

Grey District Council

Left Bank Art Gallery

Detailed Engineering Evaluation

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Grey District Council

Left Bank Art Gallery

Detailed Engineering Evaluation

1.0 Introduction

Elmac Consulting Limited has been commissioned by the Grey District Council to undertake a Detailed Engineering Evaluation (DEE) of the Left Bank Art Gallery, Mawhera Quay, Greymouth.

The building is currently being used as an art gallery.

The building was originally constructed in 1905 as a bank building and appears to have remained substantially unmodified since that time.



Left Bank Art Gallery looking south east

This report updates a previous initial DEE report dated August 2012 and is based upon a recent invasive investigation of the building.

2.0 Description

The eastern portion of the building is two storied and the remainder former banking chamber is full height and single storied. The recent invasive investigation carried out by West Coast Build and Paint has confirmed that the building is primarily constructed from unreinforced masonry with limited reinforced concrete on some areas. Being a bank building, it is likely to have been constructed well when compared to buildings of a similar age.

3.0 Earthquake Seismic Assessment

Without carrying out a sophisticated finite element analysis of the building, it is not practical to determine the current seismic capacity of the building with any certainty, however based upon findings from similar buildings, it is likely that the building has a capacity in the range

of 15% to 25% NBS (Normal Building Standard) with the most vulnerable areas being the parapets and the unreinforced masonry walls. It is understood that the building withstood the 1968 Inangahua Earthquake without substantial structural damage.

4.0 Conclusions and Recommendations

4.1 Conclusions

The overall building is very likely to be an earthquake prone building (< 33% NBS) and therefore it is recommended that it be strengthened to exceed 33% NBS and preferably as close to 67% NBS as is practical. This conclusion has been supported by the findings from the invasive investigation report.

4.2 Recommendations

If the building is to be retained medium to long term for its current use, it is recommended that retrofitted strengthening be installed. The recommendations have been amended to take into account the findings of the invasive investigation.

The following strengthening would likely be required to raise the seismic strength of the Left Bank Art Gallery to an acceptable level:

- Replace the badly corroded perimeter tie rods with new galvanised Reids bars 25 dia painted with Altex AltraTar epoxy paint or similar for added corrosion protection.
- Improve the stability of all parapets by the use of discrete steel work (to retain the aesthetics). Alternatively some portions of the parapet could be recreated using plaster coated polystyrene as has been carried out for similar buildings.
- Securely tying the roof structure to the top of all perimeter walls and possibly additional roof bracing.
- The installation of reinforced concrete inverted portal frames to increase the stability of the overall building and the north, west and east walls.
- Strengthening the two storied area brick walls with steel corner mullions and mid wall mullions.
- Installation of Helifix brick ties to tie the single wyth of wall brick to the adjacent double wyth.

In practice it is unlikely to be cost effective to only achieve a strength of 34%NBS as most of the above would be required for either 34% or 67%NBS in practice.

The main objective is to avoid total collapse from any foreseeable future earthquake by incorporating “ductile” mechanisms to absorb the earthquake energy and keep the building upright as life safety is paramount. The %NBS is the level where the building commences yielding and if there is sufficient ductility, will continue to yield but not collapse. The higher the %NBS, the less damage from any given earthquake.

An estimate of the cost of potential strengthening work has been included in Appendix C.

We recommend that the perimeter ties be replaced urgently and if the building is to remain occupied, the parapets be tied back to the roof structure as soon as possible to increase the safety of the building.

Provided the recommendations to strengthening the building are commenced within a reasonable time, the building could remain occupiable provided there is an appropriate evacuation plan. However during some stages of the upgrade programme, it may not be practical for the building to be occupied because of the disruption of the construction work.

