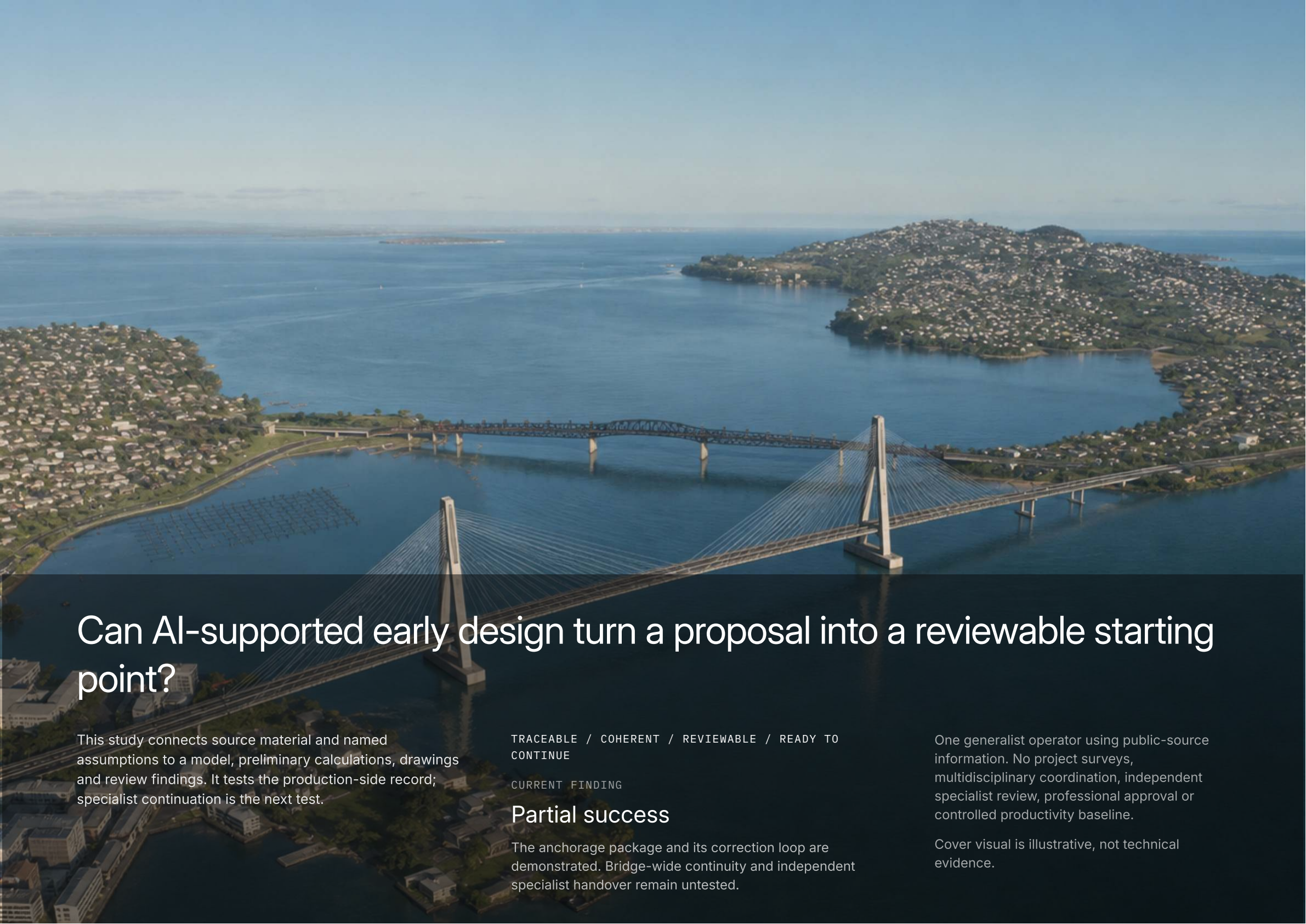




Can AI-supported early design turn a proposal into a reviewable starting point?

This study connects source material and named assumptions to a model, preliminary calculations, drawings and review findings. It tests the production-side record; specialist continuation is the next test.

