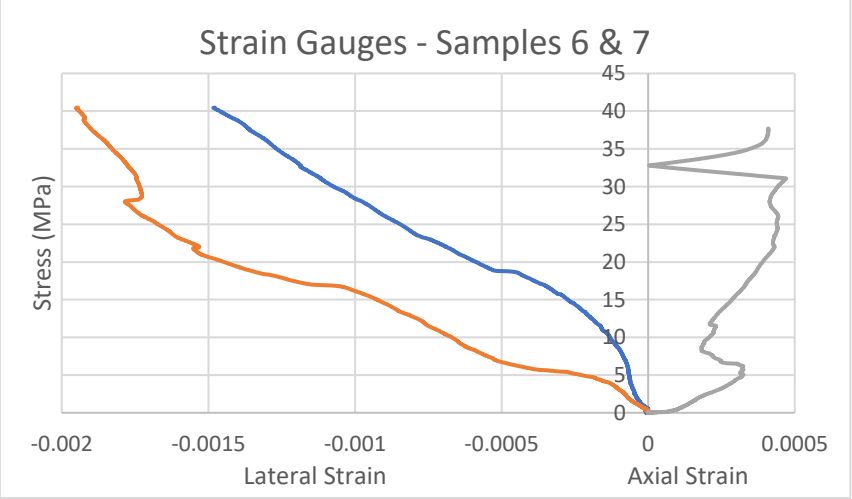

Figure 4-23 - Strain gauges samples 6 & 7 - 2/3 radius defect

4.5.2 Crane Rail Grout

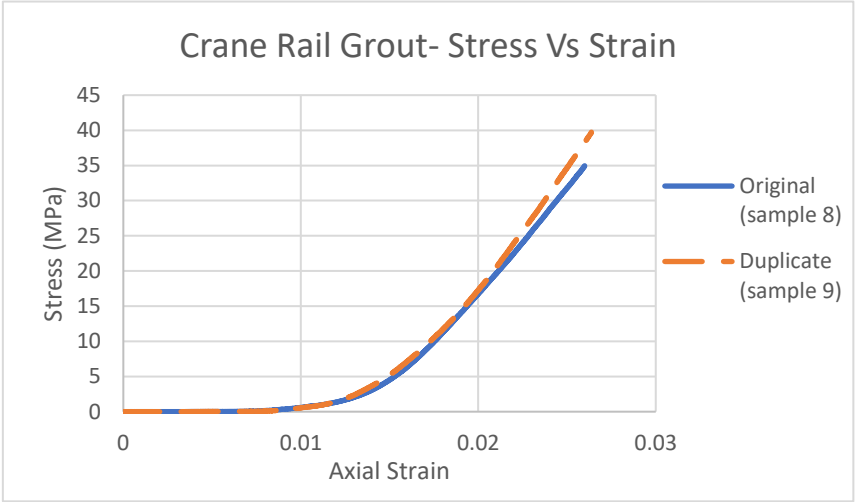

Figure 4-24 - Crane Rail Grout - 2/3 radius defect

2/3 radius defect for the CRG shows very comparative results. Once again, this data can be accepted as being accurate. Duplicating samples has offered accurate results and can be used for future development of this testing procedure. No failure was recorded with this sample offering a characteristic strength of approximately 37 MPa at approximately 0.025 strain.

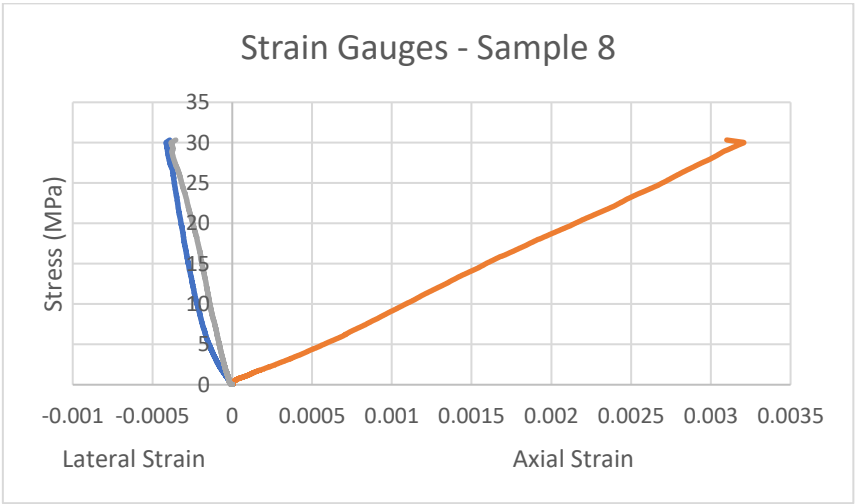

Figure 4-25 - Strain gauges sample 8 - 2/3 radius defect

4.6 Defect 1 – Comparison (6,7,8,9,10)

4.6.1 Stress Vs Strain

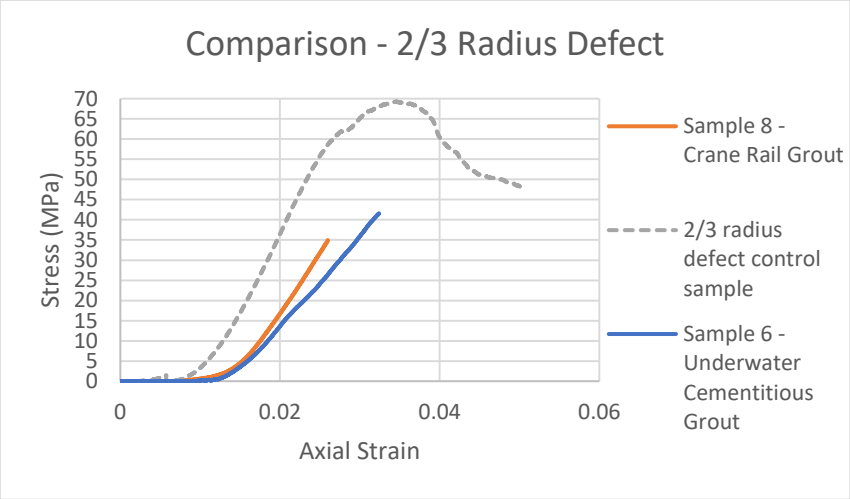

Figure 4-26 - Comparison - 2/3 radius defect

Once again, this comparison shows the dotted line (2/3 radius defect) producing a higher stress value. The reason behind this strength difference can be directly related to the cross-sectional area of the samples. All samples shown in Figure 4-26 produced maximum point load values under compression. This 2/3 radius defect still shows linear deformation, meaning that these samples could produce much higher strength characteristics shown in this graph. To gain a true reflection of strength benefits from this rehabilitation technique a larger compression testing machine needs to be sourced and implemented to gain and understating of the maximum strength from this technique of FRP wrapping.

4.6.2 Strain Gauge – 2/3 Radius Defect

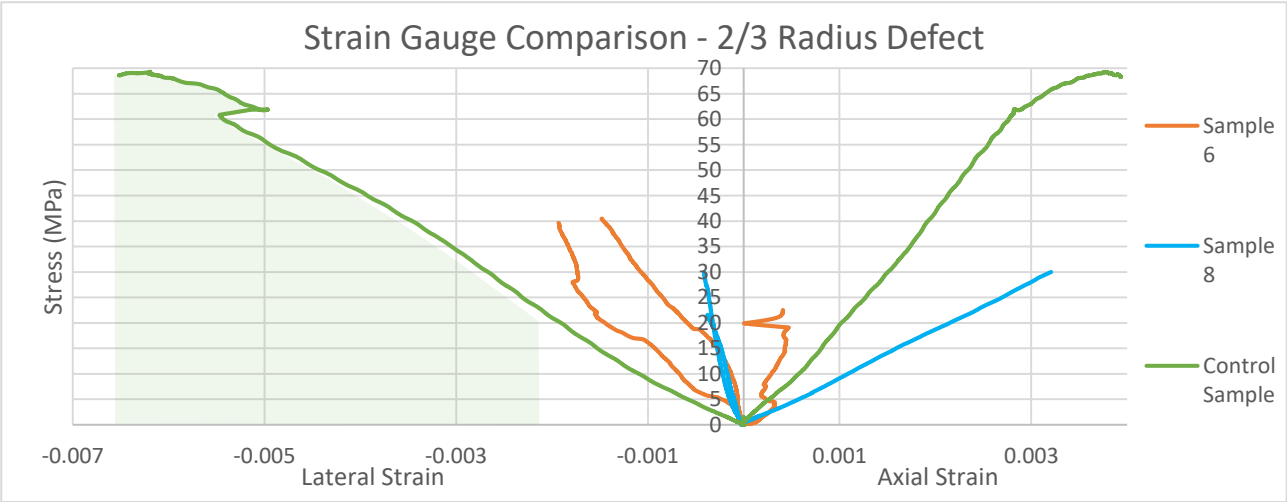

Figure 4-27 - Strain gauge comparison - 2/3 radius defect

In saying this the results obtained is a massive step in the right direction. The strain gauge readings are vital in data analysis. A comparison in strain values from that of the control sample to that of sample 6. A fracture or maximum strength can be seen from the control sample at approximately 0.03 strain. Sample 6 is still progressing a linear relationship at a strain of 0.03. This comparison shows and proves that lateral confinement from the FRP laminate is taking affect. It can be noted a reduction of approximately 66 % proving to have amazing lateral strain properties. The FRP laminate wrap offers a tensile strength of 418 MPa in the lateral direction and

4.7 Defect 2

4.7.1 Underwater Cementitious Grout

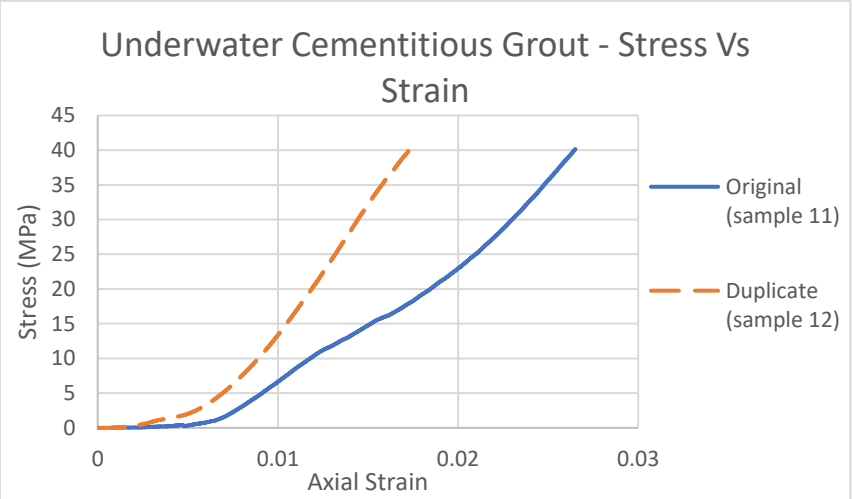

Figure 4-28 - Underwater Cementitious Grout - 1/3 radius defect

Shown in Figure 4-28 the original sample shows an unreliable data line. This graph shows nonlinear attributes, the end plates were not square on the faces of the sample pile. Therefore, creating slip as the axial force is applied. The eccentricity was aligned before testing had commenced. The duplicate sample illustrates a great trendline producing a maximum stress of approximately 39.5 MPa at 0.017 strain.

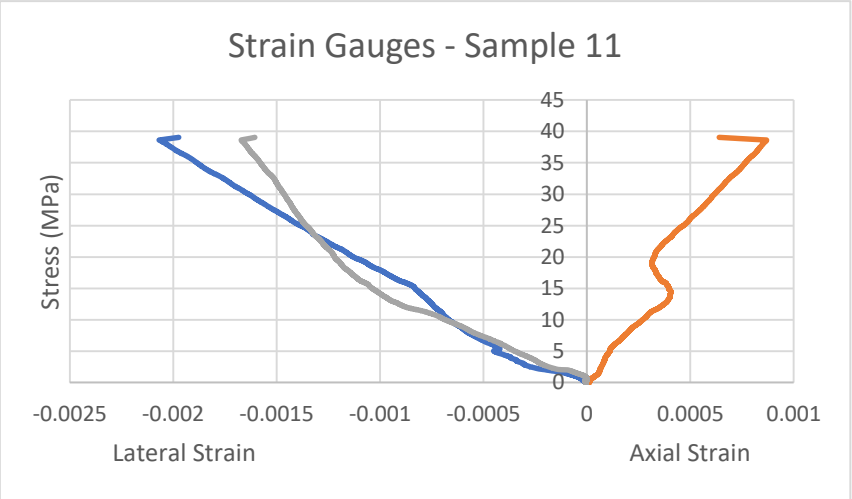

Figure 4-29 - Strain gauges sample 11 - 1/3 radius defect

4.7.2 Crane Rail Grout

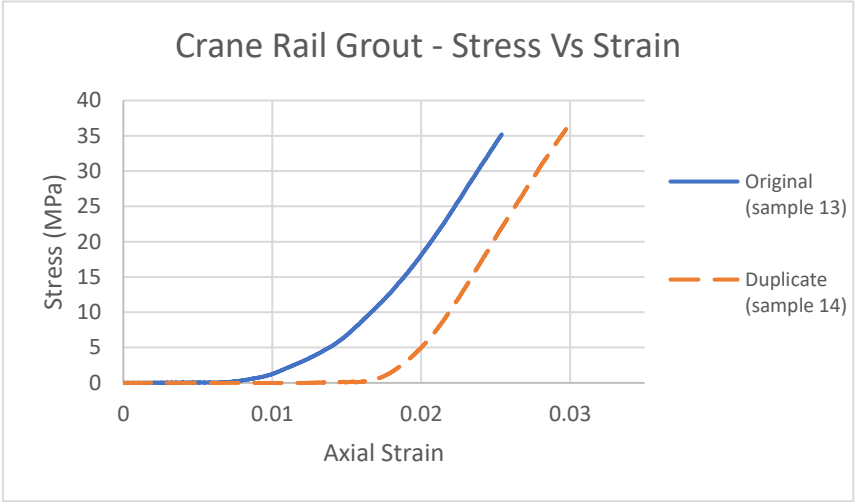

Figure 4-30 - Crane Rail Grout - 1/3 radius defect

Sample 13 and 14 both reach the maximum axial force the SANS compression machine can produce. The need for a larger machine is once again something that will need to be considered for further development. The data obtained showed sample 13 reaching approximately 35 MPa and sample 14 have a compressive strength of 35.7 MPa. Both samples also have very comparable cross-sectional areas, with samples 13 and 14 having 50043.887 mm^2 and 51122.439 mm^2. This proves similarities in data with these samples showing nearly identical strength characteristics.

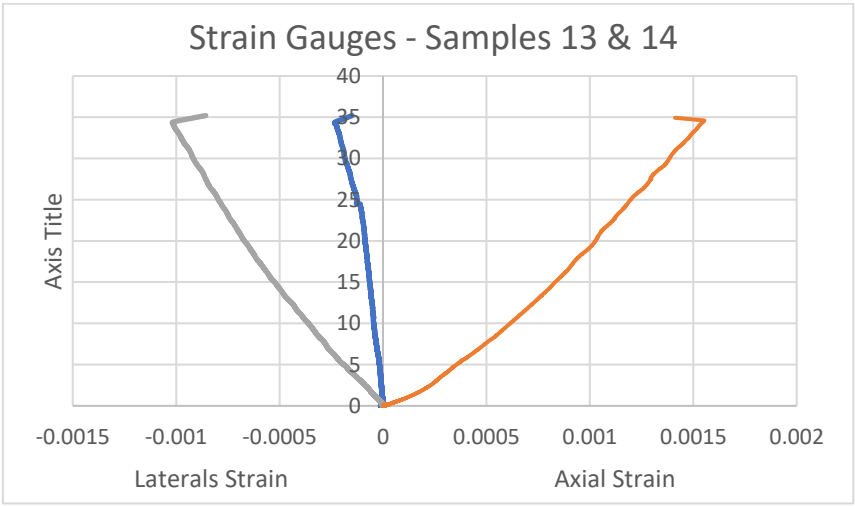

Figure 4-31 - Strain gauges sample 13 & 14 – 1/3 radius defect

The vertical strain gauge data obtained for sample 13 hasn't been incorporated into the above figure as the results weren't recorded properly throwing out the reliability of the vertical strain gauge data. So therefore sample 14's vertical data has been plotted in Figure 4-31. The variations in lateral strain is due to the sample specimen not taking on a symmetrical circular shape.

4.8 Defect 2 – Comparison (11,12,13,14,15)

4.8.1 Stress Vs Strain

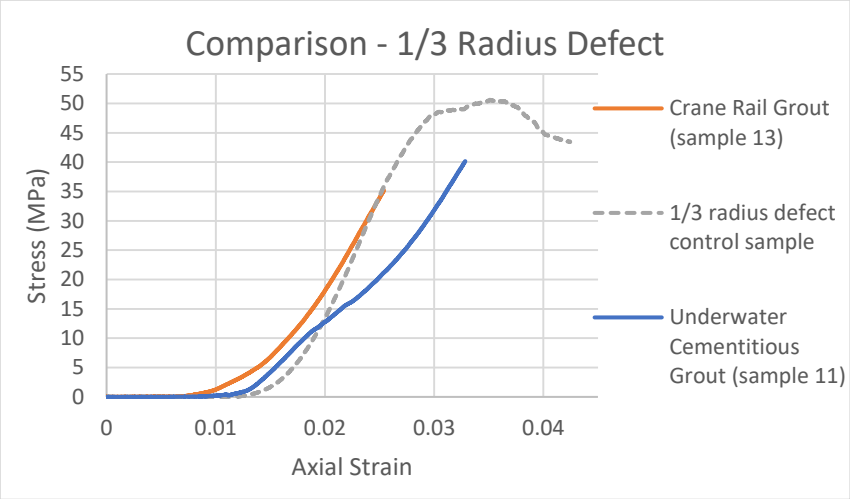

Figure 4-32 - Comparison - 1/3 radius defect

Once again, the unwrapped sample had failed due to crushing of the timber sample fibres. The fracture or failure point of the control sample is at approximately 51 MPa at a vertical strain of 0.035. Compare these controls sample values to that of the UCG. The vertical strain is 0.033 while still maintaining a linear elastic region. Therefore, an assumption that stress will reach greater values that that of the control sample. The CRG having a higher compressive strength shows a steeper curve as a reduction in vertical strain is present. The above Figure 4-32 is a fitting example of the strength characteristics between the three sample types.

4.8.2 Strain Gauge – 1/3 Radius

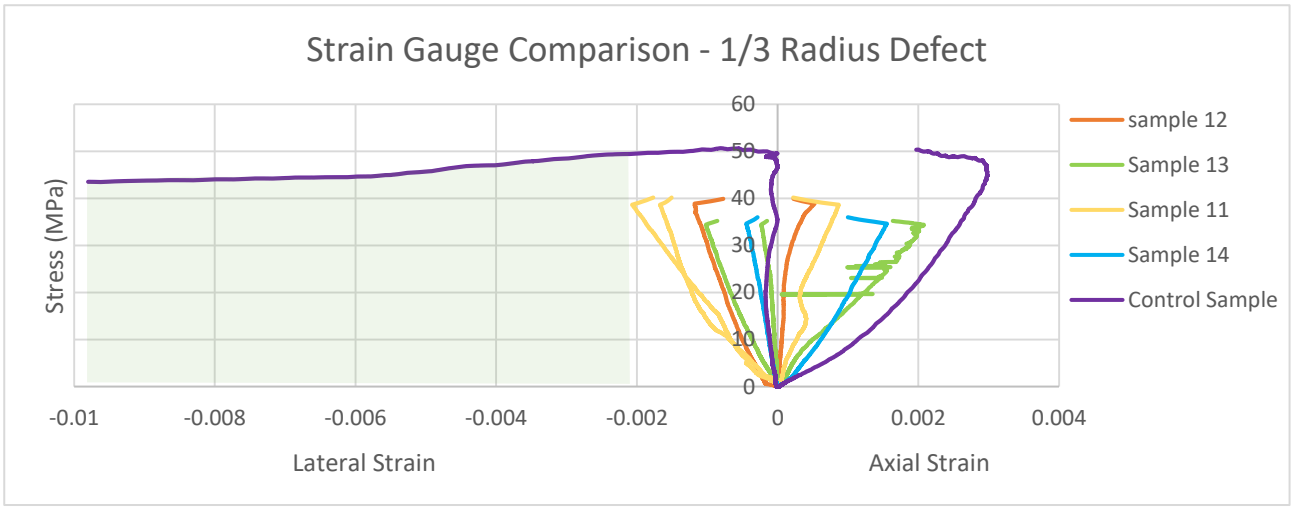

Figure 4-33 - Strain gauge comparison - 1/3 radius defect

The strain gauge reading for the wrapped samples are all clumped together around the y axis, Because the control samples are unwrapped vertical and lateral strain is much greater and can be seen visually in Figure 4-33. The green region shows the difference in lateral strain from the control sample to the highest wrapped sample.

Chapter 5 CONCLUSION

The aim of this dissertation was to validate the effectiveness of FRP wrapping on a range of defected piles at given depths. This aim was achieved and opened several doors into further research and development that will be discussed in later chapters. Testing was incorporated as it would validate hypothesis or expected outcomes stated in chapter 1, along with many achievements.

Several achievements had been achieved which can be drawn from the analysed data and graphs. All defected control samples produced a failure and showing high lateral and vertical strain values at fracture point. More conclusions can be drawn about unwrapped timber and its compressive strength. From the results obtained from the unwrapped samples showed that timber defect visual and non-visual can reduce the capacity and lateral strain. Observations of this testing showed an increase in visual split width while applying incremental axial force. Another visual observation was the crushing of fibres at the ends of the unwrapped sample pile. Both observations validated assumptions in chapter 1 about split depth being underestimated and not validated in literature.

The graphed results proved to be unreliable as a trend of split depth to compressive strength. The increase in defect depth should have shown lower compressive stress values. But in this circumstance case control samples were very spiritic due to non-visual defects within the timber samples. A further understanding of the failure characteristics of F27 grade timber have proven how unstable and unreliable with the results obtained from this experimental procedure. This timber also shows fluctuating stress values due to imperfections or defects, visual and non-visual. The largest recorded stress (σ) value was from sample

All wrapped samples proved to validate the exact reason as to why wrapping defected piles will aid in structural capacities and longevity of sub-structures. The reason behind this is because significantly reduced lateral strain values. A reduction of approximately 66 % in lateral strain. This demonstrates the effectiveness of FRP wrapping outlined in the project specification. Unfortunately, a fracture was not achieved from the rehabilitated samples at any split depth.

The Crane Rail Grout infill material 28-day strength properties are far greater than that of the Underwater Cementitious Grout. Underwater Cementitious Grout has a 28-day strength of 48.3 MPa while the Crane Rail Grout had a strength of 110 MPa. This new filler material shows the advancement in material technology and how quickly the 7-day strength is achieved. The radius defects for UCG and CRG show that CRG shows a smaller strain value than that of UCG. These structural properties gained by the CRG prove to also help with lateral confinement. These stress values gained from the UCG and CRG rehabilitation repair showed all do be approximately 45 MPa. As a result, all graphs showed linear relationship all reaching the maximum load applied by the SANS compression testing machine (1800 kN). Some results varied slight due to a difference in cross-sectional area of each timber pile sample. Further testing development is the next step in analysing a failure of each type of infill material. Accessing a larger compression testing machine will validate the assumptions with regards to larger axial loads and lateral confinement decreases.

In conclusion the results obtained only offers part of the dissertaton objectives with no failure noticed for the FRP wrapped samples. Further testing needs to be done on the stocky short columns for further development.

5.1 Further Work

Inside this given topic further work needs to be done to ascertain a fracture point or failure of the piles used for this specific analysis. This will provide a better analysis of the factual structural capacity improvements.

Updating this document with new recorded results of failure will offer a great research tool for the development into timber pile rehabilitation.

Currently QuakeWrap assume a zero-bending moment for PileMedic repair methods. This is because the jackets are epoxied together assuming full capacity is not transferred of the seams under bending. When using cementitious infill there is no bond between existing pile, infill and FRP jacket thus we cannot consider the bending moment capacity from the FRP jacket without bond. These two reasons provide for further work into data acquisition.

This zero-bending moment conservative assumption has no data to back any flexural capacities therefore can provide the basis for future development of FRP laminate wrapping data. Three experimental cases under a 3-point bending apparatus with the optional fourth. These cases can be seen listed below.

1. 3 original circular timber sections
2. 3 circular timber sections wrapped with PileMedic and infilled with cementitious grout – No Bond
3. 3 circular timber sections wrapped with PileMedic and infilled with epoxy grout – Bond
4. 3 circular timber sections wrapped with PileMedic and infilled with cementitious grout and FRP bars provided in the annulus [Optional] – this may complicate the testing but would be interesting to see the results.

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APPENDIX A – Project Specification

Project Specification

For: Rahmin Borzou

Title: Rehabilitation of Deteriorated Timber Bridges

Major: Civil Engineering

Supervisors: Dr Weena Lokuge

Enrolment: ENG4111 – EXT S1, 2017

ENG4112 – EXT S2, 2017

Project Aim: To investigate the deterioration and rehabilitation of timber bridges. Testing the strength improvements using a combination of FRP wrap and fillers.

Programme: Issue A, 13th of March 2017

1. Research the background information relating to deterioration of timber piles.
2. Review currently available data and information.
3. Research into nearby areas undergoing timber rehabilitation using the FRP wrapping concept.
4. Liaise with USQ laboratory staff for pile testing (compression testing).
5. Liaise with Ipswich City Council and Scenic Rim Regional Council into data surrounding deterioration of timber bridges/piles.
6. Demonstrate the effective use of FRP wrapping.

If time and resources permit:

7. Design and improved formula. This can be done by:
    a. Hardwood pile grade – 2 types
    b. Pile shape – 3 types
    c. Filler – 3 types
8. Establish and test a new filler yet to be used on the market.

APPENDIX B – Risk Management Plan

UNIVERSITY of SOUTHERN QUEENSLAND

Laboratory Specific Safety Induction Checklist

Civil Laboratories

To obtain laboratory and equipment use authorisation, a student must read, understand and sign off this Laboratory Specific Safety Induction Checklist before commence work in any laboratory.

No	Item	Description	√
1	Introduce relevant staff	Academic and technical staff involved	☑
		USQ Emergency contact Number – 2222 Location of nearest telephone - Location of First aid kit	☑
		Exists and Assembly areas • In case of fire or other danger Proceed in an orderly manner to the designated assembly point. Emergency Squad Members will be on hand to direct you to this area so, please follow the instructions. • Do not return to buildings until authorised personnel give the ALL CLEAR.	☑
2	Emergency Procedure	Evacuation Alarm – (Automatic smoke/heat detector) • The alarms are very sensitive so be careful what work you do near them. • When the alarm sounds, evacuating the building immediately and head off to the assembly area. • If it is safe to do so you can take your personal belongings with you but under no circumstances re-enter the building to get your possessions. • If you are aware of a false alarm, or that an emergency does not exist, inform the Building Warden in person after the evacuation. • Keep all roadways clear. • Inform an Emergency Squad member if there are any persons with a disability or an injury who require assistance. Fire Extinguisher • Staff only to use. Before using a fire extinguisher, read the instructions to ensure it is appropriate for that type of fire.	☑

3	First Aid	If you require first aid, please see the Academic or Technical. Please report any injuries or accidents /incidents to Academic or Technical staff and ensure an incident report form is complete Safety Blanket, Safety Shower and Eye wash • Student must familiarise themselves with the nearest accessible location of these. Please see Academic or Technical staff before using to ensure suitability	☑
4	Behaviour	• Reckless behaviour, practical jokes or unauthorised experiments in the laboratories are strictly prohibited • Eating and drinking are strictly prohibited inside laboratories.	☑
5	Housekeeping	• Good housekeeping practices should always be followed to maintain work areas in neat and tidy manner • Small spills shall be cleaned up immediately from work areas and floors. (Contact Technical Officer for large spills.) • All tools and equipment shall be returned to their proper storage location after use. • Access to exits, hallways, emergency equipment, and utility controls shall remain accessible at all times. • Disposal of waste should be in the appropriate containers Eg Please make sure not to exceed the weight capacity written for the metal bins. Disposing of either chemicals, contaminated liquid or any solid matters in to laboratory drains is strictly prohibited.	☑
6	Personal Protective Equipment	• You will not be allowed in to the laboratories without enclosed footwear. All other personal protective equipment (safety glasses, gloves, lab coats, ear protection, dust masks, etc.) must be worn as appropriate(eg: asphalt area needs steel capped safety shoes, heat protective gloves, lab coats, eye protection and ear muffs) • Please see Technical Staff or feel free to access PPE (Eye protection, gloves, ear protection and dust masks only) and their storage locations.	☑

7	Use of equipment	• It is the responsibility of students to ensure they have been fully instructed in, and understand the use of equipment before operating it. • Check, read and understand the SWP/SOP documents attached to the equipment before use (eg:.....) • No equipment of any type may be operated unless the person is authorised to do so(eg: Compression Testing machine) • Report for any damage or faulty equipment found. • Do not attempt to operate/use any item which has been tagged unusable for safety reasons. • Make sure to turn off power once the task is complete.	☑
8	Risk assessments	• Risk assessment forms(online version) must be completed by the student incorporating with his/her academic supervisor and USQ SAFE representative as required, and should be assessed by an authorised person before any experiment or project is undertaken independently (***These are not applicable for practice course sessions***). • Each and every step of the experiment must be included in the Risk assessment and the developed risk assessment should be revised if any alterations occurred with the on-going experiment. • No laboratory work will be permitted without a completed Risk Assessment document.	☑
9	Manual Handling	• Employ correct methods while lifting and shifting. • Apply correct postures appropriately in lifting and shifting goods (lifting and shifting of concrete moulds, concrete samples, materials, etc.) • Do not over –reach and ensure stable footing at all times. Please refer to the laboratory specific safety guidelines for more details. • Use available lifting aids; trolleys, scissor or electric lifter as appropriate and be conscious about their carrying capacities. If heavy lifting, or pushing and pulling is involved, seek help from staff.	☑
10	Storage	• Samples to be tested should be labelled and kept only in designated areas for storage. • All the unlabelled samples would be discarded by the laboratory tech staff without further notice.	☐

		• Limited storage space is available. Samples or experimental setups must be discarded or removed from the lab once the work finished.	
11	**For Post-grad and Project students only**	After Hours Access policy • Normal working hours in this laboratory are weekdays 8.00 am to 5.00 pm. • Laboratory staff should be consulted if work in the laboratory after hours is required. • No undergrad students are allowed for after hour access. • Staff and post grad students must have an approved after hour access form authorised by the academic supervisor and Head of School if necessary. The form of approval must be forwarded to the relevant tech staff to act accordingly. • It is a general rule that No duplicate keys for laboratory doors will be issued for student's name. Students must borrow keys from tech staff or ask help from USQ security. A copy of signed authority form and University ID card must be carried with you when working after hours. Rules of access – • Ensure that doors to buildings and internal areas are securely closed and locked after entering and leaving the building • Ensure that you are familiar with USQ safety rules and emergency contact numbers • Report to USQ security on any breaches of security or suspicious behaviour • You will not lend keys to another person • You must not provide access to unauthorized persons in to the building • Operation of equipment – No equipment may be operated unless two persons are present • The operator has received a training in its use and has given a work permit to use it.	☐ NA

Name (print) Rahmin Borzou Student No [redacted]

Signature [redacted] Date 01/09/2017

Technical Staff Pirooz Azargedan Signature [redacted]

Supervisor..... Signature.....

APPENDIX C – Risk Assessment

Likelihood of Occurrence	Consequence			
	A Minor First Aid or some medical attention	B Moderate Increased medical attention	C Major Severe health outcome or injury	D Extreme Intensive care or death
1 Rare	**A1**	**B1**	**C1**	**D1**
2 Unlikely	**A2**	**B2**	**C2**	**D2**
3 Likely	**A3**	**B3**	**C3**	**D3**
4 Almost Certain	**A4**	**B4**	**C4**	**D4**

Table C.1 - Personal Risk - likelihood and consequence matrix

Legend	Low Risk	Medium Risk	High Risk

Task	**Hazard**	**Risk**	**Minimisation**
2A/B	Accident because of laboratory work	C2	1. Undertake USQ safety induction and operate equipment with a USQ laboratory assistant supervising
2A/B	Exposure too dust	A3	2. Avoid eye a respiratory contact, may cause mild irritation (refer to MSDS precautions)
2A	Cutting Samples	A4	3. Wear safety equipment such as gloves and eyewear. Use a stationary cutting equipment instead of handheld cutting devices to minimise risk.
3A	Compression Testing	C2	4. Wear safety equipment and follow safety manual in accordance with compression tests. Laboratory supervisor to look over apparatus before testing commences.

Task	Hazard	Risk	Minimisation
2B	Unable to source FRP wrap, resin and grout	Low Risk	1. Organise prior with supervisor and QuakeWrap.
2B	Unable to access cutting equipment	Low Risk	2. Ensure Cutting apparatuses and equipment is sourced weeks prior to testing being carried out
3A	Unable to access testing equipment	Low Risk	3. Organise laboratory time slots prior to ensure testing can take place
4A-6B	Office package I still valid for entire duration of project	Low Risk	4. Upgrade subscription immediately

APPENDIX D – Radius and Defect Calculations

Sample No.	Circumference Top (mm)	Circumference Bot (mm)	Length (mm)	Aspect Ratio	Radius (mm)	Defect Width (mm)	Defect Depth 1/3 (mm)	Defect Depth 2/3 (mm)	Defect Depth Critical (mm)	Fill Material	Fill Depth (mm)	Ao (mm2)
1	575	585	298	1.61	92.30987	5	31	61	**92**	Grout	20	41771.76394
2D	590	586	300	1.60	93.58311	5	31	63	**94**	Grout	20	42699.33584
3	583	585	303	1.63	92.94649	5	31	62	**93**	Epoxy	20	42234.27665
4D	589	599	302	1.60	94.53804	5	32	63	**95**	Epoxy	20	43401.69926
5C	596	586	302	1.61	94.06057	5	31	63	**94**	N/A	-	27794.89884
6	592	594	302	1.60	94.37888	5	31	**63**	94	Grout	20	43284.24081
7D	634	626	302	1.51	100.26761	5	33	**67**	100	Grout	20	47736.20097
8	655	665	299	1.42	105.04226	5	35	**70**	105	Epoxy	20	51505.84912
9D	612	608	298	1.5	97.08452	5	32	**65**	97	Epoxy	20	45302.67968
10C	570	560	297	1.65	89.92254	5	30	**60**	90	N/A	-	25403.11835
11	610	602	296	1.53	96.44790	5	**32**	64	96	Grout	20	44823.61485
12D	605	612	298	1.54	96.84578	5	**32**	65	97	Grout	20	45122.73195
13	643	654	300	1.45	103.21198	5	**34**	69	103	Epoxy	20	50043.88722
14D	658	656	300	1.43	104.56480	5	**35**	70	105	Epoxy	20	51122.43853
15C	600	600	297	1.56	95.49297	5	**32**	63	95	N/A	-	28647.88976
16C	610	625	299	1.52	98.27818	-	-	-	-	N/A	-	30343.38726

Table D.1 – Timber sample dimensions and defect calculations

* The numerical values highlighted in red are the depths cut into the relevant sample No.

APPENDIX E – PLG60.6

Product Data Sheet

PileMedic™ PLG60.60

For Structural Strengthening of Columns and Submerged Piles

DESCRIPTION

PileMedic™ PLG60.60 is a high-strength Fiber Reinforced Polymer (FRP) laminate constructed with bidirectional glass fabrics providing strength in both longitudinal and transverse directions. The laminate is wrapped around the column or pole and the overlapping portions are bonded together using QuakeBond™ 220UR (Underwater Resin) or QuakeBond™ J201TC (Tack Coat) to create a strong shell around the existing structure. PileMedic™ is unique in that it allows construction of a seamless structural shell around an existing column, utility pole or submerged pile. The annular space between PileMedic™ Jacket and the host pile can be filled with QuakeBond™ 320LV Low Viscosity epoxy resin or high-strength non-shrink grout.

USE.

- Repair of underwater piles
- Repair of bridge piers
- Repair & strengthening of corroded steel columns
- Repair & strengthening of timber utility poles & bridge piling
- Applicable to all materials: concrete, steel and timber

ADVANTAGES.

- One flat sheet can be used to construct a shell of *any size in the field*, eliminating the expense and delays of special order jackets.
- The jacket provides significant *lateral confining pressure* (in the hoop direction) that increases the axial compressive capacity of the pile or column.
- Provides *flexural (bending)* enhancement.
- The *seamless shell prevents migration of moisture and oxygen* into the column, significantly reducing future rate of corrosion and deterioration.
- Annular space can be adjusted in the field *to minimize the volume of grout or resin*.
- Eliminates or reduces the need for costly divers in underwater pile repairs
- *Corrosion-resistant* system can withstand various chemicals.
- *Non-toxic, odorless* resins are approved for potable water.
- Strength of the laminates can be verified *prior to installation in the field* (in contrast with wet layup FRP systems).
- Laminates can be installed as single shells with overlapping joints along the column height or as a continuous spiral shell.
- The laminates are manufactured in our plant with the highest quality control.

PACKAGING

Standard rolls are 50 in. X 150 feet (1.27 m X 45.7 m). PileMedic™ laminates can be custom manufactured in widths up to 60 inches (1.52 m).

SHELF LIFE

PileMedic™ laminates have unlimited shelf life when stored properly.

STORAGE CONDITIONS

Store in dry place at 30°-120° F (0°-50° C).

APPLICATION

1) Cut the required length of PileMedic™ considering the number of layers necessary and the overlap length beyond the starting point.
2) Wipe PileMedic™ with appropriate cleaner (e.g. acetone or MEK) using clean cloth.
3) Apply QuakeBond™ 220UR (Underwater Resin) or QuakeBond™ J201TC (Tack Coat) on the overlapping regions of the laminate sheet.
4) Wrap the laminate around the pile or column to create a multi-layer jacket as required. Spacers may be used to control the size of the annular space between the host pile and the PileMedic™ jacket.
5) Use ratchet straps to temporarily hold the jacket in the desired size.
6) Seal the bottom of the annular space.
7) Before the epoxy cures, fill the annular space with nonshrink grout or resin; the hydrostatic pressure from the weight of the grout will press the PileMedic™ laminate plies against each other for improved bonding. For underwater applications, the grout or resin must be compatible for such applications.
8) For longer piles, repeat the above steps for additional 4-ft wide bands of jacket along the height of the pile; insert the lower portion of the new jacket a minimum of 4 inches inside the previously installed jacket.
9) Leave the installation undisturbed for 24 hours before removing the ratchet straps.
10) Apply appropriate coating on the exterior of the jacket.

Installation of PileMedic™ products must be performed only by specially- trained and approved contractors.

Laminates can be cut to appropriate length using commercial quality heavy duty shears. Care must be taken to support both sides of the laminate during cutting to avoid splintering. Since dull or worn cutting tools can damage, weaken or fray the fiber, their use should be avoided.

LIMITATIONS

Design calculations must be made and certified by a licensed professional engineer.

CAUTION

PileMedic™ PLG60.60 laminates are non-reactive. They do not require a Material Safety Data Sheet (MSDS). However, caution must be used when handling since a fine carbon dust may be present on the surface. Gloves must therefore be worn to protect against skin irritation. Care must also be taken when cutting the laminates to protect against airborne carbon dust generated by the cutting procedure. Use of an appropriate, properly fitted NIOSH approved respirator is recommended.

PILEMEDIC™ PLG60.60 PROPERTIES		
	US Units	SI Units
Longitudinal (0°) Direction:		
Tensile Strength (ASTM D3039)	62 ksi	431 MPa
Modulus of Elasticity (ASTM D3039)	3,500 ksi	24,140 MPa
Ultimate Elongation (ASTM D3039)	1.31 %	1.31 %
Transverse (90°) Direction:		
Tensile Strength (ASTM D3039)	60 ksi	418 MPa
Modulus of Elasticity (ASTM D3039)	3,650 ksi	25,250 MPa
Ultimate Elongation (ASTM D3039)	1.06%	1.06%
Laminate Properties:		
Ply Thickness	0.026 in.	0.66 mm
Barcol Hardness (ASTM D 2583)	50 min	50 min

Water Absorption	(ASTM D 570)	0.8% max	0.8% max

Jacket Diameter inches (mm)[1]	Confining pressure psi (MPa)[2]	Gain in strength psi (MPa)[3]
12	535 (3.7)	2145 (14.8)
24	265 (1.9)	1070 (7.4)
36	180 (1.2)	715 (4.9)
48	130 (0.9)	535 (3.7)
60	107 (0.7)	430 (3.0)

(1) Cylindrical jackets constructed with two plies of PileMedic™ PLG60.60 laminate plus an 8-inch (200mm) overlap beyond the starting point.
(2) Nominal confining pressure for a cylindrical jacket.
(3) Nominal increase in compressive strength of concrete column & grout due to confining pressure of jacket.

FORCE EQUIVALENCY

A double layer of PileMedic™ PLG60.60 provides the following equivalent forces:

No. 4 Gr. 40 stirrup placed at 2.5 inches on center

No. 4 Gr. 40 bars placed vertically at 2.5 inches on center

APPENDIX F – 320LV

The FRP Retrofit Experts

QuakeWrap, Inc.

2055 E. 17th Street Tucson, AZ 85719 U.S.A.

Phone: (520) 791-7000 Toll Free: (866) QuakeWrap [782-5397]

Fax: (520) 791-0600 www.QuakeWrap.com

Product Data Sheet

QuakeBond™ 320LV Low Viscosity Resin

DESCRIPTION

QuakeBond™ 320LV (Low Viscosity Resin) is a two-component, high-strength, lowviscosity structural epoxy. The low viscosity makes this an ideal product for crack injection, gravity feed or patching. It can be used as a liquid binder for sand, aggregate or other mineral fillers to form cost-effective material to fill the annular space around piles when PileMedic™ laminates are used. The resin cures underwater, making it suitable for repair of submerged piles. The high compressive and tensile strength of this epoxy provide structural strength for the pile or pole in repairs using PileMedic™ laminates. QuakeBond™ 320LV can be used in repair of concrete, masonry and wood structures. The resin also provides excellent durability and chemical resistance. The convenient 2:1 volumetric mix ratio is user friendly. QuakeBond™ 320LV is a 100% solids formulation with low toxicity and low odor during cure.

USE

- Filling the annular space created between the PileMedic™ and concrete or timber pile or pole being repaired for both above-water and submerged conditions
- As a binder mixed with sand and small-size aggregates to form a resin-based grout to fill larger annular spaces in repair of piles and poles using PileMedic™
- Filling cracks in concrete by injection or gravity feed
- Crack repairs in masonry, wood and concrete structural members
- A moisture barrier (water-proofing) system in conjunction with PileMedic™ laminates

ADVANTAGES

- High strength, high modulus, low-viscosity structural adhesive.
- Moisture insensitive – it cures under water
- Fully compatible and excellent adhesion to PileMedic™ carbon or glass laminates.
- Convenient easy mix ratio, 2:1 by volume.
- 100% solids, VOC free and Butyl Glycidyl Ether (BGE) free.
- Nearly odor-free.

COVERAGE

Apply as a filler material to fill all cracks and voids in concrete, masonry and timber structures. Application rate varies greatly based on the porosity and the volume of voids present in the structural member being repaired. For wider annular spaces, the epoxy can be mixed with clean silica sand and pea gravel (3/8 inch and under) for improved yield.

PACKAGING

Each of the components is supplied in 5-gallon (19L) containers or 55-gallon (208L) drums, resulting in 15-gallon or 165-gallon kits. Ships DOT non-regulated.

MIXING

Mix 2 parts resin “A” to 1 part hardener “B” by volume into a clean container. Mix thoroughly for 3 minutes using a paddle at low speed (400-600 rpm) to avoid air entrainment. Mix only the quantities

that can be used within pot life. REMEMBER -- you will have less working time at higher temperatures.

DO NOT THIN; solvents will prevent proper cure. If desired, silica sand and well-graded pea gravel (3/8 inch and under) can be added up to a maximum of 70 pounds sand and gravel per gallon of QuakeBond™ 320LV.

SHELF LIFE

2 years in original, unopened and properly stored containers.

STORAGE CONDITIONS

Store at 55°-100°F (13°-38°C)

CERTIFICATE OF COMPLIANCE

- Material Safety Data Sheet (MSDS) will be supplied upon request and is included with each shipment.
- ASTM C 881 Compliant

APPLICATION

Properly mixed QuakeBond™ 320LV can be used to fill the annular space between PileMedic™ jackets and the pile or pole being repaired. When introduced at the bottom of the annular space, the high density of the resin pushes the entrapped water to the top. The resin can be thickened with clean silica sand and pea gravel (3/8 inch and under) for filling larger annular spaces. All epoxy components shall be preconditioned to a temperature between 65°F (18°C) and 85°F (29°C) prior to the time of mixing.

LIMITATIONS

Minimum application temperature of the epoxy is 45° F (7°C). DO NOT THIN this epoxy with solvents.

CLEANUP

Uncured materials can be removed with approved solvent or warm soapy water. Cured materials can only be removed mechanically.

SAFETY PRECAUTIONS

Avoid breathing of vapors. Forced local exhaust is recommended to effectively minimize exposure. NIOSH approved, organic vapor respirators and forced exhaust are recommended in confined areas, or when conditions may cause high vapor concentrations. Do not weld on, burn or torch any epoxy materials as this will cause release of hazardous vapors. Consult MSDS for detailed information.

EPOXY PROPERTIES:	
Color – Both Parts “A” and “B” are amber liquid	
Viscosity Mixed at 77° F (ASTM D-2196)	780 cps
Working Time at 77° F (25° C)	20 minutes
Gel Time	30 minutes
Weight (Mixed) lb/gallon	9.21
Density (Mixed) kg/liter	1.11
Tensile Strength (ASTM D-638)	7,900 psi (54.5 MPa)
Compressive Strength (ASTM D-695)	11,200 psi (77.2 MPa)
Elongation @ Break (ASTM D-638)	4.8%
Adhesion to Concrete	>800 psi (5.5 MPa); 100% failure in concrete
Hardness, Shore D (ASTM D-2240)	86

CONSULT MATERIAL SAFETY DATA SHEET FOR MORE INFORMATION.

KEEP OUT OF REACH OF CHILDREN.
FOR INDUSTRIAL USE ONLY.

NOT FOR INTERNAL CONSUMPTION.
KEEP CONTAINER CLOSED TIGHTLY.

QuakeWrap, Inc. warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current technical data sheet if used as directed within shelf life. User determines suitability of product for intended use and assumes all risks. Buyer's sole remedy shall be limited to the purchase price or replacement of product exclusive of labor or cost of labor.

NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. QUAKEWRAP, INC. SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES.

APPENDIX G – 220UR

The FRP Retrofit Experts
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FAX: (520) 791-0600
Toll Free: (866) QuakeWrap [782-5397]
www.QuakeWrap.com

Product Data Sheet

QuakeBond™ 220UR Underwater Resin

DESCRIPTION
QuakeBond™ 220UR (Underwater Resin) is a two-component high-strength structural epoxy designed for underwater application. QuakeBond™ 220UR has an immediate high tack consistency both in air and water. QuakeBond™ 220UR trowels easily and has a user friendly 2:1 volumetric mix ratio. QuakeBond™ 220UR is a 100% solids formulation with low toxicity and low odor during cure and features a unique 12-hour turnaround to service without force cure or specialized equipment.

USE
- Adhesive for bonding external reinforcement to concrete, masonry, wood, stone, steel, etc.
- Structural bonding of carbon or glass laminates, e.g. PipeMedic™ or PileMedic™ products.
- Structural bonding of fabrics saturated with QuakeBond™ J300SR resin on vertical and overhead surfaces.

ADVANTAGES
- High strength, high modulus, structural paste adhesive.
- Fully compatible and excellent adhesion to PipeMedic™ or PileMedic™ laminates and fabrics saturated with QuakeBond™ J300SR resin.
- Paste consistency ideal for underwater applications.
- Convenient easy mix ratio, (2 volume parts of component "A" with 1 volume part of component "B").
- 100% solvent free.
- Moisture tolerant.
- 12 hour full cure.
- Tile like high gloss finish easy to clean and decontaminate.
- Environmentally sound.