Appendix A

Photographs



Left Bank Art Gallery looking south west



Left Bank Art Gallery looking north east



Inside main area looking north west



Inside main area looking south west



Looking north at window mullions



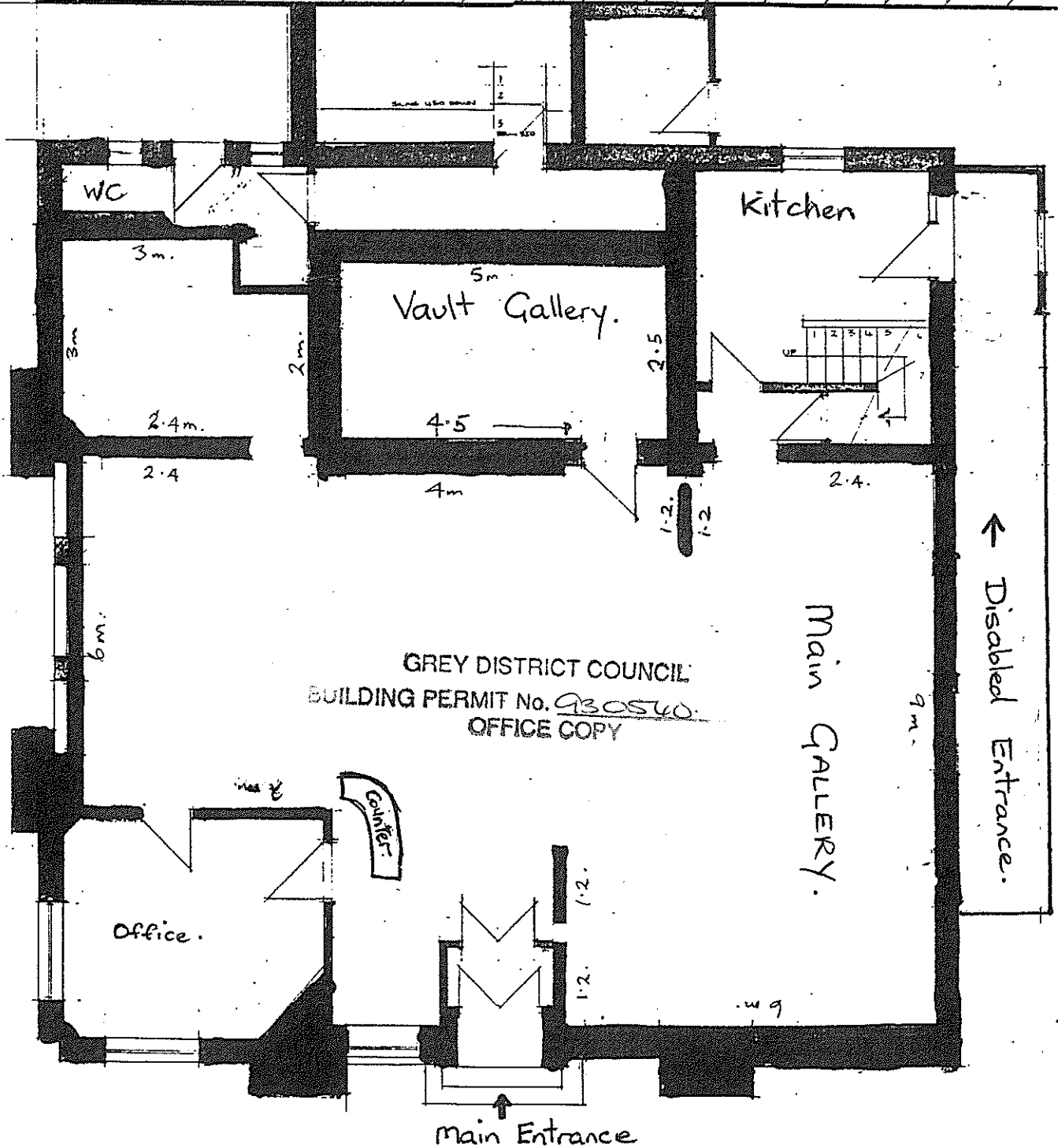
Inside concrete strong room

Appendix B

Drawings

Ground Floor.

ADJACENT BUILDING



MAWHERA QUAY.

LEFT BANK - Greymouth Art Gallery.
1 Tainui St.

1:100

Ph (03) 768 0038.