TRACEABLE / COHERENT / REVIEWABLE / READY TO CONTINUE

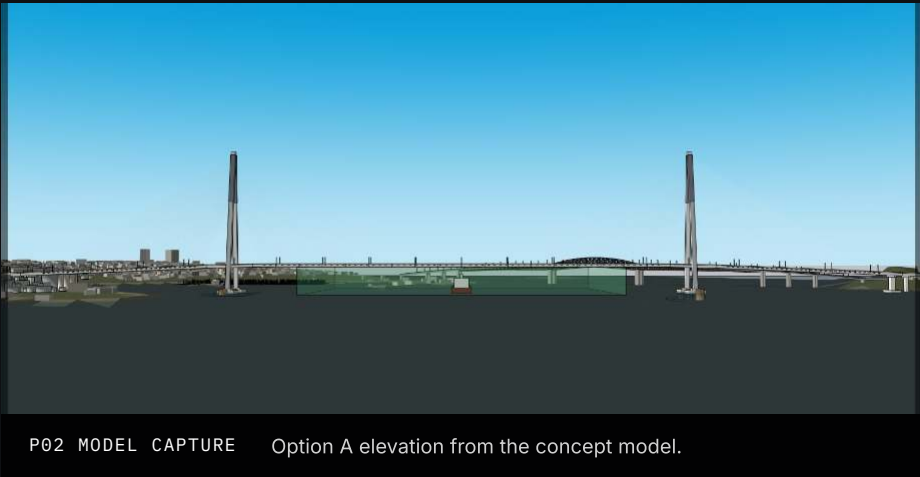
CURRENT FINDING

Partial success

The anchorage package and its correction loop are demonstrated. Bridge-wide continuity and independent specialist handover remain untested.

One generalist operator using public-source information. No project surveys, multidisciplinary coordination, independent specialist review, professional approval or controlled productivity baseline.

Cover visual is illustrative, not technical evidence.



The brief

In May 2026 Greater Auckland published Nicolas Reid's proposal for a second Waitematā crossing: a multimodal bridge just east of the existing one, from the Onewa interchange to the Victoria Park viaduct. It would carry southbound motorway lanes, two-way rapid transit and paths for walking and cycling, with the existing bridge working alongside it as one system.

THE KEY CONNECTION

The public proposal defined the corridor, broad deck and clearance envelope, and operating intent. The model is Landform's developed interpretation of it.

	THE BRIEF	THE MODEL
CORRIDOR	Onewa to the Victoria Park viaduct, east of the existing bridge	Both tie-ins represented in the harbour context model.
LENGTH	1,800 to 2,000 m crossing	2,000 m alignment: 800 m main span, 350 m side spans, 250 m approaches
DECK	Around 38 m, multimodal	38.0 m deck carrying walking, cycling, transit and traffic
CLEARANCE	43 m, matching the existing harbour bridge	43.0 m held over the 500 m navigation channel
STRUCTURE	A cable-stayed bridge	Option A cable-stayed; Option B tied arch tested as the comparator
WHERE IT DIFFERS	The 800 m main span and A-frame towers are Landform design developments, not prescribed by the proposal. Option B is Landform's comparative study. The proposal's two-bridges-one-system operation, Te Onewa station and the Westhaven and St Marys Bay outcomes are not yet modelled.	
LANE ALLOCATION	Public proposal: four motorway lanes southbound on the new bridge. Current model: two lanes each way; the complete two-bridge operating allocation is not modelled.	

Named inputs guide the study.

Span lengths, deck width and navigation clearance are recorded in the bridge-wide parameter set. The P02 anchorage package maintains separate named inputs for its calculations, model overlay and drawings.