COVERAGE
Applied at a thickness of 15 mil (0.4 mm) results in 100 square feet per gallon (0.4 liter per square meter). Rough and uneven surfaces result in lower yields.

PACKAGING
Component "A" is supplied in 2-gallon (7.58L) containers and component "B" in 1-gallon (3.79L) containers, resulting in 3-gallon kits. Likewise 15 gallon kits are available. Ships DOT non-regulated.

MIXING
Prior to mixing, components A Resin and B Hardener should be at room temperature (60-75 F/16-24C). Pour Part B Hardener into Part A Resin. Mix for 3 minutes using a Jiffy mixer head and a mechanical drill. To ensure complete mixing, scrape sides and bottom of container and continue mixing for an additional 1 or 2 minutes. Do not mix more material than can be applied within the 30 minutes pot life. DO NOT HAND MIX. Begin application immediately – no induction time.

SHELF LIFE
Shelf life is 12 months from the date of manufacture when stored in unopened containers and under recommended conditions. Material should be stored in a dry area under cover at temperatures between 45-95F/7-35C. It is recommended that the coating components be kept inside at a minimum of 60F/16C for 24 hours prior to start of application. Keep away from heat, flame and ignition sources.

CERTIFICATE OF COMPLIANCE
- Material Safety Data Sheet (MSDS) will be supplied upon request and is included with each shipment.
- Possesses 0% volatile content per EPA Test Method 24.

SURFACE PREPARATION
Steel – *Immersion Service*: SSPC-SP10 Near White Blast Cleaning with 3.0-mil profile
Non-Immersion Service: SSPC-SP6 Commercial Blast Cleaning with 2.0 mil profile
Concrete – Concrete must be properly cured for a minimum of 28 days before application of coating. Surface must be entirely free of oil, grease, dirt, detergent, surface water, laitance, curing compounds, coatings or other contaminants that may interfere with adhesion. The concrete must be abrasive blasted to provide an anchor pattern (similar to 60-80 grit sandpaper min.) for adhesion. Final prepared surface should be clean and rough. Consult SSPC-SP13 – Surface Preparation of Concrete.

APPLICATION
Air and surface temperature should be between 50-90F/10-32C. Do not begin application if air, substrate or material temperature is below 50 F/10C or expected to fall below 50F/10C within 12 hours of application. Do not begin application if dew point is within 5F/3C of the temperature. Variations in temperature can affect pot life and sag properties of this material. Do not exceed 20% by volume of thinner with NSP-T1 Thinner. NSP-T1 Thinner will not clean hoses or equipment adequately. Clean up using Acetone or other Ketone Solvent. For concrete surfaces, a primer coat of either NSP 100, 101 and 110 is strongly recommended.

LIMITATIONS
This product may not cure properly in temperatures below 50 F (10 C). All epoxies will show chalking/yellowing on exterior exposures. Application of epoxy coatings in cool temperatures and high humidity can result in the formation of amine blush. Blush may appear as a milky, white, tacky residue on the surface of the cured coating and must be removed before the application of another coat. Intercoat adhesion problems may occur if blush is not removed.

FIRST AID
In case of skin contact, wash thoroughly with soap and water. For eye contact, flush immediately. For respiratory problems, remove to fresh air. Wash clothing before reuse. Consult MSDS for detailed information.

CLEANUP
Collect with absorbent material, flush with water. Dispose of in accordance with local disposal regulations. Uncured materials can be removed with approved solvent. Cured materials can only be removed mechanically.

EPOXY PROPERTIES	
Color	White, Black, Tile Red, Light Gray
Pot Life at 77° F (25° C)	30 minutes
Full cure time	12 hours
Tensile Strength (ASTM D-638)	4360 psi (38.6 MPa)
Compressive Strength (ASTM D-695)	11700 psi (80.7 MPa)
Flexural Strength (ASTM D-790)	8900 psi (61.4 MPa)
Adhesion to Concrete	Substrate Failure
Adhesion to Steel SSPC-SP10	>1200 psi (8.3 MPa)
Adhesion to Damp Concrete	>350 psi (2.4 MPa) Substrate Failure
Tensile Elongation	5%
Hardness, Shore D	90
Abrasion Resistance	37.7 mg Average Wt. Loss
Flame Spread	Class A
Flammability	Self Extinguishing

KEEP OUT OF REACH OF CHILDREN.
NOT FOR INTERNAL CONSUMPTION.

FOR INDUSTRIAL USE ONLY.
KEEP CONTAINER CLOSED TIGHTLY.

CONSULT MATERIAL SAFETY DATA SHEET FOR MORE INFORMATION.

APPENDIX H – Cementitious Underwater Grout

FIVE STAR

CEMENTITIOUS UNDERWATER GROUT

High Performance Precision Non-Shrink Grout

PRODUCT DESCRIPTION

Five Star® Cementitious Underwater Grout is an underwater pump grade, cement-based, non-shrink grout for pile restoration and similar applications. When tested in accordance with ASTM C 827, Five Star® Cementitious Underwater Grout exhibits positive expansion. Five Star® Cementitious Underwater Grout meets the performance requirements of ASTM C 1107 and CRD-C 621 specifications for non-shrink grout.

ADVANTAGES

- Placement via tremie or pump
- Salt and seawater resistant
- Non-ferrous, non-corrosive
- Locally manufactured under strict quality control standards
- Non-shrink from the time of placement

USES

- Pile repair and restoration
- Grouting underwater
- Grouting areas subject to saltwater exposure
- Installation of anchors and dowels

PACKAGING AND YIELD

Five Star® Cementitious Underwater Grout is packaged in heavy-duty, polyethylene lined bags and is available in 20 kg units yielding approximately 10.76 litres at maximum water.

SHELF LIFE

One year in original unopened packaging when stored in dry conditions; high relative humidity will reduce shelf life.

TYPICAL PROPERTIES AT 21°C	
Early Height Change, ASTM C 827	0.0 to 4.0%
Hardened Height Change, ASTM C 1090	0.0 to 0.3%
Bond Strength, ASTM C 882, 28 Days	13.8 MPa
Compressive Strength, ASTM C 109	
1 Day	17.3 MPa
7 Days	41.4 MPa
28 Days	48.3 MPa
Working Time at 21°C	30 minutes

The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown may result. Test methods are modified where applicable.

APPENDIX I – Crane Rail Grout

FIVE STAR

CRANE RAIL GROUT

High-Flow Epoxy for Low Clearance Applications

PRODUCT DESCRIPTION

Five Star® Crane Rail Grout is a highly flowable, non-shrink, rapid strength gain, epoxy grout for tight clearance applications and dynamic loads. It is a three component, 100% solids epoxy system that exhibits positive expansion when tested in accordance with ASTM C 827 for precision grouting and alignment of crane rail. Five Star® Crane Rail Grout has excellent chemical resistance.

ADVANTAGES

- High flow for tight clearances
- Excellent adhesion to steel
- 95% Effective Bearing Area
- Expansive, non-shrink
- Chemically resistant
- Rapid strength gain for fast turnaround

USES

- Crane rail
- Railroad track rehabilitation
- Precision alignment under dynamic load conditions
- Tight clearance grouting of dynamic loads
- Transfer car runways
- Material handling tracks
- Light rail applications

PACKAGING AND YIELD

Five Star® Crane Rail Grout is a three-component system consisting of partially filled containers of resin and hardener, and one 20 kg polyethylene lined bag of aggregate. Unit yield is approximately 12.25 litres of hardened material.

SHELF LIFE

Two years in original unopened packaging when stored in dry conditions. High relative humidity will reduce shelf life.

TYPICAL PROPERTIES AT 21°C	
Height Change, ASTM C 827, at 32°C	Positive Expansion
Effective Bearing Area	95%
Compressive Strength, ASTM C 579 B*	
1 Day	90 MPa
7 Days	103 MPa
28 Days	110 MPa
Post Cure @ 60°C	117 MPa
Tensile Strength, ASTM C 307	
7 Days	17.2 MPa
Bond to Concrete, ASTM C 882	
7 Days	20.7 MPa
Flexural Strength, ASTM C 580	37.9 MPa
Working Time at 21°C	30 minutes

**Materials tested per ASTM C 579 B. Rate of loading 6.35 mm per minute. The data shown above reflects typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown above may result. Test methods are modified where applicable.*