Appendix C

Schedule of Costs for Seismic Strengthening

Full Estimate Summary

Job Name : 9715ART-GREY

Job Description

Client's Name: GREYMOUTH DISTRICT COUNCIL

LEFT BANK ART GALLERY
1 TAINUI ST GREYMOUTH
SEISMIC UPGRADE ESTIMATE
REVISED 18 / 10 /12

Trade Description	Trade %	Cost/m2	--- Labour ---			Material Total	Sub Total	Mark Up %	Trade Total
			Qty	Rate	Total				
LEFT BANK ART GALLERY - SEISMIC UPGRADING									
Hoardings	1.08	11.44	17.50	50	875	2,150	3,025	10.00	3,328
Internal Strip-out for Access Only	2.93	31.15	106.80	50	5,340	2,900	8,240	10.00	9,064
Rear 2 Storey Strengthening	22.17	235.66	419.25	50	20,963	41,380	62,343	10.00	68,578
New GF Concrete Columns, Ground Beams and Helifix	30.22	321.30	986.80	50	49,340	35,658	84,998	10.00	93,498
Parapet Restraints	8.41	89.45	166.80	50	8,340	15,324	23,664	10.00	26,031
Internal Fitout Reinstatement	9.96	105.85	98.00	50	4,900	23,102	28,002	10.00	30,803
Preliminary and General Overheads	9.07	96.47				25,520	25,520	10.00	28,072
Allowance for Contingency	8.08	85.91				25,000	25,000		25,000
Subtotal									<u>284,374.00</u>
Estimated Building Consent Cost	1.94	20.62				6,000	6,000		6,000
Estimated Consultants Fees Cost	6.14	65.29				19,000	19,000		19,000
EXCLUSIONS									
G S T									
Legal fees									
No external painting is allowed with steelwork fully painted where externally exposed.									
Work to the existing fitout and linings is limited to removal for access purposes and reinstatement is the minimum required.									
Estimate dated 18th October 2012									
GFA: 291 m2.	100.00	1,063.14	1,795.15	300	89,758	196,034	285,792		309,374

Final Total \$ 309,374

Trade Breakup

Job Name : 9715ART-GREY

Job Description

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LEFT BANK ART GALLERY
1 TAINUI ST GREYMOUTH
SEISMIC UPGRADE ESTIMATE
REVISED 18 / 10 /12

Item Description	Quantity	Unit	Rate	Mark Up %	Labour Factor	Qty	Rate	Amount
<i>Trade :</i> <u>LEFT BANK ART GALLERY - SEISMIC UPGRADING</u>								
	1.00							
<u>LEFT BANK ART GALLERY - SEISMIC UPGRADING</u> Total :								
<i>Trade :</i> <u>Hoardings</u>								
Allowances for work done sequentially								
Allowance for fence hire -8 weeks	54.00	m	25.00		0.25	13.50		2,025.00
Gates & signage	1.00	sum	300.00		4.00	4.00		500.00
Traffic management plan	1.00	sum	500.00					500.00
<u>Hoardings</u> Total :								3,025.00
<i>Trade :</i> <u>Internal Strip-out for Access Only</u>								
Remove part ground floor perimeter skirtings and part flooring for concrete columns	32.00	m	16.00		0.35	11.20		1,072.00
Remove first floor perimeter skirtings and part flooring for steel members	24.00	m	12.00		0.40	9.60		768.00
Remove ceiling in parts for access	40.00	m2	15.00		0.15	6.00		900.00
General allowance for removals (Provisional)	1.00	sum	1,500.00		80.00	80.00		5,500.00
<u>Internal Strip-out for Access Only</u> Total :								8,240.00
<i>Trade :</i> <u>Rear 2 Storey Strengthening</u>								
125 x 75 x 10 MSL x 14.4# verticals	648.00	kg	8.00		0.05	32.40		6,804.00
200 x 200 x 10 folded corner angles	1,933.00	kg	10.50		0.05	96.65		25,129.00
M12 dowels to foundation	36.00	no	26.00		0.40	14.40		1,656.00
M12 dowels to walls	363.00	no	18.00		0.30	108.90		11,979.00
Boundary connection to 1F joists 125 x 75 angle	317.00	kg	8.00		0.10	31.70		4,121.00
Connections	44.00		16.00		0.20	8.80		1,144.00
Roof truss connections to walls - Bowmac brackets	10.00	no	145.00		4.00	40.00		3,450.00
Diagonal 60 x 6 ms flat strap bracing to bottom chords of roof trusses.	40.00	m	43.50		1.16	46.40	50.00	4,060.00
Allowance for access and making good ceilings on completion	1.00	sum	2,000.00		40.00	40.00		4,000.00
<u>Rear 2 Storey Strengthening</u> Total :								62,343.00

Trade Breakup

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Client's Name : GREYMOUTH DISTRICT COUNCIL