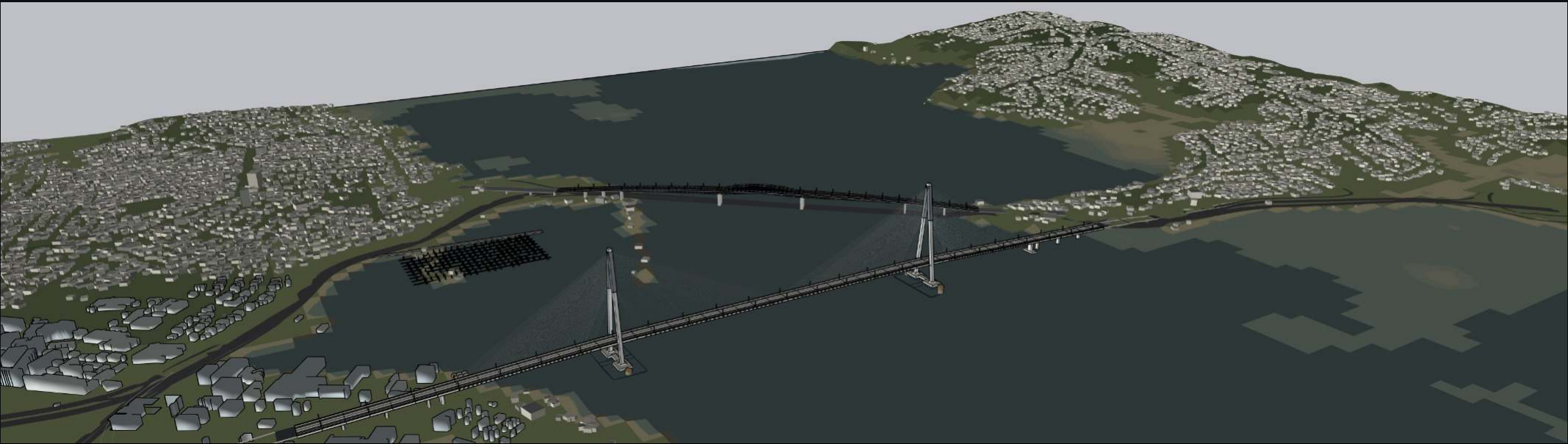


38 M DECK

PUBLIC PROPOSAL → source-context/params_P02.json: waitemata.deck_width_m = 38.0 → P02 MODEL

256 HOUSINGS

source-context/params_P02.json: waitemata.stays_per_face = 32 → P02 MODEL: 256 ENTITIES → ST-0600/ST-0602 → P01/P02 REVIEW



P02 MODEL CAPTURE Option A, cable-stayed crossing, in its harbour context.