APPENDIX J – Test Samples

Figure J.1 – Sample 1

Figure J.2 – Sample 2

Figure J.3 – Sample 3

Figure J.1 – Sample 1

Figure J.5 – Sample 5

Figure J.6 – Sample 6

Figure J.7 – Sample 7

Figure J.8 – Sample 8

Figure J.9 – Sample 9

Figure J.10 – Sample 10

Figure J.11 – Sample 11

Figure J.12 – Sample 12

Figure J.13 – Sample 13

Figure J.14 – Sample 14

Figure J.15 – Sample 15

Figure J.16 – Sample 16

APPENDIX K – Control Samples

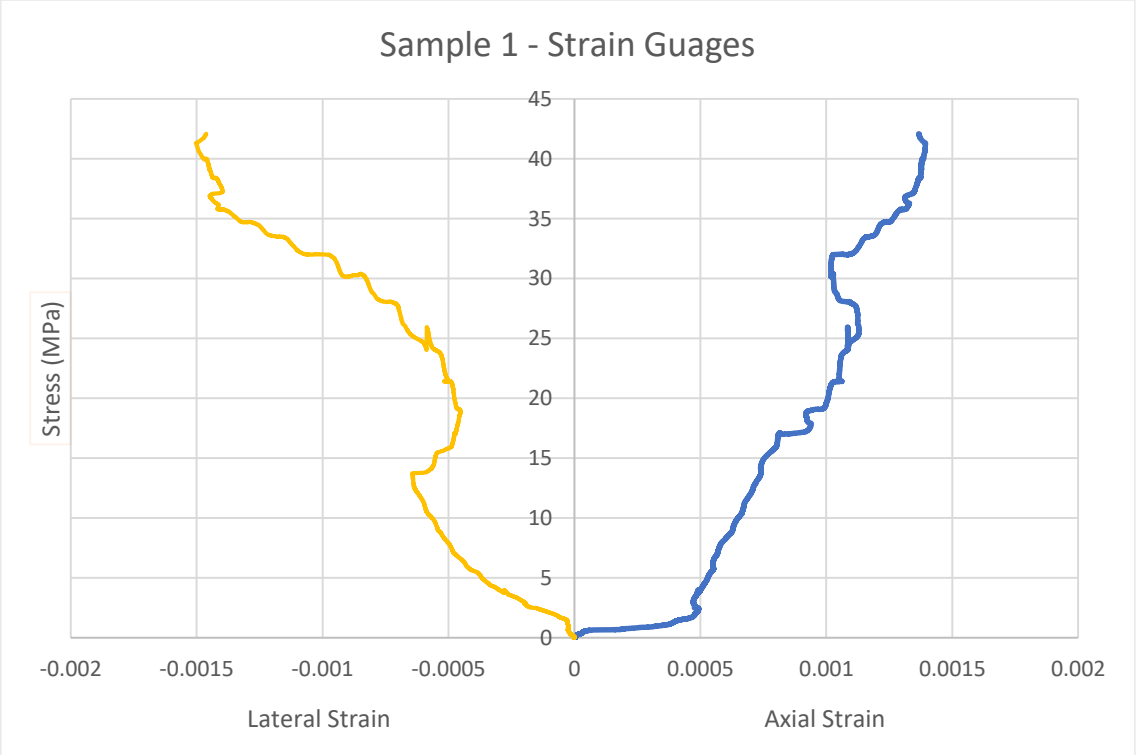

Figure K.1 –Horizontal and vertical strain gauge graph

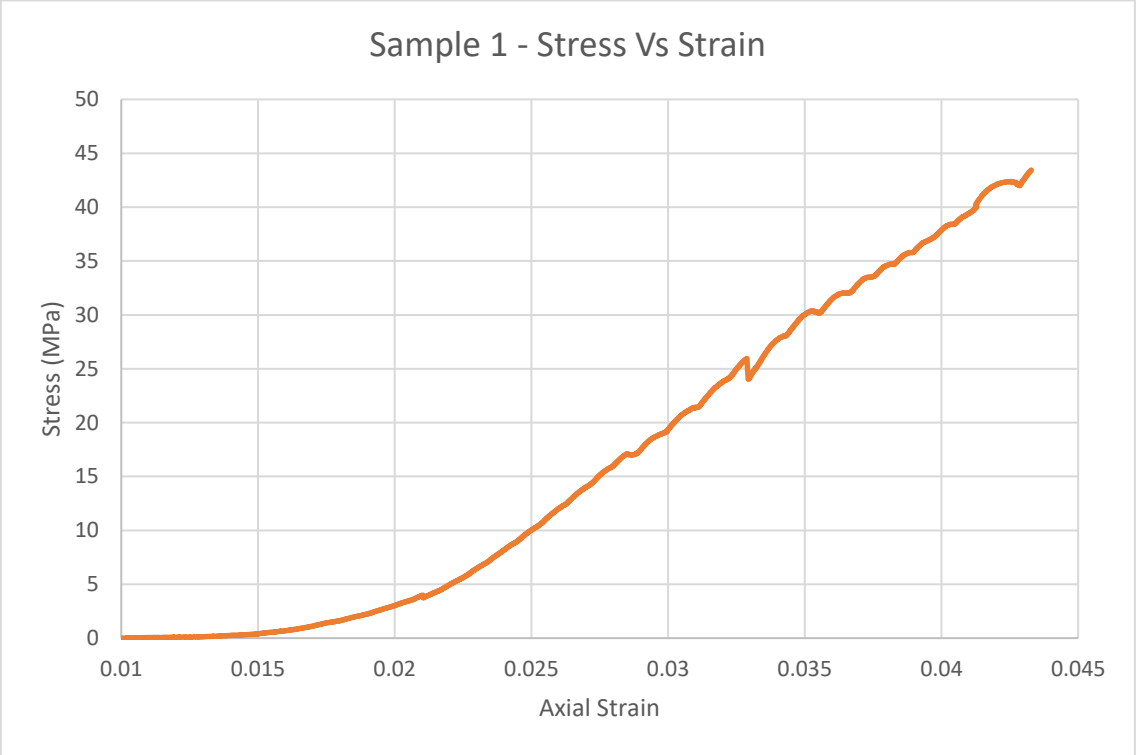

Figure K.2 –Stress vs strain graph

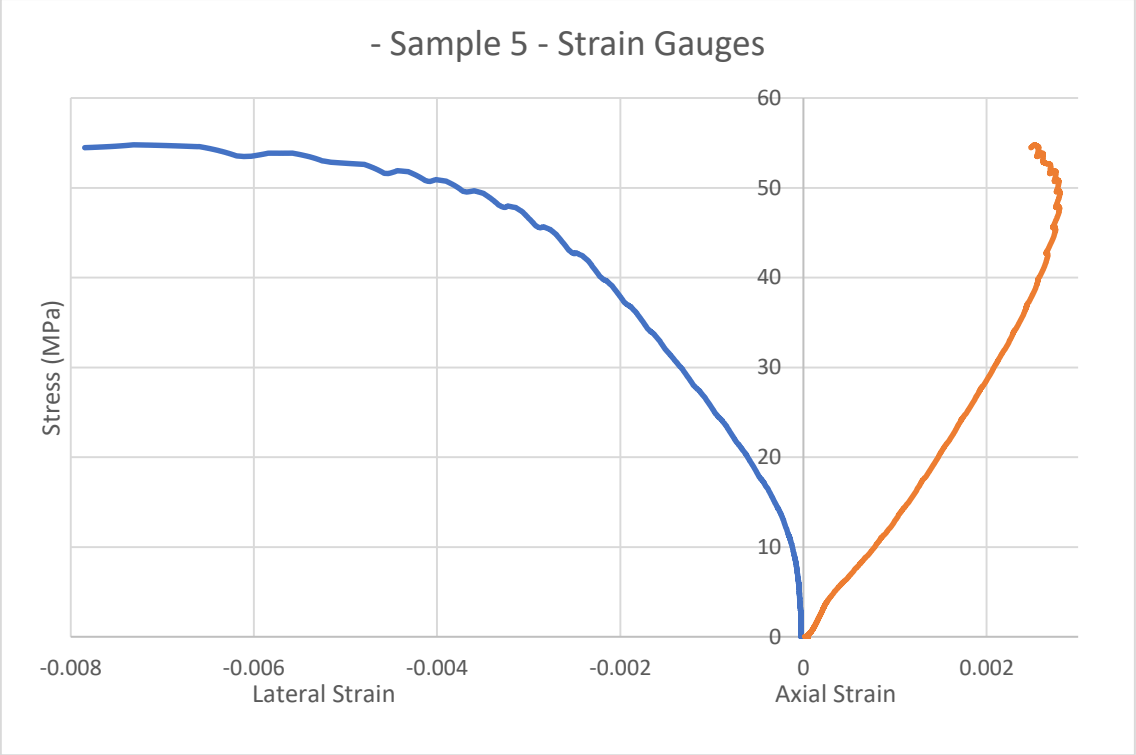

Figure K.3 –Horizontal and vertical strain gauge graph

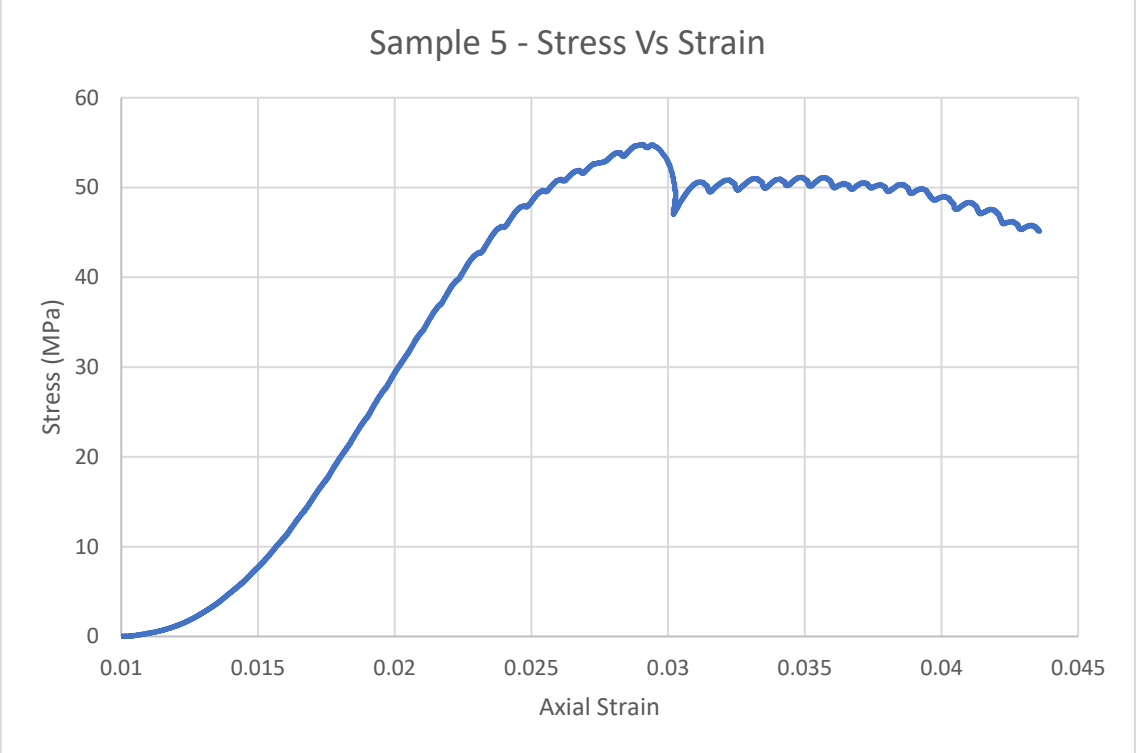

Figure K.4 –Stress vs strain graph

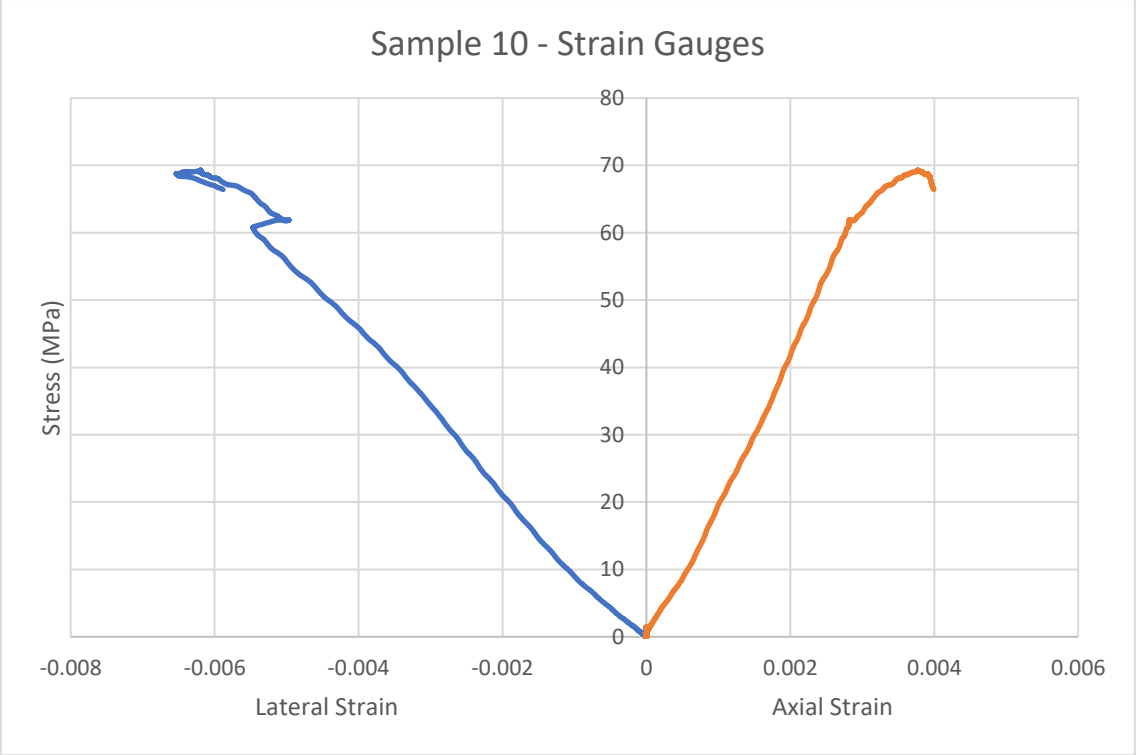

Figure K.5 –Horizontal and vertical strain gauge graph

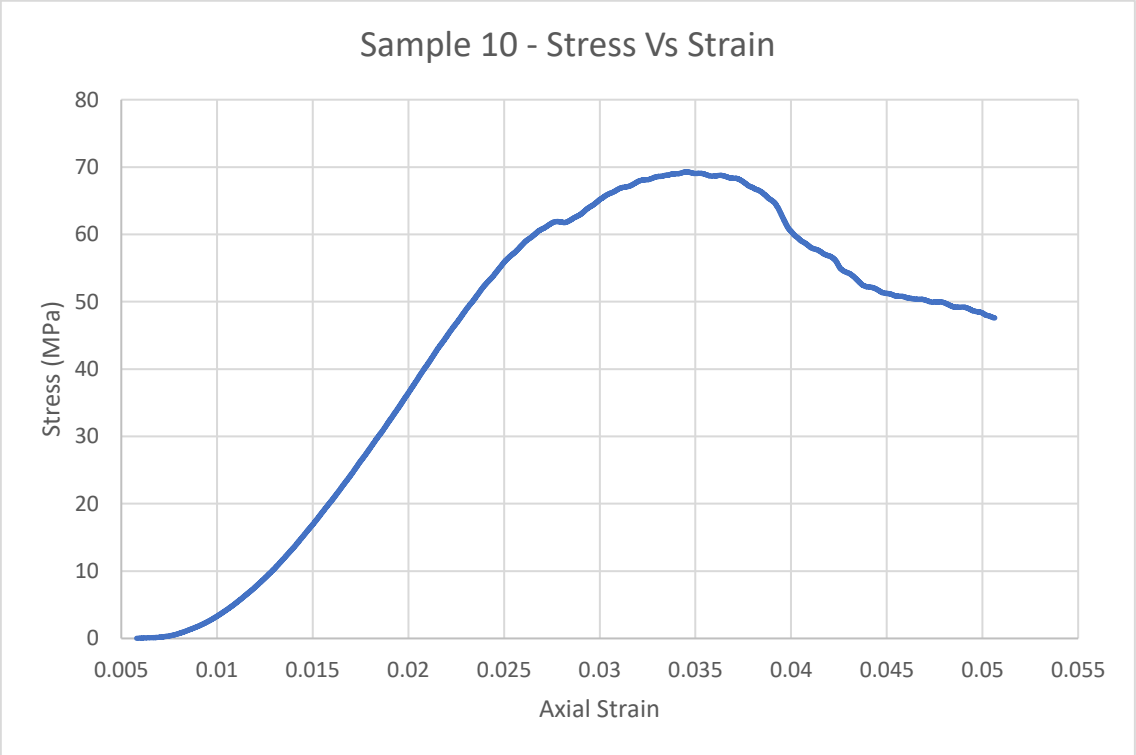

Figure K.6 –Stress vs strain graph

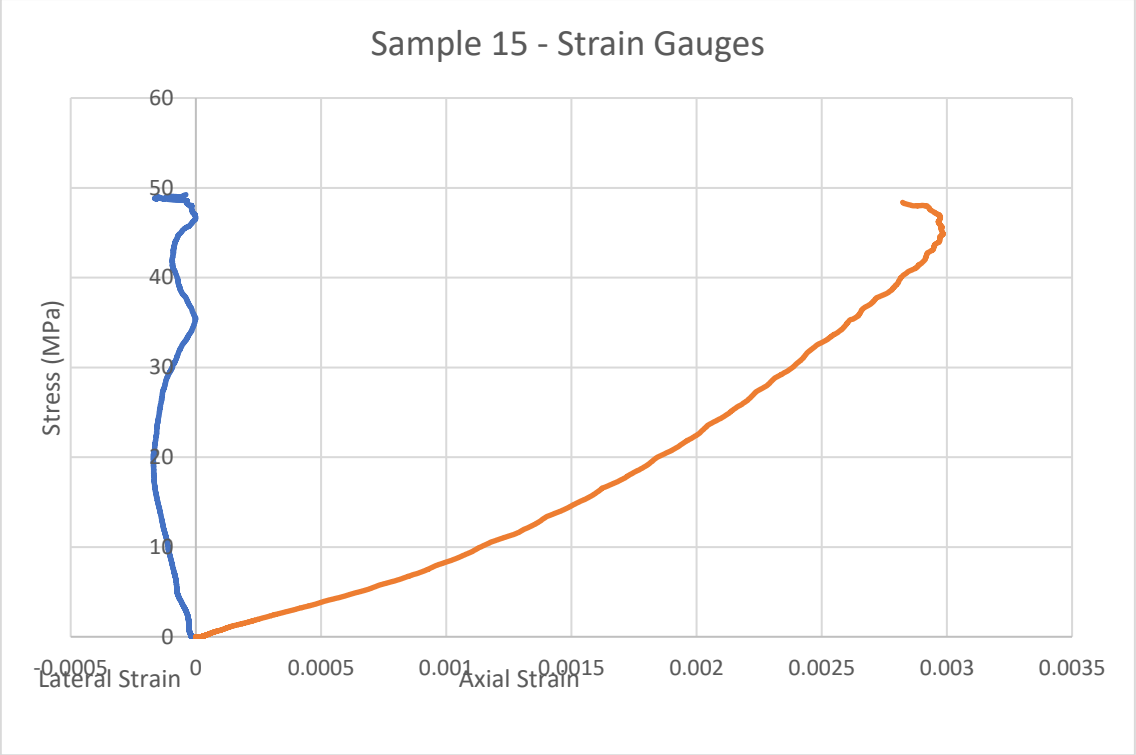

Figure K.7 –Horizontal and vertical strain gauge graph

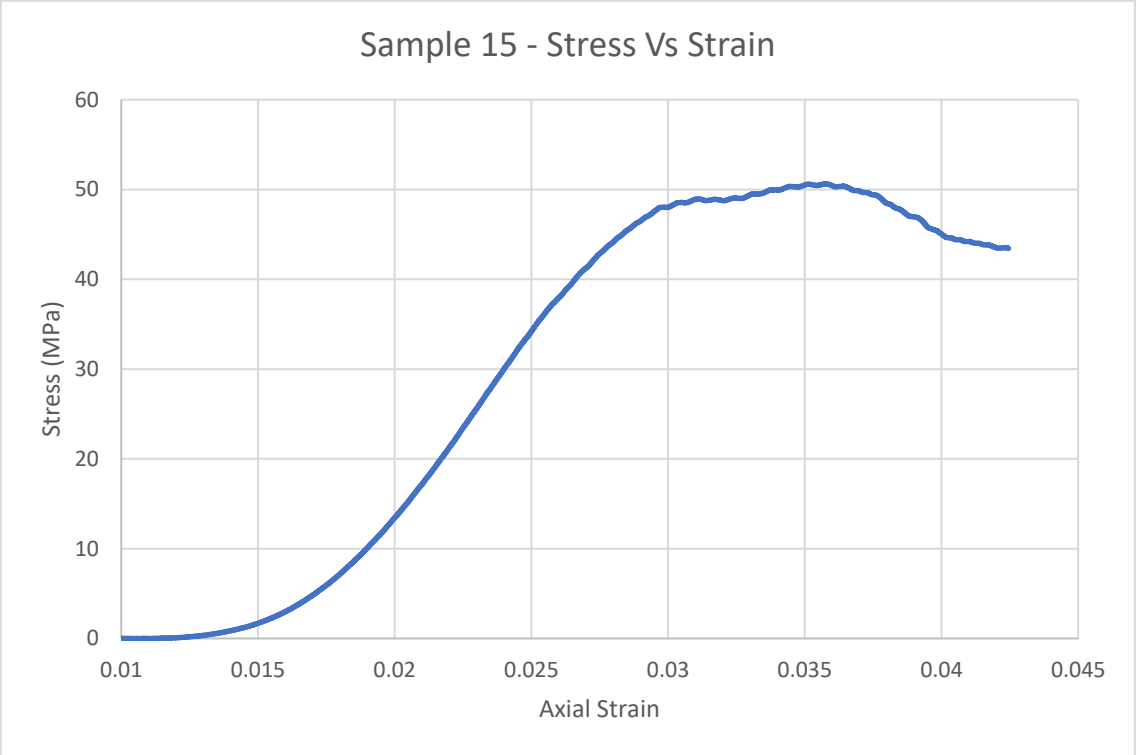

Figure K.8 –Stress vs strain graph

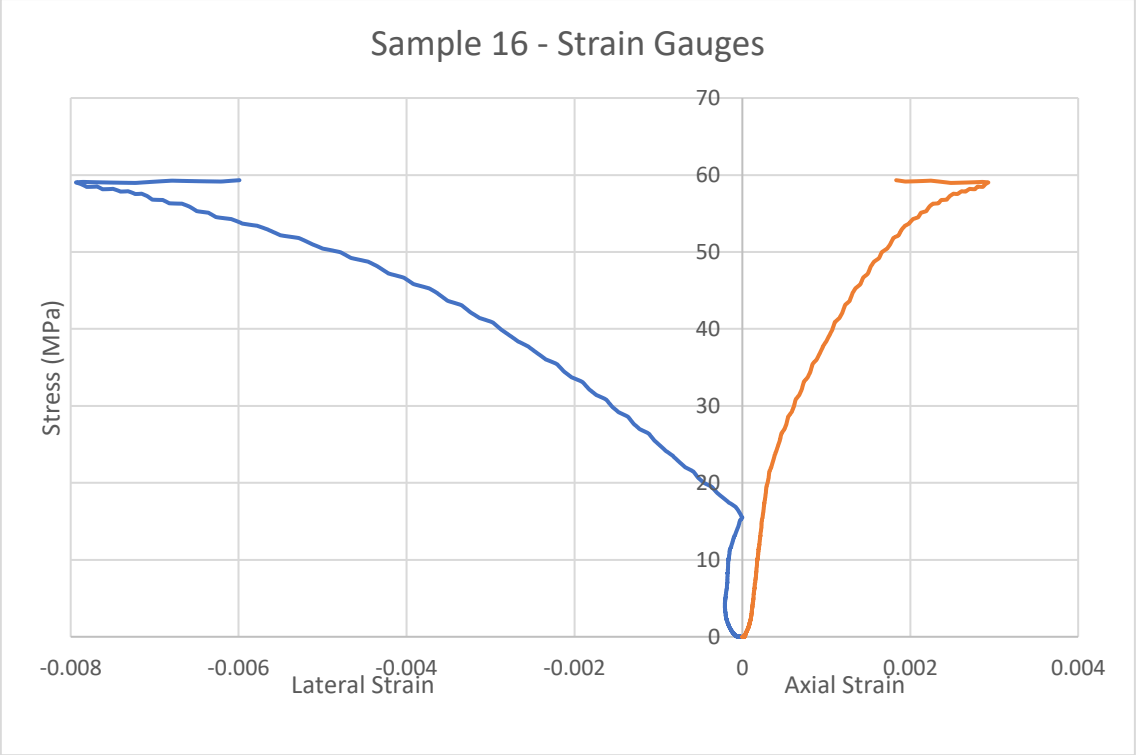

Figure K.9 –Horizontal and vertical strain gauge graph

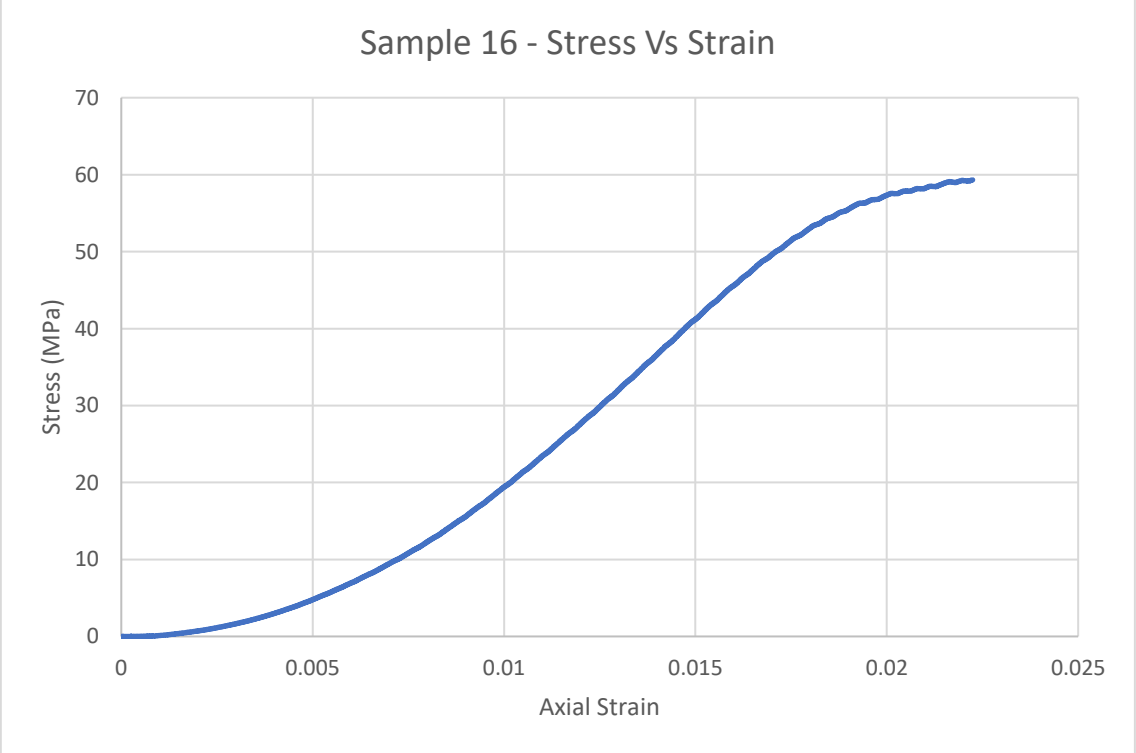

Figure K.10 –Stress vs strain graph

APPENDIX L – Radius Defect

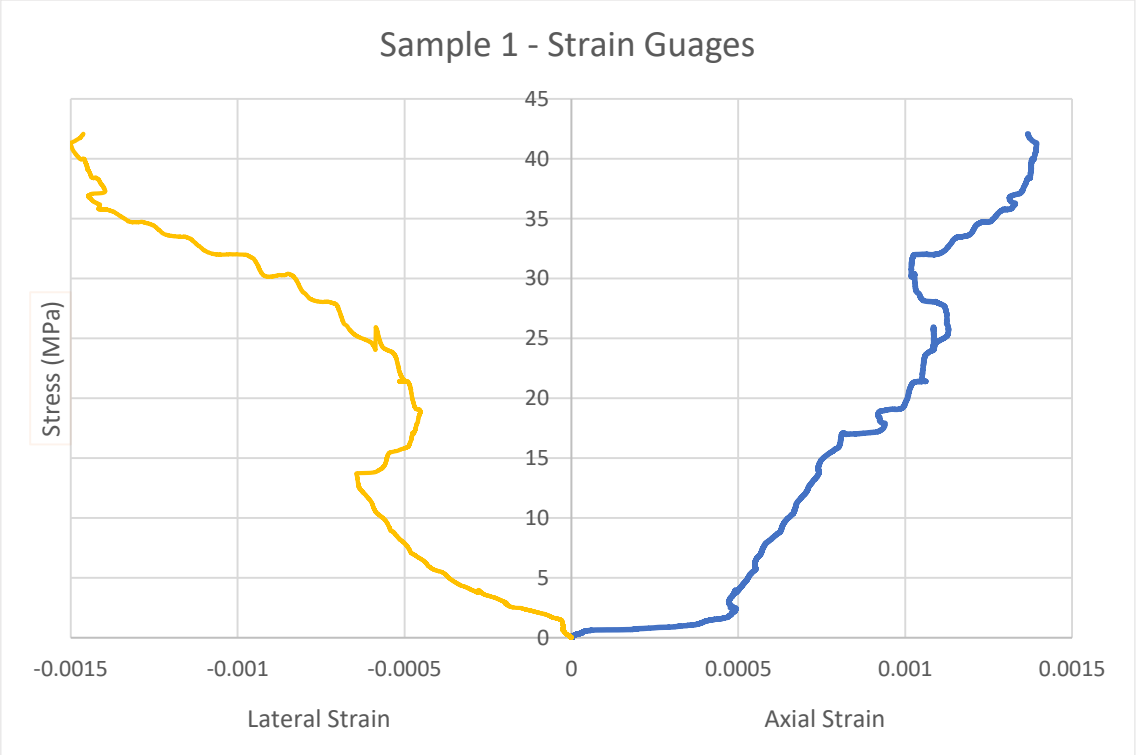

Figure L.1 – Underwater Cementitious Grout – Strain gauge data

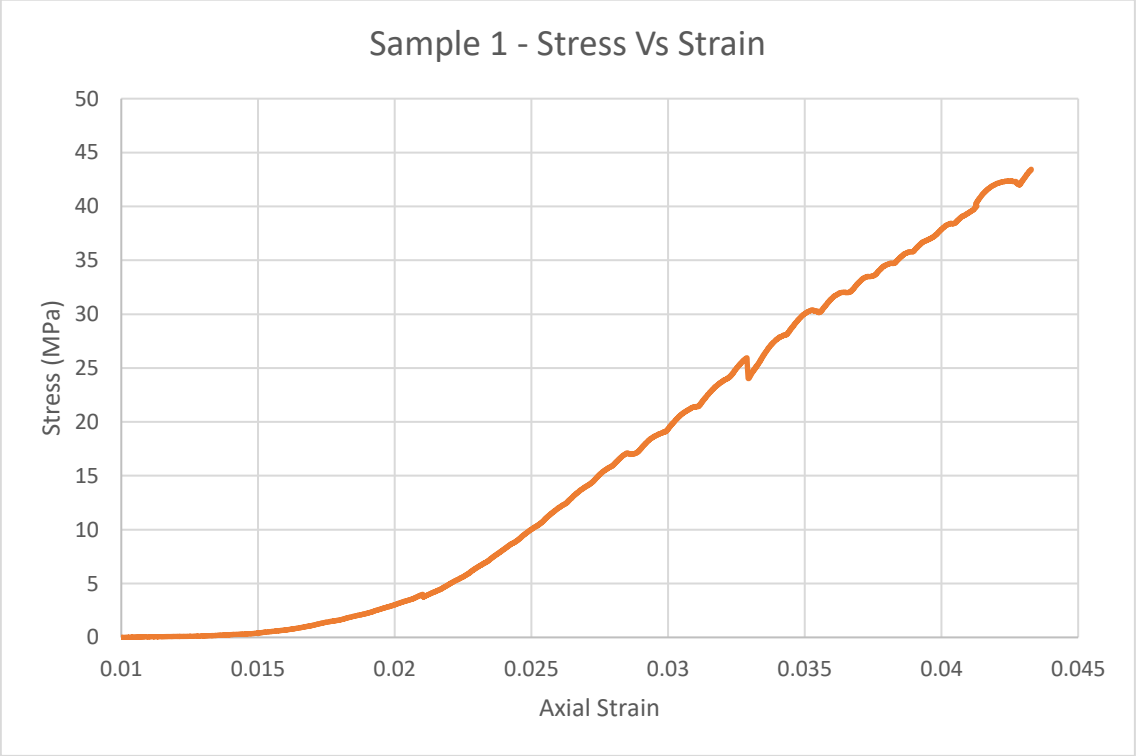

Figure L.2 – Underwater Cementitious Grout – Stress vs strain

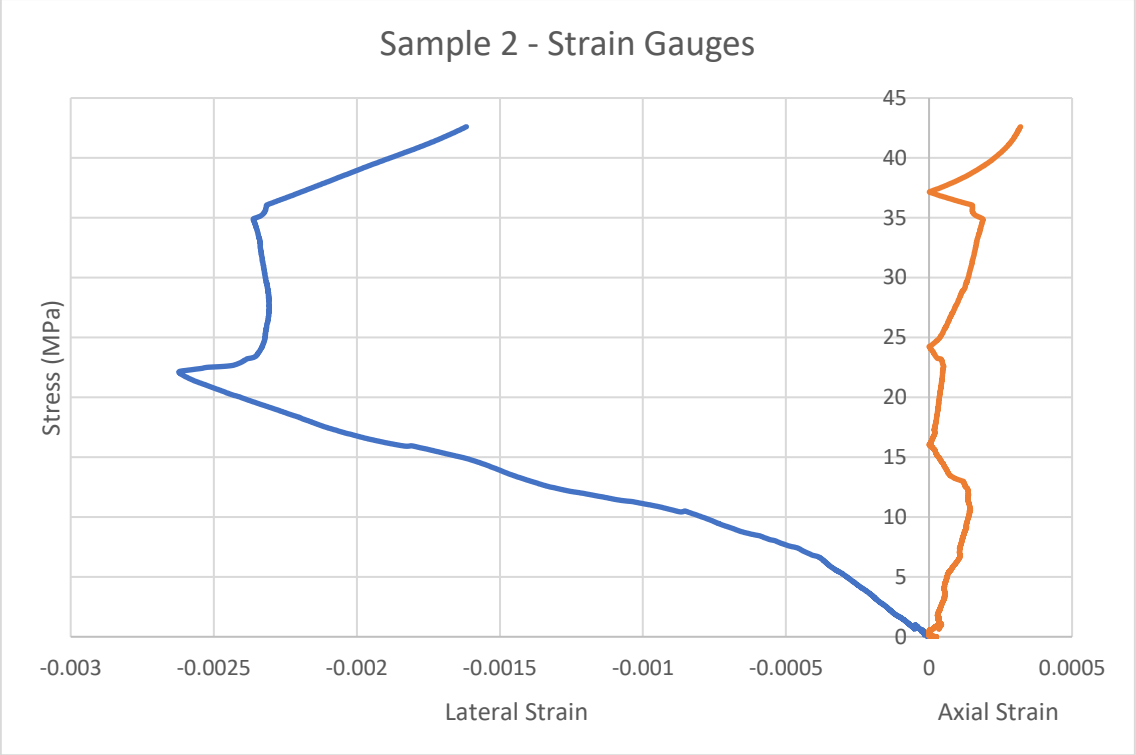

Figure L.3 – Underwater Cementitious Grout – Strain gauge data

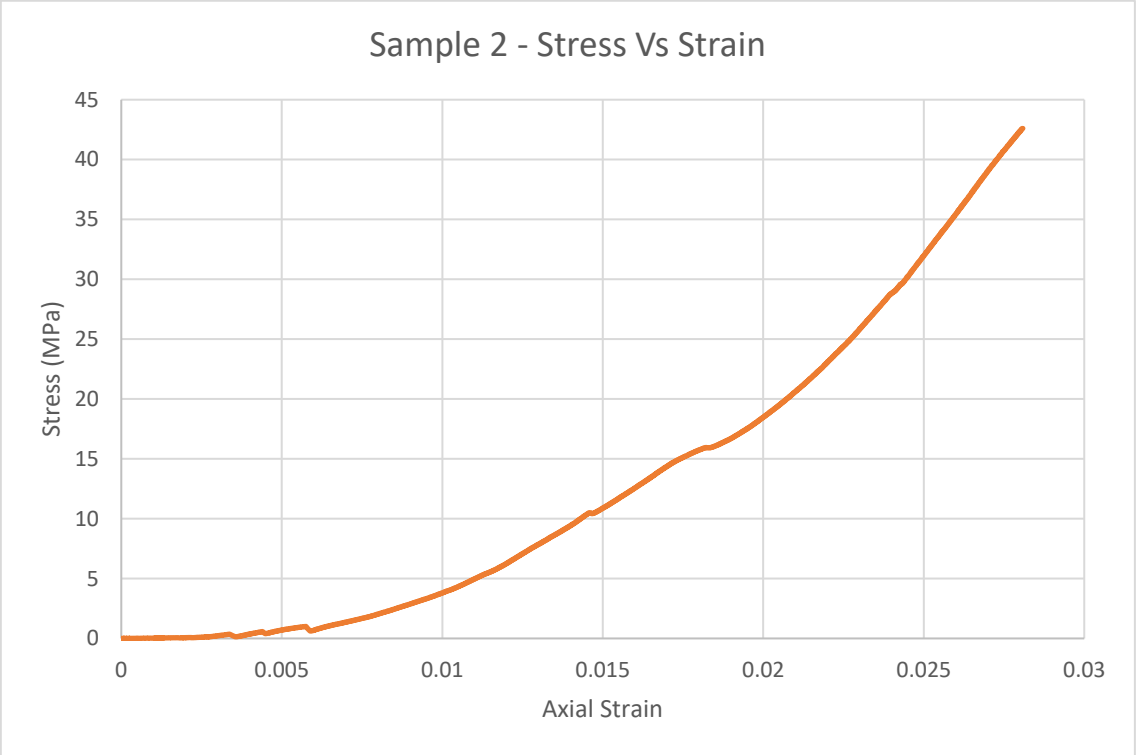

Figure L.4 – Underwater Cementitious Grout – Stress vs strain

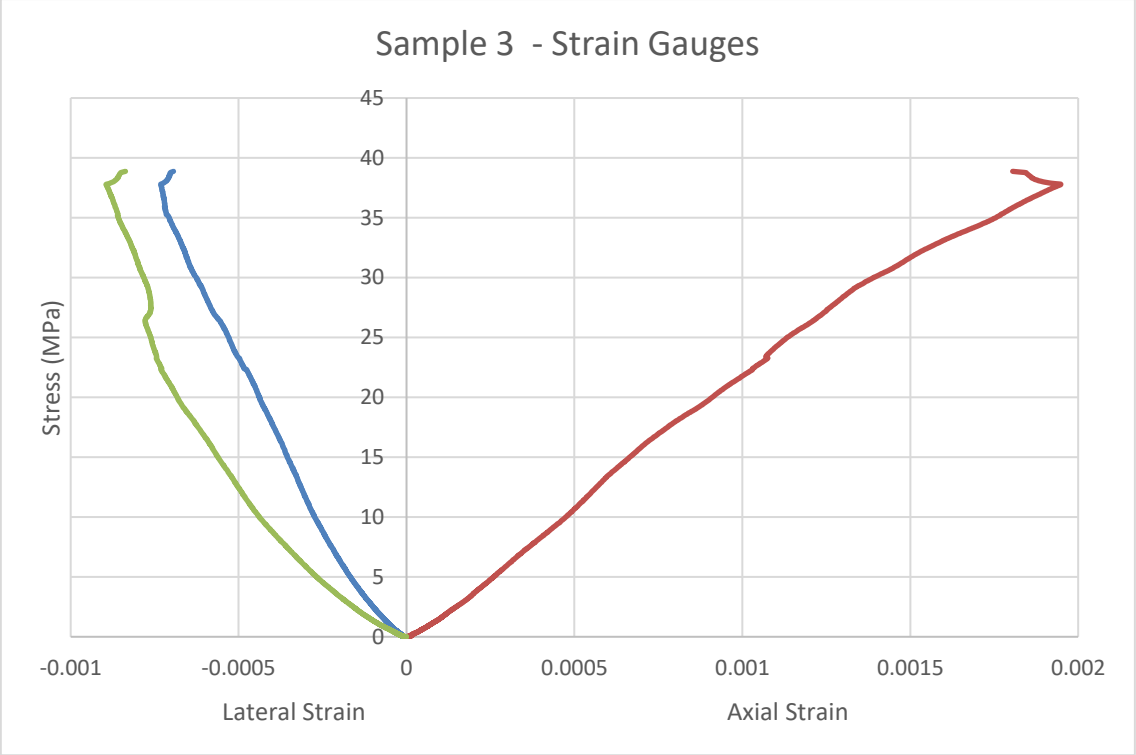

Figure L.5 – Crane Rail Grout – Strain gauge data

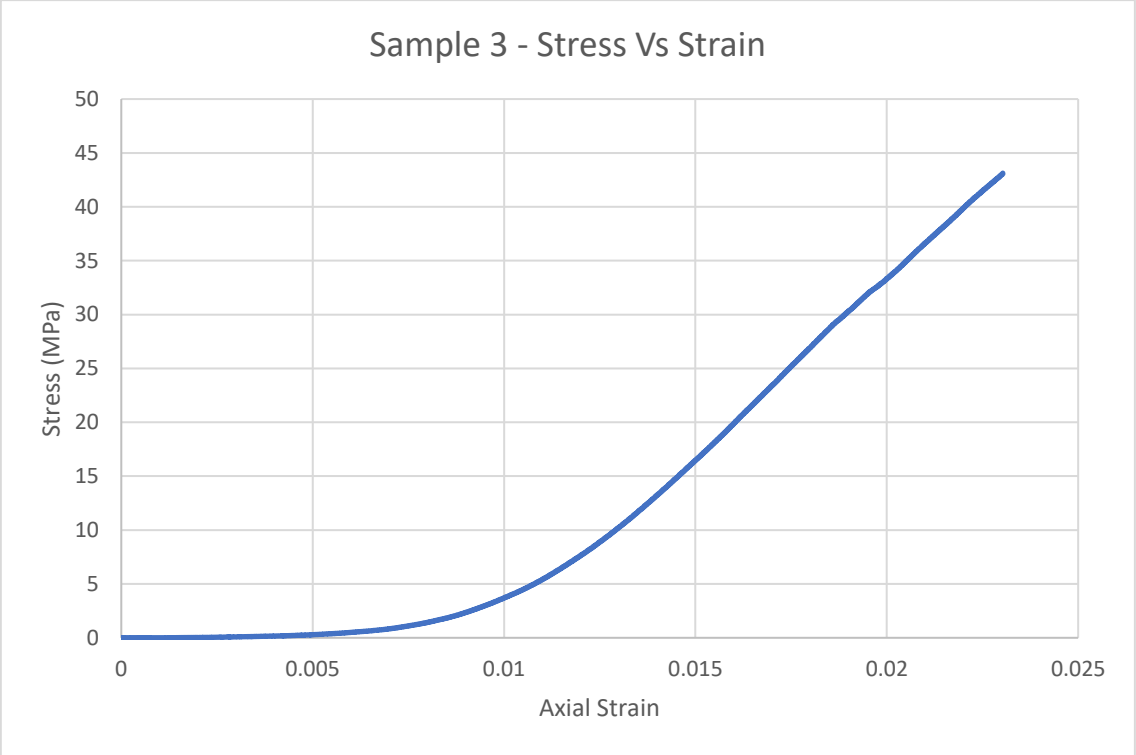

Figure L.6– Crane Rail Grout – Stress vs strain

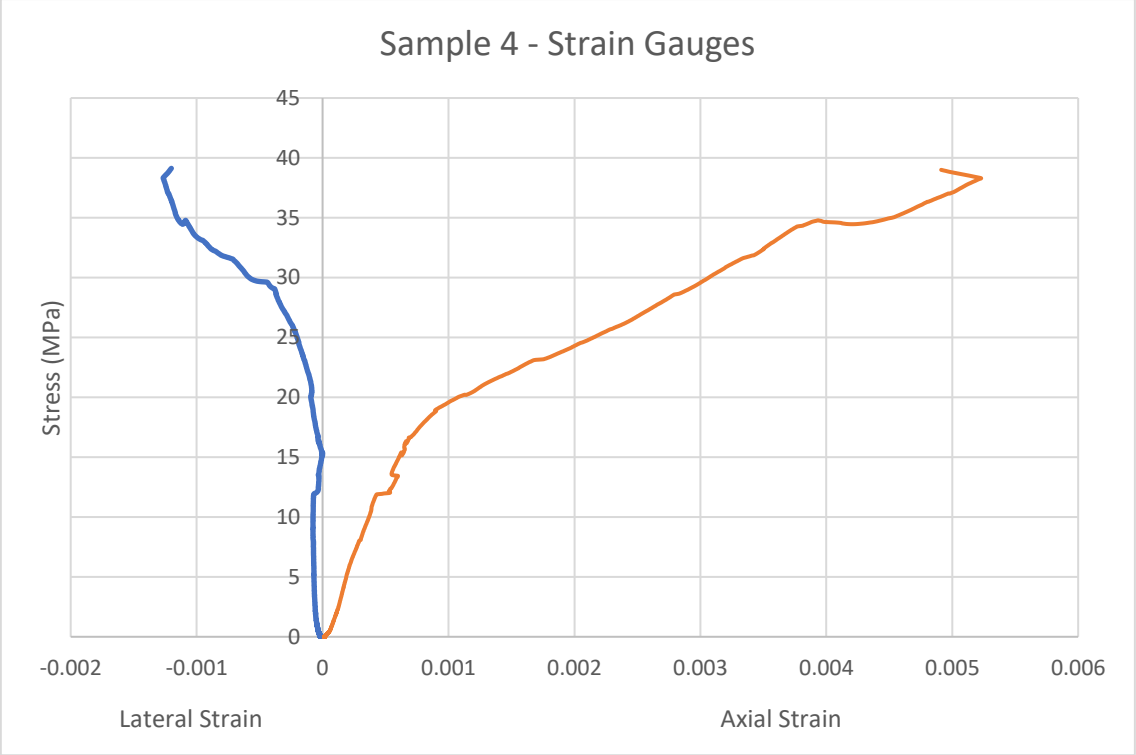

Figure L.7 – Crane Rail Grout – Strain gauge data

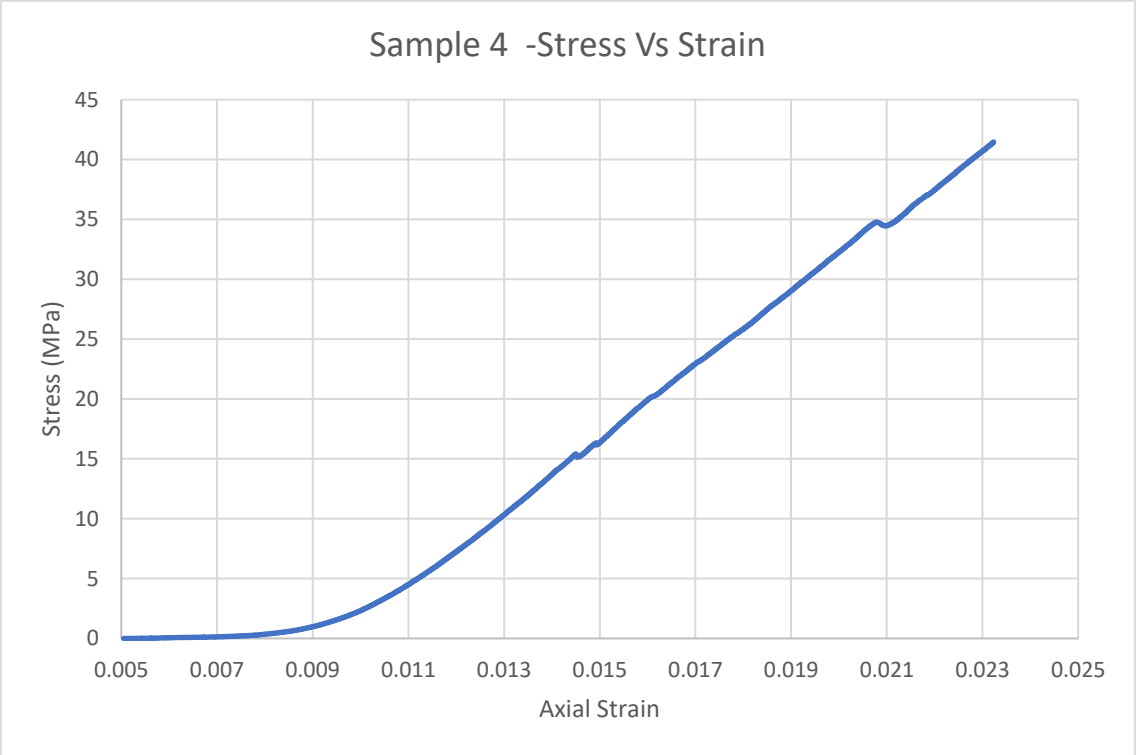

Figure L.8– Crane Rail Grout – Stress vs strain

APPENDIX M – 2/3 Radius Defect

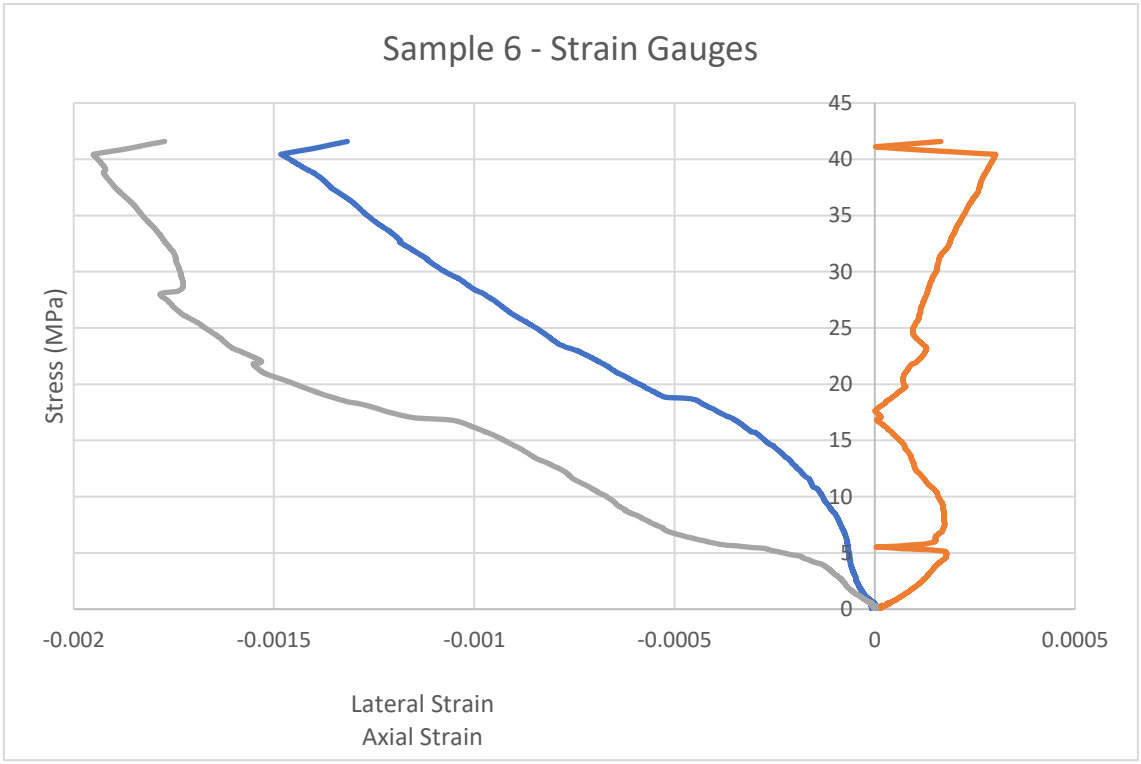

Figure M.1 – Underwater Cementitious Grout – Strain gauge data

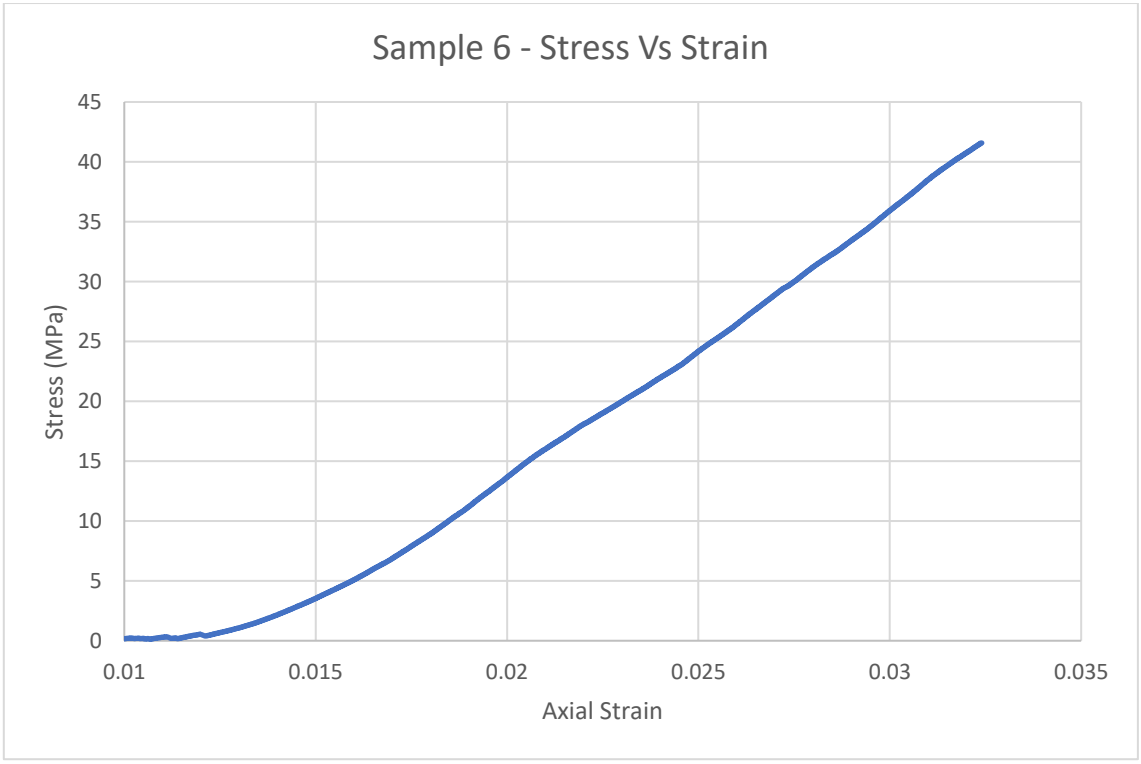

Figure M.2 – Underwater Cementitious Grout – Stress vs strain

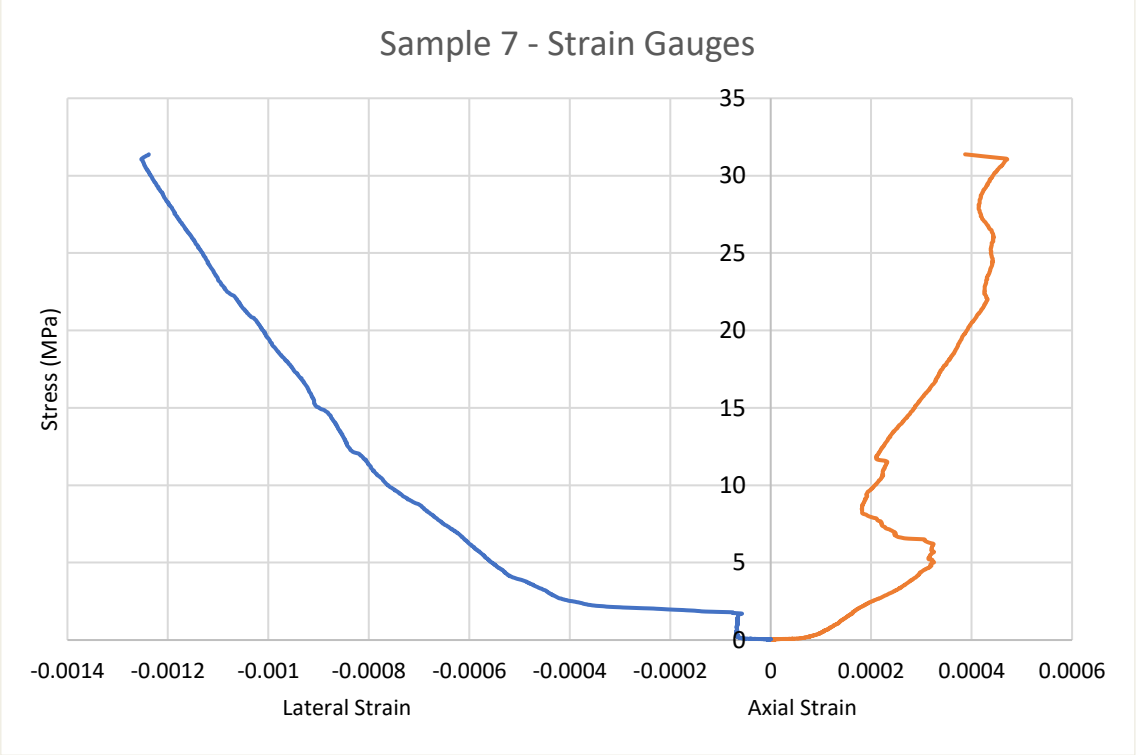

Figure M.3 – Underwater Cementitious Grout – Strain gauge data

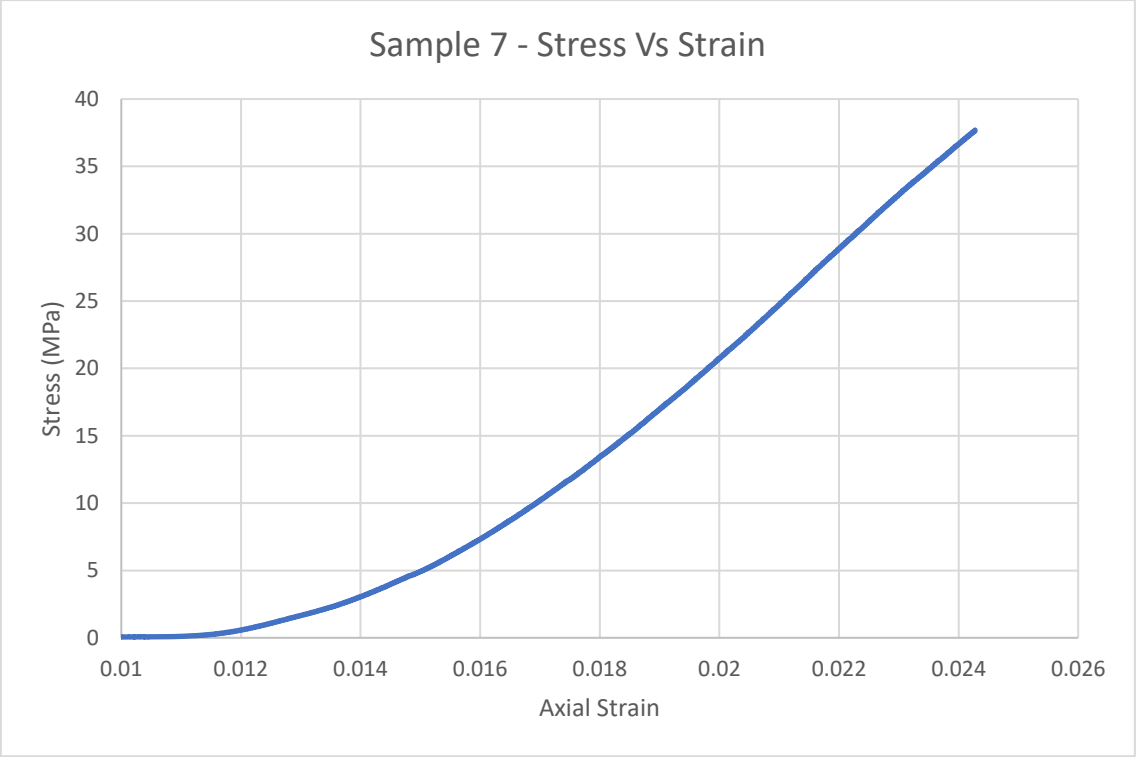

Figure M.4 – Underwater Cementitious Grout – Stress vs strain

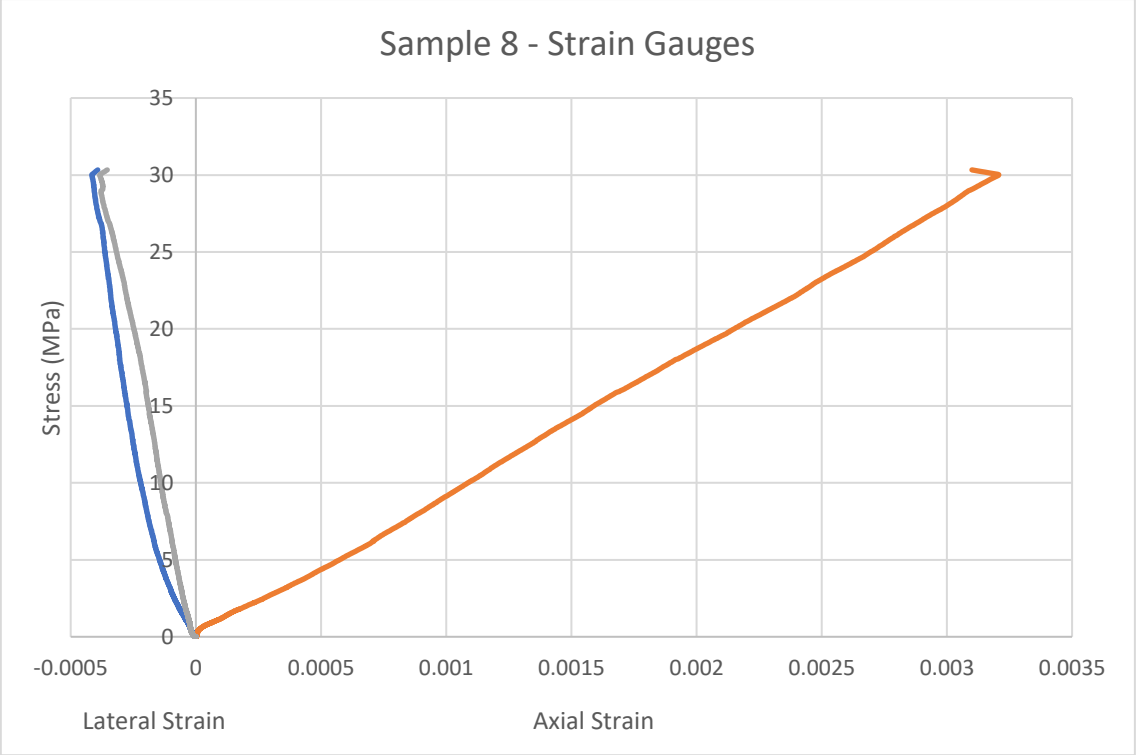

Figure M.5 – Crane Rail Grout – Strain gauge data

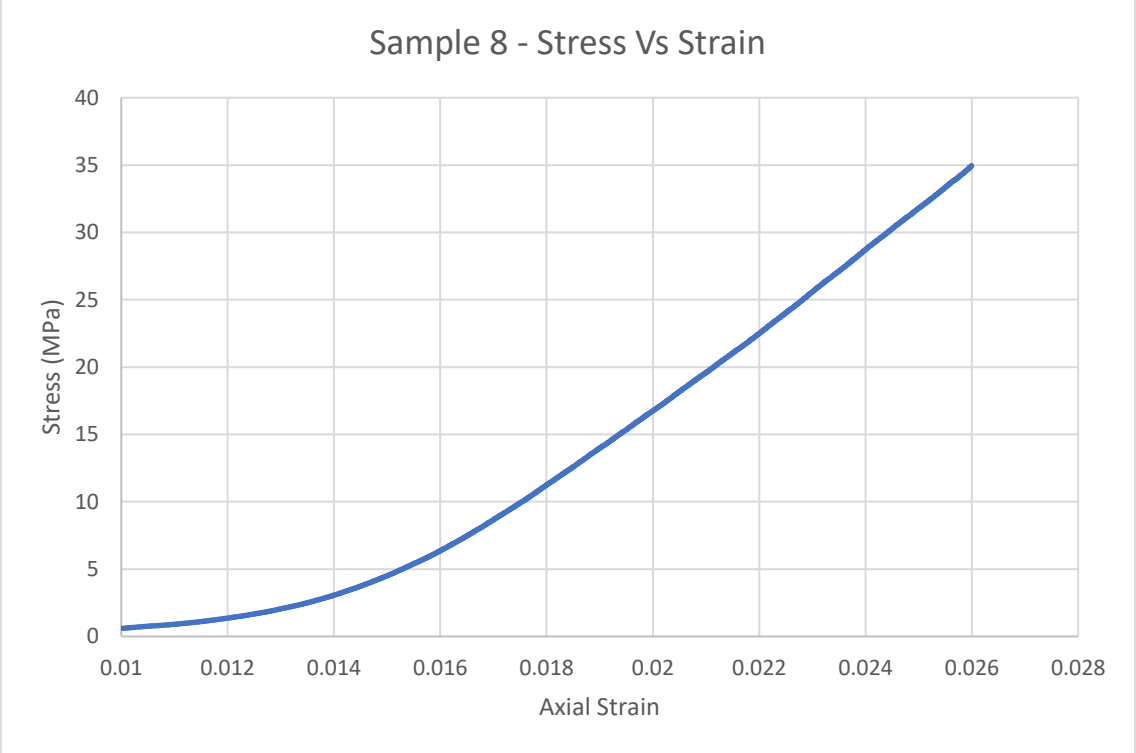

Figure M.6– Crane Rail Grout – Stress vs strain

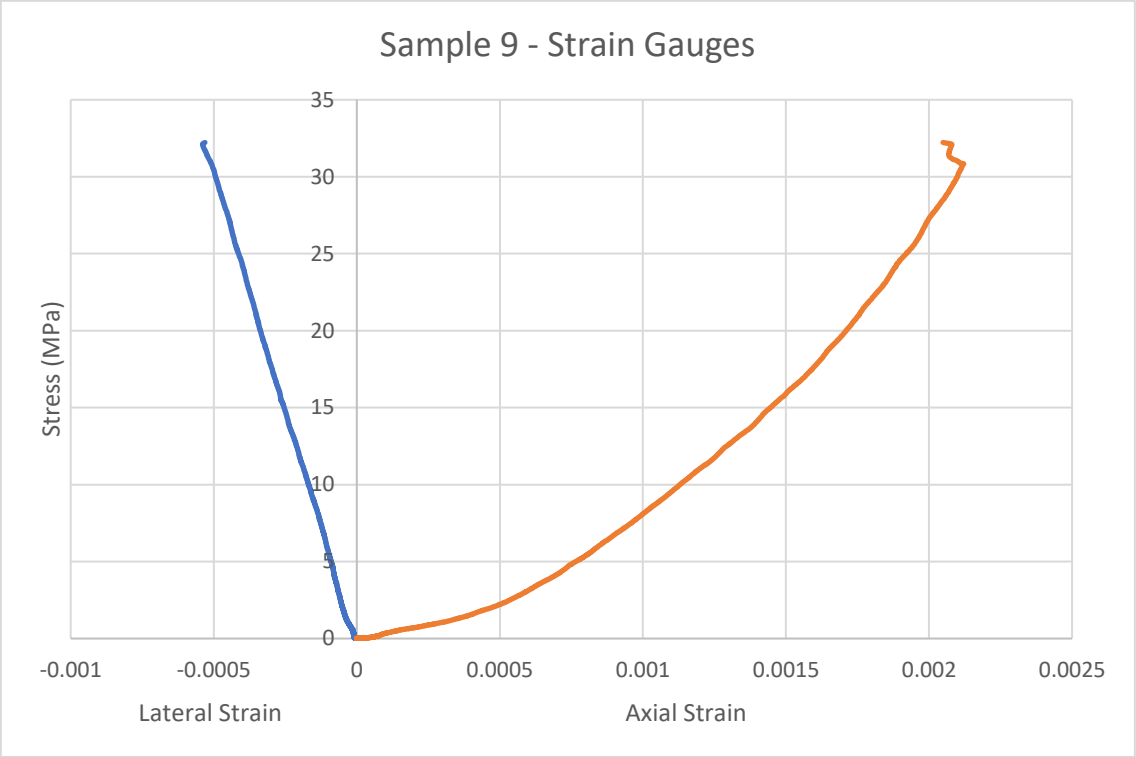

Figure M.7 – Crane Rail Grout – Strain gauge data

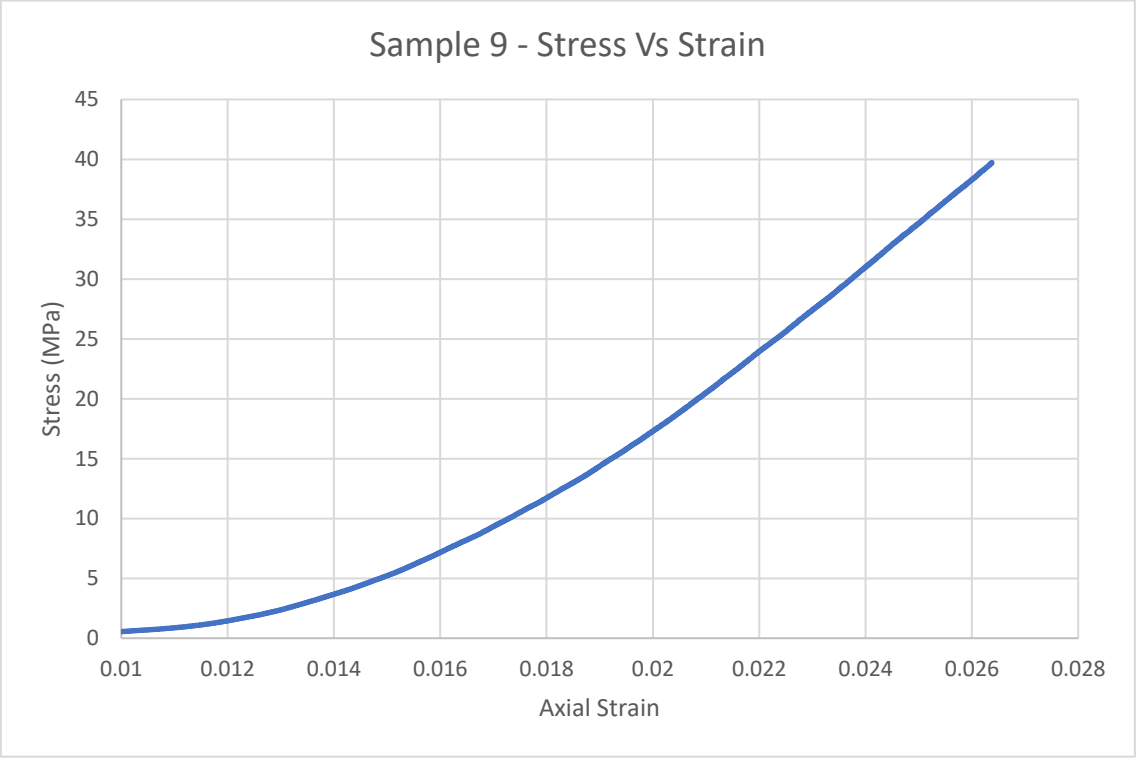

Figure M.8– Crane Rail Grout – Stress vs strain

APPENDIX N – 1/3 Radius Defect

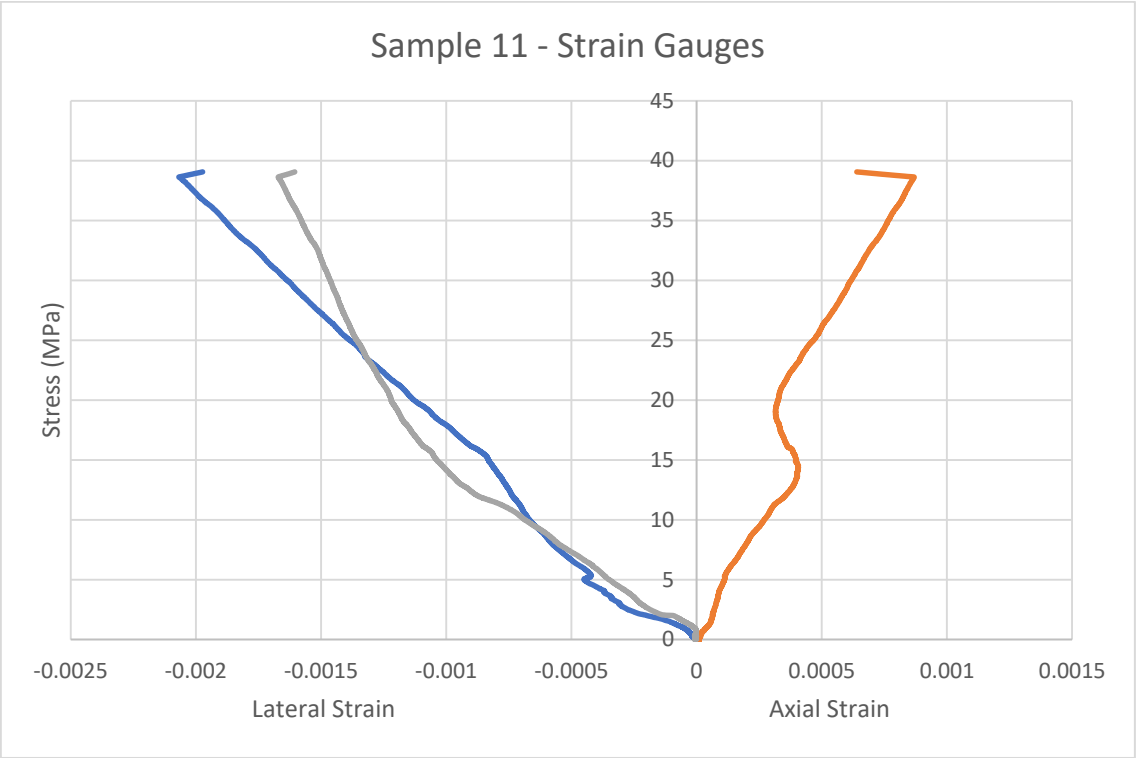

Figure N.1 – Underwater Cementitious Grout – Strain gauge data

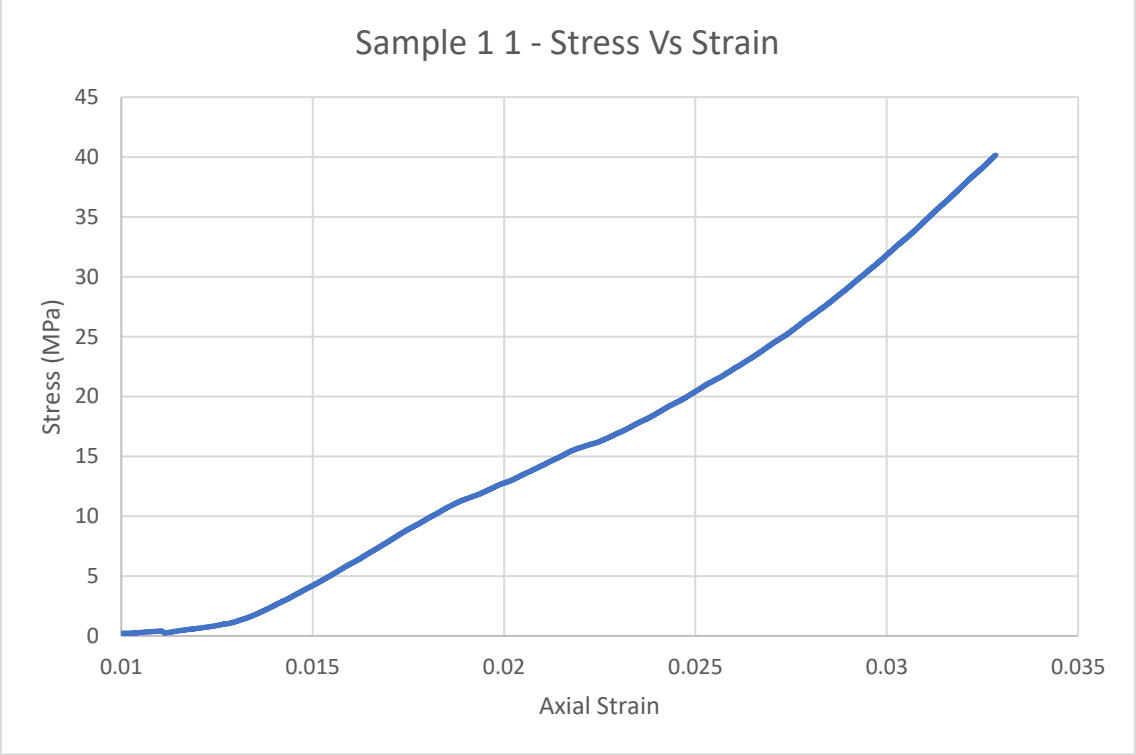

Figure N.2 – Underwater Cementitious Grout – Stress vs strain

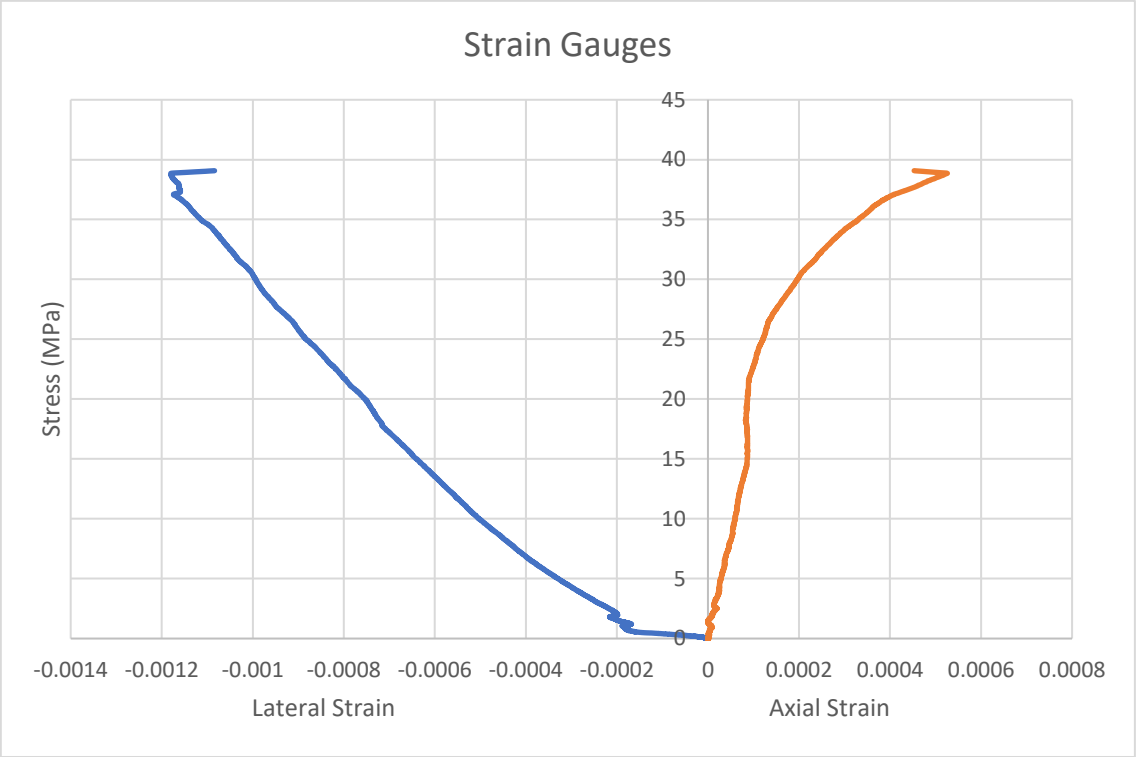

Figure N.3 – Underwater Cementitious Grout – Strain gauge data

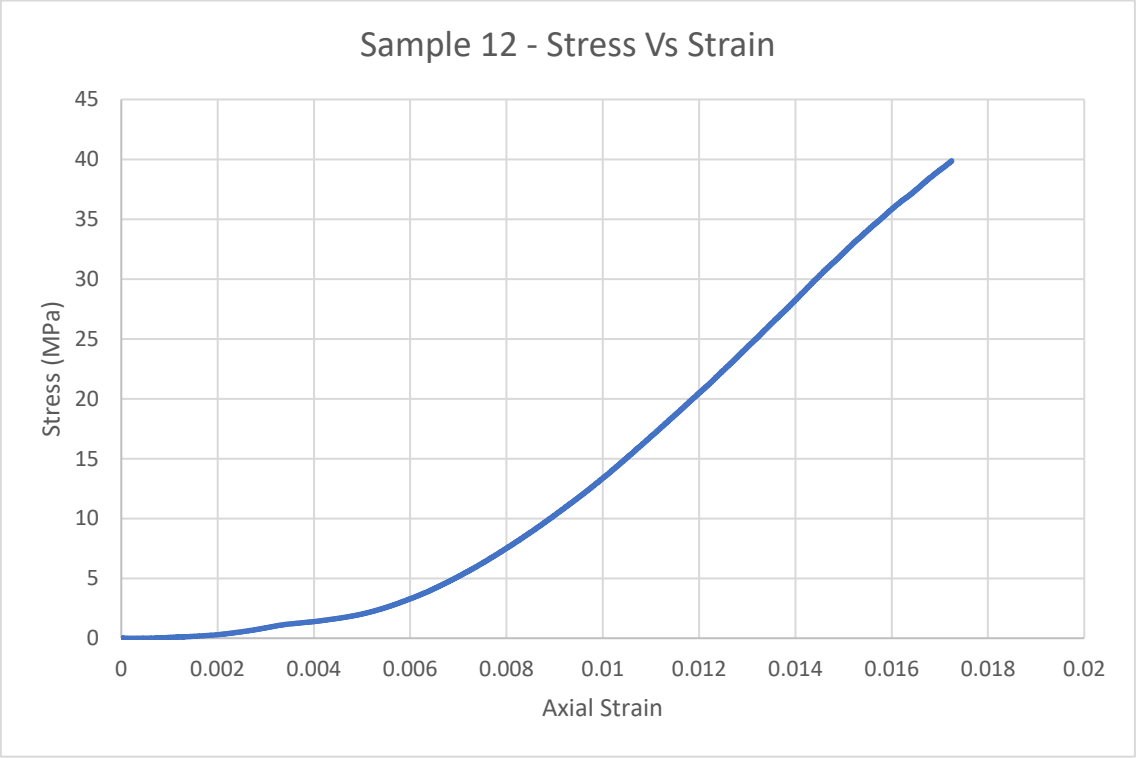

Figure N.4 – Underwater Cementitious Grout – Stress vs strain

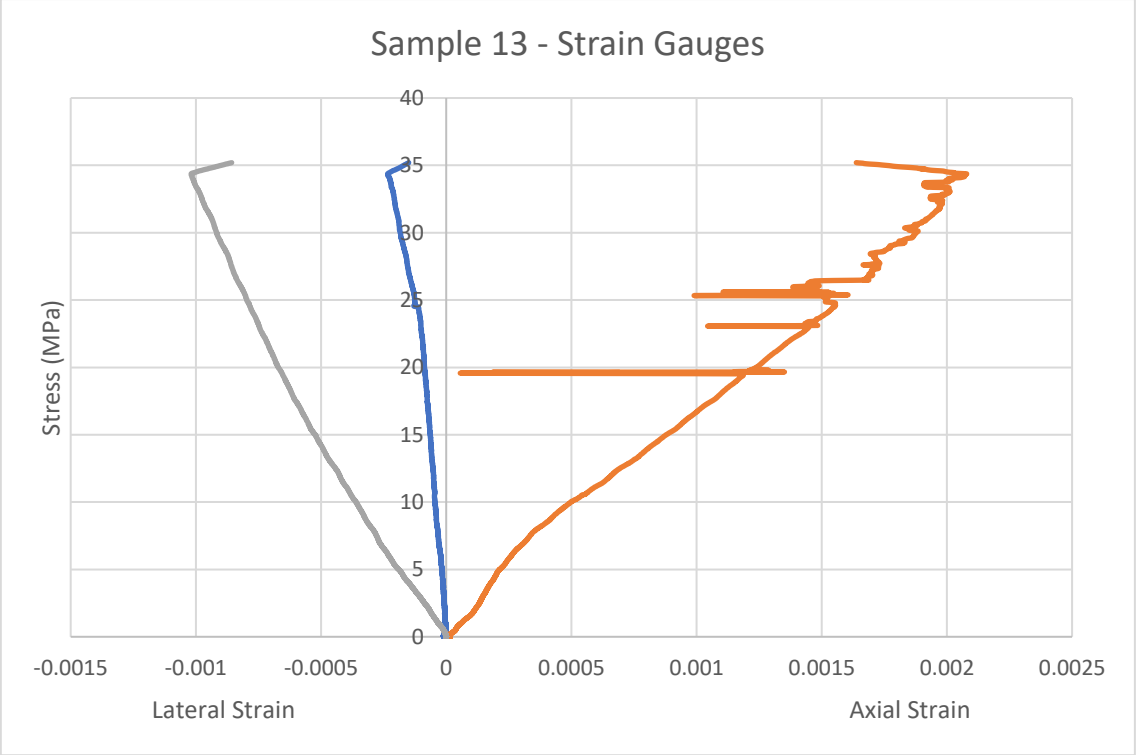

Figure N.5 – Crane Rail Grout – Strain gauge data

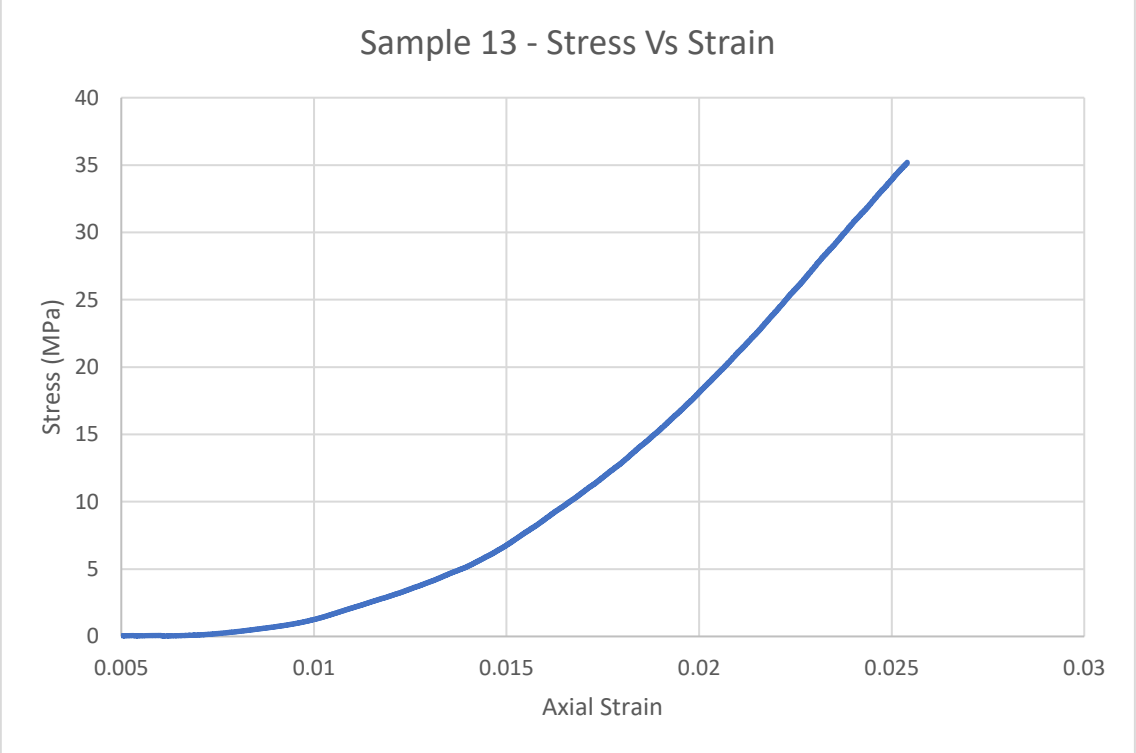

Figure N.6 – Crane Rail Grout – Stress vs strain

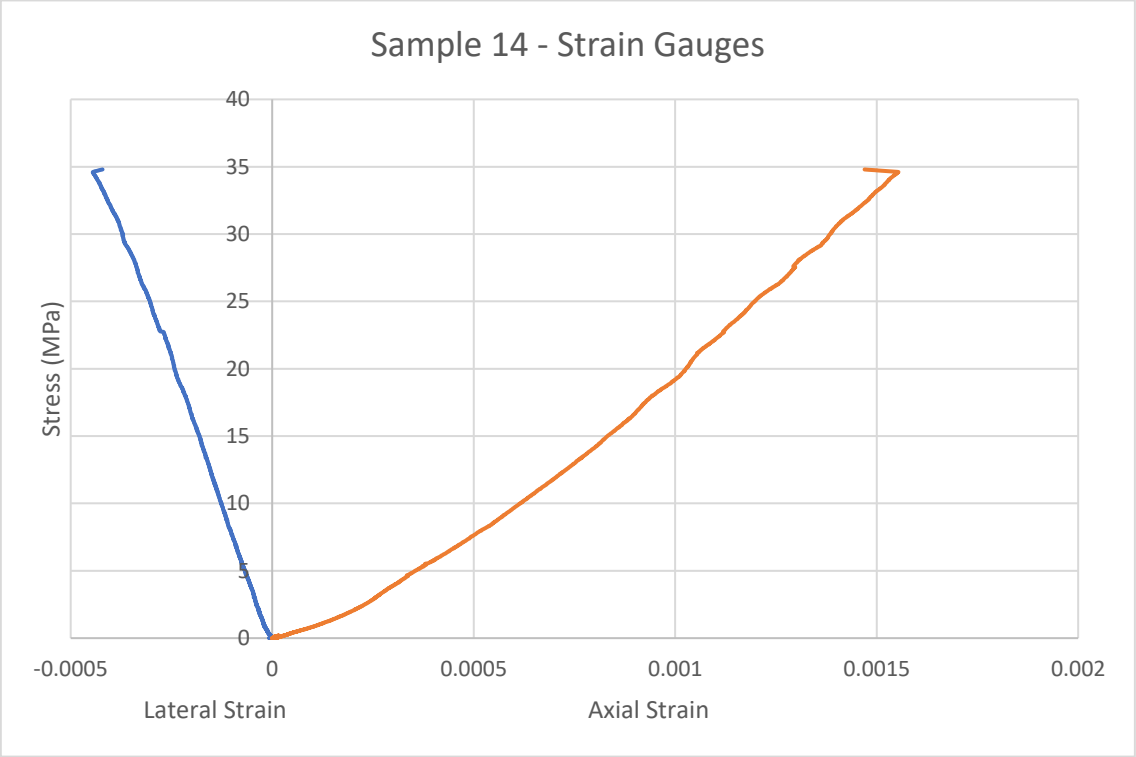

Figure N.7 – Crane Rail Grout – Strain gauge data

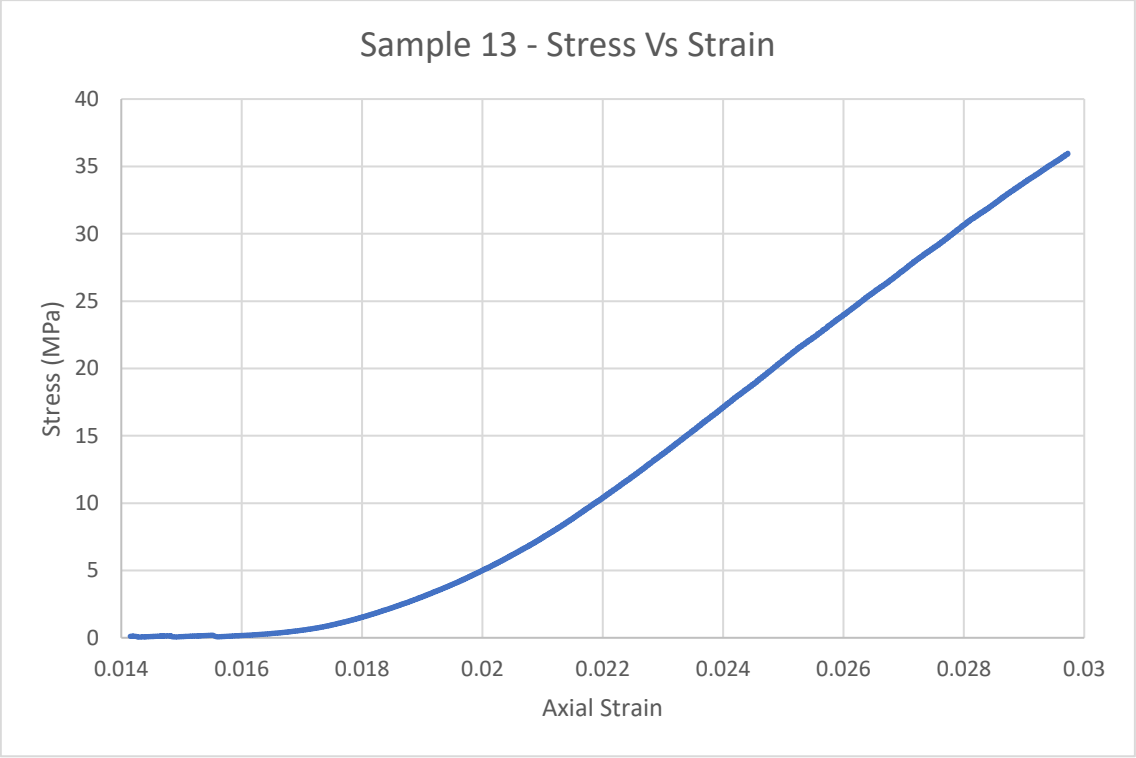

Figure N.8 – Crane Rail Grout – Stress vs strain

APPENDIX 0 – Sample 1 Data

Area(mm^2)	Length (mm)
41771.76394	298

Time (seconds)	Load (N)	Deflection (mm)		Stress (MPa)	Strain		12 (H)	14 (V)	15 (H)		12 (H)	14 (V)	15 (H)
0	5.119496	0		0.000122559	0		1	1	0		-1E-06	0.000001	0
0.097	5.119496	0		0.000122559	0		1	1	-1		-1E-06	0.000001	-0.000001
0.2	5.119496	0		0.000122559	0		1	1	-1		-1E-06	0.000001	-0.000001
0.3	2.27374E-13	0		5.44324E-18	0		1	1	-1		-1E-06	0.000001	-0.000001
0.399	2.27374E-13	0		5.44324E-18	0		1	2	-2		-1E-06	0.000002	-0.000002
0.5	17.40629	0		0.0004167	0		1	1	-1		-1E-06	0.000001	-0.000001
0.6	11.26289	0		0.000269629	0		1	1	-1		-1E-06	0.000001	-0.000001
0.701	5.119496	0		0.000122559	0		1	1	-1		-1E-06	0.000001	-0.000001
0.8	2.27374E-13	0		5.44324E-18	0		1	1	-1		-1E-06	0.000001	-0.000001
0.9	5.119496	0		0.000122559	0		1	1	-1		-1E-06	0.000001	-0.000001
1.001	5.119496	0		0.000122559	0		1	1	-2		-1E-06	0.000001	-0.000002
1.1	5.119496	0		0.000122559	0		2	1	-2		-2E-06	0.000001	-0.000002
1.199	11.26289	0		0.000269629	0		1	1	-1		-1E-06	0.000001	-0.000001
1.3	5.119496	0		0.000122559	0		2	1	-2		-2E-06	0.000001	-0.000002
1.401	11.26289	0		0.000269629	0		1	1	-1		-1E-06	0.000001	-0.000001
1.501	17.40629	0		0.0004167	0		1	0	-1		-1E-06	0	-0.000001
1.6	11.26289	0		0.000269629	0		1	1	-1		-1E-06	0.000001	-0.000001
1.699	5.119496	0		0.000122559	0		1	1	-2		-1E-06	0.000001	-0.000002
1.801	5.119496	0		0.000122559	0		1	2	-2		-1E-06	0.000002	-0.000002
1.901	2.27374E-13	0		5.44324E-18	0		1	1	-1		-1E-06	0.000001	-0.000001
2.001	2.27374E-13	0		5.44324E-18	0		1	1	-2		-1E-06	0.000001	-0.000002
2.1	2.27374E-13	0		5.44324E-18	0		1	1	-2		-1E-06	0.000001	-0.000002
2.2	11.26289	0		0.000269629	0		0	1	-1		0	0.000001	-0.000001
2.3	5.119496	0		0.000122559	0		1	0	-2		-1E-06	0	-0.000002
2.4	5.119496	0		0.000122559	0		1	1	-2		-1E-06	0.000001	-0.000002
2.5	2.27374E-13	0		5.44324E-18	0		1	0	-1		-1E-06	0	-0.000001

2.6	2.27374E-13	0		5.44324E-18	0		1	1	-2		-1E-06	0.000001	-0.000002
2.7	11.26289	0		0.000269629	0		1	1	-3		-1E-06	0.000001	-0.000003
2.8	11.26289	0		0.000269629	0		1	0	-3		-1E-06	0	-0.000003
2.901	11.26289	0		0.000269629	0		1	2	-3		-1E-06	0.000002	-0.000003
3	2.27374E-13	0		5.44324E-18	0		1	1	-2		-1E-06	0.000001	-0.000002
3.1	11.26289	0		0.000269629	0		1	1	-2		-1E-06	0.000001	-0.000002
3.2	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
3.301	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
3.399	2.27374E-13	0		5.44324E-18	0		1	2	-3		-1E-06	0.000002	-0.000003
3.5	5.119496	0		0.000122559	0		1	1	-3		-1E-06	0.000001	-0.000003
3.6	2.27374E-13	0		5.44324E-18	0		0	1	-2		0	0.000001	-0.000002
3.7	5.119496	0		0.000122559	0		1	2	-3		-1E-06	0.000002	-0.000003
3.801	5.119496	0		0.000122559	0		1	1	-3		-1E-06	0.000001	-0.000003
3.9	2.27374E-13	0		5.44324E-18	0		1	2	-4		-1E-06	0.000002	-0.000004
4.001	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
4.1	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
4.2	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
4.301	11.26289	0		0.000269629	0		0	2	-3		0	0.000002	-0.000003
4.401	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
4.5	2.27374E-13	0		5.44324E-18	0		0.61	1	-3		-6.1E-07	0.000001	-0.000003
4.6	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
4.7	2.27374E-13	0		5.44324E-18	0		1	1	-4		-1E-06	0.000001	-0.000004
4.799	11.26289	0		0.000269629	0		1	0	-3		-1E-06	0	-0.000003
4.9	5.119496	0		0.000122559	0		1	1	-3		-1E-06	0.000001	-0.000003
5	2.27374E-13	0		5.44324E-18	0		0	1	-4		0	0.000001	-0.000004
5.1	5.119496	0		0.000122559	0		1	2	-4		-1E-06	0.000002	-0.000004
5.2	2.27374E-13	0		5.44324E-18	0		1	1	-4		-1E-06	0.000001	-0.000004
5.301	5.119496	0		0.000122559	0		1	1	-2		-1E-06	0.000001	-0.000002
5.4	5.119496	0		0.000122559	0		2	2	-3		-2E-06	0.000002	-0.000003
5.499	2.27374E-13	0		5.44324E-18	0		2	1	-4		-2E-06	0.000001	-0.000004
5.6	2.27374E-13	0		5.44324E-18	0		0	1	-4		0	0.000001	-0.000004

5.7	2.27374E-13	0		5.44324E-18	0		0	1	-3		0	0.000001	-0.000003
5.801	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
5.901	5.119496	0		0.000122559	0		1	1	-3		-1E-06	0.000001	-0.000003
6.001	5.119496	0		0.000122559	0		1	1	-4		-1E-06	0.000001	-0.000004
6.1	2.27374E-13	0		5.44324E-18	0		2	1	-3		-2E-06	0.000001	-0.000003
6.201	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
6.299	2.27374E-13	0		5.44324E-18	0		1	0	-4		-1E-06	0	-0.000004
6.4	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
6.501	-5.119496	0		-0.000122559	0		0	1	-4		0	0.000001	-0.000004
6.6	2.27374E-13	0		5.44324E-18	0		1	2	-3		-1E-06	0.000002	-0.000003
6.7	5.119496	0		0.000122559	0		2	2	-4		-2E-06	0.000002	-0.000004
6.8	-11.26289	0		-0.000269629	0		1	1	-4		-1E-06	0.000001	-0.000004
6.9	5.119496	0		0.000122559	0		1	1	-3		-1E-06	0.000001	-0.000003
7.001	-5.119496	0		-0.000122559	0		2	2	-3		-2E-06	0.000002	-0.000003
7.1	2.27374E-13	0		5.44324E-18	0		1	1	-4		-1E-06	0.000001	-0.000004
7.2	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
7.301	2.27374E-13	0		5.44324E-18	0		2	1	-1		-2E-06	0.000001	-0.000001
7.4	2.27374E-13	0		5.44324E-18	0		2	1	-3		-2E-06	0.000001	-0.000003
7.5	-5.119496	0		-0.000122559	0		1	1	-2		-1E-06	0.000001	-0.000002
7.6	2.27374E-13	0		5.44324E-18	0		1	2	-2		-1E-06	0.000002	-0.000002
7.7	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
7.801	-5.119496	0		-0.000122559	0		2	2	-2		-2E-06	0.000002	-0.000002
7.9	2.27374E-13	0		5.44324E-18	0		1	2	-2		-1E-06	0.000002	-0.000002
8	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
8.1	2.27374E-13	0		5.44324E-18	0		2	2	-3		-2E-06	0.000002	-0.000003
8.2	2.27374E-13	0		5.44324E-18	0		1	0	-3		-1E-06	0	-0.000003
8.3	-11.26289	0		-0.000269629	0		1	1	-3		-1E-06	0.000001	-0.000003
8.399	-11.26289	0		-0.000269629	0		1	1	-4		-1E-06	0.000001	-0.000004
8.5	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
8.6	2.27374E-13	0		5.44324E-18	0		1	2	-2		-1E-06	0.000002	-0.000002
8.7	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003

8.8	-5.119496	0		-0.000122559	0		1	2	-2		-1E-06	0.000002	-0.000002
8.9	-11.26289	0		-0.000269629	0		1	1	-2		-1E-06	0.000001	-0.000002
9.001	-5.119496	0		-0.000122559	0		2	1	-2		-2E-06	0.000001	-0.000002
9.1	-5.119496	0		-0.000122559	0		1	1	-2		-1E-06	0.000001	-0.000002
9.2	2.27374E-13	0		5.44324E-18	0		1	1	-2		-1E-06	0.000001	-0.000002
9.3	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
9.4	-5.119496	0		-0.000122559	0		2	1	-2		-2E-06	0.000001	-0.000002
9.499	2.27374E-13	0		5.44324E-18	0		0	1	-3		0	0.000001	-0.000003
9.6	-11.26289	0		-0.000269629	0		1	1	-2		-1E-06	0.000001	-0.000002
9.701	-5.119496	0		-0.000122559	0		2	1	-1		-2E-06	0.000001	-0.000001
9.801	2.27374E-13	0		5.44324E-18	0		1	1	-3		-1E-06	0.000001	-0.000003
9.901	-5.119496	0		-0.000122559	0		1	1	-1		-1E-06	0.000001	-0.000001
9.999	-5.119496	0		-0.000122559	0		1	1	-3		-1E-06	0.000001	-0.000003
10.1	-5.119496	0		-0.000122559	0		1	0	-3		-1E-06	0	-0.000003
10.2	-11.26289	0		-0.000269629	0		1	1	-2		-1E-06	0.000001	-0.000002
10.3	-17.40629	0		-0.0004167	0		1	1	-3		-1E-06	0.000001	-0.000003
10.4	-5.119496	0		-0.000122559	0		2	1	-1		-2E-06	0.000001	-0.000001
10.501	-5.119496	0		-0.000122559	0		2	2	-2		-2E-06	0.000002	-0.000002
10.6	2.27374E-13	0		5.44324E-18	0		2	1	-3		-2E-06	0.000001	-0.000003
10.7	-5.119496	0.009643847		-0.000122559	3.23619E-05		2	1	-3		-2E-06	0.000001	-0.000003
10.8	-17.40629	0.01239923		-0.0004167	4.16082E-05		1	2	-2		-1E-06	0.000002	-0.000002
10.899	-11.26289	0.01259604		-0.000269629	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
10.999	-5.119496	0.01259604		-0.000122559	4.22686E-05		2	1	-2		-2E-06	0.000001	-0.000002
11.101	-11.26289	0.01259604		-0.000269629	4.22686E-05		2	1	-2		-2E-06	0.000001	-0.000002
11.201	-11.26289	0.01259604		-0.000269629	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
11.299	-11.26289	0.01259604		-0.000269629	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
11.4	-5.119496	0.01259604		-0.000122559	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
11.501	-11.26289	0.01259604		-0.000269629	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
11.6	-17.40629	0.01259604		-0.0004167	4.22686E-05		2	1	-2		-2E-06	0.000001	-0.000002
11.7	-11.26289	0.01259604		-0.000269629	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
11.8	-17.40629	0.01259604		-0.0004167	4.22686E-05		1	1	-3		-1E-06	0.000001	-0.000003

11.9	-17.40629	0.01259604		-0.0004167	4.22686E-05		1	1	-3		-1E-06	0.000001	-0.000003
12.001	-5.119496	0.01259604		-0.000122559	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
12.1	-17.40629	0.01259604		-0.0004167	4.22686E-05		2	1	-3		-2E-06	0.000001	-0.000003
12.201	-17.40629	0.01259604		-0.0004167	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
12.3	-17.40629	0.01259604		-0.0004167	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
12.4	-17.40629	0.01259604		-0.0004167	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
12.5	-17.40629	0.01259604		-0.0004167	4.22686E-05		1	1	-3		-1E-06	0.000001	-0.000003
12.6	-23.54968	0.01259604		-0.00056377	4.22686E-05		1	1	-3		-1E-06	0.000001	-0.000003
12.7	-23.54968	0.01259604		-0.00056377	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
12.8	-23.54968	0.01259604		-0.00056377	4.22686E-05		1	1	-3		-1E-06	0.000001	-0.000003
12.901	-23.54968	0.01259604		-0.00056377	4.22686E-05		2	1	-2		-2E-06	0.000001	-0.000002
13	-23.54968	0.01259604		-0.00056377	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
13.101	-23.54968	0.01259604		-0.00056377	4.22686E-05		1	2	-2		-1E-06	0.000002	-0.000002
13.2	-34.81258	0.01259604		-0.0008334	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
13.3	-23.54968	0.01259604		-0.00056377	4.22686E-05		1	1	-3		-1E-06	0.000001	-0.000003
13.4	-28.66918	0.01259604		-0.000686329	4.22686E-05		1	2	-2		-1E-06	0.000002	-0.000002
13.499	-28.66918	0.01259604		-0.000686329	4.22686E-05		1	2	-3		-1E-06	0.000002	-0.000003
13.6	-28.66918	0.01259604		-0.000686329	4.22686E-05		2	2	-3		-2E-06	0.000002	-0.000003
13.701	-28.66918	0.01259604		-0.000686329	4.22686E-05		1	2	-2		-1E-06	0.000002	-0.000002
13.801	-34.81258	0.01259604		-0.0008334	4.22686E-05		1	1	-2		-1E-06	0.000001	-0.000002
13.9	-23.54968	0.01259604		-0.00056377	4.22686E-05		2	2	-2		-2E-06	0.000002	-0.000002
14	-28.66918	0.01259604		-0.000686329	4.22686E-05		1	2	-2		-1E-06	0.000002	-0.000002
14.101	-17.40629	0.01259604		-0.0004167	4.22686E-05		2	0	-3		-2E-06	0	-0.000003
14.2	-34.81258	0.01909088		-0.0008334	6.40634E-05		1	2	-3		-1E-06	0.000002	-0.000003
14.299	-23.54968	0.02460165		-0.00056377	8.25559E-05		1	1	-3		-1E-06	0.000001	-0.000003
14.4	-40.95597	0.02519209		-0.00098047	8.45372E-05		1	1	-3		-1E-06	0.000001	-0.000003
14.501	-28.66918	0.02519209		-0.000686329	8.45372E-05		1	1	-3		-1E-06	0.000001	-0.000003
14.6	-34.81258	0.02519209		-0.0008334	8.45372E-05		2	2	-4		-2E-06	0.000002	-0.000004
14.7	-28.66918	0.02519209		-0.000686329	8.45372E-05		1	1	-4		-1E-06	0.000001	-0.000004
14.8	-28.66918	0.02519209		-0.000686329	8.45372E-05		1	1	-3		-1E-06	0.000001	-0.000003
14.9	-28.66918	0.02519209		-0.000686329	8.45372E-05		1	1	-3		-1E-06	0.000001	-0.000003

15.001	-40.95597	0.02519209		-0.00098047	8.45372E-05		2	1	-3		-2E-06	0.000001	-0.000003
15.1	-28.66918	0.02519209		-0.000686329	8.45372E-05		1	1	-3		-1E-06	0.000001	-0.000003
15.202	-34.81258	0.02519209		-0.0008334	8.45372E-05		2	1	-3		-2E-06	0.000001	-0.000003
15.299	-40.95597	0.02519209		-0.00098047	8.45372E-05		1	1	-3		-1E-06	0.000001	-0.000003
15.401	-34.81258	0.02519209		-0.0008334	8.45372E-05		1	2	-4		-1E-06	0.000002	-0.000004
15.5	-40.95597	0.02519209		-0.00098047	8.45372E-05		1	3	-4		-1E-06	0.000003	-0.000004
15.601	-47.09937	0.02519209		-0.001127541	8.45372E-05		1	2	-3		-1E-06	0.000002	-0.000003
15.7	-34.81258	0.02519209		-0.0008334	8.45372E-05		1	1	-4		-1E-06	0.000001	-0.000004
15.8	-34.81258	0.02519209		-0.0008334	8.45372E-05		1	1	-4		-1E-06	0.000001	-0.000004
15.9	-47.09937	0.02519209		-0.001127541	8.45372E-05		1	1	-3		-1E-06	0.000001	-0.000003
16	-47.09937	0.02519209		-0.001127541	8.45372E-05		1	2	-3		-1E-06	0.000002	-0.000003
16.1	-52.21886	0.02519209		-0.001250099	8.45372E-05		2	1	-3		-2E-06	0.000001	-0.000003
16.2	-52.21886	0.02519209		-0.001250099	8.45372E-05		1	2	-4		-1E-06	0.000002	-0.000004
16.3	-40.95597	0.02519209		-0.00098047	8.45372E-05		1	2	-4		-1E-06	0.000002	-0.000004
16.4	-52.21886	0.02519209		-0.001250099	8.45372E-05		1	1	-4		-1E-06	0.000001	-0.000004
16.5	-40.95597	0.02519209		-0.00098047	8.45372E-05		2	2	-3		-2E-06	0.000002	-0.000003
16.601	-52.21886	0.02519209		-0.001250099	8.45372E-05		1	2	-3		-1E-06	0.000002	-0.000003
16.699	-40.95597	0.02519209		-0.00098047	8.45372E-05		2	2	-3		-2E-06	0.000002	-0.000003
16.8	-40.95597	0.02519209		-0.00098047	8.45372E-05		1	2	-3		-1E-06	0.000002	-0.000003
16.9	-52.21886	0.02519209		-0.001250099	8.45372E-05		1	1	-4		-1E-06	0.000001	-0.000004
17	-52.21886	0.03641044		-0.001250099	0.000122183		1	2	-4		-1E-06	0.000002	-0.000004
