MOTT MACDONALD

NX2 - Pūhoi Viaduct

Review of precast panel load testing results

July 2020

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Executive summary

Mott MacDonald has been commissioned by the Fletcher-Acciona JV to complete this independent review of the load testing of a set of precast concrete bridge panels for the Pūhoi Viaduct. These load tests were conducted on consecutive weeks on the 11th and 18th of June 2020 on site adjacent to one of the viaduct piers on the north side of the Pūhoi river.

The precast concrete bridge panels include a thin layer of a solid concrete slab with a projecting steel reinforcement lattice, which together are designed to carry the construction loads in the temporary case while spanning the short distance between (steel) bridge girders. Top reinforcement (defined by the permanent Works design) is subsequently installed on site along with topping concrete to bind all the precast panels together, forming the composite bridge deck of the full design thickness. The precast bridge panels are essentially being used as 'permanent formwork' in this application.

The load testing of the precast panels has been completed to address the following key issues:

- Satisfying the principal designer's requirements for load testing of randomly selected precast panels to re-confirm the design assumptions.
- To address the risks that have been identified from the independent review of the temporary works design of the precast concrete bridge panels, namely:
  - Whether the precast panels have an appropriate factor of safety against failure in the temporary case.
  - Whether the failure mode of the precast panels is a buckling failure of the temporary reinforcement truss (TRT) top chord.
  - Whether the precast panel load testing is representative of how the panels will be used during construction.

In total seven load tests were conducted on four sets of precast panels, with two remaining tests on one panel, which is still to be completed. These tests included:

- Three tests in which the panels were loaded to 100% of the design load using water-filled jersey-barriers. These have been denoted as 'Serviceability limit state' (SLS) tests, although this only relates to the temporary construction load case – and not the permanent works design.
- Four tests in which the panels were loaded to 300% of the design load using a wet-mix concrete. These have been denoted as 'Ultimate limit state' (ULS) tests, although this only relates to the temporary construction load case – and not the permanent works design.

The output of these tests was positive, mainly in that there was no sudden failure of the precast panels during loading, and also due to performance of the panels having a close relationship to the analytical predictions. The results of the load tests address the items highlighted in the previous Mott MacDonald reports in that:

1. Based on the sample set of panels tested, there is an appropriate factor of safety in the temporary design case
2. With up to three times the temporary construction load applied during the tests, the failure mode (plastic deformation of the reinforcement) of the precast panels was not observed.
3. Modifications to the test regime were made such that the testing results and data produced is representative of how the actual deck construction will perform.

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In conclusion the load testing of the precast concrete bridge panels has demonstrated that:

- The deflection of the panels is in excess of the 10mm allowance the permanent works engineer has previously allowed for; as such the Permanent Works designer should review the results of the panel test and confirm that these satisfy their design assumptions.
- Based on the four ULS tests that were completed (up to three times the temporary design load), it appears that there is a reasonable factor of safety against failure in the temporary case.
- The modified ULS load testing regime which was employed is representative of how the panels will be used during construction.

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1 Introduction

At the request of the Fletcher-Acciona JV (FAJV), Mott MacDonald (MM) attended site to observe and review the results of the load testing of the Pūhoi Viaduct precast concrete bridge panels.

The MM team has been involved in this project in a structural engineering peer review capacity since March 2020. Our services commenced with an independent structural peer review of the precast bridge deck systems that were proposed for the Okahu & Pūhoi Viaducts.

Since then the team has been involved in helping to assess the risks associated with the temporary nature of the precast bridge deck systems, which have led to the establishment of and the completion of these specific, additional, load tests.

1.1 Reference information

This document should be read in conjunction with other Mott MacDonald review documents, including:

- Okahu & Pūhoi Viaducts Deck System Review report (dated 27 March 2020)
- Independent Review of the Risks with Precast Deck System (letter dated 14 April 2020)
- Pūhoi-Warkworth Motorway Precast Panel Temporary Works Review (dated 07 May 2020)
- Pūhoi-Warkworth Motorway Precast Panel Load Tests – Review (dated 11 May 2020)
- Precast Bridge Panel Inspection. Site inspection record from precast concrete bridge panel manufacture (dated 26 May 2020).

Other reference project information supplied by FAJV includes:

- Precast Deck Planks. Load Test Procedure, inclusive of load test drawings 01 to 05. (revision 2 dated May 2020)
- Issued for Construction drawings of the Precast Deck Planks (for both Okahu & Pūhoi viaducts – dated 10/02/2020).
- Precast Deck Planks. Design Report. Detailed Design Annex 1 (dated February 2020).

1.2 Relevant project information

The Pūhoi to Warkworth Motorway project (P2Wk) is an extension to the four-lane northern motorway (SH1) from the Johnstone's Hill Tunnels to a tie-in with the existing SH1 north of Warkworth, a total length of 18.5km. Two main bridge viaducts are included in this project:

- OKAHU VIADUCT. Is a multi-span steel bridge structure located at the southern section of the project, north of the Johnstone's Hill Tunnels. The bridge is 330m long (consists of six equal 55m spans) and is a multi-girder steel viaduct.
- PŪHOI VIADUCT. Is a multi-span steel bridge structure located at an approximate chainage of 62,610 within the southern section of the project. The bridge is 320.8m long (consisting of two 48m long spans and four 56.2m long spans) and is a multi-girder steel viaduct.

In both cases, the bridge superstructure comprises four 2750mm deep steel I-section girders which are continuous across all six spans, acting compositely with a 315mm thick concrete deck in Okahu viaduct and a 335mm thick concrete deck in Pūhoi viaduct.

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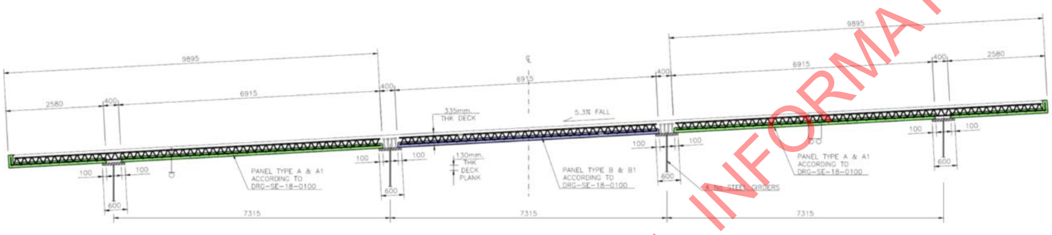
The I-section girders are equally spaced at 6.75m centres in Okahu viaduct and 7.315m in Pühoi viaduct. For each span, the steel girders consist of a span section spliced together with a heavier section over the piers.

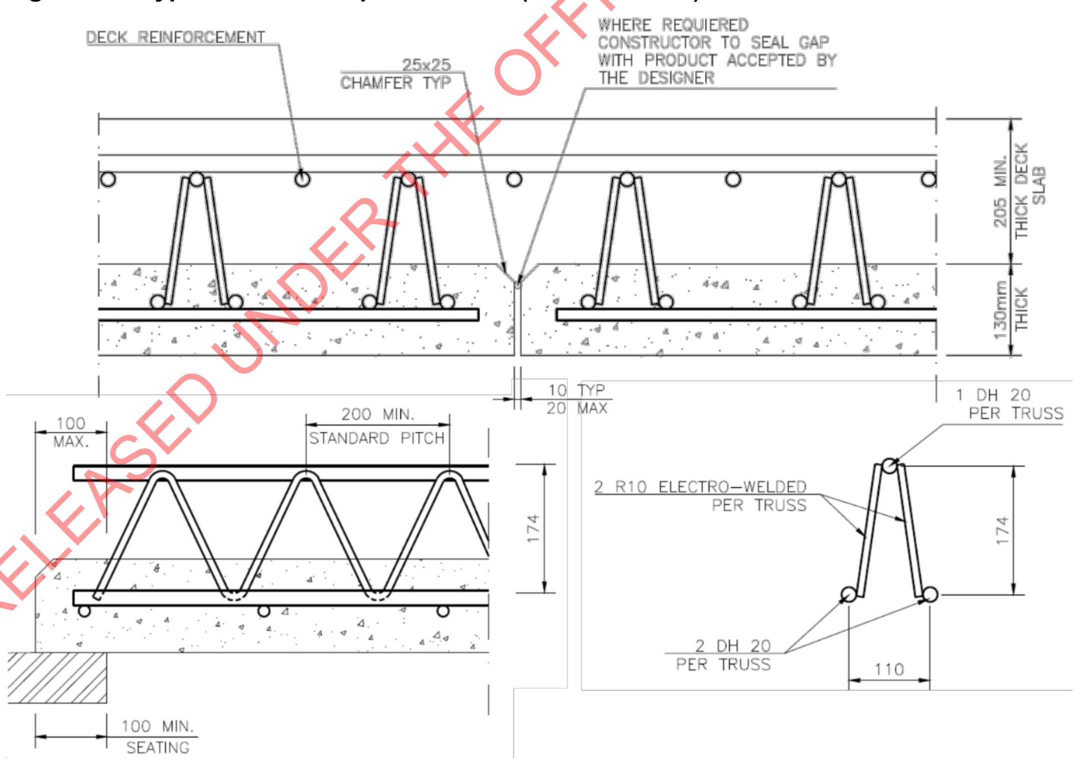
The concrete deck spans transversely between the main steel girders and comprises typically of a (nominal) 130mm precast section overlain with a 185 / 205mm (Okahu / Pūhoi) cast in-situ concrete topping which collectively provide the composite, permanent, bridge deck (to be overlain with asphalt). The precast concrete panels have been manufactured by Wilson Precast at their East Tamaki plant in Auckland. A series of temporary reinforcement trusses (TRT) comprising steel lattice girders are cast into the precast portion of the deck to provide adequate strength and stiffness to support the wet concrete during the pour; once the topping concrete has set and gained strength, the TRTs are no longer required for the (permanent) deck strength or stability. The in-situ deck pour provides continuity and diaphragm action in both directions.

Figure 1.1: Typical bridge cross section (Pühoi viaduct)



Source: FAJV

Figure 1.2: Typical details for precast deck (Pühoi viaduct)



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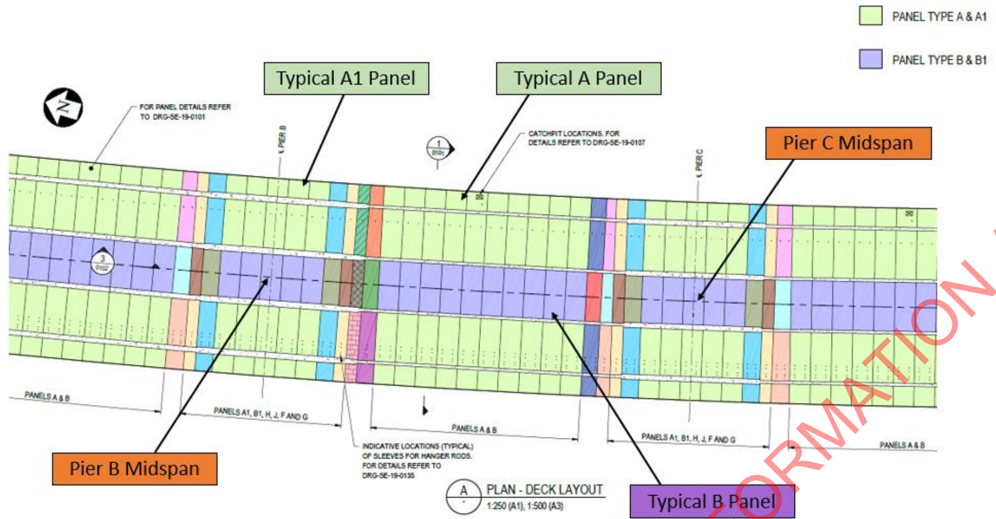
Source: FAJV

Figure 1.3: Typical bridge plan indicating panel types



Source: FAJV

1.3 Background to the expanded scope of this load testing

Initially the scope of the load testing for the precast panels was to satisfy the designers' requirements for the reconfirmation of design assumptions with the completion of the specified number of load tests per viaduct.