800 m

MAIN SPAN

2,000 m

CONCEPT ALIGNMENT

256

MODELLLED ANCHOR HOUSINGS

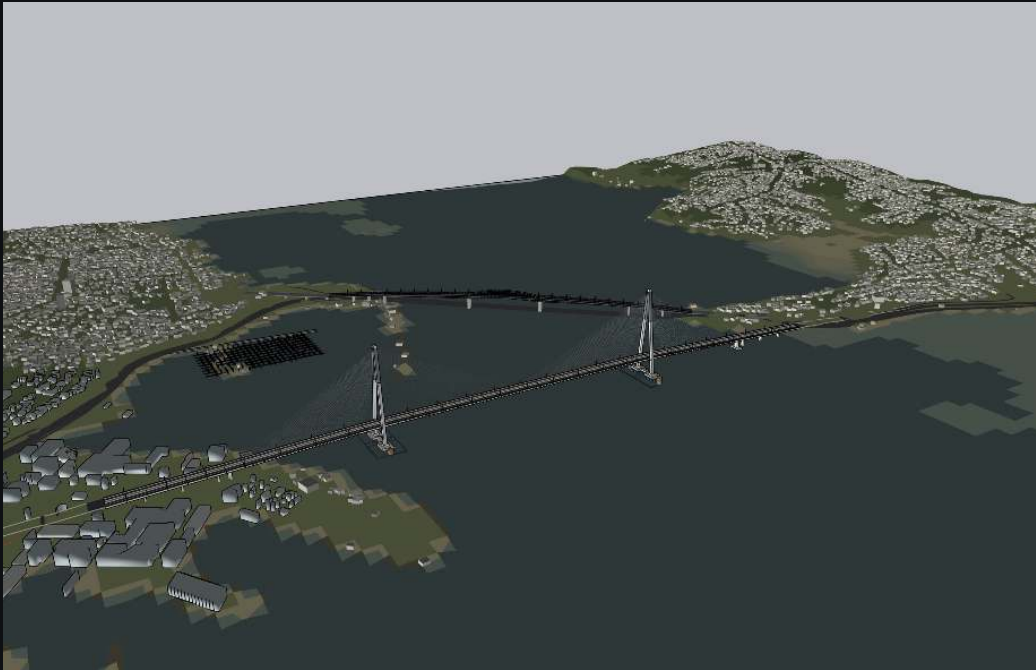
38 m

MULTIMODAL DECK

The corridor and deck envelope were compared across two bridge types.

Option A develops the proposal's cable-stayed form. Option B is a Landform comparator and remains held pending an erection strategy.

OPTION A / CABLE-STAYED



DEVELOPED INTO P02 ANCHORAGE PACKAGE

OPTION B / TIED ARCH



COMPARISON ONLY / OPEN ERECTION BLOCKER

The workflow produced a preliminary anchorage package.

Ten sheets bring arrangement, quantities, loads and open holds together. The package tests coordination and document production. Structural verification, precedent, supplier information and specialist design remain open.

WATKINSA CROSSINGS - OPTION 4 - STAY ANCHORAGE

DETAIL PACKAGE

ST-0600

SHEET 01 OF 10

Package contents and design basis

What this package contains, what governs it, and what is assumed

11 CONTENTS

See sheets. Each number lists the sheets, the envelope, and the hold that remains

SHEET	TITLE	WHAT IT IS FOR
ST-0600	Package contents and design basis	Scope, owner approvals, model traceability and the quantities used by the package
ST-0601	Anchorage typology and selection	The four families of stay-tension anchorage, what each costs, and why this one
ST-0602	Anchorage zone general arrangement	Plan, elevation and section through one anchorage bay
ST-0603	Edge node plate layout	Plate sizes, grades and the load path through the node
ST-0604	Wind map and fatigue detail categories	Mapped wind references, candidate categories and the open fatigue verification
ST-0605	Anchor head and supplier envelope	What the stay system demands of the structure around it
ST-0606	Corrosion, drainage and demineralization	What keeps it alive for 100 years in a marine environment
ST-0607	Shoring, replacement and access	How it is tensioned, how it is altered or changed, how a person reaches it
ST-0608	Tolerances and shop first article test	What must be proved once before 200 are built
ST-0609	References, hold points and verification	Every source, every hold, and the state of each check

12 WHAT GOVERNS, AND WHAT DOES NOT

The game's control rather than the goal

DESIGNER	DESIGNER
Project approval	Owner acceptance is required. The N275 Bridge Manual excludes cable-stayed bridges and railway loading. A project-specific cable stay and rest design team, documented approvals and special studies are held in.
Technical assistance	Moorage as a Category 1 structure under the Highway Structural Design Guide, including an independent design review. Design and review contributions are not recorded for the package. [11]
Proposed stay system loads	PTC 0045.1-18 with published units and to Subpart 80 (2018). These are proposed references, not an accepted project basis. [11]
Steel and fatigue	AS/NZS 1553.1 and EN 1993-1-8 are candidate design references. The current consolidated edition, project amendments, rat spectrum and detail category applicability remain to be confirmed. [11,100]
Anchorage capacity	PTC requires the anchorage to transmit the full ultimate tensile force of the cables, and prohibits hard lifting or cement grout in the anchorage area as individual strands remain replaceable. [11]

13 THE QUANTITY THAT DRIVES EVERYTHING

Reference stay BACX-01: initial preliminary demand is dependent from cable details

QUANTITY	QUANTITY
Optimal stay / strands	BACX-01 / 73
Preliminary SLS demand	9,342 kN
40% GUFS SLS threshold	9,342 kN
SLS demand / threshold	8,899
Preliminary ULS demand	11,319 kN
40% GUFS ULS threshold	11,319 kN
ULS demand / threshold	8,853
Cable GUFS	28,367 kN
Stay inclination at deck	38.5°
Back / main pier pitch	8,387 / 18,484 m
Model anchorage assemblies	250