LEFT BANK ART GALLERY
1 TAINUI ST GREYMOUTH
SEISMIC UPGRADE ESTIMATE
REVISED 18 / 10 / 12

Item Description	Quantity	Unit	Rate	Mark	Labour			Amount
				Up %	Factor	Qty	Rate	
<i>Trade : <u>New GF Concrete Columns, Ground Beams and Helifix</u></i>								
Foundation beams 1.0 x 0.8 for columns	22.00	m	625.00		15.00	330.00	50.00	30,250.00
Remove floor and reinstate on completion	48.00	m2	15.00		2.50	120.00		6,720.00
600 x 600 Concrete columns	26.00	m	510.00		15.00	390.00	50.00	32,760.00
Connections to parapet	8.00	no	250.00		6.00	48.00		4,400.00
M10 Helifix dowels to masonry at 400crs	247.00	no	24.00		0.40	98.80		10,868.00
<u>New GF Concrete Columns, Ground Beams and Helifix</u> Total :								84,998.00
<i>Trade : <u>Parapet Restraints</u></i>								
250 PFC 34.6# parapet beam	1,072.00	kg	6.50		0.05	53.60		9,648.00
125 x 75 x 6.5 MSL x 10# ties to roof framing	480.00	kg	6.50		0.08	38.40		5,040.00
M16 galv bolts with external 250dia galv plate	64.00	no	32.00		0.50	32.00		3,648.00
Seal roofing where tie passes through	12.00	no	65.00		1.00	12.00		1,380.00
Replacement Galv Reid bar in gutter	56.00	m	18.00		0.25	14.00		1,708.00
Connnections	56.00	no	25.00		0.30	16.80		2,240.00
<u>Parapet Restraints</u> Total :								23,664.00
<i>Trade : <u>Internal Fitout Reinstatement</u></i>								
Allowance for reinstatement of salvageable fit-out disrupted by wall strengthening. (Provisional Assessment)	1.00	sum	2,000.00		50.00	50.00	50.00	4,500.00
Allowance for electrical and plumbing services	1.00	sum	1,250.00		10.00	10.00		1,750.00
Reinstate ceiling linings at floor perimeter	40.00	m2	45.00		0.60	24.00		3,000.00
Refix perimeter skirtings and part flooring after installation of boundary members	56.00	m	12.00		0.25	14.00		1,372.00
Repaint affected wall surfaces	328.00	m2	30.00					9,840.00
Repaint affected ceilings	290.00	m2	26.00					7,540.00
<u>Internal Fitout Reinstatement</u> Total :								28,002.00
<i>Trade : <u>Preliminary and General Overheads</u></i>								
Main Contractors Preliminary and General Overheads	1.00	sum	25,520.00					25,520.00

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Item Description	Quantity	Unit	Rate	Mark	Labour			Amount
				Up %	Factor	Qty	Rate	
<u>Preliminary and General Overheads</u> Total :								25,520.00
<i>Trade :</i> <u>Allowance for Contingency</u>								
General Contingency - approx 10% due to condition of structure	1.00	sum	25,000.00					25,000.00
<u>Allowance for Contingency</u> Total :								25,000.00
<i>Trade :</i> <u>Subtotal</u>								
<u>Subtotal</u> Total :								
<i>Trade :</i> <u>Estimated Building Consent Cost</u>								
GDC Fee estimated	1.00	sum	6,000.00					6,000.00
<u>Estimated Building Consent Cost</u> Total :								6,000.00
<i>Trade :</i> <u>Estimated Consultants Fees Cost</u>								
Engineers fee and Supervision charges	1.00	sum	19,000.00					19,000.00
<u>Estimated Consultants Fees Cost</u> Total :								19,000.00
<i>Trade :</i>								
	1.00							
Total :								
<i>Trade :</i>								
	1.00							
Total :								
<i>Trade :</i> <u>EXCLUSIONS</u>								
	1.00							
<u>EXCLUSIONS</u> Total :								
<i>Trade :</i> <u>G S T</u>								
	1.00							

Trade Breakup

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Job Description

Client's Name : GREYMOUTH DISTRICT COUNCIL

LEFT BANK ART GALLERY
1 TAINUI ST GREYMOUTH
SEISMIC UPGRADE ESTIMATE
REVISED 18 / 10 / 12

Item Description	Quantity	Unit	Rate	Mark	Labour	Amount
				Up %	Factor	Qty Rate
<u>G S T</u> Total :						
<i>Trade : <u>Legal fees</u></i>						
	1.00					
<u>Legal fees</u> Total :						
<i>Trade : <u>No external painting is allowed with steelwork fully painted where externally exposed.</u></i>						
	1.00					
<u>No external painting is allowed with steelwork fully painted where externally exposed.</u> Total :						
<i>Trade : <u>Work to the existing fitout and linings is limited to removal for access purposes and reinstatement is the m</u></i>						
	1.00					
<u>Work to the existing fitout and linings is limited to removal for access purposes and reinstatement is the minimum required.</u> Total :						
<i>Trade :</i>						
	1.00					
Total :						
<i>Trade :</i>						
	1.00					
Total :						
<i>Trade : <u>Estimate dated 18th October 2012</u></i>						
	1.00					
<u>Estimate dated 18th October 2012</u> Total :						