Following the structural engineering peer review which Mott MacDonald conducted of the temporary works design in March 2020, a number of potential risks were identified with the temporary nature of the precast deck system, as summarised in the project references summarised in Section 1.1 of this report. These were:

- Whether the precast panels have an appropriate factor of safety against failure in the temporary case.
- Whether the failure mode of the precast panels is a buckling failure of the TRT top chord.
- Whether the precast panel load testing is representative of how the panels will be used during construction.

Following discussion of the peer review outcomes with the FAJV team, it was proposed to expand the scope of the precast panel load testing to address the issues that were highlighted. The modified scope of the load testing includes:

- Confirmation of panel straightness after the pour.
- Confirmation of panel self-weight deflection when placed on the testing rig.
- An increased number of panels tested to three times the temporary design load on the panels. [These have been denoted as 'ultimate limit state' (ULS) tests, although this only relates to the temporary construction load case – and not the permanent works design.]
- Use of wet concrete as a mass, since it better represents the situation where the TRT top chord is unrestrained.

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- Using multiple means of measurement for recording the panel deflections: dial gauges (to both sides); tape measure; laser Disto; and laser level / total station to record deflections with time.
- Load-deflection plots to include unloading plots for the tests in which water filled jersey barriers are used. [These have been denoted as 'serviceability limit state' (SLS) tests, although this only relates to the temporary construction load case – and not the permanent works design.] These unloading plots can confirm whether cracking to the precast planks has initiated and whether there is a plastic response of the system at 100% SLS.

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2 Load Testing

2.1 Introduction

The load testing of the precast panels was undertaken to the north of the Pūhoi river at the base Viaduct Pier B. Three Type A panels and one Type B panels (refer Figure 1.3: Typical bridge plan indicating panel types) were selected at random from the fabricated selection at the precast yard. A second type B panel has been selected and will undergo the same testing at a later date. Refer to Figure 2.2 to Figure 2.8 for photos of the test setup.

Note that within the Load Test Procedure prepared by FAJV and this review report some terminology has been used to distinguish between the types of tests conducted:

- Load tests in which the panels were loaded to 100% of the design load using water-filled jersey-barriers have been referred to as 'Serviceability limit state' (SLS) tests.
- Load tests in which the panels were loaded to 300% of the design load using a wet-mix concrete have been denoted as 'Ultimate limit state' (ULS) tests.
- We note that this terminology (SLS & ULS) only relates to the temporary construction load case – and should not be confused with permanent works design.

2.2 Testing revisions

A number of refinements from previous load tests have been incorporated to address previous comments made by Mott MacDonald, namely:

1. The plywood was laid on top of the steel trusses as individual sheets for the water filled jersey barriers to sit on. This was to limit the ability of these to provide restraint to the top chord of the trusses.
2. Following the loading and unloading of the jersey barriers, 'ULS' tests were completed using concrete which was installed in incremental layers up to a maximum of 600mm (approximately three times the SLS load) in a manner which simulates the on-site conditions.
3. The formwork to contain the wet concrete for the ULS test is placed adjacent to the panel, but not fixed to the panel along its length to prevent the formwork from providing any additional rigidity to the panel.
4. Panel A-2 was installed with the temporary reinforcement trusses but omitted the permanent top reinforcement. This was to investigate whether the top reinforcement has the potential to provide additional rigidity to the trusses in the temporary state.
5. Panel A-3 was intentionally damaged, with four of the truss welds broken and the top bar deformed laterally using a sledgehammer. This was to investigate the potential impact of possible construction defects on the performance of the panel set-up in the temporary state

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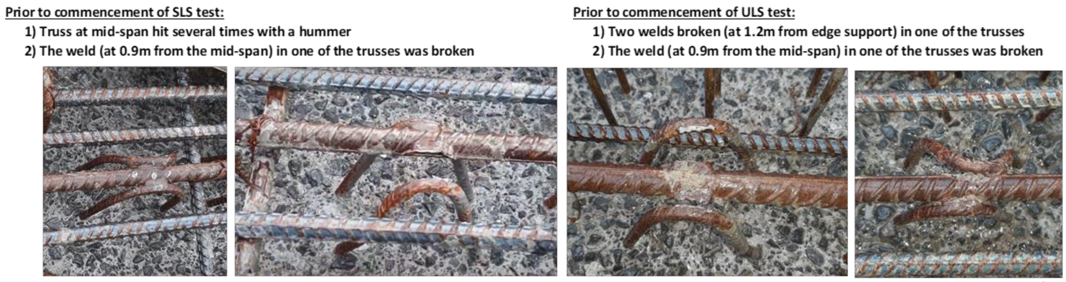
Figure 2.1: Location of damaged truss bars



Source: Acciona

2.3 Testing Methodology – Set up

1. Precast panels were fabricated at the Wilson Precast fabrication yard with the trusses in place. Concrete core samples taken during casting with the panels A-1 and B-1 cured for 23 days and A-2/A-3 cured for 28 days before the panels were selected at random for testing
2. Panels were transported to site
3. Panels were placed on steel spreader beams on hard stand at the site
4. Self-weight deflection of panels was measured and recorded.
5. SGS installed deflection dial gauges at four locations per panel: both sides at midspan and near ends of cantilever
6. During testing, movement monitoring was recorded with time using dial gauges, tape measure, laser Disto and using automatic total stations using prisms installed on the precast elements. Measurements were recorded by consistent staff members from the Fletcher-Acciona JV team throughout the test.
7. An independent formwork system is installed around the panels resting on the perimeter lip and sealed with urethane foam thus providing freedom of vertical deflection of the panels.
8. Concrete is to have retardant added to ensure the concrete does not harden prior to the completion of the test. We note that this was inadvertently missed from panel A-1 as highlighted in section 4 of the report. Mix slips were reviewed for the remaining mix deliveries to confirm the retardant was present.

2.4 Testing Methodology – SLS Testing

1. Plywood was placed in strips running perpendicular to the temporary reinforcement trusses.
2. Plastic jersey barriers were filled with water, starting with central barriers and moving outwards. This is undertaken on the central span first. Each jersey barrier has a mass of 500kg when filled.
3. During incremental filling of jersey barriers, deflection measurements are taken and recorded with load over a period of 2 hours.
4. Jersey barriers were emptied incrementally; with deflections recorded against load and time to confirm whether cracking of the concrete has been observed.

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2.5 Testing Methodology – ULS Testing

2.5.1 Type A Cantilever Panel

1. Concrete filled incrementally in central span to permanent design depth. The depth of each lift was confirmed at the centre and ends of the panel using a dipstick. The concrete was installed in the same manner as it would be in practice, with concrete pumped from height and vibrated in place by team members walking on the reinforcement top chord.
2. Measurements were taken at all locations using dial gauges, measuring tape and a total station.
3. Concrete filled at centre span incrementally to 600mm depth, with measurements taken at each increment.
4. Cantilevered section of panel filled in increments to 600mm, undertaking same measurements.

2.5.2 Type B centre Panel

1. Concrete filled incrementally to permanent design depth. The depth of each lift was confirmed at the centre and ends of the panel using a dipstick. The concrete was installed in the same manner as it would be in practice, with concrete pumped from height and vibrated in place by team members walking on the reinforcement top chord.
2. Measurements were taken at all locations using dial gauges, measuring tape and a total station.
3. Concrete filled at centre span incrementally to 600mm depth, with measurements taken at each increment.

Figure 2.2: Load testing setup adjacent the Viaduct pier north of the Pūhoi River

Source: MM Photo.
Nearest panel with concrete pumped in non-cantilevered side
Further panel with waterfilled jersey barriers

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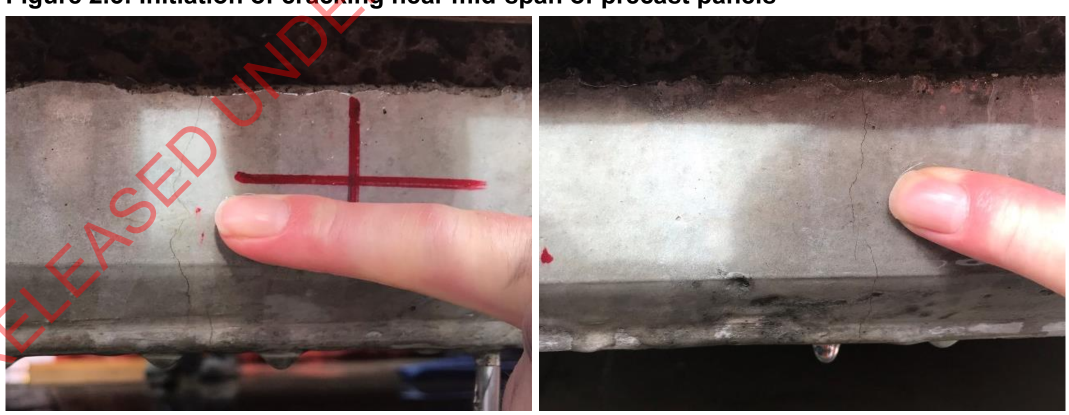
Figure 2.3: Dial Gauges setup at mid-span and near end of cantilevers

Source: MM Photos

Figure 2.4: Plywood support for jersey barriers & SLS load testing in progress

Source: MM photos

Figure 2.5: Initiation of cracking near mid-span of precast panels



Source: MM photos

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Figure 2.6: ULS load testing in progress

Source: MM photos

Figure 2.7: Independence of precast panel deflection from formwork

Source: MM photos

Figure 2.8: Cracking observed at ULS

Source: MM photos

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3 Analytical Modelling

3.1 Model Description

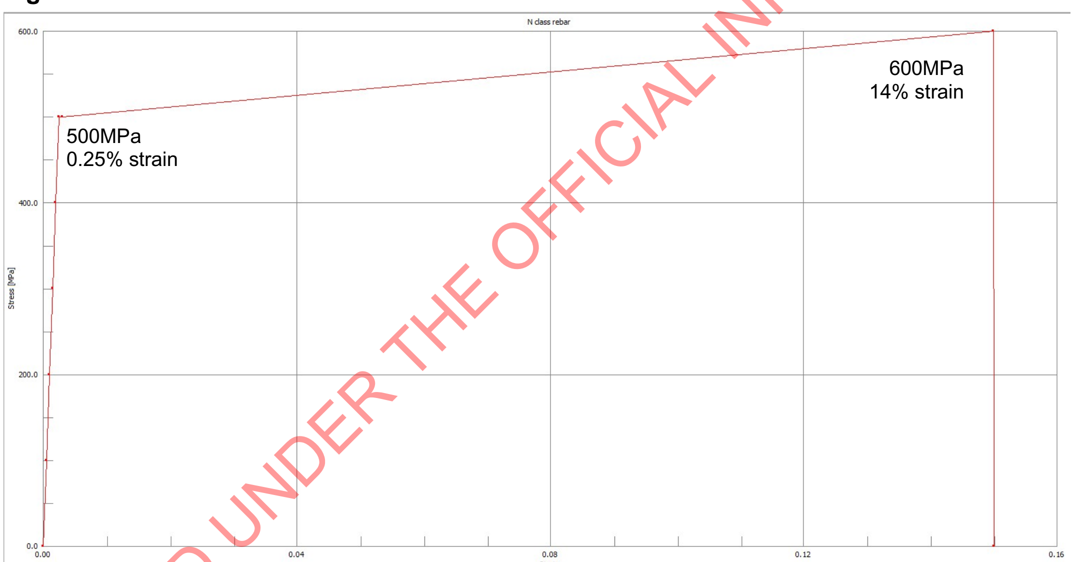
A non-linear finite element model of the precast panels has been created using Strand7. The material data has been inputted and loading applied to the panel in a similar manner to the precast panel load testing. By applying loads as increments, the analysis takes into account the plastic behaviour of the previous increment in the analysis.