14 THE COST MATTERS

2 towers x 2 stay directions x 10 positions x 2 deck edges x 250 assemblies. The P01 count of 120 is used for the second tower. The first article test on ST-0608 remains a hold before tender fabrication

15 MODEL TRACEABILITY

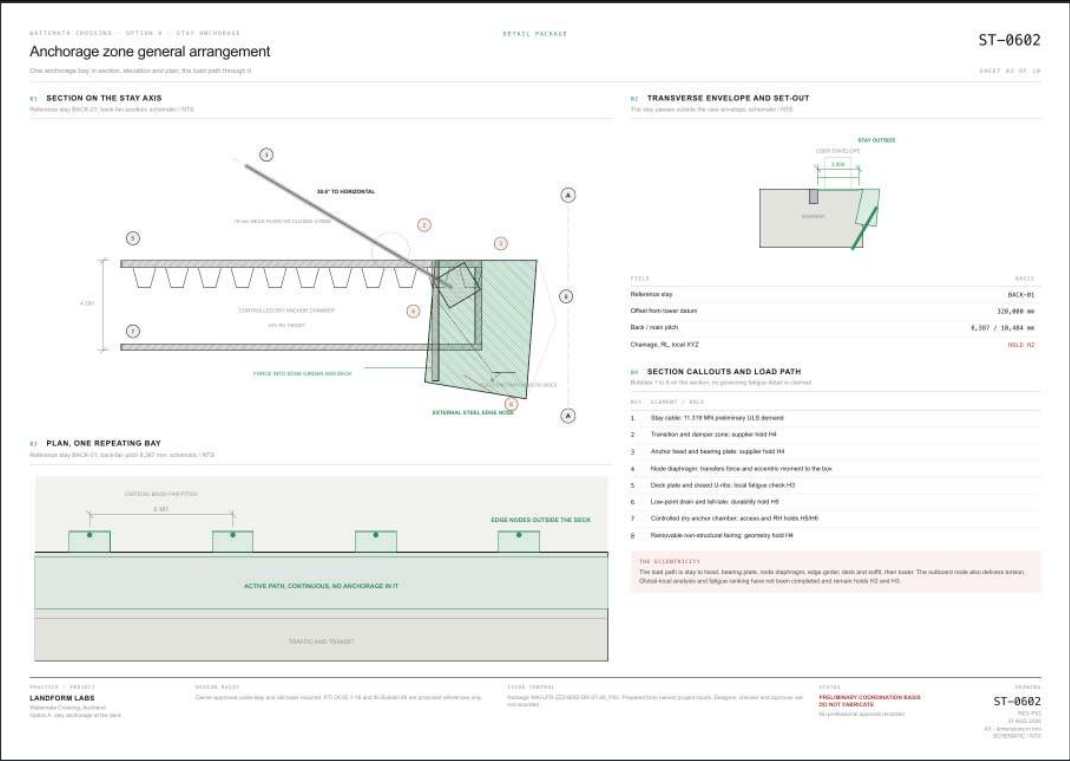
Model traces, watermarks, crosshairs, xref, metadata, P01, P02, P03, P04, P05, P06, P07, P08, P09, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P23, P24, P25, P26, P27, P28, P29, P30, P31, P32, P33, P34, P35, P36, P37, P38, P39, P40, P41, P42, P43, P44, P45, P46, P47, P48, P49, P50, P51, P52, P53, P54, P55, P56, P57, P58, P59, P60, P61, P62, P63, P64, P65, P66, P67, P68, P69, P70, P71, P72, P73, P74, P75, P76, P77, P78, P79, P80, P81, P82, P83, P84, P85, P86, P87, P88, P89, P90, P91, P92, P93, P94, P95, P96, P97, P98, P99, P100, P101, P102, P103, P104, P105, P106, P107, P108, P109, P110, P111, P112, P113, P114, P115, P116, P117, P118, P119, P120, P121, P122, P123, P124, P125, P126, P127, P128, P129, P130, P131, P132, P133, P134, P135, P136, P137, P138, P139, P140, P141, P142, P143, P144, P145, P146, P147, P148, P149, P150, P151, P152, P153, P154, P155, P156, P157, P158, P159, P160, P161, P162, P163, P164, P165, P166, P167, P168, P169, P170, P171, P172, P173, P174, 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A second review pass identified six findings in P01.