17.1	-47.09937	0.03778813		-0.001127541	0.000126806		0	1	-4		0	0.000001	-0.000004
17.201	-47.09937	0.03778813		-0.001127541	0.000126806		1	2	-3		-1E-06	0.000002	-0.000003
17.3	-52.21886	0.03778813		-0.001250099	0.000126806		1	3	-4		-1E-06	0.000003	-0.000004
17.399	-52.21886	0.03778813		-0.001250099	0.000126806		1	2	-4		-1E-06	0.000002	-0.000004
17.5	-52.21886	0.03778813		-0.001250099	0.000126806		0	2	-4		0	0.000002	-0.000004
17.6	-52.21886	0.03778813		-0.001250099	0.000126806		0	2	-4		0	0.000002	-0.000004
17.7	-58.36226	0.03778813		-0.00139717	0.000126806		1	1	-4		-1E-06	0.000001	-0.000004
17.801	-58.36226	0.03778813		-0.00139717	0.000126806		1	2	-5		-1E-06	0.000002	-0.000005
17.9	-52.21886	0.03778813		-0.001250099	0.000126806		2	3	-4		-2E-06	0.000003	-0.000004
18.001	-52.21886	0.03778813		-0.001250099	0.000126806		1	2	-4		-1E-06	0.000002	-0.000004

18.1	-64.50565	0.03778813		-0.001544241	0.000126806		1	2	-4		-1E-06	0.000002	-0.000004
18.201	-58.36226	0.03778813		-0.00139717	0.000126806		1	1	-4		-1E-06	0.000001	-0.000004
18.3	-70.64906	0.03778813		-0.001691311	0.000126806		2	1	-4		-2E-06	0.000001	-0.000004
18.4	-64.50565	0.03778813		-0.001544241	0.000126806		1	2	-5		-1E-06	0.000002	-0.000005
18.501	-64.50565	0.03778813		-0.001544241	0.000126806		1	2	-4		-1E-06	0.000002	-0.000004
18.6	-64.50565	0.03778813		-0.001544241	0.000126806		2	2	-5		-2E-06	0.000002	-0.000005
18.699	-64.50565	0.03778813		-0.001544241	0.000126806		1	2	-5		-1E-06	0.000002	-0.000005
18.801	-70.64906	0.03778813		-0.001691311	0.000126806		0	1	-4		0	0.000001	-0.000004
18.899	-70.64906	0.03778813		-0.001691311	0.000126806		1	2	-5		-1E-06	0.000002	-0.000005
19.001	-70.64906	0.04428297		-0.001691311	0.000148601		1	2	-5		-1E-06	0.000002	-0.000005
19.102	-64.50565	0.04979374		-0.001544241	0.000167093		2	2	-5		-2E-06	0.000002	-0.000005
19.2	-81.91194	0.05038418		-0.00196094	0.000169074		1	2	-4		-1E-06	0.000002	-0.000004
19.3	-75.76855	0.05038418		-0.00181387	0.000169074		2	1	-3		-2E-06	0.000001	-0.000003
19.401	-64.50565	0.05038418		-0.001544241	0.000169074		2	2	-3		-2E-06	0.000002	-0.000003
19.5	-75.76855	0.05038418		-0.00181387	0.000169074		1	2	-4		-1E-06	0.000002	-0.000004
19.6	-75.76855	0.05038418		-0.00181387	0.000169074		0	2	-4		0	0.000002	-0.000004
19.701	-70.64906	0.05038418		-0.001691311	0.000169074		1	1	-5		-1E-06	0.000001	-0.000005
19.8	-81.91194	0.05038418		-0.00196094	0.000169074		1	2	-4		-1E-06	0.000002	-0.000004
19.901	-70.64906	0.05038418		-0.001691311	0.000169074		1	3	-5		-1E-06	0.000003	-0.000005
20.001	-81.91194	0.05038418		-0.00196094	0.000169074		1	2	-4		-1E-06	0.000002	-0.000004
20.101	-81.91194	0.05038418		-0.00196094	0.000169074		1	1	-4		-1E-06	0.000001	-0.000004
20.2	-81.91194	0.05038418		-0.00196094	0.000169074		2	2	-6		-2E-06	0.000002	-0.000006
20.3	-81.91194	0.05038418		-0.00196094	0.000169074		1	1	-5		-1E-06	0.000001	-0.000005
20.401	-75.76855	0.05038418		-0.00181387	0.000169074		1	2	-5		-1E-06	0.000002	-0.000005
20.5	-94.19874	0.05038418		-0.002255082	0.000169074		1	1	-5		-1E-06	0.000001	-0.000005
20.601	-81.91194	0.05038418		-0.00196094	0.000169074		1	2	-5		-1E-06	0.000002	-0.000005
20.7	-88.05534	0.05038418		-0.002108011	0.000169074		1	2	-5		-1E-06	0.000002	-0.000005
20.8	-88.05534	0.06160253		-0.002108011	0.00020672		1	3	-5		-1E-06	0.000003	-0.000005
20.901	-94.19874	0.06298023		-0.002255082	0.000211343		1	1	-5		-1E-06	0.000001	-0.000005
21	-94.19874	0.06298023		-0.002255082	0.000211343		0	2	-6		0	0.000002	-0.000006
21.101	-81.91194	0.06298023		-0.00196094	0.000211343		1	2	-6		-1E-06	0.000002	-0.000006

21.2	-88.05534	0.06298023		-0.002108011	0.000211343		1	2	-5		-1E-06	0.000002	-0.000005
21.3	-88.05534	0.06298023		-0.002108011	0.000211343		1	2	-6		-1E-06	0.000002	-0.000006
21.402	-81.91194	0.06298023		-0.00196094	0.000211343		1	2	-6		-1E-06	0.000002	-0.000006
21.5	-88.05534	0.06298023		-0.002108011	0.000211343		2	2	-5		-2E-06	0.000002	-0.000005
21.6	-88.05534	0.06298023		-0.002108011	0.000211343		1	2	-6		-1E-06	0.000002	-0.000006
21.701	-94.19874	0.06298023		-0.002255082	0.000211343		1	2	-5		-1E-06	0.000002	-0.000005
21.8	-94.19874	0.06298023		-0.002255082	0.000211343		1	2	-5		-1E-06	0.000002	-0.000005
21.901	-88.05534	0.06298023		-0.002108011	0.000211343		1	1	-6		-1E-06	0.000001	-0.000006
22	-88.05534	0.06298023		-0.002108011	0.000211343		1	2	-6		-1E-06	0.000002	-0.000006
22.1	-94.19874	0.06298023		-0.002255082	0.000211343		1	2	-5		-1E-06	0.000002	-0.000005
22.2	-81.91194	0.06298023		-0.00196094	0.000211343		1	2	-6		-1E-06	0.000002	-0.000006
22.3	-81.91194	0.07262407		-0.00196094	0.000243705		0	2	-6		0	0.000002	-0.000006
22.4	-94.19874	0.07537945		-0.002255082	0.000252951		1	1	-6		-1E-06	0.000001	-0.000006
22.501	-81.91194	0.07557627		-0.00196094	0.000253612		0	2	-7		0	0.000002	-0.000007
22.601	-88.05534	0.07557627		-0.002108011	0.000253612		0	2	-6		0	0.000002	-0.000006
22.701	-81.91194	0.07557627		-0.00196094	0.000253612		1	3	-7		-1E-06	0.000003	-0.000007
22.8	-81.91194	0.07557627		-0.00196094	0.000253612		0	2	-7		0	0.000002	-0.000007
22.902	-75.76855	0.07557627		-0.00181387	0.000253612		1	2	-7		-1E-06	0.000002	-0.000007
23.001	-81.91194	0.07557627		-0.00196094	0.000253612		1	2	-7		-1E-06	0.000002	-0.000007
23.1	-81.91194	0.07557627		-0.00196094	0.000253612		1	2	-7		-1E-06	0.000002	-0.000007
23.201	-75.76855	0.07557627		-0.00181387	0.000253612		1	2	-8		-1E-06	0.000002	-0.000008
23.301	-70.64906	0.07557627		-0.001691311	0.000253612		1	2	-7		-1E-06	0.000002	-0.000007
23.401	-70.64906	0.07557627		-0.001691311	0.000253612		1	2	-7		-1E-06	0.000002	-0.000007
23.5	-70.64906	0.07557627		-0.001691311	0.000253612		1	1	-5		-1E-06	0.000001	-0.000005
23.6	-70.64906	0.0820711		-0.001691311	0.000275406		1	1	-6		-1E-06	0.000001	-0.000006
23.701	-52.21886	0.08758188		-0.001250099	0.000293899		1	2	-6		-1E-06	0.000002	-0.000006
23.8	-58.36226	0.08817232		-0.00139717	0.00029588		1	2	-6		-1E-06	0.000002	-0.000006
23.9	-58.36226	0.08817232		-0.00139717	0.00029588		1	2	-5		-1E-06	0.000002	-0.000005
24.001	-47.09937	0.08817232		-0.001127541	0.00029588		1	3	-5		-1E-06	0.000003	-0.000005
24.1	-47.09937	0.08817232		-0.001127541	0.00029588		1	2	-6		-1E-06	0.000002	-0.000006
24.201	-47.09937	0.08817232		-0.001127541	0.00029588		0	2	-6		0	0.000002	-0.000006

24.302	-34.81258	0.08817232		-0.0008334	0.00029588		1	2	-6		-1E-06	0.000002	-0.000006
24.4	-40.95597	0.08817232		-0.00098047	0.00029588		1	2	-7		-1E-06	0.000002	-0.000007
24.5	-34.81258	0.08817232		-0.0008334	0.00029588		1	2	-6		-1E-06	0.000002	-0.000006
24.6	-23.54968	0.08817232		-0.00056377	0.00029588		0	2	-5		0	0.000002	-0.000005
24.701	-17.40629	0.09466715		-0.0004167	0.000317675		1	1	-6		-1E-06	0.000001	-0.000006
24.8	-5.119496	0.1001779		-0.000122559	0.000336167		1	2	-6		-1E-06	0.000002	-0.000006
24.902	-11.26289	0.1007684		-0.000269629	0.000338149		0	1	-6		0	0.000001	-0.000006
25	2.27374E-13	0.1007684		5.44324E-18	0.000338149		0	2	-6		0	0.000002	-0.000006
25.101	2.27374E-13	0.1007684		5.44324E-18	0.000338149		1	2	-6		-1E-06	0.000002	-0.000006
25.2	2.27374E-13	0.1007684		5.44324E-18	0.000338149		1	1	-6		-1E-06	0.000001	-0.000006
25.301	2.27374E-13	0.1007684		5.44324E-18	0.000338149		1	1	-6		-1E-06	0.000001	-0.000006
25.401	11.26289	0.1007684		0.000269629	0.000338149		0	2	-6		0	0.000002	-0.000006
25.5	5.119496	0.1007684		0.000122559	0.000338149		1	2	-6		-1E-06	0.000002	-0.000006
25.601	11.26289	0.1072632		0.000269629	0.000359944		0	2	-6		0	0.000002	-0.000006
25.7	23.54968	0.112774		0.00056377	0.000378436		1	2	-6		-1E-06	0.000002	-0.000006
25.801	17.40629	0.1133644		0.0004167	0.000380417		1	2	-5		-1E-06	0.000002	-0.000005
25.901	28.66918	0.1133644		0.000686329	0.000380417		1	1	-6		-1E-06	0.000001	-0.000006
26	40.95597	0.1133644		0.00098047	0.000380417		1	2	-6		-1E-06	0.000002	-0.000006
26.1	17.40629	0.1133644		0.0004167	0.000380417		1	2	-5		-1E-06	0.000002	-0.000005
26.2	11.26289	0.1133644		0.000269629	0.000380417		1	2	-6		-1E-06	0.000002	-0.000006
26.301	17.40629	0.1133644		0.0004167	0.000380417		1	2	-6		-1E-06	0.000002	-0.000006
26.4	5.119496	0.1133644		0.000122559	0.000380417		1	2	-6		-1E-06	0.000002	-0.000006
26.5	11.26289	0.1245828		0.000269629	0.000418063		0	2	-6		0	0.000002	-0.000006
26.6	11.26289	0.1259605		0.000269629	0.000422686		1	2	-6		-1E-06	0.000002	-0.000006
26.701	11.26289	0.1259605		0.000269629	0.000422686		1	1	-5		-1E-06	0.000001	-0.000005
26.8	5.119496	0.1259605		0.000122559	0.000422686		0	2	-6		0	0.000002	-0.000006
26.902	11.26289	0.1259605		0.000269629	0.000422686		1	2	-5		-1E-06	0.000002	-0.000005
27.001	2.27374E-13	0.1259605		5.44324E-18	0.000422686		1	2	-6		-1E-06	0.000002	-0.000006
27.101	11.26289	0.1259605		0.000269629	0.000422686		1	2	-6		-1E-06	0.000002	-0.000006
27.2	11.26289	0.1259605		0.000269629	0.000422686		1	2	-6		-1E-06	0.000002	-0.000006
27.3	11.26289	0.1371788		0.000269629	0.000460332		1	3	-7		-1E-06	0.000003	-0.000007

27.401	28.66918	0.1385565		0.000686329	0.000464955		1	2	-7		-1E-06	0.000002	-0.000007
27.5	17.40629	0.1385565		0.0004167	0.000464955		1	2	-6		-1E-06	0.000002	-0.000006
27.6	28.66918	0.1385565		0.000686329	0.000464955		1	2	-7		-1E-06	0.000002	-0.000007
27.701	28.66918	0.1385565		0.000686329	0.000464955		0	2	-7		0	0.000002	-0.000007
27.8	28.66918	0.1385565		0.000686329	0.000464955		0	2	-7		0	0.000002	-0.000007
27.9	17.40629	0.1497748		0.0004167	0.0005026		1	1	-6		-1E-06	0.000001	-0.000006
28	23.54968	0.1511525		0.00056377	0.000507223		0	1	-5		0	0.000001	-0.000005
28.1	17.40629	0.1511525		0.0004167	0.000507223		1	1	-6		-1E-06	0.000001	-0.000006
28.201	34.81258	0.1511525		0.0008334	0.000507223		1	2	-6		-1E-06	0.000002	-0.000006
28.3	28.66918	0.1511525		0.000686329	0.000507223		0	2	-6		0	0.000002	-0.000006
28.4	40.95597	0.1576474		0.00098047	0.000529018		0	2	-6		0	0.000002	-0.000006
28.5	40.95597	0.1631581		0.00098047	0.00054751		1	1	-6		-1E-06	0.000001	-0.000006
28.6	52.21886	0.1637486		0.001250099	0.000549492		1	1	-6		-1E-06	0.000001	-0.000006
28.7	64.50565	0.1637486		0.001544241	0.000549492		0	2	-6		0	0.000002	-0.000006
28.801	70.64906	0.1637486		0.001691311	0.000549492		1	2	-6		-1E-06	0.000002	-0.000006
28.9	52.21886	0.1637486		0.001250099	0.000549492		1	1	-7		-1E-06	0.000001	-0.000007
29	58.36226	0.1702434		0.00139717	0.000571287		1	2	-5		-1E-06	0.000002	-0.000005
29.102	64.50565	0.1757542		0.001544241	0.000589779		1	2	-7		-1E-06	0.000002	-0.000007
29.2	52.21886	0.1763446		0.001250099	0.00059176		1	3	-6		-1E-06	0.000003	-0.000006
29.302	52.21886	0.1763446		0.001250099	0.00059176		1	2	-7		-1E-06	0.000002	-0.000007
29.4	52.21886	0.1763446		0.001250099	0.00059176		0	2	-7		0	0.000002	-0.000007
29.501	52.21886	0.1763446		0.001250099	0.00059176		1	2	-7		-1E-06	0.000002	-0.000007
29.602	52.21886	0.1828395		0.001250099	0.000613555		0	3	-7		0	0.000003	-0.000007
29.701	58.36226	0.1883502		0.00139717	0.000632048		0	2	-7		0	0.000002	-0.000007
29.8	58.36226	0.1889407		0.00139717	0.000634029		1	2	-5		-1E-06	0.000002	-0.000005
29.902	58.36226	0.1889407		0.00139717	0.000634029		0	2	-5		0	0.000002	-0.000005
30.002	47.09937	0.1889407		0.001127541	0.000634029		1	2	-5		-1E-06	0.000002	-0.000005
30.101	40.95597	0.1954355		0.00098047	0.000655824		1	2	-5		-1E-06	0.000002	-0.000005
30.201	23.54968	0.2009463		0.00056377	0.000674316		1	1	-6		-1E-06	0.000001	-0.000006
30.3	28.66918	0.2015367		0.000686329	0.000676298		1	2	-5		-1E-06	0.000002	-0.000005
30.4	17.40629	0.2015367		0.0004167	0.000676298		1	2	-6		-1E-06	0.000002	-0.000006

30.501	11.26289	0.2015367		0.000269629	0.000676298		1	1	-6		-1E-06	0.000001	-0.000006
30.6	5.119496	0.2111806		0.000122559	0.00070866		1	2	-6		-1E-06	0.000002	-0.000006
30.702	2.27374E-13	0.2139359		5.44324E-18	0.000717906		1	1	-7		-1E-06	0.000001	-0.000007
30.8	11.26289	0.2141328		0.000269629	0.000718566		1	2	-6		-1E-06	0.000002	-0.000006
30.9	11.26289	0.2141328		0.000269629	0.000718566		0	1	-7		0	0.000001	-0.000007
31	17.40629	0.2141328		0.0004167	0.000718566		1	2	-6		-1E-06	0.000002	-0.000006
31.1	2.27374E-13	0.2206276		5.44324E-18	0.000740361		1	2	-5		-1E-06	0.000002	-0.000005
31.2	11.26289	0.2261384		0.000269629	0.000758854		1	1	-7		-1E-06	0.000001	-0.000007
31.3	5.119496	0.2267288		0.000122559	0.000760835		0	2	-7		0	0.000002	-0.000007
31.402	11.26289	0.2267288		0.000269629	0.000760835		1	2	-6		-1E-06	0.000002	-0.000006
31.5	5.119496	0.2267288		0.000122559	0.000760835		1	1	-7		-1E-06	0.000001	-0.000007
31.6	11.26289	0.2267288		0.000269629	0.000760835		0	2	-7		0	0.000002	-0.000007
31.7	17.40629	0.2363726		0.0004167	0.000793197		1	2	-6		-1E-06	0.000002	-0.000006
31.802	5.119496	0.239128		0.000122559	0.000802443		0	1	-6		0	0.000001	-0.000006
31.9	17.40629	0.2393249		0.0004167	0.000803104		1	1	-7		-1E-06	0.000001	-0.000007
32.001	5.119496	0.2393249		0.000122559	0.000803104		0	1	-7		0	0.000001	-0.000007
32.1	11.26289	0.2458197		0.000269629	0.000824898		1	0	-6		-1E-06	0	-0.000006
32.2	11.26289	0.2513305		0.000269629	0.000843391		0	1	-7		0	0.000001	-0.000007
32.301	17.40629	0.2519209		0.0004167	0.000845372		1	1	-7		-1E-06	0.000001	-0.000007
32.401	23.54968	0.2519209		0.00056377	0.000845372		1	2	-6		-1E-06	0.000002	-0.000006
32.5	34.81258	0.2584157		0.0008334	0.000867167		1	1	-6		-1E-06	0.000001	-0.000006
32.6	47.09937	0.2639265		0.001127541	0.000885659		1	2	-5		-1E-06	0.000002	-0.000005
32.701	40.95597	0.2645169		0.00098047	0.000887641		0	2	-6		0	0.000002	-0.000006
32.8	47.09937	0.2645169		0.001127541	0.000887641		0	1	-6		0	0.000001	-0.000006
32.9	52.21886	0.2645169		0.001250099	0.000887641		0	2	-7		0	0.000002	-0.000007
33	52.21886	0.2757353		0.001250099	0.000925286		1	1	-7		-1E-06	0.000001	-0.000007
33.1	58.36226	0.277113		0.00139717	0.000929909		0	2	-7		0	0.000002	-0.000007
33.201	58.36226	0.277113		0.00139717	0.000929909		1	1	-7		-1E-06	0.000001	-0.000007
33.3	64.50565	0.277113		0.001544241	0.000929909		0	1	-7		0	0.000001	-0.000007
33.401	64.50565	0.2867568		0.001544241	0.000962271		0	2	-7		0	0.000002	-0.000007
33.5	58.36226	0.2895122		0.00139717	0.000971517		1	2	-7		-1E-06	0.000002	-0.000007

33.6	47.09937	0.289709		0.001127541	0.000972178		0	1	-7		0	0.000001	-0.000007
33.7	58.36226	0.289709		0.00139717	0.000972178		0	1	-7		0	0.000001	-0.000007
33.801	47.09937	0.2962039		0.001127541	0.000993973		1	1	-7		-1E-06	0.000001	-0.000007
33.9	52.21886	0.3017146		0.001250099	0.001012465		0	1	-7		0	0.000001	-0.000007
34	64.50565	0.3023051		0.001544241	0.001014447		0	1	-7		0	0.000001	-0.000007
34.101	75.76855	0.3023051		0.00181387	0.001014447		1	1	-7		-1E-06	0.000001	-0.000007
34.201	81.91194	0.3119489		0.00196094	0.001046808		1	2	-7		-1E-06	0.000002	-0.000007
34.3	70.64906	0.3147043		0.001691311	0.001056055		1	1	-7		-1E-06	0.000001	-0.000007
34.4	75.76855	0.3149011		0.00181387	0.001056715		0	1	-7		0	0.000001	-0.000007
34.502	88.05534	0.3149011		0.002108011	0.001056715		1	2	-7		-1E-06	0.000002	-0.000007
34.6	81.91194	0.324545		0.00196094	0.001089077		0	2	-7		0	0.000002	-0.000007
34.7	94.19874	0.3273003		0.002255082	0.001098323		1	1	-8		-1E-06	0.000001	-0.000008
34.801	81.91194	0.3274972		0.00196094	0.001098984		1	1	-7		-1E-06	0.000001	-0.000007
34.901	81.91194	0.3274972		0.00196094	0.001098984		1	2	-7		-1E-06	0.000002	-0.000007
35	70.64906	0.337141		0.001691311	0.001131346		0	1	-7		0	0.000001	-0.000007
35.101	81.91194	0.3398964		0.00196094	0.001140592		1	2	-7		-1E-06	0.000002	-0.000007
35.201	75.76855	0.3400932		0.00181387	0.001141252		1	2	-7		-1E-06	0.000002	-0.000007
35.3	75.76855	0.3400932		0.00181387	0.001141252		1	2	-7		-1E-06	0.000002	-0.000007
35.401	64.50565	0.3513116		0.001544241	0.001178898		0	2	-8		0	0.000002	-0.000008
35.5	64.50565	0.3526893		0.001544241	0.001183521		0	1	-7		0	0.000001	-0.000007
35.602	81.91194	0.3526893		0.00196094	0.001183521		1	1	-8		-1E-06	0.000001	-0.000008
35.7	94.19874	0.3623331		0.002255082	0.001215883		1	1	-7		-1E-06	0.000001	-0.000007
35.8	111.605	0.3650885		0.002671781	0.001225129		0	1	-7		0	0.000001	-0.000007
35.9	111.605	0.3652853		0.002671781	0.00122579		0	1	-7		0	0.000001	-0.000007
36	105.4616	0.3717801		0.00252471	0.001247584		1	1	-7		-1E-06	0.000001	-0.000007
36.1	99.31823	0.3772909		0.00237764	0.001266077		1	2	-7		-1E-06	0.000002	-0.000007
36.2	111.605	0.3778813		0.002671781	0.001268058		1	1	-7		-1E-06	0.000001	-0.000007
36.3	129.0113	0.3843762		0.003088481	0.001289853		1	1	-8		-1E-06	0.000001	-0.000008
36.4	129.0113	0.3898869		0.003088481	0.001308345		1	1	-8		-1E-06	0.000001	-0.000008
36.5	147.4415	0.3904774		0.003529693	0.001310327		1	1	-7		-1E-06	0.000001	-0.000007
36.6	147.4415	0.3904774		0.003529693	0.001310327		0	2	-8		0	0.000002	-0.000008