3.2 Model Inputs

3.2.1 Steel Reinforcement Trusses

The steel reinforcement truss elements have been created in Grasshopper utilising the geometry from the fabrication drawings. The trusses have been exported as .igs files to Strand7. In Strand7 a simplified stress strain curve has been estimated for the appropriate reinforcement grade as per Figure 3.1:

Figure 3.1: Reinforcement stress-strain curve



Source: MM Diagram

It is important to include the appropriate stress-strain curve as it will affect the post-elastic deformation of the panel.

Due to the restraint of the web members provided by the precast slab, the web members have been split on a plane equivalent to the surface of the precast slab, and the section of web bar contained within the slab replaced by a rigid link. This is indicated in Figure 3.2.

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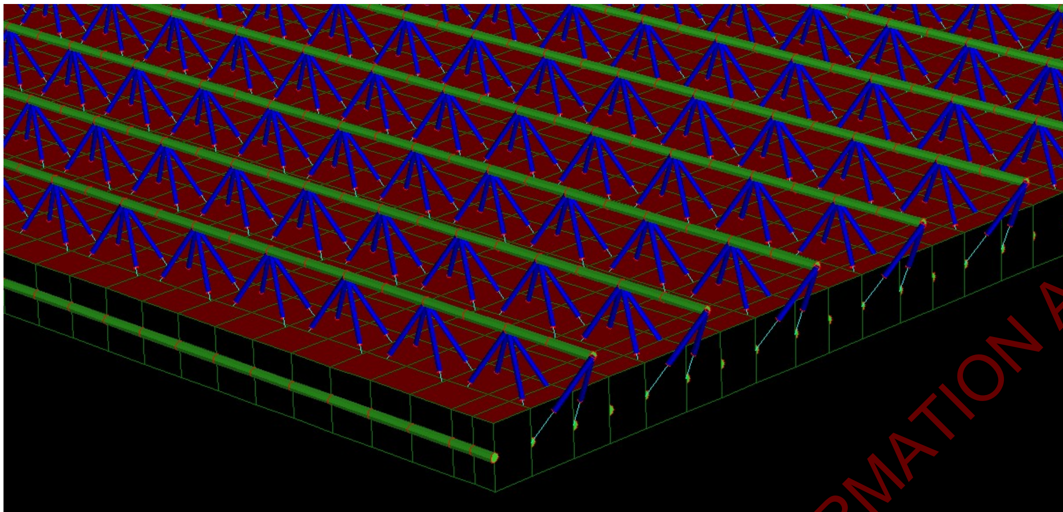
Figure 3.2: Diagram of restraint to web members in analytical model

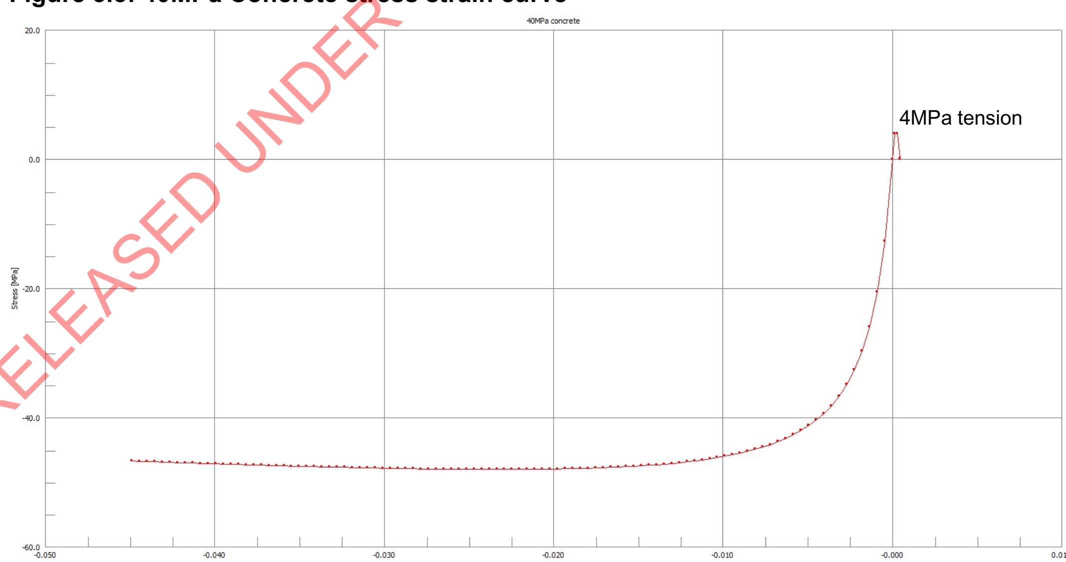


Source: MM Strand7 model

3.2.2 Concrete

Two models have been analysed to evaluate the sensitivity of the tensile effect of the concrete on the panel performance. The first model uses stress strain data based on the design concrete strength (40MPa). The second model uses the lower characteristic concrete strength from 450 samples taken from the precast factory pours and tested after 28 days of 52.3MPa. Concrete by its very nature has a high variability in terms of modulus of elasticity and rupture stress; the New Zealand concrete code takes this variability in to account and as such can be seen as being conservative as 95% of the samples will have a stiffer performance than the characteristic values.

Figure 3.3: 40MPa Concrete stress strain curve



Source: MM Diagram

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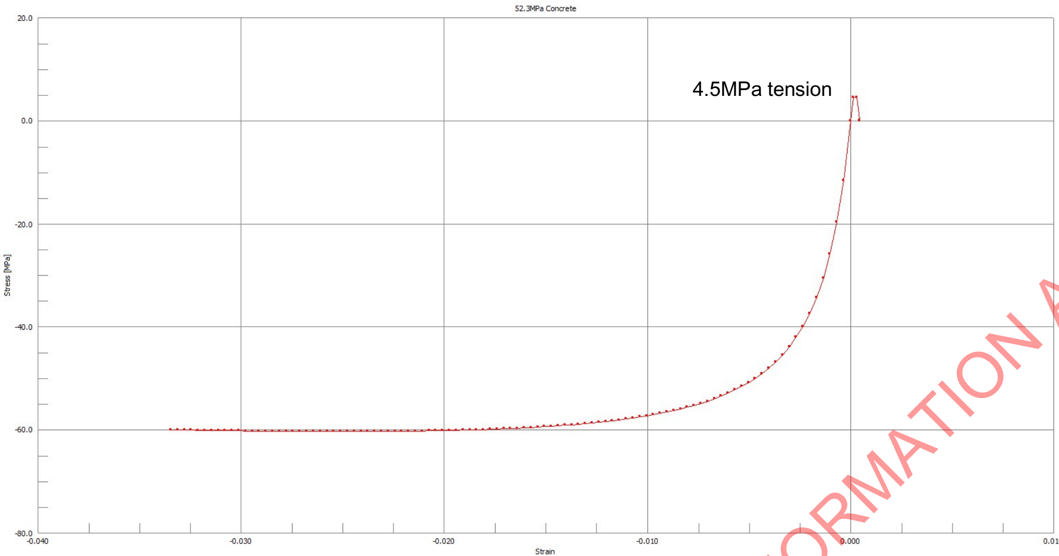
Figure 3.4: 52.3MPa Concrete stress strain curve



Source: MM Diagram

3.2.3 Loading

To simulate the loading applied to the panels by the testing, a unit 1000kN load has been applied as a uniformly distributed load over the panel. This unit load has then been factored depending on the magnitude of the load increment applied during each stage of the test. Whilst the dead load deflection of the panel has already happened and is not part of the test, this needs to be included as it affects the point of plastic deformation. As such the first increment just includes precast deflections which are subtracted from the remaining increment deflections.

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4 Review of Load Testing Results

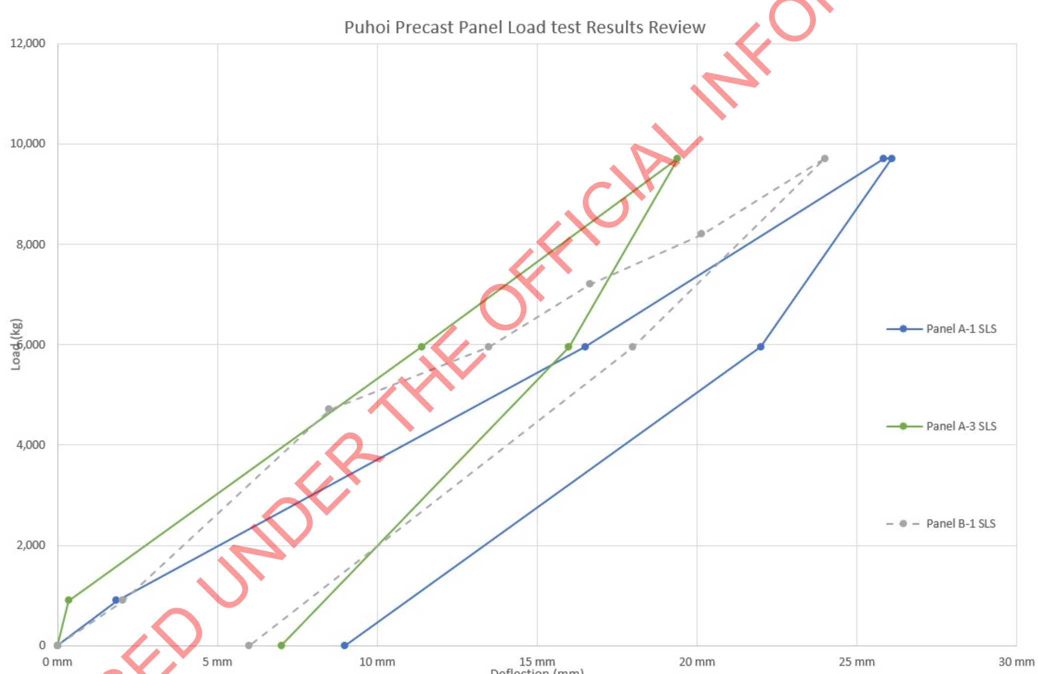
Our observations from attending the precast panel load testing and following a review of the data recorded are summarised below. The results indicated below are excluding the self-weight deflection of the panels, measured at between 3-5mm.