One finding was a stay anchorage that extended 0.85 m into the walking and cycling path. P02 moved the housing outside the 3.0 m path and recorded a provisional 0.30 m plan gap in the model and drawings. Supplier confirmation remains open.

SIX REVIEW FINDINGS AND P02 RESPONSES

- 01
- The P01 register listed ten sheets; the PDF contained nine.
- 02
- The count was corrected to match 256 modelled housings.
- 03
- Demand, allowable and breaking loads were separated.
- 04
- Main-fan and back-fan spacing were reported separately.
- 05
- The provisional 0.30 m plan gap was recorded in P02.
- 06
- Fatigue remains an open hold pending specialist assessment.



ST-0602 / P02 The P02 arrangement. Dimensions remain provisional.

Seven anchorage holds remain open.

These are the seven formal holds on the anchorage detail. ST-0609 lists each one and the evidence needed to close it. They are not the complete unresolved list for the bridge: wider transport, structural, foundation, geotechnical, wind, seismic, vessel-impact and owner-approval questions sit outside this detail package.

- H1 Precedent and arrangement
- H2 3D structure and torsion
- H3 Local fatigue
- H4 Supplier envelope
- H5 Durability
- H6 Access and replacement
- H7 First-article testing

VEHICLE LIFTING - ST-0609 - ST-0609 ANCHORAGE

ST-0609 - PACKAGE

ST-0609

References, hold points and verification

Every anchor, every hold, and the formal state of each, check.

02. VERIFICATION RECORD

Any POC should reference the verification.

DESIGN	STATE	EVIDENCE
Anchor type/typology accepted	P02	Four concept families compared in ST-0601; professional acceptance memo in P1
Stay demand and thresholds expanded	P02	DACK-C1 demand 0.240T-1.170 MN; thresholds 0.105/0.230 MN
Assembly quantity accepted	P02	2 towers x 2 bays x 32 x 2 stays = 256
P12 model path elements	P02	256 nodes on cable (y=15.0 m; path water edge (y=16.7 m; stay wire (y=20.0 m
Governing fatigue detail identified	H0L	Not established; V04 and V07 are candidates; V07 remains in the dock, not H0
Project design basis accepted	H0L	Owner-approved railway and rail loads; departures are Category 1; review not recorded; H1
Deck torsion from eccentricity	H0L	Not analysed; H2
Fatigue categories	H0L	Assigned by inspection; not by analysis or test; H5
Slip/stop geometry	H0L	System not evaluated; Every track-related dimension provisional; H4
One stay absent	H0L	Global load case does not exist; H5
Build precedent for the arrangement	H0L	No build found; H1

03. SOURCES

Publications: P1 (previous/late); P2 (accepted); P3 (accepted); H1 (not in project/late).

ISSUED	REF	TITLE / FROM	STATUS
PTT DC45-3-10	ERRATA	Revisions for Stay Cable Design, Testing and Installation; Anchorage must be installed; full ultimate force; no hard firing in the anchorage area; 10 days; indirectly responsible	P1
T10 NotTeller 89-12031		Availability of stay cable systems using prestressing strands	H1
M7A Bridge Manual v1.4		Exclusion cable-stayed bridges and railway loading; use with TAW (2007) instead of H1 amendments	H1
M7A Highway Structures Design Guide		Category 1 technical appendix; Structures Design; Statement are mostly independent review items	H1
Kiwi Rail 8-11-01-3038, Issue 2.0 (2016)		Rail 5 high design criteria; project rail owner article and loading remain to be adopted	H1
AS/NZS 1168:081:2002		Structural engineering drawing practice; This concept package is schematic and H1B	H1
AS/NZS 5131:2015 / S07 TS 3141:2016		Structural fabrication and steel structures; project execution requirements remain H2/H1	H1
AS/NZS 5168:16 / EN 13953-1:16		Steel plate steel and fatigue bases; Confirm current rail line, standards, and steel fatigue detail references before design issue	H1/H2
WSDOT 505-6000113		Stay cable system specification; anchorage tubes, stay rods, bearing plates and guide plates in high-strength low-alloy structural steel; steel cap over anchor block; steel tube and wedge; steel or concrete on exposed steel	H1
ICMSP Synthesis 353		Stay acceptance basis; 2 mH on cables; 150 MPa range; upper stress 40% GUTS; not more than 2% wire breaks	H1
Supplier: Lufkin / 8-73 approval		Slip/stop geometry for 75 strand rods; bearing plates; wedge and guide tubes; group and non-strand jacks; Not a selected system	H1
Bridge precedents and variation reports		Structural family-C precedent; Global a different family; ANZAC bridge reports; F10A variation and reporting	H1