36.7	141.2981	0.4016957		0.003382622	0.001347972		0	2	-8		0	0.000002	-0.000008
36.8	147.4415	0.4030734		0.003529693	0.001352595		0	1	-8		0	0.000001	-0.000008
36.9	158.7044	0.4030734		0.003799322	0.001352595		1	1	-8		-1E-06	0.000001	-0.000008
37	147.4415	0.4142918		0.003529693	0.001390241		0	2	-8		0	0.000002	-0.000008
37.101	170.9912	0.4156695		0.004093464	0.001394864		0	2	-7		0	0.000002	-0.000007
37.202	170.9912	0.4156695		0.004093464	0.001394864		0	2	-5		0	0.000002	-0.000005
37.3	164.8478	0.4253133		0.003946393	0.001427226		0	2	-7		0	0.000002	-0.000007
37.401	164.8478	0.4280687		0.003946393	0.001436472		1	1	-7		-1E-06	0.000001	-0.000007
37.5	176.1107	0.4282655		0.004216023	0.001437133		1	1	-6		-1E-06	0.000001	-0.000006
37.6	182.2541	0.4347604		0.004363093	0.001458928		1	2	-6		-1E-06	0.000002	-0.000006
37.702	188.3975	0.4402711		0.004510164	0.00147742		1	1	-6		-1E-06	0.000001	-0.000006
37.8	194.5409	0.4408616		0.004657234	0.001479401		0	1	-6		0	0.000001	-0.000006
37.9	194.5409	0.4408616		0.004657234	0.001479401		1	1	-7		-1E-06	0.000001	-0.000007
38	70.64906	0.4505054		0.001691311	0.001511763		1	2	-7		-1E-06	0.000002	-0.000007
38.1	111.605	0.4532608		0.002671781	0.001521009		1	1	-7		-1E-06	0.000001	-0.000007
38.2	75.76855	0.4534576		0.00181387	0.00152167		1	1	-7		-1E-06	0.000001	-0.000007
38.3	111.605	0.4631015		0.002671781	0.001554032		1	1	-7		-1E-06	0.000001	-0.000007
38.4	117.7484	0.4658569		0.002818852	0.001563278		1	1	-7		-1E-06	0.000001	-0.000007
38.501	111.605	0.4660537		0.002671781	0.001563939		1	1	-7		-1E-06	0.000001	-0.000007
38.602	111.605	0.4660537		0.002671781	0.001563939		1	1	-7		-1E-06	0.000001	-0.000007
38.7	105.4616	0.477272		0.00252471	0.001601584		1	1	-7		-1E-06	0.000001	-0.000007
38.8	123.8918	0.4786497		0.002965922	0.001606207		0	1	-6		0	0.000001	-0.000006
38.901	129.0113	0.4786497		0.003088481	0.001606207		1	1	-7		-1E-06	0.000001	-0.000007
39.002	129.0113	0.4882936		0.003088481	0.001638569		0	0	-8		0	0	-0.000008
39.102	123.8918	0.4910489		0.002965922	0.001647815		0	0	-8		0	0	-0.000008
39.2	117.7484	0.4912457		0.002818852	0.001648476		1	1	-8		-1E-06	0.000001	-0.000008
39.3	105.4616	0.4912457		0.00252471	0.001648476		1	1	-8		-1E-06	0.000001	-0.000008
39.401	117.7484	0.5024641		0.002818852	0.001686121		1	1	-7		-1E-06	0.000001	-0.000007
39.501	123.8918	0.5038418		0.002965922	0.001690744		1	2	-8		-1E-06	0.000002	-0.000008
39.601	123.8918	0.5038418		0.002965922	0.001690744		1	1	-7		-1E-06	0.000001	-0.000007
39.701	99.31823	0.5134856		0.00237764	0.001723106		0	1	-7		0	0.000001	-0.000007

39.8	111.605	0.516241		0.002671781	0.001732352		1	2	-8		-1E-06	0.000002	-0.000008
39.901	105.4616	0.5164378		0.00252471	0.001733013		0	1	-7		0	0.000001	-0.000007
40.001	117.7484	0.5164378		0.002818852	0.001733013		1	1	-8		-1E-06	0.000001	-0.000008
40.102	99.31823	0.5276562		0.00237764	0.001770658		1	1	-8		-1E-06	0.000001	-0.000008
40.201	99.31823	0.5290339		0.00237764	0.001775282		1	1	-7		-1E-06	0.000001	-0.000007
40.301	94.19874	0.5290339		0.002255082	0.001775282		1	1	-8		-1E-06	0.000001	-0.000008
40.401	99.31823	0.5386777		0.00237764	0.001807643		1	1	-8		-1E-06	0.000001	-0.000008
40.501	94.19874	0.5414331		0.002255082	0.00181689		1	2	-8		-1E-06	0.000002	-0.000008
40.602	99.31823	0.5416299		0.00237764	0.00181755		1	1	-8		-1E-06	0.000001	-0.000008
40.7	81.91194	0.5416299		0.00196094	0.00181755		0	1	-8		0	0.000001	-0.000008
40.801	99.31823	0.5528483		0.00237764	0.001855196		1	1	-8		-1E-06	0.000001	-0.000008
40.9	88.05534	0.554226		0.002108011	0.001859819		2	1	-8		-2E-06	0.000001	-0.000008
41	94.19874	0.554226		0.002255082	0.001859819		0	1	-7		0	0.000001	-0.000007
41.1	88.05534	0.5638698		0.002108011	0.001892181		1	1	-8		-1E-06	0.000001	-0.000008
41.2	88.05534	0.5666252		0.002108011	0.001901427		1	1	-8		-1E-06	0.000001	-0.000008
41.302	94.19874	0.566822		0.002255082	0.001902087		1	1	-7		-1E-06	0.000001	-0.000007
41.4	94.19874	0.566822		0.002255082	0.001902087		1	2	-6		-1E-06	0.000002	-0.000006
41.5	94.19874	0.5780404		0.002255082	0.001939733		1	1	-8		-1E-06	0.000001	-0.000008
41.6	88.05534	0.5794181		0.002108011	0.001944356		1	1	-8		-1E-06	0.000001	-0.000008
41.7	88.05534	0.5794181		0.002108011	0.001944356		1	1	-8		-1E-06	0.000001	-0.000008
41.8	81.91194	0.5890619		0.00196094	0.001976718		1	1	-8		-1E-06	0.000001	-0.000008
41.902	81.91194	0.5918173		0.00196094	0.001985964		1	1	-8		-1E-06	0.000001	-0.000008
42	88.05534	0.5920141		0.002108011	0.001986624		1	1	-7		-1E-06	0.000001	-0.000007
42.102	88.05534	0.5920141		0.002108011	0.001986624		1	1	-7		-1E-06	0.000001	-0.000007
42.2	88.05534	0.6032324		0.002108011	0.00202427		1	1	-7		-1E-06	0.000001	-0.000007
42.3	123.8918	0.6046101		0.002965922	0.002028893		2	1	-7		-2E-06	0.000001	-0.000007
42.401	141.2981	0.6046101		0.003382622	0.002028893		1	2	-8		-1E-06	0.000002	-0.000008
42.501	152.561	0.614254		0.003652252	0.002061255		1	0	-8		-1E-06	0	-0.000008
42.601	176.1107	0.6170094		0.004216023	0.002070501		2	1	-7		-2E-06	0.000001	-0.000007
42.7	194.5409	0.6172062		0.004657234	0.002071162		2	1	-8		-2E-06	0.000001	-0.000008
42.801	164.8478	0.6172062		0.003946393	0.002071162		1	1	-8		-1E-06	0.000001	-0.000008

42.901	75.76855	0.6284245		0.00181387	0.002108807		1	0	-8		-1E-06	0	-0.000008
43	111.605	0.6298022		0.002671781	0.00211343		1	1	-8		-1E-06	0.000001	-0.000008
43.101	147.4415	0.6298022		0.003529693	0.00211343		1	1	-8		-1E-06	0.000001	-0.000008
43.201	158.7044	0.6394461		0.003799322	0.002145792		1	1	-7		-1E-06	0.000001	-0.000007
43.3	176.1107	0.6422015		0.004216023	0.002155039		1	1	-8		-1E-06	0.000001	-0.000008
43.4	111.605	0.6423983		0.002671781	0.002155699		1	1	-8		-1E-06	0.000001	-0.000008
43.5	111.605	0.6423983		0.002671781	0.002155699		1	0	-8		-1E-06	0	-0.000008
43.6	117.7484	0.6536166		0.002818852	0.002193344		2	1	-8		-2E-06	0.000001	-0.000008
43.702	135.1547	0.6549943		0.003235552	0.002197967		1	1	-8		-1E-06	0.000001	-0.000008
43.8	152.561	0.6549943		0.003652252	0.002197967		1	1	-8		-1E-06	0.000001	-0.000008
43.901	135.1547	0.6662127		0.003235552	0.002235613		1	1	-8		-1E-06	0.000001	-0.000008
44	152.561	0.6675904		0.003652252	0.002240236		1	1	-8		-1E-06	0.000001	-0.000008
44.1	158.7044	0.6675904		0.003799322	0.002240236		2	0	-8		-2E-06	0	-0.000008
44.201	152.561	0.6740852		0.003652252	0.002262031		2	0	-8		-2E-06	0	-0.000008
44.3	152.561	0.679596		0.003652252	0.002280523		2	1	-9		-2E-06	0.000001	-0.000009
44.4	164.8478	0.6801865		0.003946393	0.002282505		1	1	-7		-1E-06	0.000001	-0.000007
44.501	211.9472	0.6801865		0.005073935	0.002282505		2	1	-9		-2E-06	0.000001	-0.000009
44.601	235.4968	0.6914048		0.005637703	0.00232015		2	1	-8		-2E-06	0.000001	-0.000008
44.702	194.5409	0.6927825		0.004657234	0.002324773		2	0	-8		-2E-06	0	-0.000008
44.8	223.2101	0.6927825		0.005343564	0.002324773		1	1	-8		-1E-06	0.000001	-0.000008
44.901	259.0465	0.6992773		0.006201474	0.002346568		1	1	-9		-1E-06	0.000001	-0.000009
45	276.4528	0.7047881		0.006618174	0.002365061		2	1	-9		-2E-06	0.000001	-0.000009
45.101	294.883	0.7053785		0.007059386	0.002367042		1	0	-9		-1E-06	0	-0.000009
45.201	312.2893	0.7053785		0.007476086	0.002367042		2	1	-8		-2E-06	0.000001	-0.000008
45.3	323.5522	0.7165968		0.007745716	0.002404687		1	0	-8		-1E-06	0	-0.000008
45.4	341.9824	0.7179745		0.008186927	0.00240931		1	2	-8		-1E-06	0.000002	-0.000008
45.5	347.1019	0.7179745		0.008309486	0.00240931		1	1	-9		-1E-06	0.000001	-0.000009
45.601	376.795	0.7244694		0.009020328	0.002431105		2	1	-8		-2E-06	0.000001	-0.000008
45.7	389.0817	0.7299802		0.009314467	0.002449598		1	1	-7		-1E-06	0.000001	-0.000007
45.801	395.2251	0.7305706		0.009461537	0.002451579		1	1	-5		-1E-06	0.000001	-0.000005
45.9	335.839	0.7305706		0.008039857	0.002451579		2	1	-6		-2E-06	0.000001	-0.000006

46	329.6956	0.7305706		0.007892786	0.002451579		2	0	-6		-2E-06	0	-0.000006
46.101	335.839	0.7417889		0.008039857	0.002489224		2	1	-6		-2E-06	0.000001	-0.000006
46.2	353.2453	0.7431666		0.008456557	0.002493848		2	0	-7		-2E-06	0	-0.000007
46.301	371.6754	0.7431666		0.008897766	0.002493848		1	0	-6		-1E-06	0	-0.000006
46.4	389.0817	0.7496614		0.009314467	0.002515642		2	0	-6		-2E-06	0	-0.000006
46.5	400.3446	0.7551723		0.009584096	0.002534135		2	1	-6		-2E-06	0.000001	-0.000006
46.6	412.6314	0.7557627		0.009878237	0.002536116		2	1	-6		-2E-06	0.000001	-0.000006
46.701	406.488	0.7557627		0.009731167	0.002536116		2	0	-6		-2E-06	0	-0.000006
46.8	382.9384	0.766981		0.009167398	0.002573762		2	0	-7		-2E-06	0	-0.000007
46.9	382.9384	0.7683587		0.009167398	0.002578385		2	0	-7		-2E-06	0	-0.000007
47.001	389.0817	0.7683587		0.009314467	0.002578385		2	1	-7		-2E-06	0.000001	-0.000007
47.101	406.488	0.7795771		0.009731167	0.002616031		2	1	-8		-2E-06	0.000001	-0.000008
47.2	418.7748	0.7809548		0.010025308	0.002620654		2	0	-8		-2E-06	0	-0.000008
47.3	323.5522	0.7809548		0.007745716	0.002620654		2	0	-7		-2E-06	0	-0.000007
47.4	382.9384	0.7905986		0.009167398	0.002653015		2	1	-8		-2E-06	0.000001	-0.000008
47.5	359.3887	0.793354		0.008603628	0.002662262		2	0	-8		-2E-06	0	-0.000008
47.601	382.9384	0.7935508		0.009167398	0.002662922		1	1	-8		-1E-06	0.000001	-0.000008
47.7	430.0377	0.8000457		0.010294938	0.002684717		1	1	-9		-1E-06	0.000001	-0.000009
47.8	459.7308	0.8055564		0.011005779	0.002703209		1	1	-8		-1E-06	0.000001	-0.000008
47.9	483.2805	0.8061469		0.01156955	0.002705191		2	1	-7		-2E-06	0.000001	-0.000007
48	500.6868	0.8061469		0.01198625	0.002705191		2	1	-8		-2E-06	0.000001	-0.000008
48.101	512.9736	0.8173652		0.012280391	0.002742836		2	1	-8		-2E-06	0.000001	-0.000008
48.2	524.2365	0.8187429		0.012550021	0.002747459		2	1	-9		-2E-06	0.000001	-0.000009
48.3	530.3798	0.8187429		0.012697089	0.002747459		2	1	-8		-2E-06	0.000001	-0.000008
48.402	506.8302	0.8283867		0.012133321	0.002779821		2	0	-8		-2E-06	0	-0.000008
48.5	470.9937	0.8311421		0.011275408	0.002789067		3	1	-8		-3E-06	0.000001	-0.000008
48.601	524.2365	0.8313389		0.012550021	0.002789728		2	1	-8		-2E-06	0.000001	-0.000008
48.7	536.5233	0.8378338		0.012844162	0.002811523		2	0	-8		-2E-06	0	-0.000008
48.801	489.4239	0.8433446		0.01171662	0.002830015		2	1	-8		-2E-06	0.000001	-0.000008
48.901	536.5233	0.843935		0.012844162	0.002831997		2	1	-9		-2E-06	0.000001	-0.000009
49.001	560.0729	0.843935		0.01340793	0.002831997		2	1	-8		-2E-06	0.000001	-0.000008

49.1	577.4792	0.8535788		0.01382463	0.002864358		1	1	-8		-1E-06	0.000001	-0.000008
49.201	589.766	0.8563342		0.014118772	0.002873605		1	1	-9		-1E-06	0.000001	-0.000009
49.3	607.1723	0.856531		0.014535472	0.002874265		2	0	-8		-2E-06	0	-0.000008
49.4	619.4591	0.856531		0.014829613	0.002874265		1	1	-8		-1E-06	0.000001	-0.000008
49.5	624.5786	0.8661749		0.014952172	0.002906627		1	0	-9		-1E-06	0	-0.000009
49.601	643.0088	0.8689303		0.015393384	0.002915873		2	1	-9		-2E-06	0.000001	-0.000009
49.701	648.1282	0.8691271		0.01551594	0.002916534		3	1	-9		-3E-06	0.000001	-0.000009
49.801	648.1282	0.8691271		0.01551594	0.002916534		2	1	-9		-2E-06	0.000001	-0.000009
49.902	371.6754	0.8787709		0.008897766	0.002948896		2	1	-9		-2E-06	0.000001	-0.000009
50	447.444	0.8815264		0.010711638	0.002958142		2	1	-6		-2E-06	0.000001	-0.000006
50.1	459.7308	0.8817232		0.011005779	0.002958803		1	1	-6		-1E-06	0.000001	-0.000006
50.2	506.8302	0.8817232		0.012133321	0.002958803		2	1	-6		-2E-06	0.000001	-0.000006
50.302	547.7861	0.8929415		0.013113789	0.002996448		2	1	-6		-2E-06	0.000001	-0.000006
50.4	577.4792	0.8943192		0.01382463	0.003001071		2	1	-7		-2E-06	0.000001	-0.000007
50.502	613.3157	0.8943192		0.014682543	0.003001071		1	0	-7		-1E-06	0	-0.000007
50.601	636.8654	0.8943192		0.015246313	0.003001071		2	1	-7		-2E-06	0.000001	-0.000007
50.702	666.5585	0.900814		0.015957155	0.003022866		3	1	-7		-3E-06	0.000001	-0.000007
50.801	683.9647	0.9063248		0.016373852	0.003041358		1	1	-8		-1E-06	0.000001	-0.000008
50.9	690.1082	0.9069152		0.016520925	0.00304334		2	0	-8		-2E-06	0	-0.000008
51	713.6578	0.9069152		0.017084694	0.00304334		2	0	-7		-2E-06	0	-0.000007
51.1	713.6578	0.9069152		0.017084694	0.00304334		2	1	-8		-2E-06	0.000001	-0.000008
51.2	724.9207	0.9181336		0.017354323	0.003080985		2	0	-8		-2E-06	0	-0.000008
51.301	731.0641	0.9195113		0.017501394	0.003085608		2	1	-9		-2E-06	0.000001	-0.000009
51.401	724.9207	0.9195113		0.017354323	0.003085608		1	0	-8		-1E-06	0	-0.000008
51.501	737.2075	0.9195113		0.017648465	0.003085608		1	1	-8		-1E-06	0.000001	-0.000008
51.601	683.9647	0.9260061		0.016373852	0.003107403		2	0	-8		-2E-06	0	-0.000008
51.701	677.8214	0.9315169		0.016226784	0.003125896		2	1	-9		-2E-06	0.000001	-0.000009
51.801	683.9647	0.9321073		0.016373852	0.003127877		2	0	-7		-2E-06	0	-0.000007
51.9	690.1082	0.9321073		0.016520925	0.003127877		2	1	-9		-2E-06	0.000001	-0.000009
52.002	701.371	0.9321073		0.016790553	0.003127877		2	1	-9		-2E-06	0.000001	-0.000009
52.101	695.2276	0.9386021		0.016643482	0.003149671		1	1	-9		-1E-06	0.000001	-0.000009

52.201	707.5144	0.9441129		0.016937623	0.003168164		2	1	-9		-2E-06	0.000001	-0.000009
52.301	713.6578	0.9447033		0.017084694	0.003170145		2	0	-9		-2E-06	0	-0.000009
52.4	719.8012	0.9447033		0.017231765	0.003170145		1	1	-9		-1E-06	0.000001	-0.000009
52.5	719.8012	0.9447033		0.017231765	0.003170145		2	1	-8		-2E-06	0.000001	-0.000008
52.6	731.0641	0.9447033		0.017501394	0.003170145		2	1	-9		-2E-06	0.000001	-0.000009
52.701	724.9207	0.9511982		0.017354323	0.00319194		2	2	-10		-2E-06	0.000002	-0.00001
52.802	731.0641	0.956709		0.017501394	0.003210433		2	2	-9		-2E-06	0.000002	-0.000009
52.9	737.2075	0.9572994		0.017648465	0.003212414		3	1	-9		-3E-06	0.000001	-0.000009
53.001	743.3509	0.9572994		0.017795535	0.003212414		1	1	-10		-1E-06	0.000001	-0.00001
53.101	724.9207	0.9572994		0.017354323	0.003212414		1	0	-9		-1E-06	0	-0.000009
53.201	719.8012	0.9572994		0.017231765	0.003212414		2	1	-10		-2E-06	0.000001	-0.00001
53.302	737.2075	0.9572994		0.017648465	0.003212414		2	1	-9		-2E-06	0.000001	-0.000009
53.401	737.2075	0.9685178		0.017648465	0.00325006		2	1	-9		-2E-06	0.000001	-0.000009
53.501	743.3509	0.9698955		0.017795535	0.003254683		2	0	-5		-2E-06	0	-0.000005
53.6	731.0641	0.9698955		0.017501394	0.003254683		2	1	-7		-2E-06	0.000001	-0.000007
53.7	731.0641	0.9698955		0.017501394	0.003254683		2	0	-6		-2E-06	0	-0.000006
53.8	743.3509	0.9698955		0.017795535	0.003254683		2	0	-8		-2E-06	0	-0.000008
53.9	743.3509	0.9698955		0.017795535	0.003254683		2	0	-8		-2E-06	0	-0.000008
54	731.0641	0.9763903		0.017501394	0.003276478		2	0	-8		-2E-06	0	-0.000008
54.1	737.2075	0.981901		0.017648465	0.00329497		1	0	-8		-1E-06	0	-0.000008
54.2	583.6226	0.9824915		0.013971701	0.003296951		2	1	-8		-2E-06	0.000001	-0.000008
54.302	601.0289	0.9824915		0.014388401	0.003296951		2	1	-8		-2E-06	0.000001	-0.000008
54.401	643.0088	0.9824915		0.015393384	0.003296951		2	1	-9		-2E-06	0.000001	-0.000009
54.5	660.415	0.9824915		0.015810082	0.003296951		1	1	-9		-1E-06	0.000001	-0.000009
54.601	677.8214	0.9921353		0.016226784	0.003329313		1	1	-9		-1E-06	0.000001	-0.000009
54.7	690.1082	0.9948907		0.016520925	0.003338559		2	1	-9		-2E-06	0.000001	-0.000009
54.801	695.2276	0.9950876		0.016643482	0.00333922		2	1	-9		-2E-06	0.000001	-0.000009
54.901	713.6578	0.9950876		0.017084694	0.00333922		3	1	-9		-3E-06	0.000001	-0.000009
55	707.5144	0.9950876		0.016937623	0.00333922		2	1	-10		-2E-06	0.000001	-0.00001
55.1	724.9207	0.9950876		0.017354323	0.00333922		2	1	-9		-2E-06	0.000001	-0.000009
55.2	724.9207	0.9950876		0.017354323	0.00333922		2	1	-9		-2E-06	0.000001	-0.000009

55.301	737.2075	0.9950876		0.017648465	0.00333922		2	1	-10		-2E-06	0.000001	-0.00001
55.4	719.8012	1.004731		0.017231765	0.003371581		2	1	-10		-2E-06	0.000001	-0.00001
55.5	607.1723	1.007487		0.014535472	0.003380829		2	1	-11		-2E-06	0.000001	-0.000011
55.6	630.722	1.007684		0.015099243	0.00338149		2	1	-10		-2E-06	0.000001	-0.00001
55.701	654.2717	1.007684		0.015663013	0.00338149		2	1	-10		-2E-06	0.000001	-0.00001
55.8	671.6779	1.007684		0.016079711	0.00338149		2	1	-10		-2E-06	0.000001	-0.00001
55.901	677.8214	1.007684		0.016226784	0.00338149		2	1	-10		-2E-06	0.000001	-0.00001
56.002	677.8214	1.007684		0.016226784	0.00338149		2	1	-10		-2E-06	0.000001	-0.00001
56.101	701.371	1.018902		0.016790553	0.003419134		2	1	-10		-2E-06	0.000001	-0.00001
56.2	701.371	1.02028		0.016790553	0.003423758		2	1	-10		-2E-06	0.000001	-0.00001
56.302	707.5144	1.02028		0.016937623	0.003423758		1	0	-8		-1E-06	0	-0.000008
56.402	719.8012	1.02028		0.017231765	0.003423758		2	1	-7		-2E-06	0.000001	-0.000007
56.502	707.5144	1.02028		0.016937623	0.003423758		2	1	-7		-2E-06	0.000001	-0.000007
56.601	613.3157	1.02028		0.014682543	0.003423758		2	1	-8		-2E-06	0.000001	-0.000008
56.7	654.2717	1.02028		0.015663013	0.003423758		2	1	-8		-2E-06	0.000001	-0.000008
56.801	677.8214	1.031498		0.016226784	0.003461403		2	1	-8		-2E-06	0.000001	-0.000008
56.9	701.371	1.032876		0.016790553	0.003466027		2	2	-8		-2E-06	0.000002	-0.000008
57.001	731.0641	1.032876		0.017501394	0.003466027		2	0	-9		-2E-06	0	-0.000009
57.102	743.3509	1.032876		0.017795535	0.003466027		2	1	-9		-2E-06	0.000001	-0.000009
57.2	754.6138	1.032876		0.018065165	0.003466027		1	1	-9		-1E-06	0.000001	-0.000009
57.3	754.6138	1.032876		0.018065165	0.003466027		2	0	-9		-2E-06	0	-0.000009
57.4	630.722	1.03937		0.015099243	0.003487819		2	1	-10		-2E-06	0.000001	-0.00001
57.501	660.415	1.044881		0.015810082	0.003506312		2	1	-10		-2E-06	0.000001	-0.00001
57.601	695.2276	1.045472		0.016643482	0.003508295		3	1	-10		-3E-06	0.000001	-0.00001
57.7	719.8012	1.045472		0.017231765	0.003508295		2	2	-10		-2E-06	0.000002	-0.00001
57.8	737.2075	1.045472		0.017648465	0.003508295		2	1	-10		-2E-06	0.000001	-0.00001
57.9	748.4704	1.045472		0.017918094	0.003508295		3	1	-10		-3E-06	0.000001	-0.00001
58.002	754.6138	1.045472		0.018065165	0.003508295		2	1	-10		-2E-06	0.000001	-0.00001
58.1	778.1635	1.045472		0.018628936	0.003508295		2	1	-10		-2E-06	0.000001	-0.00001
58.201	772.0201	1.045472		0.018481865	0.003508295		2	1	-10		-2E-06	0.000001	-0.00001
58.302	790.4503	1.05669		0.018923077	0.00354594		2	1	-10		-2E-06	0.000001	-0.00001

58.401	790.4503	1.058068		0.018923077	0.003550564		2	1	-10		-2E-06	0.000001	-0.00001
58.5	807.8566	1.058068		0.019339777	0.003550564		2	0	-10		-2E-06	0	-0.00001
58.6	813.9999	1.058068		0.019486845	0.003550564		2	1	-10		-2E-06	0.000001	-0.00001
58.701	690.1082	1.058068		0.016520925	0.003550564		2	1	-10		-2E-06	0.000001	-0.00001
58.801	666.5585	1.058068		0.015957155	0.003550564		2	1	-10		-2E-06	0.000001	-0.00001
58.901	701.371	1.058068		0.016790553	0.003550564		2	0	-10		-2E-06	0	-0.00001
59	731.0641	1.069286		0.017501394	0.003588208		3	1	-11		-3E-06	0.000001	-0.000011
59.101	748.4704	1.070664		0.017918094	0.003592832		2	1	-10		-2E-06	0.000001	-0.00001
59.201	784.3069	1.070664		0.018776006	0.003592832		2	1	-11		-2E-06	0.000001	-0.000011
59.302	790.4503	1.070664		0.018923077	0.003592832		2	1	-10		-2E-06	0.000001	-0.00001
59.401	801.7131	1.070664		0.019192704	0.003592832		2	2	-11		-2E-06	0.000002	-0.000011
59.501	819.1194	1.070664		0.019609404	0.003592832		2	2	-10		-2E-06	0.000002	-0.00001
59.601	825.2628	1.070664		0.019756475	0.003592832		2	2	-10		-2E-06	0.000002	-0.00001
59.7	837.5496	1.070664		0.020050616	0.003592832		3	0	-7		-3E-06	0	-0.000007
59.8	843.6931	1.080308		0.020197689	0.003625195		2	1	-8		-2E-06	0.000001	-0.000008
59.9	848.8125	1.083063		0.020320246	0.00363444		2	1	-8		-2E-06	0.000001	-0.000008
60.001	843.6931	1.08326		0.020197689	0.003635101		1	1	-8		-1E-06	0.000001	-0.000008
60.102	867.2427	1.08326		0.020761457	0.003635101		2	1	-8		-2E-06	0.000001	-0.000008
60.2	861.0993	1.08326		0.020614387	0.003635101		2	1	-8		-2E-06	0.000001	-0.000008
60.3	854.9559	1.08326		0.020467316	0.003635101		2	2	-9		-2E-06	0.000002	-0.000009
60.4	861.0993	1.08326		0.020614387	0.003635101		3	1	-9		-3E-06	0.000001	-0.000009
60.501	671.6779	1.08326		0.016079711	0.003635101		2	1	-9		-2E-06	0.000001	-0.000009
60.602	701.371	1.094478		0.016790553	0.003672745		2	1	-9		-2E-06	0.000001	-0.000009
60.701	731.0641	1.095856		0.017501394	0.003677369		3	1	-10		-3E-06	0.000001	-0.00001
60.8	760.7572	1.095856		0.018212235	0.003677369		2	1	-10		-2E-06	0.000001	-0.00001
60.902	772.0201	1.095856		0.018481865	0.003677369		3	1	-10		-3E-06	0.000001	-0.00001
61.001	784.3069	1.095856		0.018776006	0.003677369		1	1	-10		-1E-06	0.000001	-0.00001
61.1	801.7131	1.095856		0.019192704	0.003677369		1	1	-10		-1E-06	0.000001	-0.00001
61.2	825.2628	1.095856		0.019756475	0.003677369		2	0	-10		-2E-06	0	-0.00001
61.301	843.6931	1.095856		0.020197689	0.003677369		2	1	-10		-2E-06	0.000001	-0.00001
61.401	861.0993	1.095856		0.020614387	0.003677369		2	2	-10		-2E-06	0.000002	-0.00001

61.501	854.9559	1.1055		0.020467316	0.003709732		2	1	-10		-2E-06	0.000001	-0.00001
61.601	867.2427	1.108255		0.020761457	0.003718977		2	2	-10		-2E-06	0.000002	-0.00001
61.701	872.3622	1.108452		0.020884016	0.003719638		1	1	-10		-1E-06	0.000001	-0.00001
61.801	884.649	1.108452		0.021178158	0.003719638		1	1	-10		-1E-06	0.000001	-0.00001
61.9	884.649	1.108452		0.021178158	0.003719638		2	1	-10		-2E-06	0.000001	-0.00001
62.001	872.3622	1.108452		0.020884016	0.003719638		2	0	-11		-2E-06	0	-0.000011
62.101	884.649	1.108452		0.021178158	0.003719638		2	2	-10		-2E-06	0.000002	-0.00001
62.201	884.649	1.108452		0.021178158	0.003719638		2	1	-10		-2E-06	0.000001	-0.00001
62.301	884.649	1.108452		0.021178158	0.003719638		3	1	-10		-3E-06	0.000001	-0.00001
62.401	878.5056	1.108452		0.021031087	0.003719638		2	1	-11		-2E-06	0.000001	-0.000011
62.502	867.2427	1.114947		0.020761457	0.003741433		2	1	-11		-2E-06	0.000001	-0.000011
62.601	872.3622	1.120458		0.020884016	0.003759926		2	1	-11		-2E-06	0.000001	-0.000011
62.701	884.649	1.121048		0.021178158	0.003761906		2	1	-11		-2E-06	0.000001	-0.000011
62.802	884.649	1.121048		0.021178158	0.003761906		2	1	-11		-2E-06	0.000001	-0.000011
62.901	895.9119	1.121048		0.021447787	0.003761906		2	1	-10		-2E-06	0.000001	-0.00001
63.001	902.0553	1.121048		0.021594858	0.003761906		1	1	-10		-1E-06	0.000001	-0.00001
63.101	648.1282	1.121048		0.01551594	0.003761906		2	0	-11		-2E-06	0	-0.000011
63.201	690.1082	1.121048		0.016520925	0.003761906		2	1	-11		-2E-06	0.000001	-0.000011
63.301	713.6578	1.121048		0.017084694	0.003761906		2	1	-11		-2E-06	0.000001	-0.000011
63.4	748.4704	1.121048		0.017918094	0.003761906		2	1	-10		-2E-06	0.000001	-0.00001
63.5	766.9006	1.130692		0.018359306	0.003794268		2	1	-11		-2E-06	0.000001	-0.000011
63.6	795.5698	1.133447		0.019045636	0.003803513		2	0	-11		-2E-06	0	-0.000011
63.701	807.8566	1.133644		0.019339777	0.003804174		1	2	-11		-1E-06	0.000002	-0.000011
63.8	831.4063	1.133644		0.019903548	0.003804174		2	1	-11		-2E-06	0.000001	-0.000011
63.901	848.8125	1.133644		0.020320246	0.003804174		2	1	-10		-2E-06	0.000001	-0.00001
64.001	854.9559	1.133644		0.020467316	0.003804174		2	1	-11		-2E-06	0.000001	-0.000011
64.1	872.3622	1.133644		0.020884016	0.003804174		2	1	-11		-2E-06	0.000001	-0.000011
64.201	884.649	1.133644		0.021178158	0.003804174		2	1	-11		-2E-06	0.000001	-0.000011
64.301	890.7924	1.133644		0.021325228	0.003804174		2	1	-11		-2E-06	0.000001	-0.000011
64.401	890.7924	1.133644		0.021325228	0.003804174		2	1	-11		-2E-06	0.000001	-0.000011
64.501	895.9119	1.144862		0.021447787	0.003841819		1	1	-11		-1E-06	0.000001	-0.000011

64.6	908.1987	1.14624		0.021741928	0.003846443		2	1	-11		-2E-06	0.000001	-0.000011
64.701	908.1987	1.14624		0.021741928	0.003846443		2	2	-10		-2E-06	0.000002	-0.00001
64.801	908.1987	1.14624		0.021741928	0.003846443		1	1	-11		-1E-06	0.000001	-0.000011
64.901	902.0553	1.14624		0.021594858	0.003846443		2	1	-11		-2E-06	0.000001	-0.000011
65.002	919.4616	1.14624		0.022011558	0.003846443		2	0	-11		-2E-06	0	-0.000011
65.1	925.605	1.14624		0.022158629	0.003846443		3	0	-11		-3E-06	0	-0.000011
65.201	931.7484	1.14624		0.022305699	0.003846443		1	1	-11		-1E-06	0.000001	-0.000011
65.301	931.7484	1.14624		0.022305699	0.003846443		2	0	-11		-2E-06	0	-0.000011
65.401	925.605	1.14624		0.022158629	0.003846443		2	1	-11		-2E-06	0.000001	-0.000011
65.501	931.7484	1.14624		0.022305699	0.003846443		2	1	-10		-2E-06	0.000001	-0.00001
65.6	943.0113	1.14624		0.022575329	0.003846443		2	0	-11		-2E-06	0	-0.000011
65.7	937.8918	1.157458		0.02245277	0.003884087		2	1	-11		-2E-06	0.000001	-0.000011
65.801	949.1547	1.158836		0.022722399	0.003888711		2	1	-11		-2E-06	0.000001	-0.000011
65.901	937.8918	1.158836		0.02245277	0.003888711		2	0	-11		-2E-06	0	-0.000011
66.001	943.0113	1.158836		0.022575329	0.003888711		2	1	-11		-2E-06	0.000001	-0.000011
66.101	949.1547	1.158836		0.022722399	0.003888711		2	1	-12		-2E-06	0.000001	-0.000012
66.201	955.298	1.158836		0.022869468	0.003888711		2	2	-11		-2E-06	0.000002	-0.000011
66.301	943.0113	1.158836		0.022575329	0.003888711		2	1	-11		-2E-06	0.000001	-0.000011
66.401	949.1547	1.158836		0.022722399	0.003888711		2	1	-11		-2E-06	0.000001	-0.000011
66.501	949.1547	1.158836		0.022722399	0.003888711		2	1	-11		-2E-06	0.000001	-0.000011
66.601	955.298	1.158836		0.022869468	0.003888711		2	1	-10		-2E-06	0.000001	-0.00001
66.701	961.4415	1.158836		0.023016541	0.003888711		2	0	-11		-2E-06	0	-0.000011
66.801	943.0113	1.158836		0.022575329	0.003888711		2	0	-11		-2E-06	0	-0.000011
66.901	955.298	1.170054		0.022869468	0.003926356		2	1	-11		-2E-06	0.000001	-0.000011
67.001	943.0113	1.171432		0.022575329	0.00393098		1	0	-11		-1E-06	0	-0.000011
67.1	943.0113	1.171432		0.022575329	0.00393098		1	1	-11		-1E-06	0.000001	-0.000011
67.201	937.8918	1.171432		0.02245277	0.00393098		2	1	-10		-2E-06	0.000001	-0.00001
67.301	943.0113	1.171432		0.022575329	0.00393098		2	0	-10		-2E-06	0	-0.00001
67.4	937.8918	1.171432		0.02245277	0.00393098		2	1	-10		-2E-06	0.000001	-0.00001
67.502	937.8918	1.171432		0.02245277	0.00393098		2	1	-10		-2E-06	0.000001	-0.00001
67.602	943.0113	1.171432		0.022575329	0.00393098		1	1	-10		-1E-06	0.000001	-0.00001

67.702	943.0113	1.171432		0.022575329	0.00393098		2	1	-10		-2E-06	0.000001	-0.00001
67.802	943.0113	1.171432		0.022575329	0.00393098		2	1	-10		-2E-06	0.000001	-0.00001
67.9	660.415	1.171432		0.015810082	0.00393098		1	1	-10		-1E-06	0.000001	-0.00001
68	683.9647	1.171432		0.016373852	0.00393098		2	1	-10		-2E-06	0.000001	-0.00001
68.101	713.6578	1.177927		0.017084694	0.003952775		1	1	-10		-1E-06	0.000001	-0.00001
68.2	737.2075	1.183438		0.017648465	0.003971268		3	1	-10		-3E-06	0.000001	-0.00001
68.301	754.6138	1.184028		0.018065165	0.003973248		2	1	-10		-2E-06	0.000001	-0.00001
68.4	790.4503	1.184028		0.018923077	0.003973248		2	0	-10		-2E-06	0	-0.00001
68.5	790.4503	1.184028		0.018923077	0.003973248		2	1	-10		-2E-06	0.000001	-0.00001
68.602	807.8566	1.184028		0.019339777	0.003973248		2	1	-10		-2E-06	0.000001	-0.00001
68.7	831.4063	1.184028		0.019903548	0.003973248		2	0	-10		-2E-06	0	-0.00001
68.801	848.8125	1.184028		0.020320246	0.003973248		1	0	-10		-1E-06	0	-0.00001
68.9	872.3622	1.184028		0.020884016	0.003973248		1	1	-10		-1E-06	0.000001	-0.00001
69	884.649	1.184028		0.021178158	0.003973248		2	2	-10		-2E-06	0.000002	-0.00001
69.101	884.649	1.184028		0.021178158	0.003973248		1	0	-10		-1E-06	0	-0.00001
69.2	908.1987	1.184028		0.021741928	0.003973248		2	2	-10		-2E-06	0.000002	-0.00001
69.3	914.3421	1.193672		0.021888999	0.004005611		1	1	-11		-1E-06	0.000001	-0.000011
69.401	914.3421	1.196427		0.021888999	0.004014856		1	1	-10		-1E-06	0.000001	-0.00001
69.5	931.7484	1.196624		0.022305699	0.004015517		2	1	-11		-2E-06	0.000001	-0.000011
69.6	931.7484	1.196624		0.022305699	0.004015517		2	0	-11		-2E-06	0	-0.000011
69.7	931.7484	1.196624		0.022305699	0.004015517		3	0	-11		-3E-06	0	-0.000011
69.801	937.8918	1.196624		0.02245277	0.004015517		2	1	-10		-2E-06	0.000001	-0.00001
69.9	949.1547	1.196624		0.022722399	0.004015517		1	1	-11		-1E-06	0.000001	-0.000011
70.001	943.0113	1.196624		0.022575329	0.004015517		2	1	-10		-2E-06	0.000001	-0.00001
70.101	949.1547	1.196624		0.022722399	0.004015517		1	0	-11		-1E-06	0	-0.000011
70.201	955.298	1.196624		0.022869468	0.004015517		2	1	-11		-2E-06	0.000001	-0.000011
70.301	967.5848	1.196624		0.023163609	0.004015517		1	1	-11		-1E-06	0.000001	-0.000011
70.401	949.1547	1.196624		0.022722399	0.004015517		1	1	-11		-1E-06	0.000001	-0.000011
70.502	967.5848	1.196624		0.023163609	0.004015517		1	0	-10		-1E-06	0	-0.00001
70.6	967.5848	1.196624		0.023163609	0.004015517		1	0	-11		-1E-06	0	-0.000011
70.701	961.4415	1.196624		0.023016541	0.004015517		1	0	-10		-1E-06	0	-0.00001

70.8	955.298	1.196624		0.022869468	0.004015517		1	1	-12		-1E-06	0.000001	-0.000012
70.901	972.7043	1.206268		0.023286168	0.004047879		1	1	-11		-1E-06	0.000001	-0.000011
71	978.8477	1.209023		0.023433238	0.004057124		1	1	-11		-1E-06	0.000001	-0.000011
71.101	978.8477	1.20922		0.023433238	0.004057785		2	1	-11		-2E-06	0.000001	-0.000011
71.2	984.9911	1.20922		0.023580309	0.004057785		2	0	-11		-2E-06	0	-0.000011
71.301	991.1345	1.20922		0.02372738	0.004057785		2	1	-11		-2E-06	0.000001	-0.000011
71.401	978.8477	1.20922		0.023433238	0.004057785		2	0	-12		-2E-06	0	-0.000012
71.5	991.1345	1.20922		0.02372738	0.004057785		2	0	-11		-2E-06	0	-0.000011
71.6	996.254	1.20922		0.023849938	0.004057785		2	0	-11		-2E-06	0	-0.000011
71.701	978.8477	1.20922		0.023433238	0.004057785		2	0	-11		-2E-06	0	-0.000011
71.802	996.254	1.20922		0.023849938	0.004057785		1	1	-11		-1E-06	0.000001	-0.000011
71.901	996.254	1.20922		0.023849938	0.004057785		1	1	-11		-1E-06	0.000001	-0.000011
72.001	984.9911	1.20922		0.023580309	0.004057785		1	1	-11		-1E-06	0.000001	-0.000011
72.102	984.9911	1.20922		0.023580309	0.004057785		1	0	-11		-1E-06	0	-0.000011
72.201	991.1345	1.20922		0.02372738	0.004057785		2	1	-11		-2E-06	0.000001	-0.000011
72.301	991.1345	1.218864		0.02372738	0.004090148		2	1	-11		-2E-06	0.000001	-0.000011
72.401	984.9911	1.221619		0.023580309	0.004099393		1	1	-11		-1E-06	0.000001	-0.000011
72.5	996.254	1.221816		0.023849938	0.004100054		1	0	-11		-1E-06	0	-0.000011
72.6	1008.541	1.221816		0.024144085	0.004100054		1	1	-11		-1E-06	0.000001	-0.000011
72.7	1002.397	1.221816		0.023997	0.004100054		2	1	-11		-2E-06	0.000001	-0.000011
72.801	1008.541	1.221816		0.024144085	0.004100054		1	1	-11		-1E-06	0.000001	-0.000011
72.902	1002.397	1.221816		0.023997	0.004100054		1	1	-12		-1E-06	0.000001	-0.000012
73.001	1008.541	1.221816		0.024144085	0.004100054		1	1	-12		-1E-06	0.000001	-0.000012
73.101	1002.397	1.221816		0.023997	0.004100054		0	0	-12		0	0	-0.000012
73.201	1025.947	1.221816		0.024560778	0.004100054		1	1	-12		-1E-06	0.000001	-0.000012
73.3	1032.09	1.221816		0.024707839	0.004100054		1	1	-11		-1E-06	0.000001	-0.000011
73.4	1019.804	1.221816		0.024413716	0.004100054		2	1	-11		-2E-06	0.000001	-0.000011
73.5	1025.947	1.221816		0.024560778	0.004100054		2	1	-12		-2E-06	0.000001	-0.000012
73.601	1019.804	1.221816		0.024413716	0.004100054		1	0	-11		-1E-06	0	-0.000011
73.701	1038.234	1.228311		0.024854924	0.004121849		2	1	-12		-2E-06	0.000001	-0.000012
73.801	1032.09	1.233822		0.024707839	0.004140342		1	0	-12		-1E-06	0	-0.000012

73.901	1038.234	1.234412		0.024854924	0.004142322		2	0	-12		-2E-06	0	-0.000012
74.001	1032.09	1.234412		0.024707839	0.004142322		1	1	-12		-1E-06	0.000001	-0.000012
74.101	1038.234	1.234412		0.024854924	0.004142322		1	1	-12		-1E-06	0.000001	-0.000012
74.201	1049.497	1.234412		0.025124555	0.004142322		1	0	-12		-1E-06	0	-0.000012
74.3	1049.497	1.234412		0.025124555	0.004142322		1	0	-11		-1E-06	0	-0.000011
74.401	1049.497	1.234412		0.025124555	0.004142322		1	1	-11		-1E-06	0.000001	-0.000011
74.5	1043.353	1.234412		0.02497747	0.004142322		1	1	-11		-1E-06	0.000001	-0.000011
74.601	1049.497	1.234412		0.025124555	0.004142322		2	1	-11		-2E-06	0.000001	-0.000011
74.7	1055.64	1.234412		0.025271617	0.004142322		2	1	-12		-2E-06	0.000001	-0.000012
74.8	1055.64	1.234412		0.025271617	0.004142322		1	1	-12		-1E-06	0.000001	-0.000012
74.901	1061.784	1.234412		0.025418702	0.004142322		2	1	-12		-2E-06	0.000001	-0.000012
75.001	1066.903	1.234412		0.025541248	0.004142322		2	0	-12		-2E-06	0	-0.000012
75.1	1055.64	1.234412		0.025271617	0.004142322		1	1	-12		-1E-06	0.000001	-0.000012
75.202	1066.903	1.244056		0.025541248	0.004174685		2	0	-12		-2E-06	0	-0.000012
75.301	1066.903	1.246812		0.025541248	0.004183933		1	0	-11		-1E-06	0	-0.000011
75.401	1073.047	1.247008		0.025688333	0.004184591		1	0	-12		-1E-06	0	-0.000012
75.5	1079.19	1.247008		0.025835394	0.004184591		2	0	-12		-2E-06	0	-0.000012
75.601	1079.19	1.247008		0.025835394	0.004184591		1	0	-12		-1E-06	0	-0.000012
75.702	1061.784	1.247008		0.025418702	0.004184591		2	1	-12		-2E-06	0.000001	-0.000012
75.801	1079.19	1.247008		0.025835394	0.004184591		2	0	-11		-2E-06	0	-0.000011
75.902	1073.047	1.247008		0.025688333	0.004184591		1	0	-12		-1E-06	0	-0.000012
76.001	1079.19	1.247008		0.025835394	0.004184591		1	0	-12		-1E-06	0	-0.000012
76.101	1085.333	1.247008		0.025982456	0.004184591		1	0	-12		-1E-06	0	-0.000012
76.201	1091.477	1.247008		0.026129541	0.004184591		1	1	-12		-1E-06	0.000001	-0.000012
76.301	1091.477	1.247008		0.026129541	0.004184591		1	0	-13		-1E-06	0	-0.000013
76.401	991.1345	1.247008		0.02372738	0.004184591		1	1	-12		-1E-06	0.000001	-0.000012
76.501	683.9647	1.256652		0.016373852	0.004216953		2	1	-12		-2E-06	0.000001	-0.000012
76.602	724.9207	1.259408		0.017354323	0.004226201		1	0	-11		-1E-06	0	-0.000011
76.7	748.4704	1.259604		0.017918094	0.004226859		1	0	-12		-1E-06	0	-0.000012
76.8	748.4704	1.259604		0.017918094	0.004226859		1	1	-11		-1E-06	0.000001	-0.000011
76.901	790.4503	1.259604		0.018923077	0.004226859		1	1	-12		-1E-06	0.000001	-0.000012