4.1 SLS Test Results

The results of the SLS tests are indicated graphically below in Figure 4.1.

The three panels show the deflection of the 100% SLS load varies between 19mm and 26mm. The panels were held at the 100% SLS load and then released, with the residual deformation following full unloading varying between 6 and 9mm. This deflection is due to non-linear behaviour that results in a change in equilibrium in the panel caused by cracking of the bottom concrete surface.

Figure 4.1: SLS test deflection plots



Source: MM

4.2 ULS Test Review

The results of the ULS tests are represented graphically below in Figure 4.2.

The three stages of the panel behaviour can be seen clearly in the analytical deflection plots: perfectly elastic behaviour; cracking initiation at 4,000kg; and then the onset of plastic deformation of the steel reinforcement at 24,000kg (approximately 2.5 times the SLS load).

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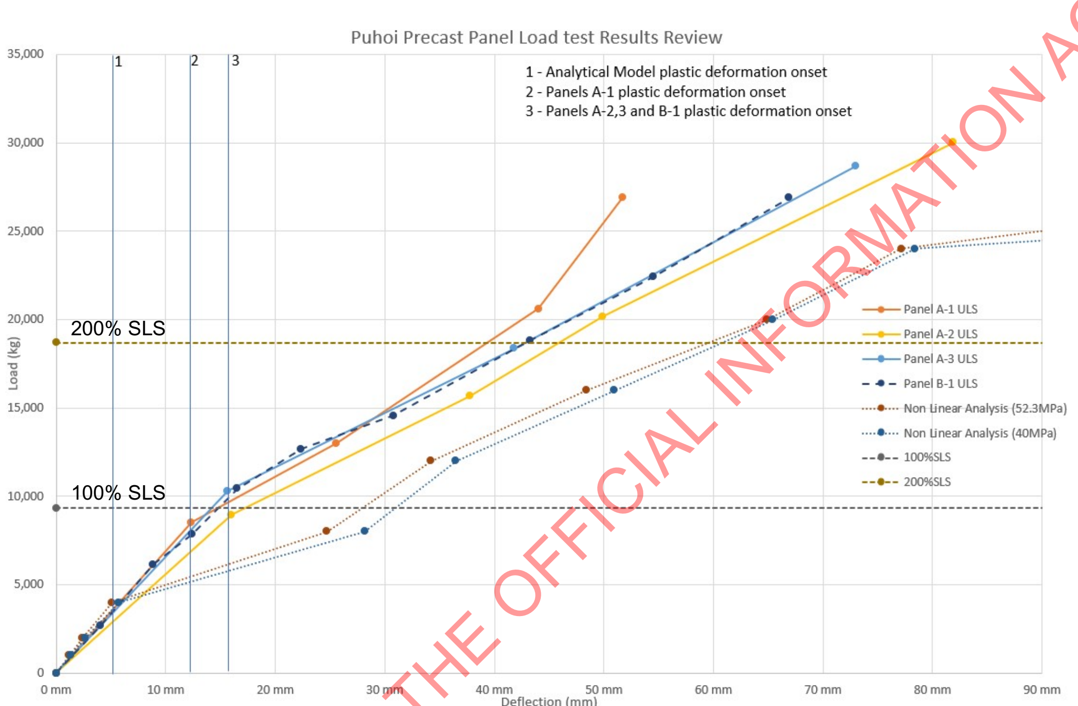
The ULS test results indicate that cracking is initiated at a higher load between 8,000 and 11,000kg. Furthermore, yielding of the reinforcement has not appeared to have occurred, as predicted by the analytical models; as such the test panels could have sustained a higher load, with the mode failure remaining unknown.

It can also be seen that, due to the wet concrete applied for the Panel A-1 test not including retardant, an increase in stiffness is noted near the end of the ULS test.

Figure 4.2: ULS test deflection plots



Source: MM

One slightly misleading aspect of the above is that, the panels tested during the SLS load test have had their deflections reset to zero prior to this test and as such do not have any residual deflections shown. This is misleading and as such we have added this in – and reference should be made to Figure 4.4.

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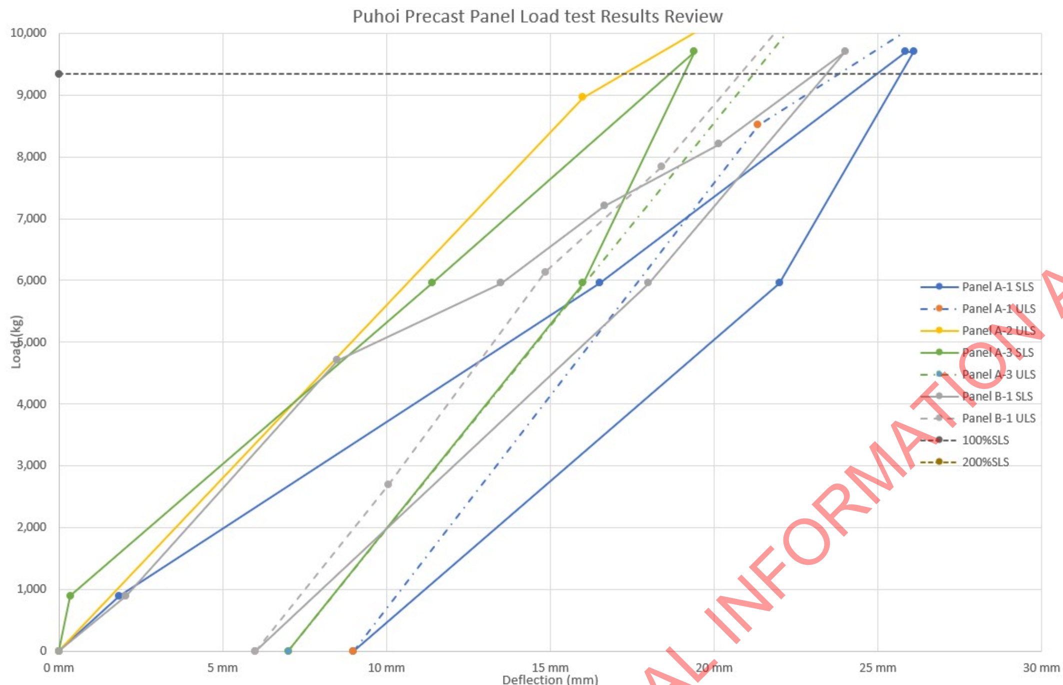
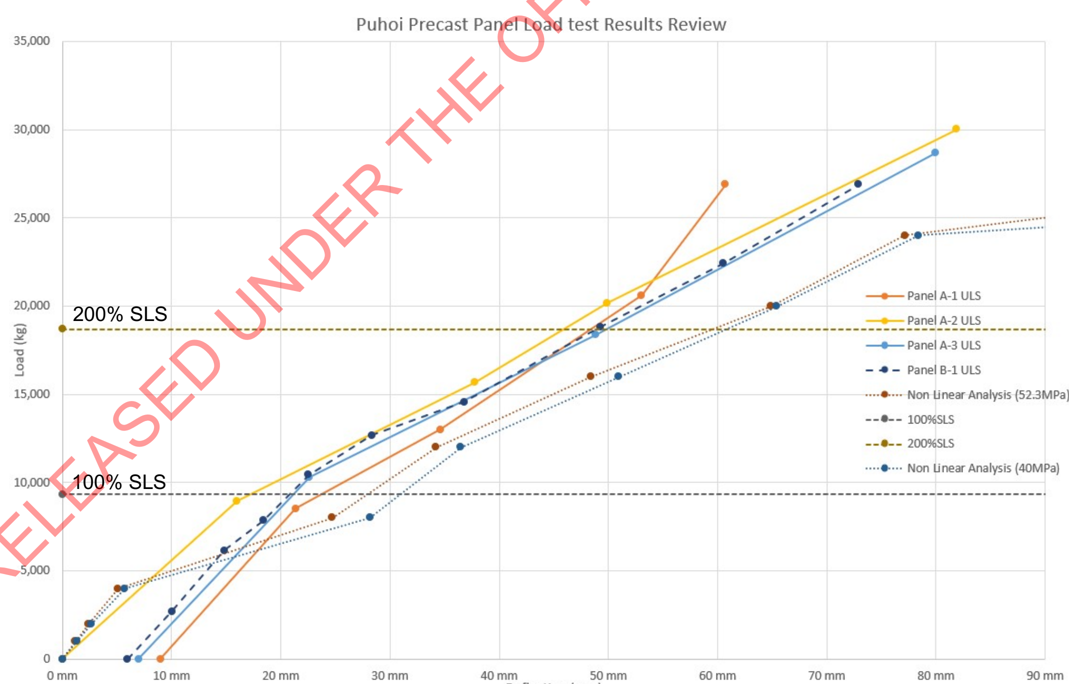
Figure 4.3: Combined deflection plot incorporating residual SLS deflections



Source: MM

Figure 4.4: ULS test deflection plots incorporating residual SLS deflections



Source: MM

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4.3 Variability in Load vs Deflection

Whilst the panels enter the plastic region under very similar deflections, the loads required to instigate this do vary. This is due to concrete properties having the potential to vary significantly between batches of concrete, an example of this is in the concrete cylinder test results which, despite the same mix design, gave a variance of between 47 and 74MPa over the 450 samples. The tensile strength of the concrete is a function of the root of the compressive strength and as such will vary in a similar manner.

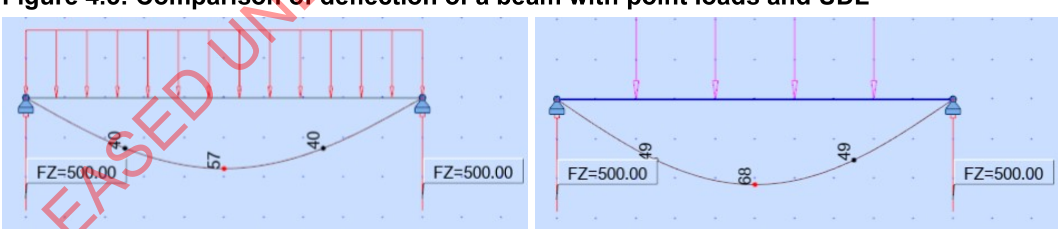
4.4 Compatibility of Test vs Analytical model

The analytical model and test model to show similar elastic behaviour, with the analytical model showing higher post-elastic deformations. The analytical model uses linear approaches to the plastic behaviour of the concrete, and lower characteristic material properties for the steel reinforcement which will result in a degree of conservatism in the estimates of the plastic deformation of the analytical panel. A sensitivity analysis shows that the tensile strain in the concrete is the largest contributing factor to the variance in the analytical results. A series of comparative analyses was undertaken adjusting the length of the tensile plateau prior to drop off. An increased tensile strain capacity lengthens the peak strain plateau, which then correlates more accurately with the post elastic deformations from the test data. This would indicate that the concrete has a higher tensile strain capacity in reality than that anticipated from the analytical models, which is supported by the load testing exhibiting a slightly stiffer performance compared to the analytical models.