04. HOLD POINTS

Check in the report, evidence, not a formal paragraph

01. PRECEDENT AND ARRANGEMENT

Check on the evidence basis in acceptance basis that the precedent was found for anchoring outboard of the main edge of road to family C and H1 (H0).

02. 3D STRUCTURE AND TORSION

Check on the evidence basis that the precedent was found for the precedent in the evidence basis, and the precedent was found in the evidence basis.

03. LOCAL FATIGUE

Check on the evidence basis that the precedent was found for the precedent in the evidence basis, and the precedent was found in the evidence basis.

04. SUPPLIER ENVELOPE

Check on the evidence basis that the precedent was found for the precedent in the evidence basis, and the precedent was found in the evidence basis.

05. DURABILITY

Check on the evidence basis that the precedent was found for the precedent in the evidence basis, and the precedent was found in the evidence basis.

06. ACCESS AND REPLACEMENT

Check on the evidence basis that the precedent was found for the precedent in the evidence basis, and the precedent was found in the evidence basis.

07. FIRST ARTICLE

Check on the evidence basis that the precedent was found for the precedent in the evidence basis, and the precedent was found in the evidence basis.

STATUS: ST-0609 - P02

Test sheets of detail with steel open hold points. That data is normal at this stage and is the point of the package. The drawing wants to the hold points can be taken from previous stage to be closed, not to anything can be taken from it.

PRELIMINARY CONSIDERATION BASIS: DO NOT FABRICATE

Project owner approval required

ST-0609

REV 1.02

17 AUG 2021

A1: construction and materials

ST-0609 / P02 Holds and release requirements in the P02 package.

Production was fast. Judgement was the constraint.



P02 MODEL CAPTURE Option A tower detail, as modelled.

WHAT WORKED

- 01 It was strong at finding the right data, recording it against named inputs and reviewing it critically.
- 02 I could give high-level direction and get 3D model and drawing artefacts back. Not perfect, but they developed quickly.
- 03 It was consistently good at telling me what to do next, which kept an unfamiliar project moving.

THE KEY INSIGHT

I could produce, review and iterate quickly. What I could not always do was recognise what good looks like in this domain. Specialist judgement remains necessary to assess the quality of everything shown here.

WHERE JUDGEMENT MATTERED

Assessing whether the evidence was adequate, recognising technical gaps and deciding whether an option was credible required domain knowledge.

THE IMPLICATION

This study is a floor, not a ceiling. The same workflow in the hands of an expert team, with a firm's past projects, reference details and design judgement to draw on, would go well beyond what is shown here.

METHOD NOTE

Models from Anthropic and OpenAI supported modelling, research and cross-model critique. I directed and selected the outputs.

THE VERDICT

A partial success.

The anchorage package and its correction loop are demonstrated. Bridge-wide continuity and independent specialist handover remain untested.

TRACEABLE	PARTIAL
COHERENT	PARTIAL
REVIEWABLE	PARTIAL
READY TO CONTINUE	UNTESTED

No conventional baseline has been recorded for time, cost or review effort.

The next test is whether a specialist can continue one design change without reconstructing the project history.

ILLUSTRATIVE VISUAL

Illustrative only, developed from the concept model. Not technical evidence.