77	801.7131	1.259604		0.019192704	0.004226859		2	0	-12		-2E-06	0	-0.000012
77.101	819.1194	1.259604		0.019609404	0.004226859		1	1	-12		-1E-06	0.000001	-0.000012
77.201	843.6931	1.259604		0.020197689	0.004226859		2	0	-12		-2E-06	0	-0.000012
77.3	861.0993	1.259604		0.020614387	0.004226859		1	1	-12		-1E-06	0.000001	-0.000012
77.401	878.5056	1.259604		0.021031087	0.004226859		1	0	-12		-1E-06	0	-0.000012
77.5	895.9119	1.259604		0.021447787	0.004226859		1	0	-12		-1E-06	0	-0.000012
77.602	925.605	1.269248		0.022158629	0.004259221		1	0	-12		-1E-06	0	-0.000012
77.7	937.8918	1.272004		0.02245277	0.00426847		0	1	-13		0	0.000001	-0.000013
77.8	943.0113	1.272201		0.022575329	0.004269131		2	1	-13		-2E-06	0.000001	-0.000013
77.901	961.4415	1.272201		0.023016541	0.004269131		2	0	-13		-2E-06	0	-0.000013
78	991.1345	1.272201		0.02372738	0.004269131		1	0	-13		-1E-06	0	-0.000013
78.101	1002.397	1.272201		0.023997	0.004269131		2	0	-13		-2E-06	0	-0.000013
78.201	1008.541	1.272201		0.024144085	0.004269131		1	1	-14		-1E-06	0.000001	-0.000014
78.3	1019.804	1.272201		0.024413716	0.004269131		1	0	-12		-1E-06	0	-0.000012
78.4	1043.353	1.272201		0.02497747	0.004269131		1	1	-13		-1E-06	0.000001	-0.000013
78.501	1049.497	1.272201		0.025124555	0.004269131		0	0	-13		0	0	-0.000013
78.602	1061.784	1.272201		0.025418702	0.004269131		0	0	-13		0	0	-0.000013
78.7	1066.903	1.278695		0.025541248	0.004290923		1	0	-13		-1E-06	0	-0.000013
78.801	1091.477	1.284206		0.026129541	0.004309416		1	0	-13		-1E-06	0	-0.000013
78.901	1085.333	1.284797		0.025982456	0.004311399		2	0	-13		-2E-06	0	-0.000013
79.001	1096.596	1.284797		0.026252087	0.004311399		1	0	-13		-1E-06	0	-0.000013
79.1	1108.883	1.284797		0.026546234	0.004311399		1	1	-13		-1E-06	0.000001	-0.000013
79.201	1120.146	1.284797		0.026815865	0.004311399		1	0	-10		-1E-06	0	-0.00001
79.301	1102.74	1.284797		0.026399172	0.004311399		2	0	-7		-2E-06	0	-0.000007
79.401	1120.146	1.284797		0.026815865	0.004311399		2	0	-9		-2E-06	0	-0.000009
79.5	1120.146	1.284797		0.026815865	0.004311399		1	0	-8		-1E-06	0	-0.000008
79.6	1138.576	1.284797		0.027257073	0.004311399		2	0	-9		-2E-06	0	-0.000009
79.702	1132.433	1.284797		0.027110011	0.004311399		2	0	-9		-2E-06	0	-0.000009
79.801	1149.839	1.29444		0.027526704	0.004343758		1	1	-10		-1E-06	0.000001	-0.00001
79.9	1155.982	1.297196		0.027673766	0.004353007		1	0	-9		-1E-06	0	-0.000009
80.002	1155.982	1.297393		0.027673766	0.004353668		1	0	-10		-1E-06	0	-0.00001

80.1	1167.245	1.297393		0.027943397	0.004353668		2	0	-10		-2E-06	0	-0.00001
80.201	1167.245	1.297393		0.027943397	0.004353668		2	0	-10		-2E-06	0	-0.00001
80.3	1167.245	1.297393		0.027943397	0.004353668		2	0	-10		-2E-06	0	-0.00001
80.4	1173.389	1.297393		0.028090482	0.004353668		2	0	-11		-2E-06	0	-0.000011
80.501	1179.532	1.297393		0.028237543	0.004353668		2	0	-11		-2E-06	0	-0.000011
80.601	1185.675	1.303887		0.028384605	0.00437546		1	0	-11		-1E-06	0	-0.000011
80.7	854.9559	1.309398		0.020467316	0.004393953		2	1	-11		-2E-06	0.000001	-0.000011
80.8	778.1635	1.309989		0.018628936	0.004395936		2	1	-12		-2E-06	0.000001	-0.000012
80.901	819.1194	1.309989		0.019609404	0.004395936		1	0	-12		-1E-06	0	-0.000012
81.001	867.2427	1.309989		0.020761457	0.004395936		1	1	-11		-1E-06	0.000001	-0.000011
81.101	890.7924	1.309989		0.021325228	0.004395936		1	1	-12		-1E-06	0.000001	-0.000012
81.202	925.605	1.316483		0.022158629	0.004417728		1	0	-13		-1E-06	0	-0.000013
81.301	955.298	1.321994		0.022869468	0.004436221		1	0	-11		-1E-06	0	-0.000011
81.401	991.1345	1.322585		0.02372738	0.004438205		2	0	-12		-2E-06	0	-0.000012
81.502	1025.947	1.322585		0.024560778	0.004438205		1	0	-12		-1E-06	0	-0.000012
81.602	1043.353	1.322585		0.02497747	0.004438205		1	0	-12		-1E-06	0	-0.000012
81.7	1079.19	1.322585		0.025835394	0.004438205		2	0	-13		-2E-06	0	-0.000013
81.8	1096.596	1.322585		0.026252087	0.004438205		1	1	-13		-1E-06	0.000001	-0.000013
81.901	1120.146	1.322585		0.026815865	0.004438205		1	0	-13		-1E-06	0	-0.000013
82.001	1132.433	1.333803		0.027110011	0.004475849		1	0	-13		-1E-06	0	-0.000013
82.1	1138.576	1.335181		0.027257073	0.004480473		1	0	-12		-1E-06	0	-0.000012
82.201	1173.389	1.335181		0.028090482	0.004480473		2	0	-13		-2E-06	0	-0.000013
82.3	1167.245	1.335181		0.027943397	0.004480473		3	0	-13		-3E-06	0	-0.000013
82.4	1179.532	1.335181		0.028237543	0.004480473		2	0	-13		-2E-06	0	-0.000013
82.501	1196.938	1.335181		0.028654236	0.004480473		1	0	-13		-1E-06	0	-0.000013
82.601	1203.082	1.344825		0.028801321	0.004512836		1	0	-13		-1E-06	0	-0.000013
82.701	1220.488	1.34758		0.029218014	0.004522081		2	0	-12		-2E-06	0	-0.000012
82.8	1220.488	1.347777		0.029218014	0.004522742		1	0	-14		-1E-06	0	-0.000014
82.901	1238.918	1.347777		0.029659222	0.004522742		1	0	-13		-1E-06	0	-0.000013
83.002	1244.038	1.347777		0.029781792	0.004522742		2	1	-13		-2E-06	0.000001	-0.000013
83.102	1244.038	1.347777		0.029781792	0.004522742		2	0	-13		-2E-06	0	-0.000013

83.2	1238.918	1.357421		0.029659222	0.004555104		1	1	-13		-1E-06	0.000001	-0.000013
83.301	1232.775	1.360176		0.02951216	0.004564349		2	0	-14		-2E-06	0	-0.000014
83.4	1232.775	1.360373		0.02951216	0.00456501		1	1	-14		-1E-06	0.000001	-0.000014
83.5	1244.038	1.360373		0.029781792	0.00456501		1	0	-13		-1E-06	0	-0.000013
83.602	1232.775	1.360373		0.02951216	0.00456501		1	0	-13		-1E-06	0	-0.000013
83.7	1238.918	1.360373		0.029659222	0.00456501		2	0	-14		-2E-06	0	-0.000014
83.802	1256.324	1.366868		0.030075914	0.004586805		1	0	-14		-1E-06	0	-0.000014
83.901	1256.324	1.372378		0.030075914	0.004605295		1	0	-13		-1E-06	0	-0.000013
84.001	1273.731	1.372969		0.030492631	0.004607279		1	0	-14		-1E-06	0	-0.000014
84.1	1256.324	1.372969		0.030075914	0.004607279		1	0	-13		-1E-06	0	-0.000013
84.201	743.3509	1.372969		0.017795535	0.004607279		1	0	-14		-1E-06	0	-0.000014
84.301	813.9999	1.379464		0.019486845	0.004629074		3	0	-14		-3E-06	0	-0.000014
84.4	872.3622	1.384974		0.020884016	0.004647564		2	0	-15		-2E-06	0	-0.000015
84.501	914.3421	1.385565		0.021888999	0.004649547		1	0	-14		-1E-06	0	-0.000014
84.601	972.7043	1.385565		0.023286168	0.004649547		1	0	-14		-1E-06	0	-0.000014
84.701	996.254	1.385565		0.023849938	0.004649547		2	0	-14		-2E-06	0	-0.000014
84.801	1049.497	1.385565		0.025124555	0.004649547		1	1	-14		-1E-06	0.000001	-0.000014
84.901	1091.477	1.396783		0.026129541	0.004687191		2	0	-14		-2E-06	0	-0.000014
85.002	1126.289	1.398161		0.026962926	0.004691815		1	0	-14		-1E-06	0	-0.000014
85.101	1162.126	1.398161		0.027820851	0.004691815		1	0	-15		-1E-06	0	-0.000015
85.201	1191.819	1.398161		0.02853169	0.004691815		2	0	-15		-2E-06	0	-0.000015
85.302	1196.938	1.404656		0.028654236	0.004713611		1	1	-15		-1E-06	0.000001	-0.000015
85.4	1215.369	1.410167		0.029095467	0.004732104		2	1	-14		-2E-06	0.000001	-0.000014
85.5	1226.631	1.410757		0.029365075	0.004734084		1	0	-14		-1E-06	0	-0.000014
85.601	1250.181	1.410757		0.029928853	0.004734084		2	0	-15		-2E-06	0	-0.000015
85.701	1262.468	1.410757		0.030222999	0.004734084		2	1	-14		-2E-06	0.000001	-0.000014
85.801	1273.731	1.420401		0.030492631	0.004766446		1	0	-14		-1E-06	0	-0.000014
85.901	1286.018	1.423156		0.030786777	0.004775691		1	1	-15		-1E-06	0.000001	-0.000015
86	1291.137	1.423353		0.030909324	0.004776352		1	1	-15		-1E-06	0.000001	-0.000015
86.101	1291.137	1.423353		0.030909324	0.004776352		2	0	-15		-2E-06	0	-0.000015
86.202	1303.424	1.423353		0.03120347	0.004776352		1	0	-15		-1E-06	0	-0.000015

86.3	1303.424	1.429848		0.03120347	0.004798148		2	0	-15		-2E-06	0	-0.000015
86.401	1309.567	1.435359		0.031350531	0.004816641		2	0	-15		-2E-06	0	-0.000015
86.501	1303.424	1.435949		0.03120347	0.004818621		1	1	-14		-1E-06	0.000001	-0.000014
86.601	1303.424	1.435949		0.03120347	0.004818621		0	0	-14		0	0	-0.000014
86.701	1315.711	1.435949		0.031497616	0.004818621		1	1	-15		-1E-06	0.000001	-0.000015
86.801	1315.711	1.435949		0.031497616	0.004818621		2	0	-14		-2E-06	0	-0.000014
86.902	1320.83	1.445593		0.031620163	0.004850983		1	0	-15		-1E-06	0	-0.000015
87	1232.775	1.448348		0.02951216	0.004860228		2	1	-15		-2E-06	0.000001	-0.000015
87.101	819.1194	1.448545		0.019609404	0.004860889		1	1	-15		-1E-06	0.000001	-0.000015
87.201	878.5056	1.448545		0.021031087	0.004860889		1	0	-15		-1E-06	0	-0.000015
87.3	931.7484	1.45504		0.022305699	0.004882685		2	1	-15		-2E-06	0.000001	-0.000015
87.401	991.1345	1.460551		0.02372738	0.004901178		1	0	-16		-1E-06	0	-0.000016
87.5	1032.09	1.461141		0.024707839	0.004903158		2	0	-16		-2E-06	0	-0.000016
87.6	1079.19	1.461141		0.025835394	0.004903158		1	1	-15		-1E-06	0.000001	-0.000015
87.701	1096.596	1.461141		0.026252087	0.004903158		1	0	-16		-1E-06	0	-0.000016
87.8	1126.289	1.470785		0.026962926	0.00493552		1	0	-16		-1E-06	0	-0.000016
87.901	1132.433	1.47354		0.027110011	0.004944765		1	1	-15		-1E-06	0.000001	-0.000015
88.001	1155.982	1.473737		0.027673766	0.004945426		1	0	-16		-1E-06	0	-0.000016
88.101	1185.675	1.473737		0.028384605	0.004945426		1	0	-15		-1E-06	0	-0.000015
88.201	1215.369	1.473737		0.029095467	0.004945426		2	1	-16		-2E-06	0.000001	-0.000016
88.301	1220.488	1.473737		0.029218014	0.004945426		2	1	-16		-2E-06	0.000001	-0.000016
88.401	1220.488	1.483381		0.029218014	0.004977789		2	1	-16		-2E-06	0.000001	-0.000016
88.501	1244.038	1.486136		0.029781792	0.004987034		2	0	-15		-2E-06	0	-0.000015
88.602	1256.324	1.486333		0.030075914	0.004987695		2	0	-16		-2E-06	0	-0.000016
88.701	1273.731	1.486333		0.030492631	0.004987695		1	1	-16		-1E-06	0.000001	-0.000016
88.8	1291.137	1.486333		0.030909324	0.004987695		2	0	-16		-2E-06	0	-0.000016
88.9	1297.28	1.486333		0.031056385	0.004987695		1	1	-15		-1E-06	0.000001	-0.000015
89.001	1286.018	1.497552		0.030786777	0.005025342		1	0	-16		-1E-06	0	-0.000016
89.101	1279.874	1.498929		0.030639692	0.005029963		2	0	-16		-2E-06	0	-0.000016
89.201	1286.018	1.498929		0.030786777	0.005029963		2	0	-16		-2E-06	0	-0.000016
89.301	1286.018	1.498929		0.030786777	0.005029963		1	1	-15		-1E-06	0.000001	-0.000015

89.401	1297.28	1.498929		0.031056385	0.005029963		1	0	-15		-1E-06	0	-0.000015
89.5	1309.567	1.498929		0.031350531	0.005029963		1	0	-17		-1E-06	0	-0.000017
89.601	1315.711	1.498929		0.031497616	0.005029963		1	1	-15		-1E-06	0.000001	-0.000015
89.701	1333.117	1.510148		0.031914309	0.005067611		1	0	-16		-1E-06	0	-0.000016
89.801	1326.974	1.511525		0.031767248	0.005072232		2	1	-17		-2E-06	0.000001	-0.000017
89.901	1344.38	1.511525		0.032183941	0.005072232		2	0	-16		-2E-06	0	-0.000016
90.001	1350.523	1.511525		0.032331002	0.005072232		2	1	-15		-2E-06	0.000001	-0.000015
90.101	1362.81	1.511525		0.032625148	0.005072232		1	0	-16		-1E-06	0	-0.000016
90.201	1380.216	1.511525		0.033041841	0.005072232		1	1	-16		-1E-06	0.000001	-0.000016
90.301	1374.073	1.522744		0.03289478	0.005109879		1	1	-16		-1E-06	0.000001	-0.000016
90.401	837.5496	1.524121		0.020050616	0.0051145		2	1	-16		-2E-06	0.000001	-0.000016
90.501	914.3421	1.524121		0.021888999	0.0051145		1	1	-17		-1E-06	0.000001	-0.000017
90.601	967.5848	1.524121		0.023163609	0.0051145		1	0	-16		-1E-06	0	-0.000016
90.701	1025.947	1.533765		0.024560778	0.005146862		2	0	-16		-2E-06	0	-0.000016
90.801	1066.903	1.536521		0.025541248	0.005156111		1	0	-17		-1E-06	0	-0.000017
90.901	1108.883	1.536717		0.026546234	0.005156768		1	0	-16		-1E-06	0	-0.000016
91	1143.696	1.536717		0.027379643	0.005156768		2	0	-17		-2E-06	0	-0.000017
91.1	1203.082	1.536717		0.028801321	0.005156768		1	1	-17		-1E-06	0.000001	-0.000017
91.202	1226.631	1.543212		0.029365075	0.005178564		2	1	-17		-2E-06	0.000001	-0.000017
91.301	1256.324	1.548723		0.030075914	0.005197057		1	0	-16		-1E-06	0	-0.000016
91.401	1262.468	1.549314		0.030222999	0.00519904		2	1	-16		-2E-06	0.000001	-0.000016
91.501	1286.018	1.549314		0.030786777	0.00519904		1	1	-17		-1E-06	0.000001	-0.000017
91.601	1309.567	1.549314		0.031350531	0.00519904		1	0	-16		-1E-06	0	-0.000016
91.701	1320.83	1.549314		0.031620163	0.00519904		2	0	-17		-2E-06	0	-0.000017
91.801	1333.117	1.549314		0.031914309	0.00519904		1	2	-18		-1E-06	0.000002	-0.000018
91.901	1356.667	1.555808		0.032478087	0.005220832		2	0	-16		-2E-06	0	-0.000016
92.001	1356.667	1.561319		0.032478087	0.005239326		1	1	-17		-1E-06	0.000001	-0.000017
92.101	1374.073	1.56191		0.03289478	0.005241309		1	1	-17		-1E-06	0.000001	-0.000017
92.2	1391.479	1.56191		0.033311473	0.005241309		1	1	-16		-1E-06	0.000001	-0.000016
92.3	1403.766	1.56191		0.033605619	0.005241309		1	0	-17		-1E-06	0	-0.000017
92.402	1403.766	1.56191		0.033605619	0.005241309		0	1	-17		0	0.000001	-0.000017

92.502	1427.316	1.56191		0.034169397	0.005241309		1	1	-16		-1E-06	0.000001	-0.000016
92.6	1439.602	1.568404		0.034463519	0.005263101		1	0	-17		-1E-06	0	-0.000017
92.701	1439.602	1.573915		0.034463519	0.005281594		2	0	-17		-2E-06	0	-0.000017
92.801	1450.865	1.574506		0.034733151	0.005283577		1	2	-17		-1E-06	0.000002	-0.000017
92.901	1450.865	1.574506		0.034733151	0.005283577		2	1	-17		-2E-06	0.000001	-0.000017
93.001	1463.152	1.574506		0.035027297	0.005283577		1	0	-17		-1E-06	0	-0.000017
93.101	1457.009	1.574506		0.034880236	0.005283577		0	0	-18		0	0	-0.000018
93.2	1468.272	1.574506		0.035149868	0.005283577		2	1	-17		-2E-06	0.000001	-0.000017
93.301	1450.865	1.574506		0.034733151	0.005283577		1	1	-18		-1E-06	0.000001	-0.000018
93.401	1433.459	1.585724		0.034316458	0.005321221		0	2	-18		0	0.000002	-0.000018
93.5	1439.602	1.587102		0.034463519	0.005325846		1	0	-17		-1E-06	0	-0.000017
93.6	1439.602	1.587102		0.034463519	0.005325846		1	1	-18		-1E-06	0.000001	-0.000018
93.701	1433.459	1.587102		0.034316458	0.005325846		1	1	-18		-1E-06	0.000001	-0.000018
93.8	1439.602	1.587102		0.034463519	0.005325846		1	1	-19		-1E-06	0.000001	-0.000019
93.901	1450.865	1.587102		0.034733151	0.005325846		0	0	-18		0	0	-0.000018
94	1439.602	1.587102		0.034463519	0.005325846		1	1	-18		-1E-06	0.000001	-0.000018
94.1	1450.865	1.587102		0.034733151	0.005325846		1	0	-17		-1E-06	0	-0.000017
94.201	1444.722	1.59832		0.03458609	0.00536349		1	1	-17		-1E-06	0.000001	-0.000017
94.301	1444.722	1.599698		0.03458609	0.005368114		1	1	-18		-1E-06	0.000001	-0.000018
94.401	1450.865	1.599698		0.034733151	0.005368114		1	2	-18		-1E-06	0.000002	-0.000018
94.5	1444.722	1.599698		0.03458609	0.005368114		1	0	-16		-1E-06	0	-0.000016
94.6	1444.722	1.599698		0.03458609	0.005368114		1	1	-18		-1E-06	0.000001	-0.000018
94.701	1444.722	1.599698		0.03458609	0.005368114		1	0	-18		-1E-06	0	-0.000018
94.801	1444.722	1.599698		0.03458609	0.005368114		2	1	-19		-2E-06	0.000001	-0.000019
94.901	1433.459	1.599698		0.034316458	0.005368114		1	0	-17		-1E-06	0	-0.000017
95	1427.316	1.599698		0.034169397	0.005368114		1	1	-18		-1E-06	0.000001	-0.000018
95.102	1433.459	1.606192		0.034316458	0.005389906		2	1	-16		-2E-06	0.000001	-0.000016
95.201	1433.459	1.611703		0.034316458	0.005408399		2	0	-18		-2E-06	0	-0.000018
95.301	1444.722	1.612294		0.03458609	0.005410383		1	0	-17		-1E-06	0	-0.000017
95.401	1444.722	1.612294		0.03458609	0.005410383		1	1	-18		-1E-06	0.000001	-0.000018
95.501	1444.722	1.612294		0.03458609	0.005410383		1	0	-18		-1E-06	0	-0.000018

95.6	1439.602	1.612294		0.034463519	0.005410383		1	1	-18		-1E-06	0.000001	-0.000018
95.701	1433.459	1.612294		0.034316458	0.005410383		2	1	-18		-2E-06	0.000001	-0.000018
95.801	1444.722	1.612294		0.03458609	0.005410383		1	0	-17		-1E-06	0	-0.000017
95.9	1439.602	1.612294		0.034463519	0.005410383		1	1	-17		-1E-06	0.000001	-0.000017
96	1444.722	1.621938		0.03458609	0.005442745		1	0	-18		-1E-06	0	-0.000018
96.101	1439.602	1.624693		0.034463519	0.00545199		1	1	-17		-1E-06	0.000001	-0.000017
96.201	1444.722	1.62489		0.03458609	0.005452651		2	1	-17		-2E-06	0.000001	-0.000017
96.3	1450.865	1.62489		0.034733151	0.005452651		2	1	-17		-2E-06	0.000001	-0.000017
96.401	1450.865	1.62489		0.034733151	0.005452651		2	1	-16		-2E-06	0.000001	-0.000016
96.501	1457.009	1.62489		0.034880236	0.005452651		1	0	-16		-1E-06	0	-0.000016
96.601	1450.865	1.62489		0.034733151	0.005452651		1	1	-16		-1E-06	0.000001	-0.000016
96.702	1444.722	1.62489		0.03458609	0.005452651		1	1	-16		-1E-06	0.000001	-0.000016
96.8	1450.865	1.62489		0.034733151	0.005452651		1	1	-16		-1E-06	0.000001	-0.000016
96.901	1457.009	1.636108		0.034880236	0.005490295		1	0	-16		-1E-06	0	-0.000016
97	1450.865	1.637486		0.034733151	0.005494919		1	1	-15		-1E-06	0.000001	-0.000015
97.101	1457.009	1.637486		0.034880236	0.005494919		1	1	-15		-1E-06	0.000001	-0.000015
97.201	1450.865	1.637486		0.034733151	0.005494919		1	1	-16		-1E-06	0.000001	-0.000016
97.301	1457.009	1.637486		0.034880236	0.005494919		1	1	-15		-1E-06	0.000001	-0.000015
97.4	1457.009	1.637486		0.034880236	0.005494919		1	1	-16		-1E-06	0.000001	-0.000016
97.501	1450.865	1.637486		0.034733151	0.005494919		2	1	-15		-2E-06	0.000001	-0.000015
97.601	1444.722	1.637486		0.03458609	0.005494919		1	1	-15		-1E-06	0.000001	-0.000015
97.701	1444.722	1.64713		0.03458609	0.005527282		2	1	-16		-2E-06	0.000001	-0.000016
97.801	1433.459	1.649885		0.034316458	0.005536527		2	1	-16		-2E-06	0.000001	-0.000016
97.901	1433.459	1.650082		0.034316458	0.005537188		2	1	-16		-2E-06	0.000001	-0.000016
98.001	1433.459	1.650082		0.034316458	0.005537188		2	2	-16		-2E-06	0.000002	-0.000016
98.102	1433.459	1.650082		0.034316458	0.005537188		1	1	-16		-1E-06	0.000001	-0.000016
98.201	1415.029	1.650082		0.033875251	0.005537188		1	1	-16		-1E-06	0.000001	-0.000016
98.301	1415.029	1.650082		0.033875251	0.005537188		1	1	-16		-1E-06	0.000001	-0.000016
98.4	1415.029	1.650082		0.033875251	0.005537188		2	1	-17		-2E-06	0.000001	-0.000017
98.501	1397.623	1.650082		0.033458558	0.005537188		2	1	-16		-2E-06	0.000001	-0.000016
98.603	1391.479	1.650082		0.033311473	0.005537188		2	1	-18		-2E-06	0.000001	-0.000018

98.701	1374.073	1.6613		0.03289478	0.005574832		1	1	-17		-1E-06	0.000001	-0.000017
98.8	1374.073	1.662678		0.03289478	0.005579456		1	2	-16		-1E-06	0.000002	-0.000016
98.901	1367.929	1.662678		0.032747695	0.005579456		1	1	-16		-1E-06	0.000001	-0.000016
99.001	1362.81	1.662678		0.032625148	0.005579456		1	0	-17		-1E-06	0	-0.000017
99.1	1374.073	1.662678		0.03289478	0.005579456		0	0	-17		0	0	-0.000017
99.201	1374.073	1.662678		0.03289478	0.005579456		1	1	-16		-1E-06	0.000001	-0.000016
99.3	1367.929	1.662678		0.032747695	0.005579456		2	0	-16		-2E-06	0	-0.000016
99.402	1374.073	1.662678		0.03289478	0.005579456		1	1	-17		-1E-06	0.000001	-0.000017
99.501	1374.073	1.669173		0.03289478	0.005601252		2	1	-16		-2E-06	0.000001	-0.000016
99.601	1380.216	1.674684		0.033041841	0.005619745		2	1	-17		-2E-06	0.000001	-0.000017
99.701	1380.216	1.675274		0.033041841	0.005621725		1	2	-16		-1E-06	0.000002	-0.000016
99.801	1380.216	1.675274		0.033041841	0.005621725		1	2	-16		-1E-06	0.000002	-0.000016
99.901	1380.216	1.675274		0.033041841	0.005621725		2	2	-16		-2E-06	0.000002	-0.000016
100.001	1380.216	1.675274		0.033041841	0.005621725		2	1	-17		-2E-06	0.000001	-0.000017
100.101	1380.216	1.675274		0.033041841	0.005621725		1	1	-17		-1E-06	0.000001	-0.000017
100.2	1374.073	1.675274		0.03289478	0.005621725		1	2	-17		-1E-06	0.000002	-0.000017
100.301	1380.216	1.675274		0.033041841	0.005621725		2	1	-17		-2E-06	0.000001	-0.000017
100.402	1380.216	1.675274		0.033041841	0.005621725		2	1	-17		-2E-06	0.000001	-0.000017
100.5	1374.073	1.675274		0.03289478	0.005621725		2	1	-17		-2E-06	0.000001	-0.000017
100.6	1380.216	1.681769		0.033041841	0.00564352		1	1	-17		-1E-06	0.000001	-0.000017
100.701	1380.216	1.68728		0.033041841	0.005662013		2	2	-17		-2E-06	0.000002	-0.000017
100.8	1380.216	1.68787		0.033041841	0.005663993		2	1	-17		-2E-06	0.000001	-0.000017
100.901	1380.216	1.68787		0.033041841	0.005663993		1	1	-18		-1E-06	0.000001	-0.000018
101.001	1386.36	1.68787		0.033188926	0.005663993		1	2	-17		-1E-06	0.000002	-0.000017
101.101	1386.36	1.68787		0.033188926	0.005663993		1	1	-16		-1E-06	0.000001	-0.000016
101.201	1374.073	1.68787		0.03289478	0.005663993		1	1	-16		-1E-06	0.000001	-0.000016
101.301	1380.216	1.68787		0.033041841	0.005663993		1	1	-18		-1E-06	0.000001	-0.000018
101.402	1386.36	1.68787		0.033188926	0.005663993		2	2	-17		-2E-06	0.000002	-0.000017
101.5	1386.36	1.68787		0.033188926	0.005663993		1	1	-18		-1E-06	0.000001	-0.000018
101.601	1391.479	1.68787		0.033311473	0.005663993		2	2	-18		-2E-06	0.000002	-0.000018
101.701	1397.623	1.68787		0.033458558	0.005663993		1	1	-17		-1E-06	0.000001	-0.000017

101.801	1374.073	1.697514		0.03289478	0.005696356		1	1	-17		-1E-06	0.000001	-0.000017
101.9	1380.216	1.700269		0.033041841	0.005705601		2	1	-18		-2E-06	0.000001	-0.000018
102	1386.36	1.700466		0.033188926	0.005706262		1	0	-18		-1E-06	0	-0.000018
102.101	1380.216	1.700466		0.033041841	0.005706262		1	2	-18		-1E-06	0.000002	-0.000018
102.202	1374.073	1.700466		0.03289478	0.005706262		1	1	-18		-1E-06	0.000001	-0.000018
102.301	1380.216	1.700466		0.033041841	0.005706262		2	1	-17		-2E-06	0.000001	-0.000017
102.401	1391.479	1.700466		0.033311473	0.005706262		1	1	-19		-1E-06	0.000001	-0.000019
102.5	1380.216	1.700466		0.033041841	0.005706262		2	1	-18		-2E-06	0.000001	-0.000018
102.601	1386.36	1.700466		0.033188926	0.005706262		1	1	-19		-1E-06	0.000001	-0.000019
102.701	1386.36	1.700466		0.033188926	0.005706262		1	1	-18		-1E-06	0.000001	-0.000018
102.801	1386.36	1.700466		0.033188926	0.005706262		2	1	-18		-2E-06	0.000001	-0.000018
102.901	1403.766	1.700466		0.033605619	0.005706262		2	1	-18		-2E-06	0.000001	-0.000018
103.001	1391.479	1.711684		0.033311473	0.005743906		1	1	-18		-1E-06	0.000001	-0.000018
103.101	1397.623	1.713062		0.033458558	0.00574853		2	1	-18		-2E-06	0.000001	-0.000018
103.2	1403.766	1.713062		0.033605619	0.00574853		1	1	-18		-1E-06	0.000001	-0.000018
103.3	1415.029	1.713062		0.033875251	0.00574853		1	1	-19		-1E-06	0.000001	-0.000019
103.401	1403.766	1.713062		0.033605619	0.00574853		1	0	-19		-1E-06	0	-0.000019
103.501	1403.766	1.713062		0.033605619	0.00574853		1	1	-18		-1E-06	0.000001	-0.000018
103.6	1409.909	1.713062		0.03375268	0.00574853		1	2	-18		-1E-06	0.000002	-0.000018
103.701	1421.172	1.713062		0.034022312	0.00574853		2	1	-18		-2E-06	0.000001	-0.000018
103.801	1421.172	1.713062		0.034022312	0.00574853		1	1	-19		-1E-06	0.000001	-0.000019
103.901	1421.172	1.713062		0.034022312	0.00574853		2	2	-18		-2E-06	0.000002	-0.000018
104	1444.722	1.713062		0.03458609	0.00574853		2	1	-18		-2E-06	0.000001	-0.000018
104.101	1444.722	1.72428		0.03458609	0.005786174		1	1	-18		-1E-06	0.000001	-0.000018
104.202	1450.865	1.725658		0.034733151	0.005790799		2	1	-18		-2E-06	0.000001	-0.000018
104.301	1457.009	1.725658		0.034880236	0.005790799		1	1	-18		-1E-06	0.000001	-0.000018
104.401	1463.152	1.725658		0.035027297	0.005790799		1	1	-18		-1E-06	0.000001	-0.000018
104.501	1463.152	1.725658		0.035027297	0.005790799		1	1	-18		-1E-06	0.000001	-0.000018
104.602	1450.865	1.725658		0.034733151	0.005790799		2	1	-19		-2E-06	0.000001	-0.000019
104.701	1468.272	1.725658		0.035149868	0.005790799		1	0	-17		-1E-06	0	-0.000017
104.801	1468.272	1.725658		0.035149868	0.005790799		1	1	-18		-1E-06	0.000001	-0.000018

104.901	1474.415	1.725658		0.035296929	0.005790799		2	1	-18		-2E-06	0.000001	-0.000018
105.001	1480.558	1.725658		0.03544399	0.005790799		1	1	-19		-1E-06	0.000001	-0.000019
105.102	1486.702	1.736876		0.035591075	0.005828443		1	2	-18		-1E-06	0.000002	-0.000018
105.201	1480.558	1.738254		0.03544399	0.005833067		2	2	-18		-2E-06	0.000002	-0.000018
105.301	1480.558	1.738254		0.03544399	0.005833067		1	1	-19		-1E-06	0.000001	-0.000019
105.4	1480.558	1.738254		0.03544399	0.005833067		1	2	-19		-1E-06	0.000002	-0.000019
105.501	1486.702	1.738254		0.035591075	0.005833067		2	1	-19		-2E-06	0.000001	-0.000019
105.601	1491.821	1.738254		0.035713622	0.005833067		1	2	-19		-1E-06	0.000002	-0.000019
105.701	1491.821	1.738254		0.035713622	0.005833067		2	1	-19		-2E-06	0.000001	-0.000019
105.801	1491.821	1.738254		0.035713622	0.005833067		1	2	-19		-1E-06	0.000002	-0.000019
105.902	1504.108	1.744749		0.036007768	0.005854862		1	1	-19		-1E-06	0.000001	-0.000019
106.001	1515.371	1.75026		0.0362774	0.005873356		1	1	-19		-1E-06	0.000001	-0.000019
106.102	1527.658	1.75085		0.036571546	0.005875336		1	0	-19		-1E-06	0	-0.000019
106.201	1527.658	1.75085		0.036571546	0.005875336		1	1	-19		-1E-06	0.000001	-0.000019
106.301	1533.801	1.75085		0.036718607	0.005875336		0	2	-19		0	0.000002	-0.000019
106.402	1545.064	1.75085		0.036988239	0.005875336		1	1	-19		-1E-06	0.000001	-0.000019
106.501	1545.064	1.75085		0.036988239	0.005875336		1	2	-19		-1E-06	0.000002	-0.000019
106.601	1557.351	1.760494		0.037282385	0.005907698		1	1	-19		-1E-06	0.000001	-0.000019
106.702	1563.494	1.76325		0.037429446	0.005916946		1	1	-20		-1E-06	0.000001	-0.00002
106.802	1563.494	1.763446		0.037429446	0.005917604		1	2	-20		-1E-06	0.000002	-0.00002
106.902	1568.614	1.763446		0.037552017	0.005917604		1	1	-20		-1E-06	0.000001	-0.00002
107.001	1563.494	1.763446		0.037429446	0.005917604		1	2	-20		-1E-06	0.000002	-0.00002
107.101	1568.614	1.763446		0.037552017	0.005917604		1	1	-19		-1E-06	0.000001	-0.000019
107.201	1563.494	1.769941		0.037429446	0.005939399		1	1	-19		-1E-06	0.000001	-0.000019
107.301	1557.351	1.775452		0.037282385	0.005957893		1	1	-19		-1E-06	0.000001	-0.000019
107.401	1551.207	1.776042		0.0371353	0.005959872		0	1	-20		0	0.000001	-0.00002
107.502	1545.064	1.776042		0.036988239	0.005959872		2	1	-20		-2E-06	0.000001	-0.00002
107.601	1551.207	1.776042		0.0371353	0.005959872		0	1	-20		0	0.000001	-0.00002
107.702	1551.207	1.776042		0.0371353	0.005959872		0	1	-20		0	0.000001	-0.00002
107.801	1551.207	1.776042		0.0371353	0.005959872		2	2	-20		-2E-06	0.000002	-0.00002
107.901	1551.207	1.776042		0.0371353	0.005959872		1	1	-20		-1E-06	0.000001	-0.00002

108.001	1538.921	1.787261		0.036841178	0.00599752		0	1	-21		0	0.000001	-0.000021
108.101	1545.064	1.788638		0.036988239	0.006002141		1	2	-20		-1E-06	0.000002	-0.00002
108.202	1551.207	1.788638		0.0371353	0.006002141		1	1	-20		-1E-06	0.000001	-0.00002
108.301	1557.351	1.788638		0.037282385	0.006002141		1	2	-21		-1E-06	0.000002	-0.000021
108.401	1521.514	1.788638		0.036424461	0.006002141		1	1	-22		-1E-06	0.000001	-0.000022
108.501	1510.251	1.788638		0.036154829	0.006002141		1	2	-20		-1E-06	0.000002	-0.00002
108.6	1510.251	1.788638		0.036154829	0.006002141		1	1	-20		-1E-06	0.000001	-0.00002
108.7	1510.251	1.788638		0.036154829	0.006002141		0	2	-21		0	0.000002	-0.000021
108.8	1533.801	1.798282		0.036718607	0.006034503		2	1	-21		-2E-06	0.000001	-0.000021
108.901	1533.801	1.801038		0.036718607	0.006043752		1	1	-20		-1E-06	0.000001	-0.00002
109.001	1533.801	1.801234		0.036718607	0.006044409		1	2	-21		-1E-06	0.000002	-0.000021
109.101	1551.207	1.801234		0.0371353	0.006044409		1	2	-21		-1E-06	0.000002	-0.000021
109.201	1545.064	1.801234		0.036988239	0.006044409		1	2	-21		-1E-06	0.000002	-0.000021
109.302	1545.064	1.801234		0.036988239	0.006044409		1	1	-21		-1E-06	0.000001	-0.000021
109.4	1551.207	1.810878		0.0371353	0.006076772		1	1	-22		-1E-06	0.000001	-0.000022
109.501	1557.351	1.813634		0.037282385	0.00608602		1	1	-21		-1E-06	0.000001	-0.000021
109.601	1557.351	1.81383		0.037282385	0.006086678		0	1	-22		0	0.000001	-0.000022
109.701	1568.614	1.81383		0.037552017	0.006086678		0	1	-21		0	0.000001	-0.000021
109.801	1563.494	1.81383		0.037429446	0.006086678		0	2	-21		0	0.000002	-0.000021
109.901	1568.614	1.820325		0.037552017	0.006108473		1	1	-21		-1E-06	0.000001	-0.000021
110.001	790.4503	1.825836		0.018923077	0.006126966		1	2	-22		-1E-06	0.000002	-0.000022
110.101	854.9559	1.826427		0.020467316	0.00612895		1	1	-22		-1E-06	0.000001	-0.000022
110.2	908.1987	1.83607		0.021741928	0.006161309		1	2	-22		-1E-06	0.000002	-0.000022
110.3	978.8477	1.838826		0.023433238	0.006170557		1	2	-22		-1E-06	0.000002	-0.000022
110.401	1025.947	1.839023		0.024560778	0.006171218		0	1	-22		0	0.000001	-0.000022
110.502	1079.19	1.839023		0.025835394	0.006171218		1	1	-21		-1E-06	0.000001	-0.000021
110.601	1120.146	1.845517		0.026815865	0.00619301		1	1	-22		-1E-06	0.000001	-0.000022
110.701	1167.245	1.851028		0.027943397	0.006211503		1	1	-22		-1E-06	0.000001	-0.000022
110.801	1209.225	1.851619		0.028948382	0.006213487		0	1	-22		0	0.000001	-0.000022
110.901	1238.918	1.851619		0.029659222	0.006213487		1	2	-22		-1E-06	0.000002	-0.000022
111.001	1267.587	1.851619		0.030345546	0.006213487		1	2	-23		-1E-06	0.000002	-0.000023

111.101	1286.018	1.851619		0.030786777	0.006213487		1	1	-22		-1E-06	0.000001	-0.000022
111.201	1309.567	1.861262		0.031350531	0.006245846		0	2	-23		0	0.000002	-0.000023
111.301	1339.26	1.864018		0.03206137	0.006255094		2	1	-22		-2E-06	0.000001	-0.000022
111.401	1362.81	1.864215		0.032625148	0.006255755		1	1	-23		-1E-06	0.000001	-0.000023
111.5	1362.81	1.864215		0.032625148	0.006255755		1	1	-22		-1E-06	0.000001	-0.000022
111.601	1380.216	1.864215		0.033041841	0.006255755		0	2	-23		0	0.000002	-0.000023
111.7	1391.479	1.864215		0.033311473	0.006255755		0	1	-23		0	0.000001	-0.000023
111.801	1415.029	1.873858		0.033875251	0.006288114		0	2	-23		0	0.000002	-0.000023
111.9	1427.316	1.876614		0.034169397	0.006297362		0	2	-24		0	0.000002	-0.000024
112.002	1427.316	1.876811		0.034169397	0.006298023		1	2	-23		-1E-06	0.000002	-0.000023
112.101	1439.602	1.876811		0.034463519	0.006298023		0	2	-23		0	0.000002	-0.000023
112.201	1444.722	1.876811		0.03458609	0.006298023		1	2	-24		-1E-06	0.000002	-0.000024
112.301	1468.272	1.876811		0.035149868	0.006298023		0	2	-24		0	0.000002	-0.000024
112.402	1457.009	1.876811		0.034880236	0.006298023		0	1	-24		0	0.000001	-0.000024
112.502	1474.415	1.886454		0.035296929	0.006330383		0	2	-23		0	0.000002	-0.000023
112.601	1480.558	1.88921		0.03544399	0.006339631		1	2	-23		-1E-06	0.000002	-0.000023
112.702	1486.702	1.889407		0.035591075	0.006340292		0	2	-24		0	0.000002	-0.000024
112.802	1491.821	1.889407		0.035713622	0.006340292		0	1	-24		0	0.000001	-0.000024
112.902	1504.108	1.889407		0.036007768	0.006340292		1	2	-24		-1E-06	0.000002	-0.000024
113.002	1504.108	1.889407		0.036007768	0.006340292		0	2	-24		0	0.000002	-0.000024
113.102	1521.514	1.889407		0.036424461	0.006340292		0	2	-23		0	0.000002	-0.000023
113.202	1521.514	1.900625		0.036424461	0.006377936		1	2	-24		-1E-06	0.000002	-0.000024
113.301	1527.658	1.902003		0.036571546	0.00638256		0	1	-24		0	0.000001	-0.000024
113.401	1545.064	1.902003		0.036988239	0.00638256		1	2	-24		-1E-06	0.000002	-0.000024
113.5	1557.351	1.902003		0.037282385	0.00638256		1	1	-24		-1E-06	0.000001	-0.000024
113.601	1557.351	1.902003		0.037282385	0.00638256		0	1	-24		0	0.000001	-0.000024
113.701	1563.494	1.902003		0.037429446	0.00638256		1	1	-24		-1E-06	0.000001	-0.000024
113.801	1557.351	1.902003		0.037282385	0.00638256		1	2	-24		-1E-06	0.000002	-0.000024
113.901	1574.757	1.902003		0.037699078	0.00638256		0	1	-24		0	0.000001	-0.000024
114	1587.044	1.913221		0.037993224	0.006420205		0	1	-25		0	0.000001	-0.000025
114.101	1580.901	1.914599		0.037846163	0.006424829		0	2	-24		0	0.000002	-0.000024

114.202	1592.163	1.914599		0.038115771	0.006424829		0	2	-24		0	0.000002	-0.000024
114.301	1598.307	1.914599		0.038262856	0.006424829		0	2	-25		0	0.000002	-0.000025
114.402	1610.594	1.914599		0.038557002	0.006424829		1	2	-25		-1E-06	0.000002	-0.000025
114.501	1610.594	1.914599		0.038557002	0.006424829		0	1	-25		0	0.000001	-0.000025
114.601	1610.594	1.914599		0.038557002	0.006424829		1	1	-25		-1E-06	0.000001	-0.000025
114.701	1615.713	1.921094		0.038679549	0.006446624		0	2	-26		0	0.000002	-0.000026
114.802	1634.143	1.926604		0.039120756	0.006465114		0	1	-25		0	0.000001	-0.000025
114.901	1639.263	1.927195		0.039243327	0.006467097		1	2	-24		-1E-06	0.000002	-0.000024
115	1639.263	1.927195		0.039243327	0.006467097		1	2	-25		-1E-06	0.000002	-0.000025
115.101	1651.55	1.927195		0.039537473	0.006467097		0	2	-24		0	0.000002	-0.000024
115.201	1657.693	1.927195		0.039684534	0.006467097		1	1	-25		-1E-06	0.000001	-0.000025
115.301	1663.836	1.927195		0.039831595	0.006467097		0	2	-26		0	0.000002	-0.000026
115.401	1681.243	1.927195		0.040248312	0.006467097		0	1	-25		0	0.000001	-0.000025
115.5	1668.956	1.93369		0.039954166	0.006488893		0	1	-25		0	0.000001	-0.000025
115.601	1681.243	1.939201		0.040248312	0.006507386		1	2	-25		-1E-06	0.000002	-0.000025
115.701	1692.506	1.939791		0.040517944	0.006509366		0	2	-24		0	0.000002	-0.000024
115.802	1687.386	1.939791		0.040395373	0.006509366		1	2	-25		-1E-06	0.000002	-0.000025
115.901	1698.649	1.939791		0.040665005	0.006509366		1	1	-25		-1E-06	0.000001	-0.000025
116.001	1710.936	1.939791		0.040959151	0.006509366		1	2	-24		-1E-06	0.000002	-0.000024
116.101	1704.792	1.939791		0.040812066	0.006509366		0	2	-25		0	0.000002	-0.000025
116.202	1698.649	1.939791		0.040665005	0.006509366		0	1	-25		0	0.000001	-0.000025
116.301	1704.792	1.946286		0.040812066	0.006531161		1	2	-25		-1E-06	0.000002	-0.000025
116.4	1692.506	1.951797		0.040517944	0.006549654		1	2	-25		-1E-06	0.000002	-0.000025
116.501	1698.649	1.952387		0.040665005	0.006551634		0	2	-26		0	0.000002	-0.000026
116.601	1704.792	1.952387		0.040812066	0.006551634		1	2	-26		-1E-06	0.000002	-0.000026
116.702	1710.936	1.952387		0.040959151	0.006551634		1	1	-25		-1E-06	0.000001	-0.000025
116.801	1716.055	1.952387		0.041081698	0.006551634		0	2	-26		0	0.000002	-0.000026
116.902	1728.342	1.952387		0.041375844	0.006551634		0	2	-26		0	0.000002	-0.000026
117.001	1722.199	1.952387		0.041228783	0.006551634		1	1	-24		-1E-06	0.000001	-0.000024
117.1	1734.485	1.952387		0.041522905	0.006551634		1	1	-24		-1E-06	0.000001	-0.000024
117.201	1734.485	1.952387		0.041522905	0.006551634		1	1	-24		-1E-06	0.000001	-0.000024

