GBG Australia

Previous Jobs Undertaken

Bolte Bridge- Tendon duct location, Translink Consortium (1999)

Anzac Bridge – Tendon duct & Reinforcement mapping, RTA NSW (2001)

Sydney Harbour Bridge, Reinforcement location and utility mapping (1999/2000)

Concrete beam compliance testing, Queensland main roads (2001)

Stingray creek bridge, tendon duct location, re-specification of design for load rating. RTA NSW. (2002)

Building Compliance—Mchaffe Associates Sydney 2003

Construction Verification / Compliance—Douglas Partners Sydney 2003

Reinforcement Verification—Arenco Syndey 2003

Sructural Investigations
Newcastle City Council—Newcastle 2003

Alan L. Wright and Associates Syndey 2003

Multiplex Sydney 2003

John Fisher, Consulting Engineers Sydney 2003

NSW Rail Infrastructure Corporation Sydney 2003

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non-destructive methods for slab investigations

Construction Arrangement

A range of methods are available to help determine the insitu construction arrangement and the specific detail of concrete structural elements

LOCATION	RECOMMENDED TECHNIQUES
Depth of Cover	Impulse Radar, “Ferroscan” Calibration drilling
Reinforcement detail	Impulse Radar, Digital covermeter, “Ferroscan”
Slab Thickness	Impulse Radar, Acoustics (Impact Echo)
Pile/Pile Cap Location	Impulse Radar, Acoustics (Impact Echo)
Concrete strength	Impulse Radar, Compressive testing for cores, Ultrasonics, Schmitt hammer, Impact Echo
Location of post-tension ducts	Impulse Radar, “Ferroscan” metal detector,

Condition

NDI methods for identifying and determining the extent of defects associated with workmanship, fatigue, or deterioration of materials include the following:

LOCATION	RECOMMENDED TECHNIQUES
Corrosion	Ultrasonic Thickness Testing, Half Cell Potential, Impulse Radar, Resistivity, MMP®
Delamination of surfacing	Infrared thermography, Radar, Acoustics
Voids/ honeycombing	Radar, calibration by coring or endoscopic inspection of narrow drill hole, Acoustic (Impact Echo)
Voids in post-tension ducts	Radiography, drilling and endoscope, Acoustics (Impact Echo)
Cracking	Ultrasonics, crack width gauge
Assessment of moisture content / Testing waterproof membrane	Resistivity, Impulse Radar, Infra Red Thermography
Voids Below Slab	Impulse Radar
Variation in Base / Sub-base Compaction	Impulse Radar, Falling Weight Deflectometer, Dynamic Cone Penetrometer, Portable Seismic Pavement Analysis

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Non Destructive Techniques for CONCRETE SLAB AND STRUCTURAL INVESTIGATIONS

GBG Australia

GBG Australia is a specialist in applying non-destructive investigative techniques for assessment of concrete slabs. We offer our clients innovative methods of revealing structural and condition information whilst minimizing both costs and disturbances of the site.

Company Expertise

GBG Australia is a subsidiary with one of the United Kingdoms foremost non destructive investigation companies – GBG UK Ltd. The UK partner has pioneered the application of shallow geophysical techniques to the precision investigation environmental sites and engineered structures in UK and Europe since 1982. Having been part of CMP-GBG with CMPS&F and GHD in the last 10 years, GBG Australia is now an Independent consultant company and the Australian office of GBG UK.
The Company has existed in Australia since 1993 and has carried out numerous investigations for State, Local Government and private asset owners.

PH

non-destructive techniques

Applications for

Concrete Slabs and Foundations

Verification of engineering design for existing concrete slabs traditionally involved exposure of reinforcement at multiple sites across a slab, with no information available between exposures. This information is of limited use for verification of construction, and of no use for the calculation of loadings for building alteration. Non-destructive techniques allow validation of entire slab construction. Detail of mesh and bar layout can be plotted, and with limited physical disruption, verification of bar diameters can be achieved. GBG Australia is actively expanding the use and capabilities of applied physics and micro-geophysical techniques for construction verification and validation.

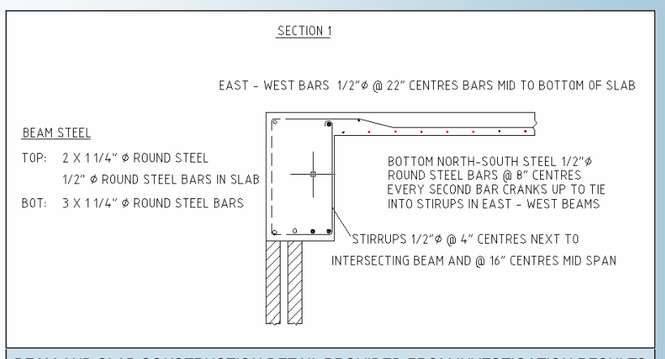
STEEL REINFORCEMENT EXPOSED FOR MEASURING

NON DESTRUCTIVE METHODS FOR VERIFICATION OF CONSTRUCTION DETAILS FOR FLOOR SLABS AND BEAMS.

Background

A warehouse constructed near the turn of 20th century, was altered to accommodate offices in the late 1960's, this alteration involved construction of reinforced concrete floors supported on a column and beam construction. It was proposed to alter the building for domestic units. Alterations entail addition of one story and partitioning of floors to create apartments. Current building regulations require fireproof wall construction, additional stairwells and alterations to services. No structural details or drawings are in existence for either the original construction of the properties or the previous alterations.

GBG Australia was commissioned to carry out an investigation of the structural members and slabs to supply reinforcement details, slab thickness, and concrete integrity information with minimum disturbance to the fabric of the building and resident tenants.