4.5 SLS Water Tests vs In-Situ Concrete Test

The test undertaken utilising the water filled jersey barriers shows a higher deflection than the same loading applied via wet concrete. This may be due to a number of variances between the tests. The first two variances are in the way the load is applied. The jersey barriers were distributed on the top of the slab panels, however by this very nature the load is being applied as line loads, with a higher concentration of load at the centre of the panel, this can result in a variance of up to 20% as is indicated by the figure below. A secondary effect which is more prominent as time passes is the viscous nature of the concrete beginning to set and bond to the precast elements. This is particularly evident in panel A-1 where the retardant was not present, and the effect of the hardening concrete is evident.

Figure 4.5: Comparison of deflection of a beam with point loads and UDL



Source: MM

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5 Conclusions & Recommendations

5.1 Conclusions

Our conclusion is that the output of these tests was positive, mainly in that there was no failure of the precast panels during loading, and also due to performance of the panels having a close relationship to the analytical predictions. The results of the load tests address the items highlighted in the previous Mott MacDonald reports in that:

1. Based on the sample set of panels tested, there is an appropriate factor of safety in the temporary design case
2. With up to three times the temporary construction load applied during the tests, the failure mode (plastic deformation of the reinforcement) of the precast panels was not observed.
3. Modifications to the test regime were made such that the testing results and data produced is representative of how the actual deck construction will perform.

In conclusion the load testing of the precast concrete bridge panels has demonstrated that:

- The deflection of the panels is in excess of the 10mm allowance the permanent works engineer has expressly allowed for; as such the Permanent Works designer should review the results of the panel tests and undertake a statistical analysis of the results to confirm that this satisfies their design assumptions.
- Based on the four ULS tests that were completed (up to three times the temporary design load), there is an appropriate factor of safety against failure in the temporary case.
- The modified ULS load testing regime which was employed is representative of how the panels will be used during construction.

5.2 Recommendations

It is recommended that the Permanent Works designer reviews the implications of the precast panel deflection during construction on the permanent works design. An observation from this independent temporary works design review is that there is a possible increase in dead load imposed on the bridge structures depending on the methodology undertaken to account for the panel deflection under the wet weight of concrete.

The current design drawings indicate a 10mm maximum deflection during construction of the precast panels, which based on the testing undertaken will be exceeded. The Permanent Works designer should review whether the design has adequate allowance to accommodate this additional precast panel deflection.

The design precast panel deflection to be reviewed should be taken considering the statistical implications of the number of samples of tests that have been conducted. An example of such a method is shown below in Figure 5.1, with the key input data summarised in Table 5.1.

Table 5.1: 100% SLS Test deflection results

Panel	A-1	A-2	A-3	B-1	Mean	Std. Dev.
Self-weight Deflection (mm)	3	4	4	5	3.9	0.7
100% SLS Test Deflection (mm)	26	17	19	24	21.2	4

Source: MM

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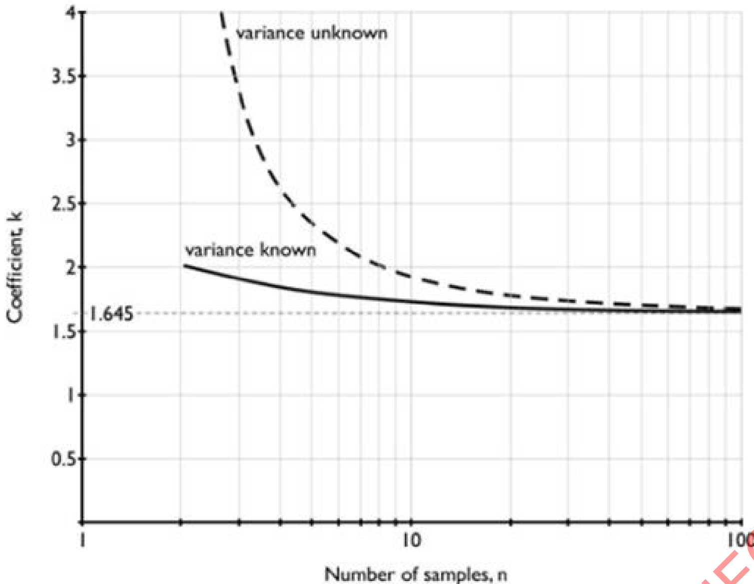
Figure 5.1: Statistical coefficients for determining the 5% fractile with 95% confidence



Source: SCI

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Appendices

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A. Precast Panel Load Testing Data

Appended in this section of the report is the Precast Panel Load Testing Data that has been received and reviewed from FAJV.

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TEST #1. PANEL TYPE A. 11/06/2020

INITIAL CHECKS

Sitting of the panels

	EDGE SUPPORT	CANTILEVER SUPPORT #1	CANTILEVER SUPPORT #2
NORTH	100 mm	105 mm	100 mm
SOUTH	110 mm	100 mm	110 mm

Self-weight Deflection

MID-SPAN	~3mm

Northern gauge placed 0.5m from the tip of the cantilever

Presence of cracks in the edges of the panel prior to commencement of the test due to drilling of holes for the formwork

Link

SLS TEST

LOAD TEST SEQUENCE	WEIGHT CENTRAL PART [kg]	TIME	LASER METER – CONTROL POINT #1. MID-SPAN. NORTH READING	NORTH DEFLECTION	SOUTH READING	SOUTH DEFLECTION	AVERAGE DEFLECTION	LASER METER – CONTROL POINT #2. CANTILEVER TIP. NORTH READING	NORTH DEFLECTION	SOUTH READING	SOUTH DEFLECTION	AVERAGE DEFLECTION	GAUGES – CONTROL POINT #1. MID-SPAN. NORTH DEFLECTION	SOUTH DEFLECTION	AVERAGE DEFLECTION	GAUGES – CONTROL POINT #2. CANTILEVER TIP. NORTH DEFLECTION	SOUTH DEFLECTION	AVERAGE DEFLECTION
PRECAST PANEL WITHOUT ANY LOAD APPLIED (BASELINE)	0	10:14	310 mm	0 mm	316 mm	0 mm	0 mm	310 mm	0 mm	296 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
EMPTY WATER BARRIERS INSTALLED AND PLYWOOD	892	10:42	308 mm	2 mm	315 mm	1 mm	2 mm	309 mm	1 mm	296 mm	0 mm	1 mm	3 mm	1 mm	2 mm	1 mm	1 mm	1 mm
+11.5 BARRIERS CENTRAL PART FILLED WITH WATER	5,958	11:23	293 mm	17 mm	299 mm	17 mm	17 mm	317 mm	-7 mm	305 mm	-9 mm	-8 mm	18 mm	15 mm	17 mm	-7 mm	-10 mm	-8 mm
+19 BARRIERS CENTRAL PART FILLED WITH WATER	9,708	11:45	283 mm	27 mm	290 mm	26 mm	27 mm	321 mm	-11 mm	311 mm	-15 mm	-13 mm	27 mm	25 mm	26 mm	-13 mm	-17 mm	-15 mm
+19 BARRIERS CENTRAL PART WITH WATER (CHECK MEASUREMENT HAS STABILIZED)	9,708	12:01	282 mm	28 mm	290 mm	26 mm	27 mm	321 mm	-11 mm	311 mm	-15 mm	-13 mm	27 mm	25 mm	26 mm	-13 mm	-17 mm	-15 mm
+3.5 BARRIERS CANTILEVER FILLED WITH WATER		12:12	284 mm	26 mm	291 mm	25 mm	26 mm	318 mm	-8 mm	308 mm	-12 mm	-10 mm	26 mm	24 mm	25 mm	-10 mm	-13 mm	-11 mm
+7 BARRIERS CANTILEVER FILLED WITH WATER		12:31	284 mm	26 mm	291 mm	25 mm	26 mm	316 mm	-6 mm	304 mm	-8 mm	-7 mm	26 mm	24 mm	25 mm	-6 mm	-10 mm	-8 mm
+7 BARRIERS CANTILEVER WITH WATER (CHECK MEASUREMENT HAS STABILIZED)		12:50	284 mm	26 mm	292 mm	24 mm	25 mm	315 mm	-5 mm	305 mm	-9 mm	-7 mm	26 mm	24 mm	25 mm	-6 mm	-10 mm	-8 mm
-3.5 BARRIERS CANTILEVER FILLED WITH WATER (+3.5 REMAINING)		13:01	284 mm	26 mm	291 mm	25 mm	26 mm	318 mm	-8 mm	308 mm	-12 mm	-10 mm	26 mm	24 mm	25 mm	-10 mm	-14 mm	-12 mm
-3.5 BARRIERS CANTILEVER FILLED WITH WATER (+0 REMAINING)		13:23	284 mm	26 mm	289 mm	27 mm	27 mm	323 mm	-13 mm	313 mm	-17 mm	-15 mm	27 mm	26 mm	27 mm	-14 mm	-19 mm	-17 mm
-7.5 BARRIERS CENTRAL PART FILLED WITH WATER (+11.5 REMAINING)	5,958	13:47	288 mm	22 mm	295 mm	21 mm	22 mm	320 mm	-10 mm	310 mm	-14 mm	-12 mm	23 mm	20 mm	21 mm	-10 mm	-16 mm	-13 mm
-11.5 BARRIERS CENTRAL PART (+0 REMAINING). PANEL EMPTY.	0	14:27	301 mm	9 mm	308 mm	8 mm	9 mm	313 mm	-3 mm	303 mm	-7 mm	-5 mm	8 mm	8 mm	8 mm	-3 mm	-8 mm	-6 mm
-11.5 BARRIERS CENTRAL PART (+0 REMAINING). PANEL EMPTY (CHECK MEASUREMENT HAS STABILIZED)	0	15:52	301 mm	9 mm	307 mm	9 mm	9 mm	315 mm	-5 mm	303 mm	-7 mm	-6 mm	8 mm	8 mm	8 mm	-3 mm	-8 mm	-6 mm

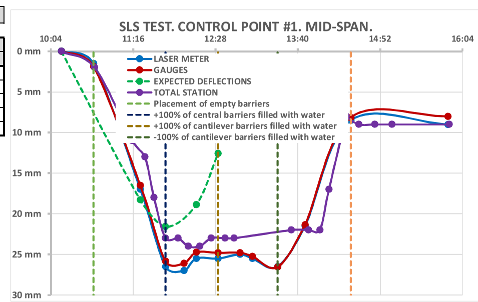
TIME	TOTAL STATION – POINT #1 NORTH DEFLECTION	POINT #2 NORTH DEFLECTION
10:14	0 mm	0 mm
10:43	2 mm	2 mm
11:16	11 mm	-7 mm
11:27	13 mm	-9 mm
11:35	18 mm	-13 mm
11:45	23 mm	-16 mm
11:56	23 mm	-16 mm
12:05	24 mm	-15 mm
12:15	24 mm	-11 mm
12:25	23 mm	-8 mm
12:37	23 mm	-8 mm
12:45	23 mm	-8 mm
13:35	22 mm	-13 mm