117.302	1739.605	1.963605		0.041645476	0.006589279		1	1	-23		-1E-06	0.000001	-0.000023
117.402	1745.748	1.964983		0.041792537	0.006593903		0	2	-24		0	0.000002	-0.000024
117.5	1739.605	1.964983		0.041645476	0.006593903		0	1	-22		0	0.000001	-0.000022
117.602	1751.892	1.964983		0.041939622	0.006593903		0	1	-23		0	0.000001	-0.000023
117.703	1775.441	1.964983		0.042503376	0.006593903		1	2	-24		-1E-06	0.000002	-0.000024
117.801	1763.155	1.964983		0.042209254	0.006593903		0	2	-23		0	0.000002	-0.000023
117.901	1775.441	1.964983		0.042503376	0.006593903		0	1	-24		0	0.000001	-0.000024
118.001	1787.728	1.964983		0.042797522	0.006593903		1	1	-24		-1E-06	0.000001	-0.000024
118.101	1792.848	1.971478		0.042920093	0.006615698		1	1	-23		-1E-06	0.000001	-0.000023
118.201	1787.728	1.976989		0.042797522	0.006634191		0	1	-24		0	0.000001	-0.000024
118.301	1787.728	1.977579		0.042797522	0.006636171		0	1	-24		0	0.000001	-0.000024
118.403	1798.991	1.977579		0.043067154	0.006636171		1	1	-24		-1E-06	0.000001	-0.000024
118.501	1805.135	1.977579		0.043214239	0.006636171		0	1	-24		0	0.000001	-0.000024
118.601	1811.278	1.977579		0.0433613	0.006636171		0	1	-24		0	0.000001	-0.000024
118.701	1822.541	1.977579		0.043630932	0.006636171		0	2	-22		0	0.000002	-0.000022
118.801	1816.397	1.977579		0.043483847	0.006636171		0	1	-23		0	0.000001	-0.000023
118.901	1822.541	1.977579		0.043630932	0.006636171		0	2	-23		0	0.000002	-0.000023
119.002	1828.684	1.977579		0.043777993	0.006636171		1	1	-23		-1E-06	0.000001	-0.000023
119.101	1822.541	1.988797		0.043630932	0.006673815		0	1	-22		0	0.000001	-0.000022
119.2	1839.947	1.990175		0.044047625	0.00667844		0	2	-19		0	0.000002	-0.000019
119.303	1846.09	1.990175		0.044194686	0.00667844		0	0	-18		0	0	-0.000018
119.403	1846.09	1.990175		0.044194686	0.00667844		1	2	-18		-1E-06	0.000002	-0.000018
119.501	1846.09	1.990175		0.044194686	0.00667844		0	2	-19		0	0.000002	-0.000019
119.601	1839.947	1.990175		0.044047625	0.00667844		0	1	-18		0	0.000001	-0.000018
119.701	1846.09	1.990175		0.044194686	0.00667844		0	1	-19		0	0.000001	-0.000019
119.802	1858.377	1.990175		0.044488832	0.00667844		1	1	-19		-1E-06	0.000001	-0.000019
119.902	1863.497	1.990175		0.044611403	0.00667844		0	1	-18		0	0.000001	-0.000018
120.001	1869.64	2.001394		0.044758464	0.006716087		0	1	-18		0	0.000001	-0.000018
120.101	1875.784	2.002771		0.044905549	0.006720708		0	2	-17		0	0.000002	-0.000017
120.201	1875.784	2.002771		0.044905549	0.006720708		0	1	-17		0	0.000001	-0.000017
120.301	1881.927	2.002771		0.04505261	0.006720708		0	1	-17		0	0.000001	-0.000017

120.402	1881.927	2.002771		0.04505261	0.006720708		0	1	-16		0	0.000001	-0.000016
120.501	1875.784	2.002771		0.044905549	0.006720708		0	1	-17		0	0.000001	-0.000017
120.601	1887.046	2.002771		0.045175157	0.006720708		0	2	-16		0	0.000002	-0.000016
120.701	1887.046	2.002771		0.045175157	0.006720708		0	1	-16		0	0.000001	-0.000016
120.801	1893.19	2.002771		0.045322242	0.006720708		0	1	-16		0	0.000001	-0.000016
120.901	1899.333	2.012415		0.045469303	0.00675307		1	1	-15		-1E-06	0.000001	-0.000015
121.001	1911.62	2.015171		0.045763449	0.006762319		0	1	-14		0	0.000001	-0.000014
121.102	1905.477	2.015367		0.045616388	0.006762977		0	1	-12		0	0.000001	-0.000012
121.202	1916.74	2.015367		0.04588602	0.006762977		0	1	-12		0	0.000001	-0.000012
121.301	1911.62	2.015367		0.045763449	0.006762977		1	1	-13		-1E-06	0.000001	-0.000013
121.401	1911.62	2.015367		0.045763449	0.006762977		0	1	-11		0	0.000001	-0.000011
121.501	1916.74	2.015367		0.04588602	0.006762977		0	1	-10		0	0.000001	-0.00001
121.602	1916.74	2.015367		0.04588602	0.006762977		0	2	-10		0	0.000002	-0.00001
121.702	1929.026	2.015367		0.046180142	0.006762977		0	1	-10		0	0.000001	-0.00001
121.801	1935.17	2.025011		0.046327227	0.006795339		0	1	-9		0	0.000001	-0.000009
121.9	1922.883	2.027766		0.046033081	0.006804584		0	1	-9		0	0.000001	-0.000009
122	1940.289	2.027963		0.046449774	0.006805245		1	2	-8		-1E-06	0.000002	-0.000008
122.101	1940.289	2.027963		0.046449774	0.006805245		0	2	-8		0	0.000002	-0.000008
122.201	1946.433	2.027963		0.046596859	0.006805245		0	1	-7		0	0.000001	-0.000007
122.301	1952.576	2.027963		0.04674392	0.006805245		0	1	-7		0	0.000001	-0.000007
122.4	1946.433	2.027963		0.046596859	0.006805245		0	2	-6		0	0.000002	-0.000006
122.501	1963.839	2.027963		0.047013552	0.006805245		0	1	-6		0	0.000001	-0.000006
122.601	1976.126	2.027963		0.047307698	0.006805245		0	2	-7		0	0.000002	-0.000007
122.701	1969.982	2.034458		0.047160613	0.00682704		0	1	-7		0	0.000001	-0.000007
122.801	1976.126	2.039969		0.047307698	0.006845534		0	2	-6		0	0.000002	-0.000006
122.901	1969.982	2.040559		0.047160613	0.006847513		0	1	-6		0	0.000001	-0.000006
123.001	1969.982	2.040559		0.047160613	0.006847513		0	1	-6		0	0.000001	-0.000006
123.101	1982.269	2.040559		0.047454759	0.006847513		0	2	-6		0	0.000002	-0.000006
123.202	1969.982	2.040559		0.047160613	0.006847513		0	1	-6		0	0.000001	-0.000006
123.301	1982.269	2.040559		0.047454759	0.006847513		0	2	-7		0	0.000002	-0.000007
123.401	1982.269	2.040559		0.047454759	0.006847513		0	1	-6		0	0.000001	-0.000006

123.501	1987.389	2.040559		0.04757733	0.006847513		0	1	-5		0	0.000001	-0.000005
123.603	1987.389	2.040559		0.04757733	0.006847513		0	2	-6		0	0.000002	-0.000006
123.701	1999.675	2.051778		0.047871452	0.006885161		0	1	-6		0	0.000001	-0.000006
123.802	2017.082	2.053155		0.048288169	0.006889782		0	2	-6		0	0.000002	-0.000006
123.9	2023.225	2.053155		0.04843523	0.006889782		1	2	-6		-1E-06	0.000002	-0.000006
124.001	2023.225	2.053155		0.04843523	0.006889782		0	1	-7		0	0.000001	-0.000007
124.1	2017.082	2.053155		0.048288169	0.006889782		0	2	-6		0	0.000002	-0.000006
124.201	2017.082	2.053155		0.048288169	0.006889782		1	1	-5		-1E-06	0.000001	-0.000005
124.3	2017.082	2.053155		0.048288169	0.006889782		0	2	-5		0	0.000002	-0.000005
124.401	2017.082	2.062799		0.048288169	0.006922144		0	1	-6		0	0.000001	-0.000006
124.502	2010.938	2.065555		0.048141084	0.006931393		0	1	-6		0	0.000001	-0.000006
124.601	1999.675	2.065751		0.047871452	0.00693205		0	1	-6		0	0.000001	-0.000006
124.7	2017.082	2.065751		0.048288169	0.00693205		0	1	-7		0	0.000001	-0.000007
124.801	2005.819	2.065751		0.048018537	0.00693205		1	2	-6		-1E-06	0.000002	-0.000006
124.902	1999.675	2.065751		0.047871452	0.00693205		0	2	-6		0	0.000002	-0.000006
125.001	1987.389	2.065751		0.04757733	0.00693205		0	2	-6		0	0.000002	-0.000006
125.101	1969.982	2.07697		0.047160613	0.006969698		0	2	-6		0	0.000002	-0.000006
125.202	1963.839	2.078347		0.047013552	0.006974319		0	1	-6		0	0.000001	-0.000006
125.301	1969.982	2.078347		0.047160613	0.006974319		0	2	-6		0	0.000002	-0.000006
125.403	1963.839	2.078347		0.047013552	0.006974319		0	1	-6		0	0.000001	-0.000006
125.502	1952.576	2.078347		0.04674392	0.006974319		0	1	-6		0	0.000001	-0.000006
125.601	1952.576	2.078347		0.04674392	0.006974319		0	2	-6		0	0.000002	-0.000006
125.701	1976.126	2.078347		0.047307698	0.006974319		0	1	-6		0	0.000001	-0.000006
125.801	1976.126	2.087991		0.047307698	0.007006681		0	2	-5		0	0.000002	-0.000005
125.901	1976.126	2.090747		0.047307698	0.00701593		1	1	-5		-1E-06	0.000001	-0.000005
126.001	1976.126	2.090943		0.047307698	0.007016587		0	1	-7		0	0.000001	-0.000007
126.1	1982.269	2.090943		0.047454759	0.007016587		1	1	-6		-1E-06	0.000001	-0.000006
126.201	1958.719	2.090943		0.046890981	0.007016587		0	1	-5		0	0.000001	-0.000005
126.303	1952.576	2.090943		0.04674392	0.007016587		0	1	-6		0	0.000001	-0.000006
126.401	1952.576	2.090943		0.04674392	0.007016587		0	1	-6		0	0.000001	-0.000006
126.501	1935.17	2.102162		0.046327227	0.007054235		1	2	-6		-1E-06	0.000002	-0.000006

126.601	1929.026	2.103539		0.046180142	0.007058856		0	2	-6		0	0.000002	-0.000006
126.7	1916.74	2.103539		0.04588602	0.007058856		0	1	-6		0	0.000001	-0.000006
126.802	1911.62	2.103539		0.045763449	0.007058856		0	1	-6		0	0.000001	-0.000006
126.901	1899.333	2.103539		0.045469303	0.007058856		0	2	-5		0	0.000002	-0.000005
127.001	1893.19	2.103539		0.045322242	0.007058856		1	2	-5		-1E-06	0.000002	-0.000005
127.102	1887.046	2.113183		0.045175157	0.007091218		1	1	-6		-1E-06	0.000001	-0.000006
127.202	1869.64	2.115939		0.044758464	0.007100466		0	1	-5		0	0.000001	-0.000005
127.301	1858.377	2.116136		0.044488832	0.007101128		0	2	-7		0	0.000002	-0.000007
127.403	1846.09	2.116136		0.044194686	0.007101128		1	2	-6		-1E-06	0.000002	-0.000006
127.502	1846.09	2.116136		0.044194686	0.007101128		0	2	-6		0	0.000002	-0.000006
127.601	1828.684	2.116136		0.043777993	0.007101128		0	2	-6		0	0.000002	-0.000006
127.701	1816.397	2.125779		0.043483847	0.007133487		1	1	-6		-1E-06	0.000001	-0.000006
127.8	1792.848	2.128535		0.042920093	0.007142735		0	2	-6		0	0.000002	-0.000006
127.9	1781.585	2.128731		0.042650461	0.007143393		0	2	-6		0	0.000002	-0.000006
128.001	1787.728	2.128731		0.042797522	0.007143393		0	2	-6		0	0.000002	-0.000006
128.102	1763.155	2.128731		0.042209254	0.007143393		0	2	-6		0	0.000002	-0.000006
128.201	1769.298	2.128731		0.042356315	0.007143393		0	2	-7		0	0.000002	-0.000007
128.301	1775.441	2.138375		0.042503376	0.007175755		1	2	-6		-1E-06	0.000002	-0.000006
128.402	1775.441	2.141131		0.042503376	0.007185003		0	2	-6		0	0.000002	-0.000006
128.502	1781.585	2.141328		0.042650461	0.007185664		0	1	-6		0	0.000001	-0.000006
128.602	1787.728	2.141328		0.042797522	0.007185664		0	2	-6		0	0.000002	-0.000006
128.701	1792.848	2.141328		0.042920093	0.007185664		0	1	-7		0	0.000001	-0.000007
128.801	1805.135	2.141328		0.043214239	0.007185664		0	2	-6		0	0.000002	-0.000006
128.9	1805.135	2.147822		0.043214239	0.007207456		0	2	-6		0	0.000002	-0.000006
129.001	1834.828	2.153333		0.043925078	0.00722595		0	2	-6		0	0.000002	-0.000006
129.101	1822.541	2.153924		0.043630932	0.007227933		0	2	-6		0	0.000002	-0.000006
129.201	1834.828	2.153924		0.043925078	0.007227933		0	1	-6		0	0.000001	-0.000006
129.301	1834.828	2.153924		0.043925078	0.007227933		0	1	-7		0	0.000001	-0.000007
129.401	1839.947	2.153924		0.044047625	0.007227933		0	1	-6		0	0.000001	-0.000006
129.502	1852.234	2.153924		0.044341771	0.007227933		0	2	-6		0	0.000002	-0.000006
129.601	1858.377	2.165142		0.044488832	0.007265577		1	1	-6		-1E-06	0.000001	-0.000006

129.701	1852.234	2.16652		0.044341771	0.007270201		1	2	-6		-1E-06	0.000002	-0.000006
129.801	1869.64	2.16652		0.044758464	0.007270201		0	2	-6		0	0.000002	-0.000006
129.9	1863.497	2.16652		0.044611403	0.007270201		0	2	-6		0	0.000002	-0.000006
130.002	1852.234	2.16652		0.044341771	0.007270201		1	2	-6		-1E-06	0.000002	-0.000006
130.102	1852.234	2.16652		0.044341771	0.007270201		0	1	-6		0	0.000001	-0.000006
130.203	1846.09	2.177738		0.044194686	0.007307846		0	2	-6		0	0.000002	-0.000006
130.302	1852.234	2.179116		0.044341771	0.00731247		0	1	-7		0	0.000001	-0.000007
130.401	1846.09	2.179116		0.044194686	0.00731247		0	2	-7		0	0.000002	-0.000007
130.502	1846.09	2.179116		0.044194686	0.00731247		0	2	-7		0	0.000002	-0.000007
130.602	1846.09	2.179116		0.044194686	0.00731247		0	2	-6		0	0.000002	-0.000006
130.703	1858.377	2.179116		0.044488832	0.00731247		0	2	-6		0	0.000002	-0.000006
130.801	1858.377	2.185611		0.044488832	0.007334265		0	2	-6		0	0.000002	-0.000006
130.901	1863.497	2.191122		0.044611403	0.007352758		0	2	-7		0	0.000002	-0.000007
131.001	1863.497	2.191712		0.044611403	0.007354738		1	2	-7		-1E-06	0.000002	-0.000007
131.101	1875.784	2.191712		0.044905549	0.007354738		0	2	-8		0	0.000002	-0.000008
131.2	1875.784	2.191712		0.044905549	0.007354738		0	2	-6		0	0.000002	-0.000006
131.301	1881.927	2.191712		0.04505261	0.007354738		1	2	-6		-1E-06	0.000002	-0.000006
131.402	1881.927	2.191712		0.04505261	0.007354738		0	1	-6		0	0.000001	-0.000006
131.5	1887.046	2.20293		0.045175157	0.007392383		0	1	-5		0	0.000001	-0.000005
131.603	1893.19	2.204308		0.045322242	0.007397007		0	2	-7		0	0.000002	-0.000007
131.702	1893.19	2.204308		0.045322242	0.007397007		0	1	-7		0	0.000001	-0.000007
131.801	1899.333	2.204308		0.045469303	0.007397007		0	1	-7		0	0.000001	-0.000007
131.901	1911.62	2.204308		0.045763449	0.007397007		0	1	-7		0	0.000001	-0.000007
132.003	1916.74	2.204308		0.04588602	0.007397007		0	2	-7		0	0.000002	-0.000007
132.101	1922.883	2.204308		0.046033081	0.007397007		1	2	-7		-1E-06	0.000002	-0.000007
132.201	1929.026	2.213952		0.046180142	0.007429369		0	2	-7		0	0.000002	-0.000007
132.302	1929.026	2.216707		0.046180142	0.007438614		0	1	-6		0	0.000001	-0.000006
132.403	1963.839	2.216904		0.047013552	0.007439275		0	2	-7		0	0.000002	-0.000007
132.502	1946.433	2.216904		0.046596859	0.007439275		0	2	-7		0	0.000002	-0.000007
132.601	1963.839	2.216904		0.047013552	0.007439275		0	2	-7		0	0.000002	-0.000007
132.701	1963.839	2.216904		0.047013552	0.007439275		1	2	-8		-1E-06	0.000002	-0.000008

132.801	1976.126	2.216904		0.047307698	0.007439275		1	2	-8		-1E-06	0.000002	-0.000008
132.901	1976.126	2.223399		0.047307698	0.00746107		0	2	-6		0	0.000002	-0.000006
133.001	1987.389	2.228909		0.04757733	0.00747956		1	2	-7		-1E-06	0.000002	-0.000007
133.103	2005.819	2.2295		0.048018537	0.007481544		0	2	-7		0	0.000002	-0.000007
133.201	2010.938	2.2295		0.048141084	0.007481544		0	1	-7		0	0.000001	-0.000007
133.302	2017.082	2.2295		0.048288169	0.007481544		1	1	-7		-1E-06	0.000001	-0.000007
133.403	2023.225	2.2295		0.04843523	0.007481544		0	2	-8		0	0.000002	-0.000008
133.5	2035.512	2.2295		0.048729376	0.007481544		0	2	-8		0	0.000002	-0.000008
133.602	2040.631	2.2295		0.048851923	0.007481544		0	2	-8		0	0.000002	-0.000008
133.7	2046.775	2.235995		0.048999008	0.007503339		0	2	-7		0	0.000002	-0.000007
133.801	2059.062	2.241506		0.049293154	0.007521832		0	2	-7		0	0.000002	-0.000007
133.903	2059.062	2.242096		0.049293154	0.007523812		1	2	-7		-1E-06	0.000002	-0.000007
134	2070.324	2.242096		0.049562762	0.007523812		0	1	-8		0	0.000001	-0.000008
134.102	2070.324	2.242096		0.049562762	0.007523812		0	2	-7		0	0.000002	-0.000007
134.2	2070.324	2.242096		0.049562762	0.007523812		0	1	-7		0	0.000001	-0.000007
134.301	2082.611	2.242096		0.049856908	0.007523812		0	2	-8		0	0.000002	-0.000008
134.401	2070.324	2.242096		0.049562762	0.007523812		0	2	-7		0	0.000002	-0.000007
134.501	2076.468	2.253314		0.049709847	0.007561456		1	1	-8		-1E-06	0.000001	-0.000008
134.602	2076.468	2.254692		0.049709847	0.007566081		0	1	-8		0	0.000001	-0.000008
134.701	2070.324	2.254692		0.049562762	0.007566081		1	1	-7		-1E-06	0.000001	-0.000007
134.802	2082.611	2.254692		0.049856908	0.007566081		0	2	-7		0	0.000002	-0.000007
134.901	2087.731	2.254692		0.049979479	0.007566081		1	2	-7		-1E-06	0.000002	-0.000007
135.001	2093.874	2.254692		0.05012654	0.007566081		1	2	-8		-1E-06	0.000002	-0.000008
135.101	2106.161	2.254692		0.050420686	0.007566081		0	1	-8		0	0.000001	-0.000008
135.202	2111.28	2.254692		0.050543233	0.007566081		1	1	-8		-1E-06	0.000001	-0.000008
135.302	2111.28	2.254692		0.050543233	0.007566081		0	2	-8		0	0.000002	-0.000008
135.401	2123.567	2.26591		0.050837379	0.007603725		0	1	-7		0	0.000001	-0.000007
135.5	2134.83	2.267288		0.051107011	0.007608349		1	2	-8		-1E-06	0.000002	-0.000008
135.601	2140.973	2.267288		0.051254072	0.007608349		0	2	-7		0	0.000002	-0.000007
135.702	2147.117	2.267288		0.051401157	0.007608349		1	2	-8		-1E-06	0.000002	-0.000008
135.801	2170.667	2.267288		0.051964935	0.007608349		1	2	-8		-1E-06	0.000002	-0.000008

135.902	2164.523	2.267288		0.05181785	0.007608349		0	1	-8		0	0.000001	-0.000008
136.001	2182.953	2.267288		0.052259057	0.007608349		1	1	-8		-1E-06	0.000001	-0.000008
136.101	2188.073	2.267288		0.052381628	0.007608349		1	1	-8		-1E-06	0.000001	-0.000008
136.202	2194.216	2.267288		0.052528689	0.007608349		0	1	-8		0	0.000001	-0.000008
136.301	2200.36	2.278506		0.052675774	0.007645993		0	2	-8		0	0.000002	-0.000008
136.401	2211.623	2.279884		0.052945406	0.007650617		1	1	-7		-1E-06	0.000001	-0.000007
136.502	2217.766	2.279884		0.053092467	0.007650617		1	1	-8		-1E-06	0.000001	-0.000008
136.601	2230.053	2.279884		0.053386613	0.007650617		0	1	-7		0	0.000001	-0.000007
136.702	2230.053	2.279884		0.053386613	0.007650617		1	2	-7		-1E-06	0.000002	-0.000007
136.801	2235.172	2.279884		0.05350916	0.007650617		1	1	-7		-1E-06	0.000001	-0.000007
136.901	2253.602	2.279884		0.053950367	0.007650617		1	1	-8		-1E-06	0.000001	-0.000008
137.001	2253.602	2.279884		0.053950367	0.007650617		1	1	-8		-1E-06	0.000001	-0.000008
137.102	2253.602	2.279884		0.053950367	0.007650617		1	1	-8		-1E-06	0.000001	-0.000008
137.201	2259.746	2.289528		0.054097452	0.00768298		0	1	-8		0	0.000001	-0.000008
137.302	2253.602	2.292284		0.053950367	0.007692228		1	1	-8		-1E-06	0.000001	-0.000008
137.401	2253.602	2.29248		0.053950367	0.007692886		0	1	-7		0	0.000001	-0.000007
137.501	2271.009	2.29248		0.054367084	0.007692886		1	2	-8		-1E-06	0.000002	-0.000008
137.601	2271.009	2.29248		0.054367084	0.007692886		1	2	-8		-1E-06	0.000002	-0.000008
137.703	2283.295	2.29248		0.054661206	0.007692886		1	1	-7		-1E-06	0.000001	-0.000007
137.801	2277.152	2.29248		0.054514145	0.007692886		1	1	-7		-1E-06	0.000001	-0.000007
137.9	2283.295	2.29248		0.054661206	0.007692886		1	1	-8		-1E-06	0.000001	-0.000008
138.001	2288.415	2.29248		0.054783777	0.007692886		1	1	-8		-1E-06	0.000001	-0.000008
138.103	2306.845	2.29248		0.055224984	0.007692886		1	1	-8		-1E-06	0.000001	-0.000008
138.201	2300.702	2.303699		0.055077923	0.007730534		1	2	-8		-1E-06	0.000002	-0.000008
138.303	2311.965	2.305076		0.055347555	0.007735154		1	1	-8		-1E-06	0.000001	-0.000008
138.403	2318.108	2.305076		0.055494616	0.007735154		1	2	-8		-1E-06	0.000002	-0.000008
138.501	2324.251	2.305076		0.055641677	0.007735154		0	2	-8		0	0.000002	-0.000008
138.603	2335.514	2.305076		0.055911309	0.007735154		1	1	-8		-1E-06	0.000001	-0.000008
138.701	2335.514	2.305076		0.055911309	0.007735154		1	2	-8		-1E-06	0.000002	-0.000008
138.802	2341.658	2.305076		0.056058394	0.007735154		1	2	-8		-1E-06	0.000002	-0.000008
138.902	2353.945	2.305076		0.05635254	0.007735154		1	2	-9		-1E-06	0.000002	-0.000009

139.002	2359.064	2.305076		0.056475087	0.007735154		1	1	-7		-1E-06	0.000001	-0.000007
139.101	2365.208	2.31472		0.056622172	0.007767517		1	2	-7		-1E-06	0.000002	-0.000007
139.2	2371.351	2.317475		0.056769233	0.007776762		1	2	-7		-1E-06	0.000002	-0.000007
139.301	2377.494	2.317672		0.056916294	0.007777423		1	1	-8		-1E-06	0.000001	-0.000008
139.403	2383.638	2.317672		0.057063379	0.007777423		1	0	-8		-1E-06	0	-0.000008
139.501	2388.757	2.317672		0.057185926	0.007777423		1	1	-8		-1E-06	0.000001	-0.000008
139.601	2388.757	2.317672		0.057185926	0.007777423		1	2	-8		-1E-06	0.000002	-0.000008
139.702	2407.187	2.317672		0.057627133	0.007777423		2	2	-8		-2E-06	0.000002	-0.000008
139.801	2407.187	2.317672		0.057627133	0.007777423		1	1	-8		-1E-06	0.000001	-0.000008
139.901	2418.45	2.317672		0.057896765	0.007777423		1	2	-8		-1E-06	0.000002	-0.000008
140.003	2418.45	2.327316		0.057896765	0.007809785		1	1	-8		-1E-06	0.000001	-0.000008
140.102	2430.737	2.330071		0.058190911	0.00781903		1	2	-8		-1E-06	0.000002	-0.000008
140.201	2435.856	2.330268		0.058313458	0.007819691		1	1	-8		-1E-06	0.000001	-0.000008
140.303	2442	2.330268		0.058460543	0.007819691		1	2	-8		-1E-06	0.000002	-0.000008
140.401	2448.143	2.330268		0.058607604	0.007819691		1	1	-8		-1E-06	0.000001	-0.000008
140.502	2459.406	2.330268		0.058877236	0.007819691		1	2	-8		-1E-06	0.000002	-0.000008
140.602	2459.406	2.330268		0.058877236	0.007819691		1	2	-8		-1E-06	0.000002	-0.000008
140.701	2471.693	2.330268		0.059171382	0.007819691		2	1	-8		-2E-06	0.000001	-0.000008
140.801	2465.55	2.330268		0.059024321	0.007819691		1	1	-8		-1E-06	0.000001	-0.000008
140.901	2477.836	2.330268		0.059318443	0.007819691		1	1	-8		-1E-06	0.000001	-0.000008
141.002	2495.243	2.341487		0.05973516	0.007857339		1	2	-8		-1E-06	0.000002	-0.000008
141.101	2501.386	2.342864		0.059882221	0.00786196		2	2	-8		-2E-06	0.000002	-0.000008
141.202	2495.243	2.342864		0.05973516	0.00786196		1	2	-8		-1E-06	0.000002	-0.000008
141.301	2501.386	2.342864		0.059882221	0.00786196		1	2	-8		-1E-06	0.000002	-0.000008
141.401	2501.386	2.342864		0.059882221	0.00786196		0	2	-9		0	0.000002	-0.000009
141.502	2507.529	2.342864		0.060029282	0.00786196		1	2	-8		-1E-06	0.000002	-0.000008
141.601	2518.792	2.342864		0.060298914	0.00786196		1	1	-8		-1E-06	0.000001	-0.000008
141.702	2524.936	2.342864		0.060445999	0.00786196		1	1	-7		-1E-06	0.000001	-0.000007
141.801	2542.342	2.342864		0.060862692	0.00786196		1	1	-9		-1E-06	0.000001	-0.000009
141.902	2536.198	2.354083		0.060715607	0.007899607		1	1	-8		-1E-06	0.000001	-0.000008
142.001	2548.485	2.35546		0.061009753	0.007904228		2	1	-8		-2E-06	0.000001	-0.000008

142.101	2565.892	2.35546		0.06142647	0.007904228		1	1	-7		-1E-06	0.000001	-0.000007
142.201	2565.892	2.35546		0.06142647	0.007904228		0	1	-8		0	0.000001	-0.000008
142.301	2583.298	2.35546		0.061843163	0.007904228		2	2	-8		-2E-06	0.000002	-0.000008
142.402	2589.441	2.35546		0.061990224	0.007904228		1	1	-9		-1E-06	0.000001	-0.000009
142.501	2589.441	2.35546		0.061990224	0.007904228		2	2	-9		-2E-06	0.000002	-0.000009
142.601	2595.585	2.365104		0.062137309	0.007936591		1	2	-9		-1E-06	0.000002	-0.000009
142.701	2612.991	2.36786		0.062554002	0.007945839		1	2	-9		-1E-06	0.000002	-0.000009
142.801	2612.991	2.368057		0.062554002	0.0079465		2	1	-9		-2E-06	0.000001	-0.000009
142.903	2612.991	2.368057		0.062554002	0.0079465		1	1	-8		-1E-06	0.000001	-0.000008
143.003	2619.135	2.368057		0.062701087	0.0079465		1	2	-8		-1E-06	0.000002	-0.000008
143.102	2625.278	2.368057		0.062848148	0.0079465		2	2	-8		-2E-06	0.000002	-0.000008
143.201	2625.278	2.368057		0.062848148	0.0079465		1	1	-8		-1E-06	0.000001	-0.000008
143.301	2636.541	2.379275		0.06311778	0.007984144		1	2	-9		-1E-06	0.000002	-0.000009
143.402	2648.827	2.380652		0.063411902	0.007988765		1	1	-8		-1E-06	0.000001	-0.000008
143.501	2648.827	2.380652		0.063411902	0.007988765		1	1	-8		-1E-06	0.000001	-0.000008
143.602	2648.827	2.380652		0.063411902	0.007988765		1	2	-8		-1E-06	0.000002	-0.000008
143.701	2654.971	2.380652		0.063558987	0.007988765		1	2	-8		-1E-06	0.000002	-0.000008
143.801	2648.827	2.380652		0.063411902	0.007988765		1	2	-9		-1E-06	0.000002	-0.000009
143.901	2648.827	2.380652		0.063411902	0.007988765		1	2	-9		-1E-06	0.000002	-0.000009
144.001	2660.09	2.390296		0.063681534	0.008021128		1	2	-9		-1E-06	0.000002	-0.000009
144.102	2666.234	2.393052		0.063828619	0.008030376		1	2	-9		-1E-06	0.000002	-0.000009
144.202	2683.64	2.393249		0.064245312	0.008031037		1	1	-9		-1E-06	0.000001	-0.000009
144.302	2689.783	2.393249		0.064392373	0.008031037		1	2	-8		-1E-06	0.000002	-0.000008
144.401	2689.783	2.393249		0.064392373	0.008031037		0	1	-9		0	0.000001	-0.000009
144.501	2689.783	2.393249		0.064392373	0.008031037		2	2	-8		-2E-06	0.000002	-0.000008
144.601	2707.19	2.393249		0.06480909	0.008031037		2	1	-9		-2E-06	0.000001	-0.000009
144.701	2702.07	2.402892		0.064686519	0.008063396		2	1	-9		-2E-06	0.000001	-0.000009
144.801	2713.333	2.405648		0.064956151	0.008072644		1	2	-9		-1E-06	0.000002	-0.000009
144.901	2719.477	2.405844		0.065103236	0.008073302		1	1	-8		-1E-06	0.000001	-0.000008
145.002	2719.477	2.405844		0.065103236	0.008073302		2	2	-10		-2E-06	0.000002	-0.00001
145.101	2736.883	2.405844		0.065519929	0.008073302		0	2	-9		0	0.000002	-0.000009

145.201	2743.026	2.405844		0.06566699	0.008073302		1	2	-10		-1E-06	0.000002	-0.00001
145.302	2743.026	2.405844		0.06566699	0.008073302		2	1	-9		-2E-06	0.000001	-0.000009
145.401	2760.433	2.415488		0.066083707	0.008105664		0	2	-9		0	0.000002	-0.000009
145.501	2760.433	2.418244		0.066083707	0.008114913		1	2	-9		-1E-06	0.000002	-0.000009
145.602	2760.433	2.418441		0.066083707	0.008115574		1	2	-9		-1E-06	0.000002	-0.000009
145.701	2772.719	2.418441		0.066377829	0.008115574		1	2	-10		-1E-06	0.000002	-0.00001
145.801	2778.863	2.418441		0.066524914	0.008115574		2	2	-10		-2E-06	0.000002	-0.00001
145.901	2778.863	2.418441		0.066524914	0.008115574		2	2	-10		-2E-06	0.000002	-0.00001
146.002	2783.982	2.418441		0.066647461	0.008115574		1	1	-9		-1E-06	0.000001	-0.000009
146.101	2783.982	2.429659		0.066647461	0.008153218		2	1	-10		-2E-06	0.000001	-0.00001
146.201	2807.532	2.431037		0.067211239	0.008157842		1	2	-10		-1E-06	0.000002	-0.00001
146.302	2813.675	2.431037		0.0673583	0.008157842		1	2	-9		-1E-06	0.000002	-0.000009
146.401	2819.819	2.431037		0.067505385	0.008157842		2	2	-10		-2E-06	0.000002	-0.00001
146.502	2837.225	2.431037		0.067922078	0.008157842		2	1	-10		-2E-06	0.000001	-0.00001
146.602	2831.082	2.431037		0.067775017	0.008157842		2	2	-10		-2E-06	0.000002	-0.00001
146.701	2837.225	2.437531		0.067922078	0.008179634		2	1	-10		-2E-06	0.000001	-0.00001
146.801	2849.512	2.443042		0.068216224	0.008198128		1	2	-10		-1E-06	0.000002	-0.00001
146.903	2855.655	2.443633		0.068363285	0.008200111		1	2	-10		-1E-06	0.000002	-0.00001
147.002	2860.775	2.443633		0.068485856	0.008200111		1	1	-10		-1E-06	0.000001	-0.00001
147.101	2855.655	2.443633		0.068363285	0.008200111		1	2	-10		-1E-06	0.000002	-0.00001
147.202	2879.205	2.443633		0.068927063	0.008200111		1	2	-10		-1E-06	0.000002	-0.00001
147.301	2873.062	2.443633		0.068780002	0.008200111		2	2	-10		-2E-06	0.000002	-0.00001
147.401	2890.468	2.450128		0.069196695	0.008221906		2	1	-10		-2E-06	0.000001	-0.00001
147.501	2890.468	2.455638		0.069196695	0.008240396		2	2	-11		-2E-06	0.000002	-0.000011
147.602	2884.324	2.456229		0.06904961	0.008242379		2	1	-10		-2E-06	0.000001	-0.00001
147.7	2884.324	2.456229		0.06904961	0.008242379		2	1	-11		-2E-06	0.000001	-0.000011
147.801	2890.468	2.456229		0.069196695	0.008242379		1	1	-10		-1E-06	0.000001	-0.00001
147.903	2884.324	2.456229		0.06904961	0.008242379		2	1	-10		-2E-06	0.000001	-0.00001
148.001	2896.611	2.456229		0.069343756	0.008242379		2	2	-11		-2E-06	0.000002	-0.000011
148.101	2896.611	2.465873		0.069343756	0.008274742		2	2	-10		-2E-06	0.000002	-0.00001
148.201	2914.017	2.468628		0.069760449	0.008283987		1	2	-10		-1E-06	0.000002	-0.00001

148.302	2907.874	2.468825		0.069613388	0.008284648		2	1	-11		-2E-06	0.000001	-0.000011
148.401	2914.017	2.468825		0.069760449	0.008284648		2	2	-10		-2E-06	0.000002	-0.00001
148.501	2920.161	2.468825		0.069907534	0.008284648		1	2	-11		-1E-06	0.000002	-0.000011
148.602	2920.161	2.468825		0.069907534	0.008284648		1	1	-11		-1E-06	0.000001	-0.000011
148.701	2931.424	2.47532		0.070177166	0.008306443		3	1	-10		-3E-06	0.000001	-0.00001
148.802	2931.424	2.48083		0.070177166	0.008324933		1	2	-10		-1E-06	0.000002	-0.00001
148.902	2937.567	2.481421		0.070324227	0.008326916		1	2	-10		-1E-06	0.000002	-0.00001
149.003	2937.567	2.481421		0.070324227	0.008326916		2	1	-10		-2E-06	0.000001	-0.00001
149.101	2937.567	2.481421		0.070324227	0.008326916		2	2	-10		-2E-06	0.000002	-0.00001
149.201	2954.973	2.481421		0.07074092	0.008326916		2	2	-10		-2E-06	0.000002	-0.00001
149.302	2943.71	2.481421		0.070471288	0.008326916		1	2	-11		-1E-06	0.000002	-0.000011
149.402	2961.117	2.487916		0.070888005	0.008348711		1	2	-10		-1E-06	0.000002	-0.00001
149.502	2954.973	2.493426		0.07074092	0.008367201		1	2	-10		-1E-06	0.000002	-0.00001
149.602	2943.71	2.494017		0.070471288	0.008369185		2	2	-10		-2E-06	0.000002	-0.00001
149.701	2954.973	2.494017		0.07074092	0.008369185		1	1	-10		-1E-06	0.000001	-0.00001
149.802	2949.854	2.494017		0.070618373	0.008369185		2	2	-10		-2E-06	0.000002	-0.00001
149.901	2954.973	2.494017		0.07074092	0.008369185		3	2	-10		-3E-06	0.000002	-0.00001
150.002	2943.71	2.494017		0.070471288	0.008369185		1	2	-10		-1E-06	0.000002	-0.00001
150.101	2931.424	2.503661		0.070177166	0.008401547		2	1	-11		-2E-06	0.000001	-0.000011
150.202	2943.71	2.506416		0.070471288	0.008410792		1	2	-11		-1E-06	0.000002	-0.000011
150.301	2943.71	2.506613		0.070471288	0.008411453		1	1	-11		-1E-06	0.000001	-0.000011
150.402	2937.567	2.506613		0.070324227	0.008411453		2	2	-11		-2E-06	0.000002	-0.000011
150.502	2931.424	2.506613		0.070177166	0.008411453		2	1	-11		-2E-06	0.000001	-0.000011
150.602	2926.304	2.506613		0.070054595	0.008411453		2	1	-11		-2E-06	0.000001	-0.000011
150.702	2931.424	2.506613		0.070177166	0.008411453		2	2	-10		-2E-06	0.000002	-0.00001
150.802	2926.304	2.517831		0.070054595	0.008449097		1	1	-11		-1E-06	0.000001	-0.000011
150.903	2902.755	2.519209		0.069490841	0.008453721		2	2	-11		-2E-06	0.000002	-0.000011
151.001	2896.611	2.519209		0.069343756	0.008453721		2	2	-11		-2E-06	0.000002	-0.000011
151.101	2879.205	2.519209		0.068927063	0.008453721		2	2	-11		-2E-06	0.000002	-0.000011
151.203	2849.512	2.519209		0.068216224	0.008453721		2	2	-11		-2E-06	0.000002	-0.000011
151.301	2825.962	2.519209		0.067652446	0.008453721		1	2	-11		-1E-06	0.000002	-0.000011

151.401	2802.412	2.525704		0.067088668	0.008475517		2	1	-11		-2E-06	0.000001	-0.000011
151.501	2760.433	2.531215		0.066083707	0.00849401		2	1	-11		-2E-06	0.000001	-0.000011
151.603	2695.927	2.531805		0.064539458	0.00849599		2	1	-11		-2E-06	0.000001	-0.000011
151.701	2631.421	2.531805		0.062995209	0.00849599		2	1	-12		-2E-06	0.000001	-0.000012
151.803	2531.079	2.531805		0.06059306	0.00849599		2	2	-12		-2E-06	0.000002	-0.000012
151.901	2459.406	2.531805		0.058877236	0.00849599		2	1	-11		-2E-06	0.000001	-0.000011
152.001	2388.757	2.531805		0.057185926	0.00849599		1	2	-11		-1E-06	0.000002	-0.000011
152.101	2318.108	2.543024		0.055494616	0.008533638		2	2	-11		-2E-06	0.000002	-0.000011
152.201	2241.316	2.544401		0.053656245	0.008538258		2	1	-12		-2E-06	0.000001	-0.000012
152.301	2164.523	2.544401		0.05181785	0.008538258		2	2	-12		-2E-06	0.000002	-0.000012
152.401	2093.874	2.544401		0.05012654	0.008538258		2	2	-11		-2E-06	0.000002	-0.000011
152.502	2023.225	2.544401		0.04843523	0.008538258		2	1	-12		-2E-06	0.000001	-0.000012
152.601	1940.289	2.550896		0.046449774	0.008560054		2	2	-11		-2E-06	0.000002	-0.000011
152.701	1893.19	2.556407		0.045322242	0.008578547		2	1	-12		-2E-06	0.000001	-0.000012
152.801	1858.377	2.556997		0.044488832	0.008580527		1	2	-12		-1E-06	0.000002	-0.000012
152.901	1834.828	2.556997		0.043925078	0.008580527		1	1	-12		-1E-06	0.000001	-0.000012
153.001	1798.991	2.556997		0.043067154	0.008580527		1	1	-12		-1E-06	0.000001	-0.000012
153.101	1781.585	2.556997		0.042650461	0.008580527		1	1	-13		-1E-06	0.000001	-0.000013
153.201	1763.155	2.556997		0.042209254	0.008580527		2	2	-12		-2E-06	0.000002	-0.000012
153.302	1745.748	2.563492		0.041792537	0.008602322		2	2	-11		-2E-06	0.000002	-0.000011
153.402	1728.342	2.569003		0.041375844	0.008620815		1	2	-12		-1E-06	0.000002	-0.000012
153.502	1704.792	2.569593		0.040812066	0.008622795		1	1	-12		-1E-06	0.000001	-0.000012
153.602	1687.386	2.569593		0.040395373	0.008622795		2	2	-13		-2E-06	0.000002	-0.000013
153.701	1687.386	2.569593		0.040395373	0.008622795		1	1	-13		-1E-06	0.000001	-0.000013
153.802	1663.836	2.569593		0.039831595	0.008622795		2	2	-12		-2E-06	0.000002	-0.000012
153.902	1657.693	2.569593		0.039684534	0.008622795		2	2	-13		-2E-06	0.000002	-0.000013
154.001	1639.263	2.576088		0.039243327	0.008644591		2	2	-13		-2E-06	0.000002	-0.000013
154.102	1639.263	2.581599		0.039243327	0.008663084		2	1	-13		-2E-06	0.000001	-0.000013
154.203	1634.143	2.582189		0.039120756	0.008665064		2	2	-13		-2E-06	0.000002	-0.000013
154.302	1621.856	2.582189		0.03882661	0.008665064		2	2	-13		-2E-06	0.000002	-0.000013
154.402	1615.713	2.582189		0.038679549	0.008665064		2	2	-13		-2E-06	0.000002	-0.000013

154.501	1604.45	2.582189		0.038409917	0.008665064		3	1	-13		-3E-06	0.000001	-0.000013
154.601	1598.307	2.582189		0.038262856	0.008665064		2	2	-14		-2E-06	0.000002	-0.000014
154.703	1574.757	2.582189		0.037699078	0.008665064		2	1	-13		-2E-06	0.000001	-0.000013
154.801	1568.614	2.591833		0.037552017	0.008697426		2	1	-13		-2E-06	0.000001	-0.000013
154.901	1557.351	2.594588		0.037282385	0.008706671		2	1	-14		-2E-06	0.000001	-0.000014
155.001	1527.658	2.594785		0.036571546	0.008707332		2	2	-12		-2E-06	0.000002	-0.000012
155.101	1515.371	2.594785		0.0362774	0.008707332		2	2	-14		-2E-06	0.000002	-0.000014
155.201	1504.108	2.594785		0.036007768	0.008707332		2	1	-14		-2E-06	0.000001	-0.000014
155.301	1486.702	2.594785		0.035591075	0.008707332		2	1	-14		-2E-06	0.000001	-0.000014
155.401	1486.702	2.594785		0.035591075	0.008707332		2	1	-14		-2E-06	0.000001	-0.000014
155.501	1480.558	2.594785		0.03544399	0.008707332		3	2	-12		-3E-06	0.000002	-0.000012
155.602	1463.152	2.604429		0.035027297	0.008739695		2	2	-13		-2E-06	0.000002	-0.000013
155.701	1463.152	2.607184		0.035027297	0.00874894		1	1	-14		-1E-06	0.000001	-0.000014
155.802	1444.722	2.607381		0.03458609	0.008749601		2	2	-14		-2E-06	0.000002	-0.000014
155.901	1433.459	2.607381		0.034316458	0.008749601		2	1	-14		-2E-06	0.000001	-0.000014
156.002	1421.172	2.607381		0.034022312	0.008749601		2	2	-14		-2E-06	0.000002	-0.000014
156.102	1421.172	2.607381		0.034022312	0.008749601		2	2	-14		-2E-06	0.000002	-0.000014
156.202	1409.909	2.607381		0.03375268	0.008749601		2	1	-14		-2E-06	0.000001	-0.000014
156.301	1397.623	2.607381		0.033458558	0.008749601		3	1	-13		-3E-06	0.000001	-0.000013
156.401	1397.623	2.607381		0.033458558	0.008749601		2	2	-14		-2E-06	0.000002	-0.000014
156.501	1386.36	2.607381		0.033188926	0.008749601		2	2	-14		-2E-06	0.000002	-0.000014
156.602	1380.216	2.6186		0.033041841	0.008787248		2	2	-14		-2E-06	0.000002	-0.000014
156.702	1380.216	2.619977		0.033041841	0.008791869		2	0	-14		-2E-06	0	-0.000014
156.802	1374.073	2.619977		0.03289478	0.008791869		2	2	-15		-2E-06	0.000002	-0.000015
156.902	1356.667	2.619977		0.032478087	0.008791869		2	2	-14		-2E-06	0.000002	-0.000014
157.002	1350.523	2.619977		0.032331002	0.008791869		2	1	-14		-2E-06	0.000001	-0.000014
157.101	1344.38	2.619977		0.032183941	0.008791869		2	1	-14		-2E-06	0.000001	-0.000014
157.202	1350.523	2.619977		0.032331002	0.008791869		1	2	-14		-1E-06	0.000002	-0.000014
157.301	1339.26	2.619977		0.03206137	0.008791869		2	2	-15		-2E-06	0.000002	-0.000015
157.402	1344.38	2.619977		0.032183941	0.008791869		2	1	-15		-2E-06	0.000001	-0.000015
157.502	1339.26	2.629621		0.03206137	0.008824232		2	2	-16		-2E-06	0.000002	-0.000016

157.602	1339.26	2.632377		0.03206137	0.00883348		2	2	-15		-2E-06	0.000002	-0.000015
157.703	1326.974	2.632573		0.031767248	0.008834138		3	2	-14		-3E-06	0.000002	-0.000014
157.801	1326.974	2.632573		0.031767248	0.008834138		2	2	-15		-2E-06	0.000002	-0.000015
157.901	1326.974	2.632573		0.031767248	0.008834138		2	2	-15		-2E-06	0.000002	-0.000015
158.002	1320.83	2.632573		0.031620163	0.008834138		2	2	-15		-2E-06	0.000002	-0.000015
158.102	1320.83	2.632573		0.031620163	0.008834138		2	2	-15		-2E-06	0.000002	-0.000015
158.201	1309.567	2.632573		0.031350531	0.008834138		2	1	-15		-2E-06	0.000001	-0.000015
158.302	1309.567	2.632573		0.031350531	0.008834138		2	3	-15		-2E-06	0.000003	-0.000015
158.401	1303.424	2.632573		0.03120347	0.008834138		1	2	-15		-1E-06	0.000002	-0.000015
158.501	1315.711	2.642217		0.031497616	0.0088665		2	1	-15		-2E-06	0.000001	-0.000015
158.602	1303.424	2.644973		0.03120347	0.008875748		3	2	-15		-3E-06	0.000002	-0.000015
158.702	1303.424	2.645169		0.03120347	0.008876406		2	1	-14		-2E-06	0.000001	-0.000014
158.801	1309.567	2.645169		0.031350531	0.008876406		2	2	-15		-2E-06	0.000002	-0.000015
158.902	1303.424	2.645169		0.03120347	0.008876406		2	1	-15		-2E-06	0.000001	-0.000015
159.002	1291.137	2.645169		0.030909324	0.008876406		2	1	-15		-2E-06	0.000001	-0.000015
159.102	1291.137	2.645169		0.030909324	0.008876406		2	1	-15		-2E-06	0.000001	-0.000015
159.202	1297.28	2.645169		0.031056385	0.008876406		2	2	-15		-2E-06	0.000002	-0.000015
159.302	1286.018	2.645169		0.030786777	0.008876406		2	2	-15		-2E-06	0.000002	-0.000015
159.401	1279.874	2.645169		0.030639692	0.008876406		2	2	-16		-2E-06	0.000002	-0.000016
159.501	1279.874	2.654813		0.030639692	0.008908768		2	1	-15		-2E-06	0.000001	-0.000015
159.601	1279.874	2.657569		0.030639692	0.008918017		2	1	-15		-2E-06	0.000001	-0.000015
159.702	1267.587	2.657765		0.030345546	0.008918674		2	2	-16		-2E-06	0.000002	-0.000016
159.802	1267.587	2.657765		0.030345546	0.008918674		2	2	-16		-2E-06	0.000002	-0.000016
159.902	1250.181	2.657765		0.029928853	0.008918674		2	1	-16		-2E-06	0.000001	-0.000016
160.001	1244.038	2.657765		0.029781792	0.008918674		2	1	-16		-2E-06	0.000001	-0.000016
160.102	1256.324	2.657765		0.030075914	0.008918674		2	1	-16		-2E-06	0.000001	-0.000016
160.202	1238.918	2.657765		0.029659222	0.008918674		2	2	-17		-2E-06	0.000002	-0.000017
160.301	1238.918	2.657765		0.029659222	0.008918674		2	2	-16		-2E-06	0.000002	-0.000016
160.401	1238.918	2.657765		0.029659222	0.008918674		2	2	-17		-2E-06	0.000002	-0.000017
160.502	1232.775	2.667409		0.02951216	0.008951037		2	1	-15		-2E-06	0.000001	-0.000015
160.602	1238.918	2.670165		0.029659222	0.008960285		1	1	-16		-1E-06	0.000001	-0.000016