BEAM AND SLAB CONSTRUCTION DETAIL PROVIDED FROM INVESTIGATION RESULTS

Methodology

A detailed investigation utilizing High Frequency Impulse Radar, metal detection instruments, covermeter and a "Shmidt Hammer" was combined with a limited physical verification programme. The investigation revealed the reinforcement layout, allowing steel details to be plotted as CAD drawings. Reporting of concrete condition, slab thickness, reinforcement bar sizes and spacing enabled engineering calculations to be made to verify the load bearing capabilities of the structure.

The information gained from this investigation allowed the project to be undertaken, with limited demolition, and slight alterations to the project proposed originally.

SPECIFICATION CHECKING OF STANDARD DOMESTIC CONCRETE SLAB CONSTRUCTION, SYDNEY NSW.

Background

A two story brick veneer house constructed on a raft slab developed extensive cracking of the floor slab. The owner, occupiers core drilled the lounge room floor and revealed that the slab thickness was of below specification at this locality. GBG Australia was commissioned to undertake an investigation of the entire floor slab area (180m^2) to assess construction compliance with specification. The preferred investigation method was High Frequency Impulse Radar.

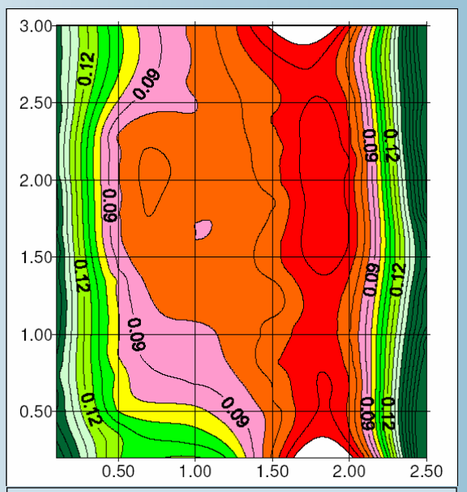
Methodology

Radar profiles were collected at 0.5m centers in an orthogonal grid from all the ground floor rooms. The antenna operating with a centre frequency of 1.5GHz was ground coupled. This enabled a high resolution of the concrete slab base and the steel reinforcement placement.

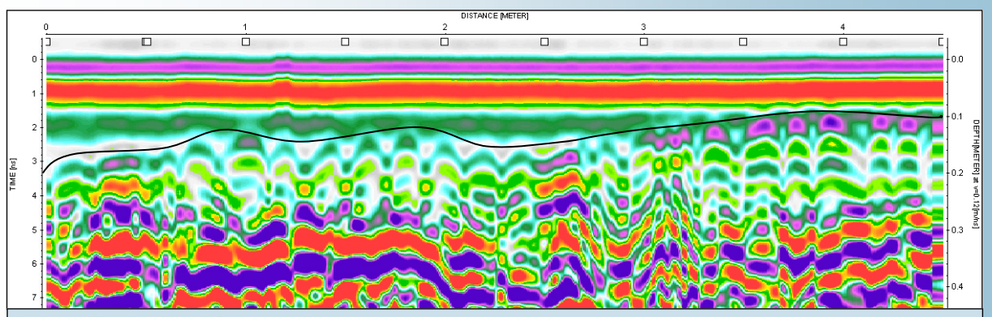
Results

The results were presented as colour contour plots of the floor slab thickness for each room. Tables were presented for minimum, mean and maximum thickness of each room.

The floor slab was found to vary in thickness from 74mm to 160mm, the construction design was for a slab thickness of 110mm. The depth of coverage of the reinforcement mesh was able to be assessed. And was found to vary from 15mm to 65mm, the accepted minimum for this construction was to be 40mm.



An area of floor slab contoured showing thickness, the region in red is less than 80mm thick.



Radar profile showing reinforcement placement.

COMERCIAL SLAB INVESTIGATION / TENDON DUCT LOCATION

Background

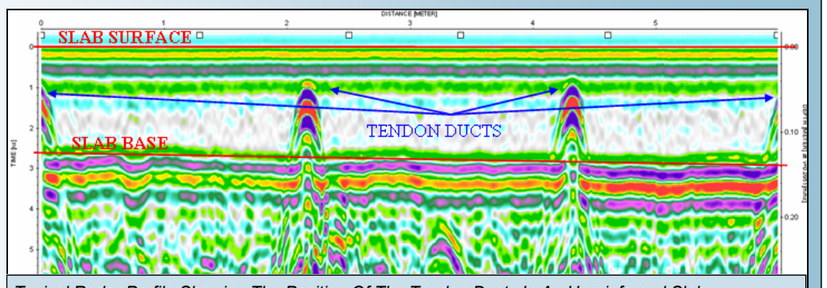
The area investigated was a 54m by 6m portion of a bulk goods warehouse floor slab. The slab is reinforced with post tensioned tendons; housed in ducting. Due to the requirement to expand the office floor space, a mezzanine floor was planned for a corner of the warehouse. The envisaged design will require the erection of additional support columns. This will require cutting through the existing slab to allow excavation for the column footings therefore there was a requirement to accurately locate the ducts prior to excavation of the slab to avoid damage and possible loss of load capacity in the slab

Methodology & Equipment

The subsurface investigation technique selected was high frequency impulse radar. Impulse radar is a non-destructive technique that provides reflection imaging of the subsurface of a material. The technique is very effective in the location of tendon ducts with plain slabs or complicated reinforced slab / beam structures as the ducts produce a different signal to surrounding reinforcement and so can be isolated and plotted from the profiles.

Results

The results were presented in a scaled plan drawing giving the exact location of each duct to a tolerance of +/- 10mm and the depth of the duct in the slab relative to the surface.



Typical Radar Profile Showing The Position Of The Tendon Ducts In An Unreinforced Slab