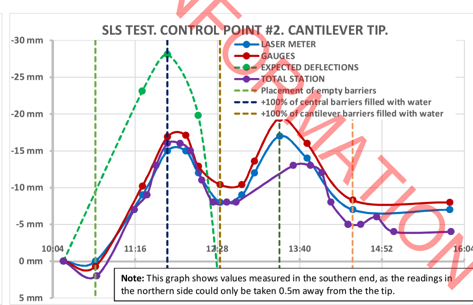
EXPECTED DEFLECTIONS

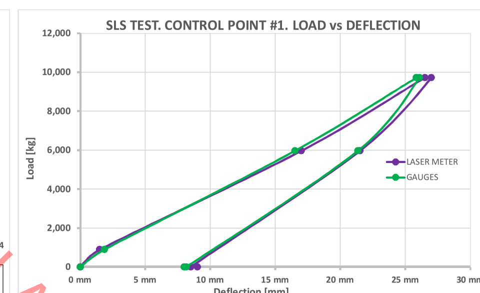
	TYPE A 600mm POINT #1	POINT #2
STAGE 0 (NO LOAD)	0.0	0.0
STAGE 1 (60% LOAD CENTER)	18.3	-23.1
STAGE 2 (100% LOAD CENTER)	21.6	-28.1
STAGE 3 (50% CANTILEVER)	18.9	-19.8
STAGE 4 (100% CANTILEVER)	12.6	4.3

SEQUENCE

Placement of empty barriers	10:42
+60% of central barriers filled with water	11:23
+100% of central barriers filled with water	11:45
+50% of cantilever barriers filled with water	12:12
+100% of cantilever barriers filled with water	12:31
-50% of cantilever barriers filled with water	13:01
-100% of cantilever barriers filled with water	13:23
-40% of cantilever barriers filled with water	13:47
-100% of cantilever barriers filled with water	14:27







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TEST #1. PANEL TYPE A. 11/06/2020

ULS TEST

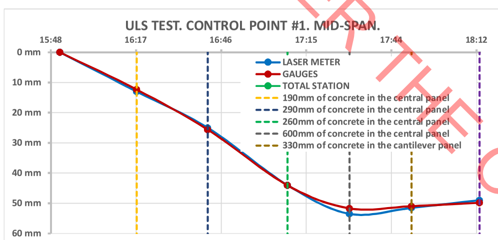
LOAD TEST SEQUENCE	WEIGHT CENTRAL PART [kg]	TIME	LASER METER										GAUGES					
			CONTROL POINT #1. MID-SPAN.					CONTROL POINT #2. CANTILEVER TIP.					CONTROL POINT #1. MID-SPAN.			CONTROL POINT #2. CANTILEVER TIP.		
			NORTH		SOUTH		AVERAGE	NORTH		SOUTH		AVERAGE	NORTH	SOUTH	AVERAGE	NORTH	SOUTH	AVERAGE
			READING	DEFLECTION	READING	DEFLECTION	DEFLECTION	READING	DEFLECTION	READING	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION
PRECAST PANEL WITHOUT ANY LOAD APPLIED (BASELINE)	0	15:52	301 mm	0 mm	307 mm	0 mm	0 mm	315 mm	0 mm	303 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
POURING 190MM OF CONCRETE IN THE CENTRAL PART	8,514	16:18	287 mm	14 mm	295 mm	12 mm	13 mm	320 mm	-5 mm	309 mm	-6 mm	-6 mm	14 mm	11 mm	12 mm	-6 mm	-7 mm	-6 mm
POURING 290MM OF CONCRETE IN THE CENTRAL PART	12,995	16:42	275 mm	26 mm	283 mm	24 mm	25 mm	326 mm	-11 mm	317 mm	-14 mm	-13 mm	26 mm	25 mm	26 mm	-12 mm	-13 mm	-13 mm
POURING 460MM OF CONCRETE IN THE CENTRAL PART	20,612	17:09	255 mm	46 mm	265 mm	42 mm	44 mm	335 mm	-20 mm	327 mm	-24 mm	-22 mm	46 mm	42 mm	44 mm	-21 mm	-25 mm	-23 mm
POURING 600MM OF CONCRETE IN THE CENTRAL PART	26,886	17:30	245 mm	56 mm	256 mm	51 mm	54 mm	338 mm	-23 mm	335 mm	-32 mm	-28 mm	54 mm	49 mm	52 mm	-26 mm	-31 mm	-28 mm
POURING 330MM OF CONCRETE IN THE CANTILEVER		17:51	248 mm	53 mm	257 mm	50 mm	52 mm	330 mm	-15 mm	322 mm	-19 mm	-17 mm	53 mm	49 mm	51 mm	-16 mm	-18 mm	-17 mm
POURING 630MM OF CONCRETE IN THE CANTILEVER		18:14	250 mm	51 mm	260 mm	47 mm	49 mm	320 mm	-5 mm	311 mm	-8 mm	-7 mm	52 mm	48 mm	50 mm	-6 mm	-7 mm	-6 mm
FINAL MEASUREMENT THE DAY AFTER THE TEST		09:10	249 mm	52 mm	258 mm	49 mm	51 mm	321 mm	-6 mm	310 mm	-7 mm	-7 mm						

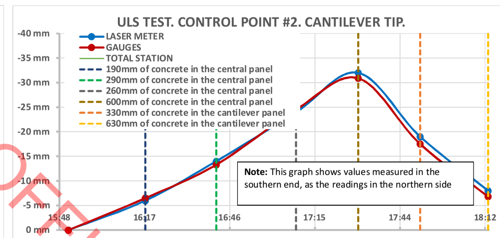
SEQUENCE

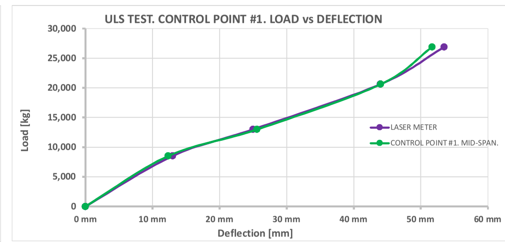
190mm of concrete in the central panel	16:18
290mm of concrete in the central panel	16:42
260mm of concrete in the central panel	17:09
600mm of concrete in the central panel	17:30
330mm of concrete in the cantilever panel	17:51
630mm of concrete in the cantilever panel	18:14

DEFLECTION AT 100% SLS LOAD (205mm OF CONCRETE)

100% SLS Load	9,186
Interpolated deflection at mid-span	15
Interpolated deflection at cantilever tip	-7







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TEST #2. PANEL TYPE A (ONLY WITH PART OF PERMANENT REINFORCEMENT). 18/06/2020

INITIAL CHECKS

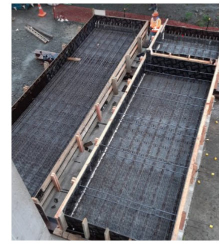
Sitting of the panels

	EDGE SUPPORT	CANTILEVER SUPPORT #1	CANTILEVER SUPPORT #2
NORTH	105 mm	108 mm	110 mm
SOUTH	107 mm	103 mm	107 mm

Self-weight Deflection

MID-SPAN	~4mm

Panel only with part of permanent reinforcement (panel in the right side)



ULS TEST

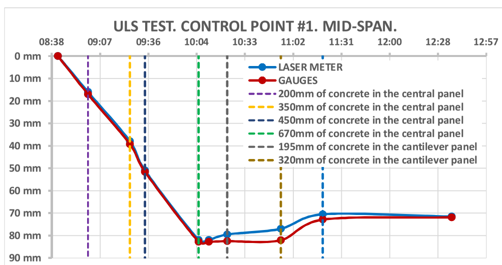
LOAD TEST SEQUENCE	WEIGHT CENTRAL PART [kg]	TIME	LASER METER												GAUGES				
			CONTROL POINT #1. MID-SPAN.					CONTROL POINT #2. CANTILEVER TIP.							CONTROL POINT #1. MID-SPAN.			CONTROL POINT #2.	
			NORTH		SOUTH		AVERAGE	NORTH		CENTER		SOUTH		AVERAGE	NORTH	SOUTH	AVERAGE	CENTER	AVERAGE
			READING	DEFLECTION	READING	DEFLECTION	DEFLECTION	READING	DEFLECTION	READING	DEFLECTION	READING	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION
PRECAST PANEL WITHOUT ANY LOAD APPLIED (BASELINE)	0	08:42	302 mm	0 mm	303 mm	0 mm	0 mm	287 mm	0 mm	275 mm	0 mm	260 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
POURING 200MM OF CONCRETE IN THE CENTRAL PART	8,962	09:00	285 mm	17 mm	288 mm	15 mm	16 mm	299 mm	-12 mm	285 mm	-10 mm	271 mm	-11 mm	-11 mm	17 mm	15 mm	16 mm	-12 mm	-12 mm
POURING 350MM OF CONCRETE IN THE CENTRAL PART	15,683	09:25	263 mm	39 mm	266 mm	37 mm	38 mm	316 mm	-29 mm	306 mm	-31 mm	290 mm	-30 mm	-30 mm	39 mm	36 mm	38 mm	-28 mm	-28 mm
POURING 450MM OF CONCRETE IN THE CENTRAL PART	20,164	09:34	250 mm	52 mm	253 mm	50 mm	51 mm	327 mm	-40 mm	315 mm	-40 mm	302 mm	-42 mm	-41 mm	52 mm	48 mm	50 mm	-40 mm	-40 mm
POURING 670MM OF CONCRETE IN THE CENTRAL PART	30,022	10:06	219 mm	83 mm	222 mm	81 mm	82 mm	358 mm	-71 mm	347 mm	-72 mm	333 mm	-73 mm	-72 mm	83 mm	81 mm	82 mm	-70 mm	-70 mm
POURING 670MM IN THE CENTRAL PART (CHECK MEASUREMENT HAS STABILIZED)	30,022	10:12	219 mm	83 mm	222 mm	81 mm	82 mm	360 mm	-73 mm	345 mm	-70 mm	333 mm	-73 mm	-72 mm	83 mm	81 mm	82 mm	-70 mm	-70 mm
POURING 195MM OF CONCRETE IN THE CANTILEVER		10:23	221 mm	81 mm	225 mm	78 mm	80 mm	346 mm	-59 mm	330 mm	-55 mm	319 mm	-59 mm	-58 mm	83 mm	78 mm	80 mm	-55 mm	-55 mm
POURING 320MM OF CONCRETE IN THE CANTILEVER		10:55	224 mm	78 mm	227 mm	76 mm	77 mm	330 mm	-43 mm	316 mm	-41 mm	305 mm	-45 mm	-43 mm	82 mm	76 mm	79 mm	-45 mm	-45 mm
POURING 610MM OF CONCRETE IN THE CANTILEVER		11:20	230 mm	72 mm	234 mm	69 mm	71 mm	308 mm	-21 mm	289 mm	-14 mm	280 mm	-20 mm	-18 mm	73 mm	66 mm	69 mm	-20 mm	-20 mm
POURING 610MM IN THE CANTILEVER (CHECK MEASUREMENT HAS STABILIZED)		12:37	230 mm	72 mm	232 mm	71 mm	72 mm	309 mm	-22 mm	288 mm	-13 mm	280 mm	-20 mm	-18 mm	72 mm	66 mm	69 mm	-20 mm	-20 mm
FINAL MEASUREMENT THE DAY AFTER THE TEST		09:00	230 mm	72 mm	233 mm	70 mm	71 mm	299 mm	-12 mm	285 mm	-10 mm	281 mm	-21 mm	-14 mm					