160.702	1220.488	2.670362		0.029218014	0.008960946		2	2	-17		-2E-06	0.000002	-0.000017
160.801	1220.488	2.670362		0.029218014	0.008960946		2	3	-17		-2E-06	0.000003	-0.000017
160.902	1209.225	2.670362		0.028948382	0.008960946		2	2	-16		-2E-06	0.000002	-0.000016
161.002	1196.938	2.670362		0.028654236	0.008960946		1	2	-16		-1E-06	0.000002	-0.000016
161.101	1191.819	2.670362		0.02853169	0.008960946		2	1	-16		-2E-06	0.000001	-0.000016
161.201	1185.675	2.670362		0.028384605	0.008960946		3	1	-16		-3E-06	0.000001	-0.000016
161.302	1167.245	2.670362		0.027943397	0.008960946		2	2	-16		-2E-06	0.000002	-0.000016
161.401	1173.389	2.676857		0.028090482	0.008982742		2	2	-17		-2E-06	0.000002	-0.000017
161.502	1167.245	2.682367		0.027943397	0.009001232		2	1	-16		-2E-06	0.000001	-0.000016
161.603	1155.982	2.682958		0.027673766	0.009003215		2	1	-16		-2E-06	0.000001	-0.000016
161.702	1149.839	2.682958		0.027526704	0.009003215		2	1	-17		-2E-06	0.000001	-0.000017
161.801	1143.696	2.682958		0.027379643	0.009003215		2	1	-17		-2E-06	0.000001	-0.000017
161.901	1143.696	2.682958		0.027379643	0.009003215		2	1	-16		-2E-06	0.000001	-0.000016
162.001	1132.433	2.682958		0.027110011	0.009003215		2	1	-16		-2E-06	0.000001	-0.000016
162.102	1132.433	2.682958		0.027110011	0.009003215		2	2	-17		-2E-06	0.000002	-0.000017
162.201	1120.146	2.682958		0.026815865	0.009003215		1	2	-17		-1E-06	0.000002	-0.000017
162.301	1126.289	2.682958		0.026962926	0.009003215		2	2	-16		-2E-06	0.000002	-0.000016
162.402	1108.883	2.694176		0.026546234	0.009040859		2	2	-16		-2E-06	0.000002	-0.000016
162.501	1108.883	2.695554		0.026546234	0.009045483		2	1	-17		-2E-06	0.000001	-0.000017
162.602	1108.883	2.695554		0.026546234	0.009045483		2	1	-17		-2E-06	0.000001	-0.000017
162.702	1102.74	2.695554		0.026399172	0.009045483		1	1	-17		-1E-06	0.000001	-0.000017
162.802	1102.74	2.695554		0.026399172	0.009045483		3	2	-17		-3E-06	0.000002	-0.000017
162.901	1085.333	2.695554		0.025982456	0.009045483		3	2	-17		-3E-06	0.000002	-0.000017
163.002	1079.19	2.695554		0.025835394	0.009045483		2	1	-18		-2E-06	0.000001	-0.000018
163.102	1085.333	2.695554		0.025982456	0.009045483		1	1	-17		-1E-06	0.000001	-0.000017
163.202	1073.047	2.702048		0.025688333	0.009067275		2	1	-17		-2E-06	0.000001	-0.000017
163.301	1073.047	2.707559		0.025688333	0.009085768		2	1	-17		-2E-06	0.000001	-0.000017
163.402	1079.19	2.70815		0.025835394	0.009087752		1	1	-17		-1E-06	0.000001	-0.000017
163.501	1066.903	2.70815		0.025541248	0.009087752		2	1	-17		-2E-06	0.000001	-0.000017
163.602	1066.903	2.70815		0.025541248	0.009087752		2	1	-16		-2E-06	0.000001	-0.000016
163.702	1066.903	2.70815		0.025541248	0.009087752		2	1	-18		-2E-06	0.000001	-0.000018

163.801	1066.903	2.70815		0.025541248	0.009087752		2	1	-17		-2E-06	0.000001	-0.000017
163.902	1061.784	2.717793		0.025418702	0.009120111		2	1	-17		-2E-06	0.000001	-0.000017
164.002	1066.903	2.720549		0.025541248	0.009129359		2	2	-18		-2E-06	0.000002	-0.000018
164.101	1055.64	2.720746		0.025271617	0.00913002		2	2	-18		-2E-06	0.000002	-0.000018
164.202	1055.64	2.720746		0.025271617	0.00913002		1	1	-17		-1E-06	0.000001	-0.000017
164.302	1055.64	2.720746		0.025271617	0.00913002		1	1	-17		-1E-06	0.000001	-0.000017
164.401	1043.353	2.720746		0.02497747	0.00913002		2	2	-18		-2E-06	0.000002	-0.000018
164.501	1025.947	2.73039		0.024560778	0.009162383		1	2	-18		-1E-06	0.000002	-0.000018
164.601	1008.541	2.733145		0.024144085	0.009171628		1	1	-17		-1E-06	0.000001	-0.000017
164.701	1008.541	2.733342		0.024144085	0.009172289		1	1	-18		-1E-06	0.000001	-0.000018
164.801	1008.541	2.733342		0.024144085	0.009172289		2	2	-17		-2E-06	0.000002	-0.000017
164.901	996.254	2.733342		0.023849938	0.009172289		1	2	-16		-1E-06	0.000002	-0.000016
165.002	984.9911	2.733342		0.023580309	0.009172289		2	2	-17		-2E-06	0.000002	-0.000017
165.101	978.8477	2.733342		0.023433238	0.009172289		2	2	-17		-2E-06	0.000002	-0.000017
165.201	972.7043	2.74456		0.023286168	0.009209933		2	1	-17		-2E-06	0.000001	-0.000017
165.302	972.7043	2.745938		0.023286168	0.009214557		1	1	-18		-1E-06	0.000001	-0.000018
165.402	955.298	2.745938		0.022869468	0.009214557		1	2	-17		-1E-06	0.000002	-0.000017
165.503	955.298	2.745938		0.022869468	0.009214557		2	1	-18		-2E-06	0.000001	-0.000018
165.602	943.0113	2.745938		0.022575329	0.009214557		2	1	-17		-2E-06	0.000001	-0.000017
165.702	949.1547	2.745938		0.022722399	0.009214557		1	1	-17		-1E-06	0.000001	-0.000017
165.802	937.8918	2.757156		0.02245277	0.009252201		1	1	-18		-1E-06	0.000001	-0.000018
165.903	914.3421	2.758534		0.021888999	0.009256826		1	2	-17		-1E-06	0.000002	-0.000017
166.002	902.0553	2.758534		0.021594858	0.009256826		2	1	-18		-2E-06	0.000001	-0.000018
166.102	890.7924	2.758534		0.021325228	0.009256826		2	1	-18		-2E-06	0.000001	-0.000018
166.202	872.3622	2.758534		0.020884016	0.009256826		1	2	-18		-1E-06	0.000002	-0.000018
166.302	848.8125	2.758534		0.020320246	0.009256826		2	1	-17		-2E-06	0.000001	-0.000017
166.402	848.8125	2.768178		0.020320246	0.009289188		1	1	-18		-1E-06	0.000001	-0.000018
166.502	819.1194	2.770933		0.019609404	0.009298433		1	1	-17		-1E-06	0.000001	-0.000017
166.602	801.7131	2.77113		0.019192704	0.009299094		0	1	-17		0	0.000001	-0.000017
166.701	778.1635	2.77113		0.018628936	0.009299094		1	1	-18		-1E-06	0.000001	-0.000018
166.802	760.7572	2.77113		0.018212235	0.009299094		1	1	-17		-1E-06	0.000001	-0.000017

166.902	748.4704	2.77113		0.017918094	0.009299094		1	1	-17		-1E-06	0.000001	-0.000017
167.002	731.0641	2.782348		0.017501394	0.009336738		0	1	-18		0	0.000001	-0.000018
167.102	707.5144	2.783726		0.016937623	0.009341362		1	1	-17		-1E-06	0.000001	-0.000017
167.201	701.371	2.783726		0.016790553	0.009341362		1	1	-18		-1E-06	0.000001	-0.000018
167.301	695.2276	2.783726		0.016643482	0.009341362		2	1	-18		-2E-06	0.000001	-0.000018
167.402	695.2276	2.783726		0.016643482	0.009341362		2	2	-18		-2E-06	0.000002	-0.000018
167.502	690.1082	2.783726		0.016520925	0.009341362		1	1	-17		-1E-06	0.000001	-0.000017
167.601	671.6779	2.794944		0.016079711	0.009379007		1	1	-17		-1E-06	0.000001	-0.000017
167.701	666.5585	2.796322		0.015957155	0.009383631		0	2	-18		0	0.000002	-0.000018
167.801	643.0088	2.796322		0.015393384	0.009383631		2	2	-18		-2E-06	0.000002	-0.000018
167.901	636.8654	2.796322		0.015246313	0.009383631		1	2	-17		-1E-06	0.000002	-0.000017
168.003	630.722	2.796322		0.015099243	0.009383631		0	1	-17		0	0.000001	-0.000017
168.101	619.4591	2.796322		0.014829613	0.009383631		1	1	-18		-1E-06	0.000001	-0.000018
168.202	613.3157	2.805966		0.014682543	0.009415993		1	1	-17		-1E-06	0.000001	-0.000017
168.301	601.0289	2.808721		0.014388401	0.009425238		1	1	-18		-1E-06	0.000001	-0.000018
168.401	589.766	2.808918		0.014118772	0.009425899		1	2	-18		-1E-06	0.000002	-0.000018
168.503	589.766	2.808918		0.014118772	0.009425899		1	2	-18		-1E-06	0.000002	-0.000018
168.602	577.4792	2.808918		0.01382463	0.009425899		1	1	-18		-1E-06	0.000001	-0.000018
168.702	560.0729	2.808918		0.01340793	0.009425899		2	1	-17		-2E-06	0.000001	-0.000017
168.801	560.0729	2.815413		0.01340793	0.009447695		1	2	-18		-1E-06	0.000002	-0.000018
168.901	553.9295	2.820924		0.01326086	0.009466188		0	1	-18		0	0.000001	-0.000018
169.001	536.5233	2.821514		0.012844162	0.009468168		1	1	-18		-1E-06	0.000001	-0.000018
169.102	524.2365	2.821514		0.012550021	0.009468168		1	1	-18		-1E-06	0.000001	-0.000018
169.203	524.2365	2.821514		0.012550021	0.009468168		1	1	-19		-1E-06	0.000001	-0.000019
169.301	500.6868	2.821514		0.01198625	0.009468168		1	2	-17		-1E-06	0.000002	-0.000017
169.401	489.4239	2.831158		0.01171662	0.00950053		1	1	-17		-1E-06	0.000001	-0.000017
169.502	483.2805	2.833913		0.01156955	0.009509775		1	1	-18		-1E-06	0.000001	-0.000018
169.602	470.9937	2.83411		0.011275408	0.009510436		1	1	-18		-1E-06	0.000001	-0.000018
169.701	453.5874	2.83411		0.010858708	0.009510436		0	1	-18		0	0.000001	-0.000018
169.801	453.5874	2.83411		0.010858708	0.009510436		1	1	-18		-1E-06	0.000001	-0.000018
169.903	453.5874	2.83411		0.010858708	0.009510436		1	2	-18		-1E-06	0.000002	-0.000018

170.002	442.3245	2.840605		0.010589079	0.009532232		1	2	-18		-1E-06	0.000002	-0.000018
170.101	436.1811	2.846116		0.010442008	0.009550725		1	2	-18		-1E-06	0.000002	-0.000018
170.201	436.1811	2.846706		0.010442008	0.009552705		0	1	-17		0	0.000001	-0.000017
170.302	423.8943	2.846706		0.010147867	0.009552705		2	1	-18		-2E-06	0.000001	-0.000018
170.401	430.0377	2.846706		0.010294938	0.009552705		0	1	-19		0	0.000001	-0.000019
170.501	430.0377	2.846706		0.010294938	0.009552705		0	2	-19		0	0.000002	-0.000019
170.601	423.8943	2.853201		0.010147867	0.0095745		0	1	-19		0	0.000001	-0.000019
170.701	406.488	2.858712		0.009731167	0.009592993		1	1	-19		-1E-06	0.000001	-0.000019
170.801	406.488	2.859302		0.009731167	0.009594973		1	1	-19		-1E-06	0.000001	-0.000019
170.902	400.3446	2.859302		0.009584096	0.009594973		2	0	-18		-2E-06	0	-0.000018
171.001	389.0817	2.859302		0.009314467	0.009594973		1	1	-18		-1E-06	0.000001	-0.000018
171.101	389.0817	2.859302		0.009314467	0.009594973		0	1	-19		0	0.000001	-0.000019
171.201	389.0817	2.859302		0.009314467	0.009594973		1	2	-19		-1E-06	0.000002	-0.000019
171.302	376.795	2.859302		0.009020328	0.009594973		0	1	-18		0	0.000001	-0.000018
171.402	371.6754	2.870521		0.008897766	0.009632621		0	1	-19		0	0.000001	-0.000019
171.501	359.3887	2.871898		0.008603628	0.009637242		0	1	-18		0	0.000001	-0.000018
171.601	353.2453	2.871898		0.008456557	0.009637242		0	1	-19		0	0.000001	-0.000019
171.703	359.3887	2.871898		0.008603628	0.009637242		1	1	-19		-1E-06	0.000001	-0.000019
171.801	335.839	2.871898		0.008039857	0.009637242		0	1	-18		0	0.000001	-0.000018
171.902	329.6956	2.871898		0.007892786	0.009637242		0	0	-17		0	0	-0.000017
172.001	323.5522	2.871898		0.007745716	0.009637242		0	1	-18		0	0.000001	-0.000018
172.102	318.4327	2.883117		0.007623157	0.009674889		0	1	-18		0	0.000001	-0.000018
172.202	312.2893	2.884494		0.007476086	0.00967951		0	1	-18		0	0.000001	-0.000018
172.303	294.883	2.884494		0.007059386	0.00967951		1	1	-19		-1E-06	0.000001	-0.000019
172.402	271.3333	2.884494		0.006495615	0.00967951		0	2	-18		0	0.000002	-0.000018
172.502	259.0465	2.884494		0.006201474	0.00967951		0	1	-18		0	0.000001	-0.000018
172.603	247.7836	2.884494		0.005931844	0.00967951		0	1	-19		0	0.000001	-0.000019
172.701	241.6402	2.884494		0.005784774	0.00967951		1	1	-18		-1E-06	0.000001	-0.000018
172.803	223.2101	2.890989		0.005343564	0.009701305		0	1	-19		0	0.000001	-0.000019
172.901	223.2101	2.8965		0.005343564	0.009719799		0	1	-19		0	0.000001	-0.000019
173.001	223.2101	2.89709		0.005343564	0.009721779		0	1	-19		0	0.000001	-0.000019

173.103	211.9472	2.89709		0.005073935	0.009721779		1	1	-18		-1E-06	0.000001	-0.000018
173.201	211.9472	2.89709		0.005073935	0.009721779		1	1	-18		-1E-06	0.000001	-0.000018
173.301	199.6604	2.89709		0.004779793	0.009721779		1	1	-18		-1E-06	0.000001	-0.000018
173.401	194.5409	2.89709		0.004657234	0.009721779		0	2	-19		0	0.000002	-0.000019
173.501	176.1107	2.89709		0.004216023	0.009721779		0	1	-18		0	0.000001	-0.000018
173.602	164.8478	2.906734		0.003946393	0.009754141		0	1	-19		0	0.000001	-0.000019
173.703	158.7044	2.90949		0.003799322	0.009763389		0	1	-19		0	0.000001	-0.000019
173.803	141.2981	2.909686		0.003382622	0.009764047		0	2	-19		0	0.000002	-0.000019
173.901	135.1547	2.909686		0.003235552	0.009764047		0	1	-19		0	0.000001	-0.000019
174.001	135.1547	2.909686		0.003235552	0.009764047		0	1	-19		0	0.000001	-0.000019
174.101	129.0113	2.909686		0.003088481	0.009764047		0	0	-19		0	0	-0.000019
174.201	117.7484	2.909686		0.002818852	0.009764047		0	1	-19		0	0.000001	-0.000019
174.302	129.0113	2.909686		0.003088481	0.009764047		0	1	-18		0	0.000001	-0.000018
174.402	129.0113	2.909686		0.003088481	0.009764047		0	1	-19		0	0.000001	-0.000019
174.501	117.7484	2.91933		0.002818852	0.009796409		0	1	-19		0	0.000001	-0.000019
174.602	129.0113	2.922086		0.003088481	0.009805658		0	2	-19		0	0.000002	-0.000019
174.701	117.7484	2.922282		0.002818852	0.009806315		0	1	-19		0	0.000001	-0.000019
174.803	117.7484	2.922282		0.002818852	0.009806315		0	0	-18		0	0	-0.000018
174.901	123.8918	2.922282		0.002965922	0.009806315		0	1	-19		0	0.000001	-0.000019
175.001	117.7484	2.922282		0.002818852	0.009806315		0	1	-19		0	0.000001	-0.000019
175.101	117.7484	2.922282		0.002818852	0.009806315		0	1	-19		0	0.000001	-0.000019
175.201	117.7484	2.922282		0.002818852	0.009806315		0	0	-19		0	0	-0.000019
175.302	111.605	2.922282		0.002671781	0.009806315		0	1	-19		0	0.000001	-0.000019
175.402	117.7484	2.933501		0.002818852	0.009843963		0	0	-20		0	0	-0.00002
175.503	117.7484	2.934878		0.002818852	0.009848584		0	1	-19		0	0.000001	-0.000019
175.602	111.605	2.934878		0.002671781	0.009848584		0	1	-19		0	0.000001	-0.000019
175.702	117.7484	2.934878		0.002818852	0.009848584		0	1	-19		0	0.000001	-0.000019
175.802	117.7484	2.934878		0.002818852	0.009848584		0	2	-19		0	0.000002	-0.000019
175.902	117.7484	2.934878		0.002818852	0.009848584		0	2	-19		0	0.000002	-0.000019
176.001	129.0113	2.934878		0.003088481	0.009848584		0	1	-19		0	0.000001	-0.000019
176.102	135.1547	2.934878		0.003235552	0.009848584		0	1	-19		0	0.000001	-0.000019

176.203	135.1547	2.934878		0.003235552	0.009848584		1	2	-19		-1E-06	0.000002	-0.000019
176.302	141.2981	2.941373		0.003382622	0.009870379		0	1	-19		0	0.000001	-0.000019
176.403	147.4415	2.946884		0.003529693	0.009888872		1	1	-19		-1E-06	0.000001	-0.000019
176.501	141.2981	2.947474		0.003382622	0.009890852		0	1	-19		0	0.000001	-0.000019
176.602	152.561	2.947474		0.003652252	0.009890852		1	1	-19		-1E-06	0.000001	-0.000019
176.701	152.561	2.947474		0.003652252	0.009890852		0	1	-19		0	0.000001	-0.000019
176.801	158.7044	2.947474		0.003799322	0.009890852		0	1	-19		0	0.000001	-0.000019
176.902	158.7044	2.947474		0.003799322	0.009890852		0	1	-19		0	0.000001	-0.000019
177.002	164.8478	2.947474		0.003946393	0.009890852		0	1	-19		0	0.000001	-0.000019
177.103	176.1107	2.947474		0.004216023	0.009890852		0	1	-19		0	0.000001	-0.000019
177.202	170.9912	2.947474		0.004093464	0.009890852		1	1	-19		-1E-06	0.000001	-0.000019
177.301	176.1107	2.958693		0.004216023	0.0099285		0	2	-19		0	0.000002	-0.000019
177.401	188.3975	2.960071		0.004510164	0.009933124		0	1	-19		0	0.000001	-0.000019
177.501	188.3975	2.960071		0.004510164	0.009933124		0	1	-18		0	0.000001	-0.000018
177.602	199.6604	2.960071		0.004779793	0.009933124		0	1	-19		0	0.000001	-0.000019
177.701	194.5409	2.960071		0.004657234	0.009933124	0	0	2	-19		0	0.000002	-0.000019
177.802	205.8038	2.960071		0.004926864	0.009933124	0	0	1	-19		0	0.000001	-0.000019
177.901	211.9472	2.960071		0.005073935	0.009933124	0	0	2	-19		0	0.000002	-0.000019
178.002	199.6604	2.960071		0.004779793	0.009933124	0	0	1	-19		0	0.000001	-0.000019
178.103	205.8038	2.960071		0.004926864	0.009933124	0	1	1	-19		-1E-06	0.000001	-0.000019
178.202	211.9472	2.966565		0.005073935	0.009954916	0	1	2	-19		-1E-06	0.000002	-0.000019
178.302	218.0905	2.972076		0.005221003	0.009973409	0	0	1	-19		0	0.000001	-0.000019
178.402	223.2101	2.972667		0.005343564	0.009975393	0	0	1	-19		0	0.000001	-0.000019
178.502	205.8038	2.972667		0.004926864	0.009975393	0	0	1	-18		0	0.000001	-0.000018
178.601	211.9472	2.972667		0.005073935	0.009975393	0	0	1	-19		0	0.000001	-0.000019
178.703	205.8038	2.972667		0.004926864	0.009975393	0	1	1	-19		-1E-06	0.000001	-0.000019
178.801	205.8038	2.972667		0.004926864	0.009975393	0	0	2	-19		0	0.000002	-0.000019
178.902	211.9472	2.972667		0.005073935	0.009975393	0	0	2	-19		0	0.000002	-0.000019
179.002	199.6604	2.972667		0.004779793	0.009975393	0	0	2	-19		0	0.000002	-0.000019
179.101	211.9472	2.979161		0.005073935	0.009997185	0	0	1	-19		0	0.000001	-0.000019
179.203	211.9472	2.984672		0.005073935	0.010015678	0	1	2	-19		-1E-06	0.000002	-0.000019

179.302	194.5409	2.985263		0.004657234	0.010017661	0	0	1	-19		0	0.000001	-0.000019
179.402	194.5409	2.985263		0.004657234	0.010017661	0	0	1	-18		0	0.000001	-0.000018
179.502	188.3975	2.985263		0.004510164	0.010017661	0	1	1	-18		-1E-06	0.000001	-0.000018
179.602	188.3975	2.985263		0.004510164	0.010017661	0	0	1	-19		0	0.000001	-0.000019
179.702	176.1107	2.985263		0.004216023	0.010017661	0	0	2	-19		0	0.000002	-0.000019
179.802	182.2541	2.985263		0.004363093	0.010017661	0	0	2	-19		0	0.000002	-0.000019
179.902	182.2541	2.985263		0.004363093	0.010017661	0	0	2	-18		0	0.000002	-0.000018
180.002	188.3975	2.991757		0.004510164	0.010039453	0	1	1	-18		-1E-06	0.000001	-0.000018
180.101	194.5409	2.997268		0.004657234	0.010057946	0	1	1	-19		-1E-06	0.000001	-0.000019
180.202	199.6604	2.997859		0.004779793	0.01005993	0	1	1	-19		-1E-06	0.000001	-0.000019
180.302	199.6604	2.997859		0.004779793	0.01005993	0	1	1	-19		-1E-06	0.000001	-0.000019
180.403	199.6604	2.997859		0.004779793	0.01005993	0	0	1	-19		0	0.000001	-0.000019
180.503	199.6604	2.997859		0.004779793	0.01005993	0	1	2	-19		-1E-06	0.000002	-0.000019
180.601	218.0905	2.997859		0.005221003	0.01005993	0	0	2	-18		0	0.000002	-0.000018
180.702	211.9472	2.997859		0.005073935	0.01005993	0	0	2	-19		0	0.000002	-0.000019
180.801	211.9472	2.997859		0.005073935	0.01005993	0	1	1	-19		-1E-06	0.000001	-0.000019
180.901	211.9472	2.997859		0.005073935	0.01005993	0	1	1	-19		-1E-06	0.000001	-0.000019
181.002	218.0905	3.009077		0.005221003	0.010097574	0	1	1	-19		-1E-06	0.000001	-0.000019
181.102	218.0905	3.010455		0.005221003	0.010102198	0	0	2	-18		0	0.000002	-0.000018
181.201	223.2101	3.010455		0.005343564	0.010102198	0	0	1	-19		0	0.000001	-0.000019
181.301	223.2101	3.010455		0.005343564	0.010102198	0	1	1	-19		-1E-06	0.000001	-0.000019
181.401	229.3534	3.010455		0.005490632	0.010102198	0	0	1	-19		0	0.000001	-0.000019
181.502	229.3534	3.010455		0.005490632	0.010102198	0	0	1	-19		0	0.000001	-0.000019
181.602	241.6402	3.010455		0.005784774	0.010102198	0	0	1	-19		0	0.000001	-0.000019
181.703	235.4968	3.010455		0.005637703	0.010102198	0	0	1	-18		0	0.000001	-0.000018
181.801	247.7836	3.010455		0.005931844	0.010102198	0	1	1	-19		-1E-06	0.000001	-0.000019
181.901	241.6402	3.021673		0.005784774	0.010139842	0	1	2	-19		-1E-06	0.000002	-0.000019
182.001	241.6402	3.023051		0.005784774	0.010144466	0	1	2	-19		-1E-06	0.000002	-0.000019
182.101	241.6402	3.023051		0.005784774	0.010144466	0	1	1	-19		-1E-06	0.000001	-0.000019
182.201	265.1899	3.023051		0.006348544	0.010144466	0	1	2	-19		-1E-06	0.000002	-0.000019
182.301	265.1899	3.023051		0.006348544	0.010144466	0	1	1	-18		-1E-06	0.000001	-0.000018

182.402	259.0465	3.023051		0.006201474	0.010144466	0	1	1	-18		-1E-06	0.000001	-0.000018
182.501	265.1899	3.023051		0.006348544	0.010144466	0	1	1	-19		-1E-06	0.000001	-0.000019
182.603	265.1899	3.023051		0.006348544	0.010144466	0	0	1	-19		0	0.000001	-0.000019
182.702	276.4528	3.032695		0.006618174	0.010176829	0	1	1	-19		-1E-06	0.000001	-0.000019
182.803	282.5962	3.03545		0.006765245	0.010186074	0	1	2	-19		-1E-06	0.000002	-0.000019
182.901	288.7396	3.035647		0.006912315	0.010186735	0	2	1	-19		-2E-06	0.000001	-0.000019
183.003	294.883	3.035647		0.007059386	0.010186735	0	1	1	-19		-1E-06	0.000001	-0.000019
183.101	312.2893	3.035647		0.007476086	0.010186735	0	0	1	-20		0	0.000001	-0.00002
183.201	306.1459	3.035647		0.007329015	0.010186735	0	0	1	-18		0	0.000001	-0.000018
183.302	323.5522	3.035647		0.007745716	0.010186735	0	1	1	-19		-1E-06	0.000001	-0.000019
183.402	323.5522	3.035647		0.007745716	0.010186735	0	1	1	-19		-1E-06	0.000001	-0.000019
183.502	335.839	3.042142		0.008039857	0.01020853	0	1	1	-18		-1E-06	0.000001	-0.000018
183.602	341.9824	3.047652		0.008186927	0.01022702	0	1	1	-18		-1E-06	0.000001	-0.000018
183.703	353.2453	3.048243		0.008456557	0.010229003	0	0	1	-19		0	0.000001	-0.000019
183.802	376.795	3.048243		0.009020328	0.010229003	0	1	1	-19		-1E-06	0.000001	-0.000019
183.902	389.0817	3.048243		0.009314467	0.010229003	0	1	2	-19		-1E-06	0.000002	-0.000019
184.001	395.2251	3.048243		0.009461537	0.010229003	0	0	0	-19		0	0	-0.000019
184.101	406.488	3.048243		0.009731167	0.010229003	0	1	1	-19		-1E-06	0.000001	-0.000019
184.202	423.8943	3.048243		0.010147867	0.010229003	0	1	2	-19		-1E-06	0.000002	-0.000019
184.302	436.1811	3.057887		0.010442008	0.010261366	0	1	1	-18		-1E-06	0.000001	-0.000018
184.403	447.444	3.060642		0.010711638	0.010270611	0	1	1	-18		-1E-06	0.000001	-0.000018
184.501	465.8742	3.060839		0.01115285	0.010271272	0	1	1	-19		-1E-06	0.000001	-0.000019
184.601	483.2805	3.060839		0.01156955	0.010271272	0	1	1	-18		-1E-06	0.000001	-0.000018
184.702	477.1371	3.060839		0.011422479	0.010271272	0	1	1	-19		-1E-06	0.000001	-0.000019
184.802	489.4239	3.060839		0.01171662	0.010271272	0	0	2	-19		0	0.000002	-0.000019
184.902	489.4239	3.060839		0.01171662	0.010271272	0	1	2	-19		-1E-06	0.000002	-0.000019
185.002	489.4239	3.072057		0.01171662	0.010308916	0	1	1	-19		-1E-06	0.000001	-0.000019
185.101	500.6868	3.073435		0.01198625	0.01031354	0	1	1	-19		-1E-06	0.000001	-0.000019
185.202	512.9736	3.073435		0.012280391	0.01031354	0	1	1	-19		-1E-06	0.000001	-0.000019
185.302	500.6868	3.073435		0.01198625	0.01031354	0	1	1	-18		-1E-06	0.000001	-0.000018
185.401	512.9736	3.073435		0.012280391	0.01031354	0	1	1	-19		-1E-06	0.000001	-0.000019

185.501	519.1169	3.073435		0.012427459	0.01031354	0	1	1	-18		-1E-06	0.000001	-0.000018
185.602	553.9295	3.083079		0.01326086	0.010345903	0	1	1	-18		-1E-06	0.000001	-0.000018
185.703	547.7861	3.085834		0.013113789	0.010355148	0	2	1	-17		-2E-06	0.000001	-0.000017
185.803	583.6226	3.086031		0.013971701	0.010355809	0	1	1	-17		-1E-06	0.000001	-0.000017
185.901	589.766	3.086031		0.014118772	0.010355809	0	1	1	-17		-1E-06	0.000001	-0.000017
186.001	624.5786	3.086031		0.014952172	0.010355809	0	2	1	-17		-2E-06	0.000001	-0.000017
186.102	643.0088	3.086031		0.015393384	0.010355809	0	1	1	-17		-1E-06	0.000001	-0.000017
186.201	654.2717	3.092526		0.015663013	0.010377604	0	1	1	-17		-1E-06	0.000001	-0.000017
186.302	683.9647	3.098037		0.016373852	0.010396097	0	1	2	-17		-1E-06	0.000002	-0.000017
186.402	707.5144	3.098627		0.016937623	0.010398077	0	1	0	-16		-1E-06	0	-0.000016
186.503	731.0641	3.098627		0.017501394	0.010398077	0	1	1	-17		-1E-06	0.000001	-0.000017
186.603	743.3509	3.098627		0.017795535	0.010398077	0	2	1	-17		-2E-06	0.000001	-0.000017
186.702	784.3069	3.098627		0.018776006	0.010398077	0	1	0	-17		-1E-06	0	-0.000017
186.802	795.5698	3.098627		0.019045636	0.010398077	0	1	2	-16		-1E-06	0.000002	-0.000016
186.902	813.9999	3.109845		0.019486845	0.010435721	0	2	1	-16		-2E-06	0.000001	-0.000016
187.002	837.5496	3.111223		0.020050616	0.010440346	0	1	1	-16		-1E-06	0.000001	-0.000016
187.102	861.0993	3.111223		0.020614387	0.010440346	0	1	1	-17		-1E-06	0.000001	-0.000017
187.202	878.5056	3.111223		0.021031087	0.010440346	0	2	1	-17		-2E-06	0.000001	-0.000017
187.301	914.3421	3.111223		0.021888999	0.010440346	0	1	1	-17		-1E-06	0.000001	-0.000017
187.403	931.7484	3.111223		0.022305699	0.010440346	0	2	1	-16		-2E-06	0.000001	-0.000016
187.502	949.1547	3.122441		0.022722399	0.01047799	0	1	1	-17		-1E-06	0.000001	-0.000017
187.601	984.9911	3.123819		0.023580309	0.010482614	0	2	1	-17		-2E-06	0.000001	-0.000017
187.701	1002.397	3.123819		0.023997	0.010482614	0	2	0	-17		-2E-06	0	-0.000017
187.803	1038.234	3.123819		0.024854924	0.010482614	0	1	1	-17		-1E-06	0.000001	-0.000017
187.902	1049.497	3.123819		0.025124555	0.010482614	0	1	1	-17		-1E-06	0.000001	-0.000017
188.002	1073.047	3.123819		0.025688333	0.010482614	0	1	1	-17		-1E-06	0.000001	-0.000017
188.101	1091.477	3.135037		0.026129541	0.010520258	0	2	1	-17		-2E-06	0.000001	-0.000017
188.201	1102.74	3.136415		0.026399172	0.010524883	0	1	1	-17		-1E-06	0.000001	-0.000017
188.301	1120.146	3.136415		0.026815865	0.010524883	0	2	1	-18		-2E-06	0.000001	-0.000018
188.403	1143.696	3.136415		0.027379643	0.010524883	0	2	1	-17		-2E-06	0.000001	-0.000017
188.501	1173.389	3.136415		0.028090482	0.010524883	0	2	1	-17		-2E-06	0.000001	-0.000017

188.602	1203.082	3.136415		0.028801321	0.010524883	0	1	1	-18		-1E-06	0.000001	-0.000018
188.701	1209.225	3.146059		0.028948382	0.010557245	0	2	1	-17		-2E-06	0.000001	-0.000017
188.802	1226.631	3.148814		0.029365075	0.01056649	0	2	1	-17		-2E-06	0.000001	-0.000017
188.902	1244.038	3.149011		0.029781792	0.010567151	0	2	0	-17		-2E-06	0	-0.000017
189.003	1273.731	3.149011		0.030492631	0.010567151	0	1	2	-16		-1E-06	0.000002	-0.000016
189.101	1297.28	3.149011		0.031056385	0.010567151	0	1	1	-16		-1E-06	0.000001	-0.000016
189.203	1326.974	3.149011		0.031767248	0.010567151	0	1	1	-16		-1E-06	0.000001	-0.000016
189.302	1333.117	3.155506		0.031914309	0.010588946	0	2	1	-17		-2E-06	0.000001	-0.000017
189.401	1350.523	3.161017		0.032331002	0.01060744	0	1	1	-16		-1E-06	0.000001	-0.000016
189.503	1362.81	3.161607		0.032625148	0.010609419	0	2	1	-16		-2E-06	0.000001	-0.000016
189.602	1380.216	3.161607		0.033041841	0.010609419	0	2	0	-16		-2E-06	0	-0.000016
189.702	1403.766	3.161607		0.033605619	0.010609419	0	1	1	-16		-1E-06	0.000001	-0.000016
189.802	1415.029	3.161607		0.033875251	0.010609419	0	1	0	-16		-1E-06	0	-0.000016
189.901	1444.722	3.161607		0.03458609	0.010609419	0	1	1	-16		-1E-06	0.000001	-0.000016
190.001	1450.865	3.161607		0.034733151	0.010609419	0	1	1	-15		-1E-06	0.000001	-0.000015
190.102	1480.558	3.172826		0.03544399	0.010647067	0	1	1	-16		-1E-06	0.000001	-0.000016
190.201	1504.108	3.174203		0.036007768	0.010651688	0	1	1	-16		-1E-06	0.000001	-0.000016
190.301	1521.514	3.174203		0.036424461	0.010651688	0	2	1	-16		-2E-06	0.000001	-0.000016
190.403	1538.921	3.174203		0.036841178	0.010651688	0	1	1	-16		-1E-06	0.000001	-0.000016
190.502	1568.614	3.174203		0.037552017	0.010651688	0	1	0	-16		-1E-06	0	-0.000016
190.602	1598.307	3.174203		0.038262856	0.010651688	0	2	2	-15		-2E-06	0.000002	-0.000015
190.702	1604.45	3.174203		0.038409917	0.010651688	0	2	0	-15		-2E-06	0	-0.000015
190.801	1645.406	3.185422		0.039390388	0.010689336	0	2	1	-15		-2E-06	0.000001	-0.000015
190.903	1657.693	3.186799		0.039684534	0.010693956	0	1	0	-15		-1E-06	0	-0.000015
191.002	1675.099	3.186799		0.040101227	0.010693956	0	2	1	-15		-2E-06	0.000001	-0.000015
191.102	1687.386	3.186799		0.040395373	0.010693956	0	1	1	-14		-1E-06	0.000001	-0.000014
191.202	1716.055	3.186799		0.041081698	0.010693956	0	1	1	-14		-1E-06	0.000001	-0.000014
191.302	1739.605	3.186799		0.041645476	0.010693956	0	1	1	-15		-1E-06	0.000001	-0.000015
191.403	1751.892	3.186799		0.041939622	0.010693956	0	1	1	-14		-1E-06	0.000001	-0.000014
191.501	1758.035	3.193294		0.042086683	0.010715752	0	2	0	-15		-2E-06	0	-0.000015
191.602	1792.848	3.198805		0.042920093	0.010734245	0	1	1	-14		-1E-06	0.000001	-0.000014

191.702	1816.397	3.199395		0.043483847	0.010736225	0	1	1	-15		-1E-06	0.000001	-0.000015
191.802	1839.947	3.199395		0.044047625	0.010736225	0	1	1	-14		-1E-06	0.000001	-0.000014
191.902	1858.377	3.199395		0.044488832	0.010736225	0	2	1	-15		-2E-06	0.000001	-0.000015
192.003	1881.927	3.199395		0.04505261	0.010736225	0	1	1	-16		-1E-06	0.000001	-0.000016
192.102	1905.477	3.199395		0.045616388	0.010736225	0	2	1	-14		-2E-06	0.000001	-0.000014
192.201	1911.62	3.199395		0.045763449	0.010736225	0	1	0	-14		-1E-06	0	-0.000014
192.303	1929.026	3.209039		0.046180142	0.010768587	0	2	1	-15		-2E-06	0.000001	-0.000015
192.401	1935.17	3.211795		0.046327227	0.010777836	0	2	1	-15		-2E-06	0.000001	-0.000015
192.503	1940.289	3.211992		0.046449774	0.010778497	0	2	1	-15		-2E-06	0.000001	-0.000015
192.603	1952.576	3.211992		0.04674392	0.010778497	0	1	0	-15		-1E-06	0	-0.000015
192.702	1969.982	3.211992		0.047160613	0.010778497	0	2	1	-15		-2E-06	0.000001	-0.000015
192.802	1976.126	3.211992		0.047307698	0.010778497	0	1	0	-15		-1E-06	0	-0.000015
192.901	1982.269	3.211992		0.047454759	0.010778497	0	1	1	-15		-1E-06	0.000001	-0.000015
193.003	1999.675	3.211992		0.047871452	0.010778497	0	1	0	-15		-1E-06	0	-0.000015
193.103	2023.225	3.211992		0.04843523	0.010778497	0	2	0	-15		-2E-06	0	-0.000015
193.201	2035.512	3.221635		0.048729376	0.010810856	0	2	0	-15		-2E-06	0	-0.000015
193.303	2059.062	3.224391		0.049293154	0.010820104	0	2	0	-15		-2E-06	0	-0.000015
193.403	2076.468	3.224587		0.049709847	0.010820762	0	2	1	-16		-2E-06	0.000001	-0.000016
193.502	2087.731	3.224587		0.049979479	0.010820762	0	1	0	-16		-1E-06	0	-0.000016
193.601	2100.018	3.224587		0.050273625	0.010820762	0	2	0	-17		-2E-06	0	-0.000017
193.702	2111.28	3.224587		0.050543233	0.010820762	0	2	1	-16		-2E-06	0.000001	-0.000016
193.801	2129.71	3.224587		0.05098444	0.010820762	0	2	0	-16		-2E-06	0	-0.000016
193.901	2159.404	3.224587		0.051695303	0.010820762	0	2	1	-16		-2E-06	0.000001	-0.000016
194.001	2159.404	3.224587		0.051695303	0.010820762	0	2	1	-15		-2E-06	0.000001	-0.000015
194.102	2176.81	3.235806		0.052111996	0.010858409	0	3	0	-16		-3E-06	0	-0.000016
194.202	2182.953	3.237184		0.052259057	0.010863034	0	2	0	-15		-2E-06	0	-0.000015
194.302	2194.216	3.237184		0.052528689	0.010863034	0	2	0	-16		-2E-06	0	-0.000016
194.403	2176.81	3.237184		0.052111996	0.010863034	0	2	1	-15		-2E-06	0.000001	-0.000015
194.502	2188.073	3.237184		0.052381628	0.010863034	0	1	0	-16		-1E-06	0	-0.000016
194.602	2194.216	3.237184		0.052528689	0.010863034	0	2	0	-15		-2E-06	0	-0.000015
194.702	2194.216	3.237184		0.052528689	0.010863034	0	2	0	-16		-2E-06	0	-0.000016

194.802	2200.36	3.237184		0.052675774	0.010863034	0	2	1	-16		-2E-06	0.000001	-0.000016
194.902	2211.623	3.237184		0.052945406	0.010863034	0	2	0	-16		-2E-06	0	-0.000016
195.003	2223.909	3.248402		0.053239528	0.010900678	0	2	0	-16		-2E-06	0	-0.000016
195.102	2217.766	3.249779		0.053092467	0.010905299	0	1	1	-15		-1E-06	0.000001	-0.000015
195.201	2223.909	3.249779		0.053239528	0.010905299	0	2	1	-16		-2E-06	0.000001	-0.000016
195.302	2230.053	3.249779		0.053386613	0.010905299	0	2	1	-15		-2E-06	0.000001	-0.000015
195.402	2235.172	3.249779		0.05350916	0.010905299	0	2	0	-15		-2E-06	0	-0.000015
195.504	2247.459	3.249779		0.053803306	0.010905299	0	1	1	-15		-1E-06	0.000001	-0.000015
195.604	2253.602	3.249779		0.053950367	0.010905299	0	2	1	-15		-2E-06	0.000001	-0.000015
195.703	2271.009	3.249779		0.054367084	0.010905299	0	2	0	-15		-2E-06	0	-0.000015
195.801	2283.295	3.249779		0.054661206	0.010905299	0	2	1	-16		-2E-06	0.000001	-0.000016
195.902	2294.558	3.260998		0.054930838	0.010942946	0	2	0	-16		-2E-06	0	-0.000016
196.001	2306.845	3.262376		0.055224984	0.01094757	0	2	1	-15		-2E-06	0.000001	-0.000015
196.101	2318.108	3.262376		0.055494616	0.01094757	0	2	0	-15		-2E-06	0	-0.000015
196.202	2324.251	3.262376		0.055641677	0.01094757	0	2	1	-16		-2E-06	0.000001	-0.000016
196.302	2335.514	3.262376		0.055911309	0.01094757	0	2	0	-15		-2E-06	0	-0.000015
196.402	2335.514	3.262376		0.055911309	0.01094757	0	2	0	-15		-2E-06	0	-0.000015
196.501	2347.801	3.262376		0.056205455	0.01094757	0	2	0	-15		-2E-06	0	-0.000015
196.602	2347.801	3.262376		0.056205455	0.01094757	0	1	0	-15		-1E-06	0	-0.000015
196.702	2365.208	3.262376		0.056622172	0.01094757	0	3	0	-15		-3E-06	0	-0.000015
196.802	2371.351	3.272019		0.056769233	0.01097993	0	2	1	-16		-2E-06	0.000001	-0.000016
196.902	2371.351	3.274775		0.056769233	0.010989178	0	2	0	-16		-2E-06	0	-0.000016
197.003	2383.638	3.274972		0.057063379	0.010989839	0	2	1	-16		-2E-06	0.000001	-0.000016
197.101	2383.638	3.274972		0.057063379	0.010989839	0	2	0	-15		-2E-06	0	-0.000015
197.201	2394.9	3.274972		0.057332987	0.010989839	0	1	1	-16		-1E-06	0.000001	-0.000016
197.302	2383.638	3.274972		0.057063379	0.010989839	0	2	0	-16		-2E-06	0	-0.000016
197.402	2371.351	3.274972		0.056769233	0.010989839	0	2	0	-15		-2E-06	0	-0.000015
197.502	2365.208	3.274972		0.056622172	0.010989839	0	3	0	-15		-3E-06	0	-0.000015
197.601	2353.945	3.274972		0.05635254	0.010989839	0	2	0	-15		-2E-06	0	-0.000015
197.702	2353.945	3.28619		0.05635254	0.011027483	0	2	0	-15		-2E-06	0	-0.000015
197.803	2365.208	3.287568		0.056622172	0.011032107	0	2	0	-16		-2E-06	0	-0.000016

197.902	2377.494	3.287568		0.056916294	0.011032107	0	3	0	-15		-3E-06	0	-0.000015
198.001	2365.208	3.287568		0.056622172	0.011032107	0	2	0	-16		-2E-06	0	-0.000016
198.102	2359.064	3.287568		0.056475087	0.011032107	0	2	0	-15		-2E-06	0	-0.000015
198.201	2359.064	3.287568		0.056475087	0.011032107	0	2	1	-16		-2E-06	0.000001	-0.000016
198.302	2353.945	3.287568		0.05635254	0.011032107	0	2	0	-16		-2E-06	0	-0.000016
198.402	2353.945	3.287568		0.05635254	0.011032107	0	2	0	-16		-2E-06	0	-0.000016
198.502	2383.638	3.294063		0.057063379	0.011053903	0	2	0	-16		-2E-06	0	-0.000016
198.603	2388.757	3.299573		0.057185926	0.011072393	0	2	0	-16		-2E-06	0	-0.000016
198.702	2383.638	3.300164		0.057063379	0.011074376	0	2	0	-16		-2E-06	0	-0.000016
198.802	2394.9	3.300164		0.057332987	0.011074376	0	3	0	-16		-3E-06	0	-0.000016
198.902	2394.9	3.300164		0.057332987	0.011074376	0	3	0	-16		-3E-06	0	-0.000016
199.002	2394.9	3.300164		0.057332987	0.011074376	0	2	0	-16		-2E-06	0	-0.000016
199.102	2388.757	3.300164		0.057185926	0.011074376	0	2	0	-17		-2E-06	0	-0.000017
199.203	2377.494	3.300164		0.056916294	0.011074376	0	1	0	-17		-1E-06	0	-0.000017
199.302	2388.757	3.309808		0.057185926	0.011106738	0	3	0	-16		-3E-06	0	-0.000016
199.402	2401.044	3.312563		0.057480072	0.011115983	0	3	1	-16		-3E-06	0.000001	-0.000016
199.501	2401.044	3.31276		0.057480072	0.011116644	0	2	0	-16		-2E-06	0	-0.000016