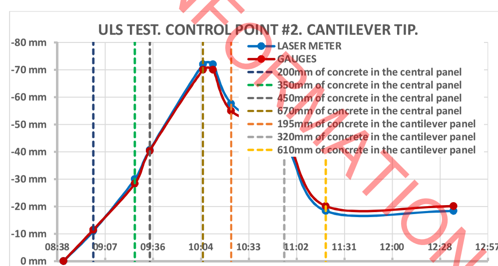
SEQUENCE

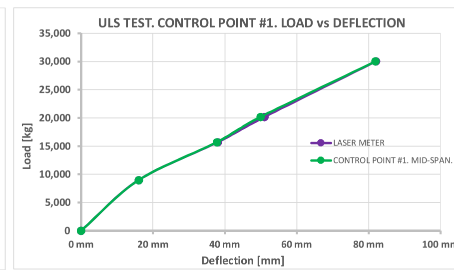
200mm of concrete in the central panel	09:00
350mm of concrete in the central panel	09:25
450mm of concrete in the central panel	09:34
670mm of concrete in the central panel	10:06
195mm of concrete in the cantilever panel	10:23
320mm of concrete in the cantilever panel	10:55
610mm of concrete in the cantilever panel	11:20

DEFLECTION AT 100% SLS LOAD (205mm OF CONCRETE)

100% SLS Load	9,186
Interpolated deflection at mid-span	17
Interpolated deflection at cantilever tip	-12







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TEST #3. PANEL TYPE A. 18/06/2020

INITIAL CHECKS

Sitting of the panels

	EDGE SUPPORT	CANTILEVER SUPPORT #1	CANTILEVER SUPPORT #2
NORTH	86 mm	125 mm	90 mm
SOUTH	75 mm	150 mm	80 mm

Self-weight Deflection

MID-SPAN	~4mm

Prior to commencement of SLS test:

1) Truss at mid-span hit several times with a hummer
2) The weld (at 0.9m from the mid-span) in one of the trusses was broken

Prior to commencement of ULS test:

1) Two welds broken (at 1.2m from edge support) in one of the trusses
2) The weld (at 0.9m from the mid-span) in one of the trusses was broken

SLS TEST

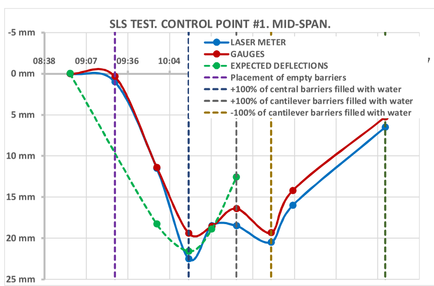
LOAD TEST SEQUENCE	WEIGHT CENTRAL PART [kg]	TIME	LASER METER												GAUGES				
			CONTROL POINT #1. MID-SPAN.					CONTROL POINT #2. CANTILEVER TIP.							CONTROL POINT #1. MID-SPAN.			CONTROL POINT #2.	
			NORTH		SOUTH		AVERAGE	NORTH		CENTER		SOUTH		AVERAGE	NORTH	SOUTH	AVERAGE	CENTER	AVERAGE
			READING	DEFLECTION	READING	DEFLECTION	DEFLECTION	READING	DEFLECTION	READING	DEFLECTION	READING	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION
PRECAST PANEL WITHOUT ANY LOAD APPLIED (BASELINE)	0	08:56	323 mm	0 mm	326 mm	0 mm	0 mm	344 mm	0 mm	359 mm	0 mm	369 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
EMPTY WATER BARRIERS INSTALLED AND PLYWOOD	892	09:27	322 mm	1 mm	325 mm	1 mm	1 mm	344 mm	0 mm	358 mm	1 mm	368 mm	1 mm	1 mm	1 mm	0 mm	0 mm	0 mm	0 mm
+11.5 BARRIERS CENTRAL PART FILLED WITH WATER	5,958	09:56	311 mm	12 mm	315 mm	11 mm	12 mm	354 mm	-10 mm	367 mm	-8 mm	377 mm	-8 mm	-9 mm	12 mm	11 mm	11 mm	-8 mm	-8 mm
+19 BARRIERS CENTRAL PART FILLED WITH WATER	9,708	10:18	300 mm	23 mm	304 mm	22 mm	23 mm	362 mm	-18 mm	375 mm	-16 mm	385 mm	-16 mm	-17 mm	21 mm	18 mm	19 mm	-18 mm	-18 mm
+3.5 BARRIERS CANTILEVER FILLED WITH WATER		10:34	302 mm	21 mm	310 mm	16 mm	19 mm	353 mm	-9 mm	367 mm	-8 mm	379 mm	-10 mm	-10 mm	20 mm	18 mm	19 mm	-10 mm	-10 mm
+7 BARRIERS CANTILEVER FILLED WITH WATER		10:51	305 mm	18 mm	307 mm	19 mm	19 mm	347 mm	-3 mm	361 mm	-2 mm	372 mm	-3 mm	-3 mm	17 mm	16 mm	16 mm	-3 mm	-3 mm
-7 BARRIERS CANTILEVER FILLED WITH WATER (+0 REMAINING)		11:15	301 mm	22 mm	307 mm	19 mm	21 mm	362 mm	-18 mm	376 mm	-17 mm	386 mm	-17 mm	-18 mm	20 mm	18 mm	19 mm	-19 mm	-19 mm
-7.5 BARRIERS CENTRAL PART FILLED WITH WATER (+11.5 REMAINING)	5,958	11:30	307 mm	16 mm	310 mm	16 mm	16 mm	358 mm	-14 mm	372 mm	-13 mm	383 mm	-14 mm	-14 mm	15 mm	13 mm	14 mm	-13 mm	-13 mm
-11.5 BARRIERS CENTRAL PART (+0 REMAINING). PANEL EMPTY.	0	12:34	317 mm	6 mm	319 mm	7 mm	7 mm	351 mm	-7 mm	365 mm	-6 mm	374 mm	-5 mm	-6 mm	6 mm	5 mm	5 mm	-6 mm	-6 mm

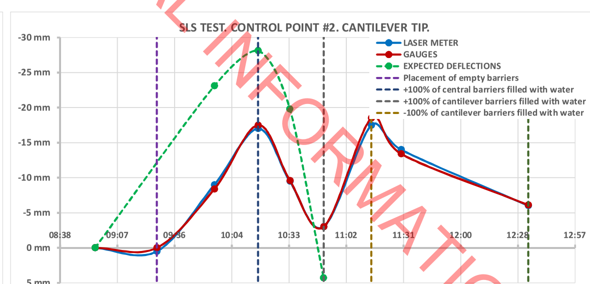
EXPECTED DEFLECTIONS

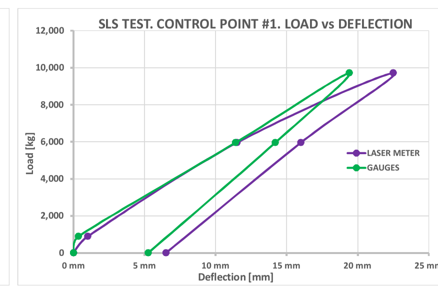
	TYPE A 600mm	
	POINT #1	POINT #2
STAGE 0 (NO LOAD)	0.0	0.0
STAGE 1 (60% LOAD CENTER)	18.3	-23.1
STAGE 2 (100% LOAD CENTER)	21.6	-28.1
STAGE 3 (50% CANTILEVER)	18.9	-19.8
STAGE 4 (100% CANTILEVER)	12.6	4.3

SEQUENCE

Placement of empty barriers	09:27
+60% of central barriers filled with water	09:56
+100% of central barriers filled with water	10:18
+50% of cantilever barriers filled with water	10:34
+100% of cantilever barriers filled with water	10:51
-100% of cantilever barriers filled with water	11:15
-40% of cantilever barriers filled with water	11:30
-100% of cantilever barriers filled with water	12:34







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TEST #3. PANEL TYPE A. — 18/06/2020

ULS TEST

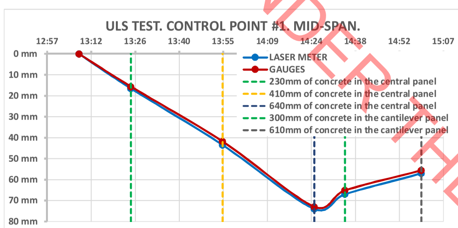
LOAD TEST SEQUENCE	WEIGHT CENTRAL PART [kg]	TIME	LASER METER														GAUGES				
			CONTROL POINT #1. MID-SPAN.					CONTROL POINT #2. CANTILEVER TIP.									CONTROL POINT #1. MID-SPAN.			CONTROL POINT #2.	
			NORTH		SOUTH		AVERAGE	NORTH		CENTER		SOUTH		AVERAGE			NORTH	SOUTH	AVERAGE	CENTER	AVERAGE
			READING	DEFLECTION	READING	DEFLECTION	DEFLECTION	READING	DEFLECTION	READING	DEFLECTION	READING	DEFLECTION	DEFLECTION			DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION
PRECAST PANEL WITHOUT ANY LOAD APPLIED (BASELINE)	0	13:08	318 mm	0 mm	319 mm	0 mm	0 mm	375 mm	0 mm	369 mm	0 mm	352 mm	0 mm	0 mm			0 mm	0 mm	0 mm	0 mm	0 mm
POURING 230MM OF CONCRETE IN THE CENTRAL PART	10,306	13:25	301 mm	17 mm	303 mm	16 mm	17 mm	389 mm	-14 mm	384 mm	-15 mm	365 mm	-13 mm	-14 mm			16 mm	16 mm	16 mm	-15 mm	-15 mm
POURING 410MM OF CONCRETE IN THE CENTRAL PART	18,372	13:55	274 mm	44 mm	276 mm	43 mm	44 mm	390 mm	-25 mm	403 mm	-25 mm	411 mm	-25 mm	-25 mm			43 mm	41 mm	42 mm	-25 mm	-25 mm
POURING 640MM OF CONCRETE IN THE CENTRAL PART	28,678	14:25	243 mm	75 mm	246 mm	73 mm	74 mm	421 mm	-56 mm	434 mm	-56 mm	443 mm	-57 mm	-57 mm			75 mm	71 mm	73 mm	-55 mm	-55 mm
POURING 300MM OF CONCRETE IN THE CANTILEVER		14:35	251 mm	67 mm	252 mm	67 mm	67 mm	390 mm	-25 mm	403 mm	-25 mm	412 mm	-26 mm	-26 mm			66 mm	64 mm	65 mm	-25 mm	-25 mm
POURING 610MM OF CONCRETE IN THE CANTILEVER		15:00	261 mm	57 mm	262 mm	57 mm	57 mm	357 mm	8 mm	369 mm	9 mm	379 mm	7 mm	8 mm			56 mm	55 mm	56 mm	11 mm	11 mm

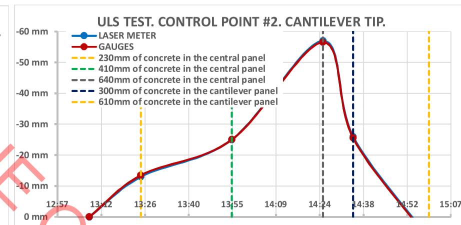
SEQUENCE

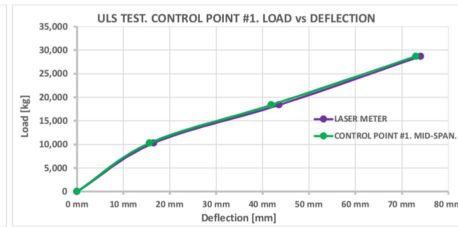
230mm of concrete in the central panel	13:25
410mm of concrete in the central panel	13:55
640mm of concrete in the central panel	14:25
300mm of concrete in the cantilever panel	14:35
610mm of concrete in the cantilever panel	15:00

DEFLECTION AT 100% SLS LOAD (205mm OF CONCRETE)

100% SLS Load	9,186
Interpolated deflection at mid-span	13
Interpolated deflection at cantilever tip	-12







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TEST #1. PANEL TYPE B. 11/06/2020

INITIAL CHECKS

Sitting of the panels

	EASTERN EDGE SUPPORT	WESTERN EDGE SUPPORT
NORTH	110 mm	100 mm
SOUTH	108 mm	105 mm

Self-weight Deflection

MID-SPAN	~5mm

Incorrect ending of the trusses

SLS TEST

LOAD TEST SEQUENCE	WEIGHT [kg]	TIME	LASER METER					GAUGES		
			CONTROL POINT #1. MID-SPAN.					CONTROL POINT #1. MID-SPAN.		
			NORTH		SOUTH		AVERAGE	NORTH	SOUTH	AVERAGE
			READING	DEFLECTION	READING	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION	DEFLECTION
PRECAST PANEL WITHOUT ANY LOAD APPLIED (BASELINE)	0	09:14	265 mm	0 mm	250 mm	0 mm	0 mm	0 mm	0 mm	0 mm
EMPTY WATER BARRIERS INSTALLED AND PLYWOOD	892	09:27	263 mm	2 mm	249 mm	1 mm	2 mm	2 mm	2 mm	2 mm
+9 BARRIERS FILLED WITH WATER	4,708	09:42	256 mm	9 mm	243 mm	7 mm	8 mm	7 mm	10 mm	9 mm
+11.5 BARRIERS FILLED WITH WATER	5,958	09:50	252 mm	13 mm	237 mm	13 mm	13 mm	13 mm	15 mm	14 mm
+14 BARRIERS FILLED WITH WATER	7,208	09:56	248 mm	17 mm	235 mm	15 mm	16 mm	17 mm	17 mm	17 mm
+16 BARRIERS FILLED WITH WATER	8,208	10:02	244 mm	21 mm	230 mm	20 mm	21 mm	20 mm	20 mm	20 mm
+16 BARRIERS FILLED WITH WATER	8,208	10:46	245 mm	20 mm	230 mm	20 mm	20 mm	19 mm	20 mm	20 mm
+19 BARRIERS FILLED WITH WATER	9,708	11:01	242 mm	23 mm	226 mm	24 mm	24 mm	24 mm	24 mm	24 mm
+19 BARRIERS FILLED WITH WATER	9,708	11:09	242 mm	23 mm	227 mm	23 mm	23 mm	24 mm	24 mm	24 mm
-7.5 BARRIERS (+11.5 REMAINING)	5,958	11:32	247 mm	18 mm	232 mm	18 mm	18 mm	19 mm	18 mm	18 mm
-11.5 BARRIERS (+0 REMAINING)	0	12:00	259 mm	6 mm	244 mm	6 mm	6 mm	6 mm	6 mm	6 mm
-11.5 BARRIERS (+0 REMAINING). CHECK MEASUREMENT HAS STABILIZED.	0	12:10	259 mm	6 mm	244 mm	6 mm	6 mm	6 mm	6 mm	6 mm

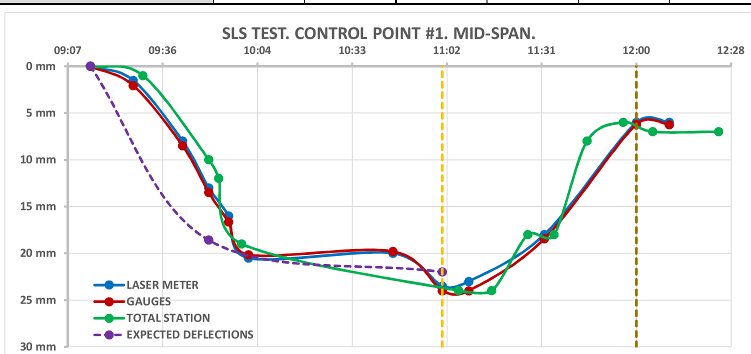
TIME	TOTAL STATION POINT #1 NORTH DEFLECTION
09:14	0 mm
09:30	1 mm
09:50	10 mm
09:53	12 mm
10:00	19 mm
11:06	24 mm
11:16	24 mm
11:27	18 mm
11:35	18 mm
11:45	8 mm
11:56	6 mm
12:05	7 mm
12:25	7 mm

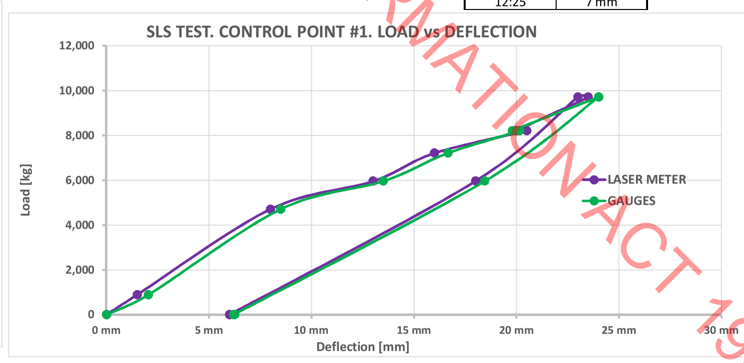
EXPECTED DEFLECTIONS

	TYPE B & B1 POINT #1
STAGE 1 (60% LOAD CENTER)	18.6
STAGE 2 (100% LOAD CENTER)	22.0

SEQUENCE

Placement of empty barriers	09:27
+60% of barriers filled with water	09:50
+100% of barriers filled with water	11:01
-40% of barriers filled with water	11:32
-100% of barriers filled with water	12:00





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TEST #1. PANEL TYPE B. 11/06/2020

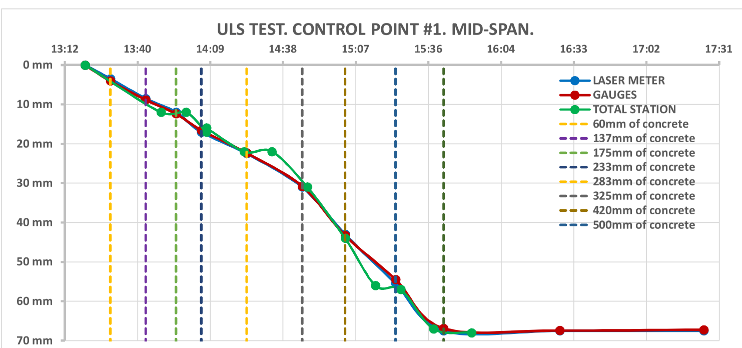
ULS TEST

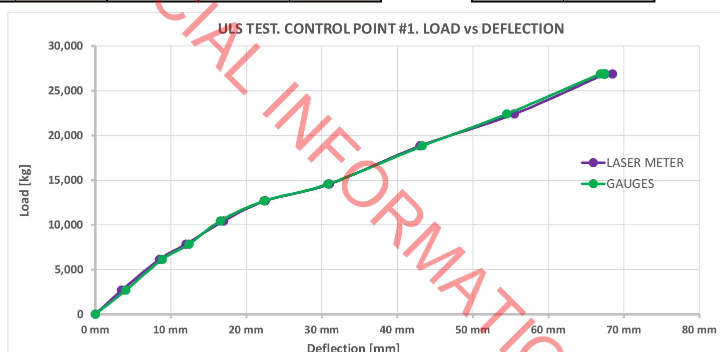
LOAD TEST SEQUENCE	WEIGHT [kg]	TIME	LASER METER – CONTROL POINT #1. MID-SPAN. NORTH READING	NORTH DEFLECTION	SOUTH READING	SOUTH DEFLECTION	AVERAGE DEFLECTION	GAUGES – CONTROL POINT #1. MID-SPAN. NORTH DEFLECTION	SOUTH DEFLECTION	AVERAGE DEFLECTION
PRECAST PANEL WITHOUT ANY LOAD APPLIED (BASELINE)	0	13:20	259 mm	0 mm	244 mm	0 mm	0 mm	0 mm	0 mm	0 mm
POURING 60MM OF CONCRETE IN THE CENTRAL PART	2,689	13:30	256 mm	3 mm	240 mm	4 mm	4 mm	4 mm	4 mm	4 mm
POURING 137MM OF CONCRETE IN THE CENTRAL PART	6,139	13:44	251 mm	8 mm	235 mm	9 mm	9 mm	8 mm	10 mm	9 mm
POURING 175MM OF CONCRETE IN THE CENTRAL PART	7,842	13:56	247 mm	12 mm	232 mm	12 mm	12 mm	13 mm	12 mm	12 mm
POURING 233MM OF CONCRETE IN THE CENTRAL PART	10,441	14:06	242 mm	17 mm	227 mm	17 mm	17 mm	16 mm	17 mm	17 mm
POURING 283MM OF CONCRETE IN THE CENTRAL PART	12,681	14:24	236 mm	23 mm	222 mm	22 mm	23 mm	22 mm	22 mm	22 mm
POURING 325MM OF CONCRETE IN THE CENTRAL PART	14,563	14:46	228 mm	31 mm	213 mm	31 mm	31 mm	31 mm	30 mm	31 mm
POURING 420MM OF CONCRETE IN THE CENTRAL PART	18,820	15:03	216 mm	43 mm	201 mm	43 mm	43 mm	44 mm	43 mm	43 mm
POURING 500MM OF CONCRETE IN THE CENTRAL PART	22,405	15:23	203 mm	56 mm	189 mm	55 mm	56 mm	56 mm	54 mm	55 mm
POURING 600MM OF CONCRETE IN THE CENTRAL PART	26,886	15:42	191 mm	68 mm	177 mm	67 mm	68 mm	67 mm	67 mm	67 mm
POURING 600MM OF CONCRETE IN THE CENTRAL PART (CHECK MEASUREMENT HAS STABILIZED)	26,886	16:28	192 mm	67 mm	176 mm	68 mm	68 mm	68 mm	67 mm	67 mm
POURING 600MM OF CONCRETE IN THE CENTRAL PART (CHECK MEASUREMENT HAS STABILIZED)	26,886	17:25	191 mm	68 mm	177 mm	67 mm	68 mm	69 mm	66 mm	67 mm
FINAL MEASUREMENT THE DAY AFTER THE TEST	26,886	09:10	190 mm	69 mm	176 mm	68 mm	69 mm			

TIME	TOTAL STATION POINT #1 NORTH DEFLECTION
13:20	0 mm
13:50	12 mm
14:00	12 mm
14:08	17 mm
14:08	16 mm
14:23	22 mm
14:34	22 mm
14:48	31 mm
15:03	44 mm
15:15	56 mm
15:25	57 mm
15:38	67 mm
15:53	68 mm

SEQUENCE	
60mm of concrete	13:30
137mm of concrete	13:44
175mm of concrete	13:56
233mm of concrete	14:06
283mm of concrete	14:24
325mm of concrete	14:46
420mm of concrete	15:03
500mm of concrete	15:23
600mm of concrete	15:42

DEFLECTION AT 100% SLS LOAD (205mm OF CONCRETE	
100% SLS Load	9,186
Interpolated deflection at mid-span	15





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