



**GAMMON**

## FOREWORD

*"I know Mr. Ravikiran Vaidya and M/s Geo Dynamics since inception. GAMMON was probably the first company to award the work of Low and High Strain Dynamic Testing of Pile on large scale to M/s Geo Dynamics. Since then our association has grown. This is mainly because of very timely services offered by Geo Dynamics at very reasonable rates under the dynamic leadership of Mr. Ravikiran Vaidya. In addition, I observed that Mr. Ravikiran Vaidya is receptive to any suggestions/improvements and also any simple or complicated technical queries. He always rationally analyses such queries and if necessary he contacts PDI USA and comes up with satisfactory answers soon thereafter.*

*His innovative mind has helped Geo Dynamics to grow rapidly from dynamic pile testing to other tests on concrete structures and promotion of equipments necessary for quality testing of such structures. His analytical mind coupled with his zeal for advancement and improvement has helped him to be recognized as authorized trainer of PDI Technologies (USA) in India and Abroad. As a result, he has carried out such tests and training in countries like Gulf, South Asia, Mauritius, Madagascar, etc. in addition to India. Geo Dynamics' professional approach is helping in promoting good engineering practices which is close to my heart. I hope their Quarterly Newsletter (QNL) will be another step in this direction.*

*In rapidly developing country like India, I wish more and more such companies come up to help us for rapid growth coupled with good engineering practices.*

*I wish Geo dynamics' Quarterly Newsletter very good reception from our Technical Community in India and abroad."*

**N.V. NAYAK**

*Advisor, Gammon India Ltd.*

*Managing Director, Gammon Realty Ltd.*

*Chairman, Geocon International Pvt. Ltd.*

## **GAMMON INDIA LIMITED**

**An ISO 9001 Company**

GAMMON HOUSE, VEER SAVARKAR MARG, P. O. BOX NO. 9129, PRABHADEVI, MUMBAI-400 025. INDIA.  
Telephone : 91- 22 - 6111 4000 • 2430 6761 • Fax : 91 - 22 - 2430 0221 • 2430 0529  
E-Mail : gammon@gammonindia.com • Website : www.gammonindia.com





**ABOUT US**

Geo Dynamics is pleased to announce starting of its quarterly newsletter for the benefit of the deep foundation and construction industry. The objective of these newsletters will be to keep everybody in the industry updated with the latest technologies in testing and quality assurance, provide updates on upcoming events etc., and to present some interesting case studies.

We also take this opportunity to thank our clients and well wishers who have consistently encouraged us during the past decade. Today, Geo Dynamics is akin to an institution of foundation quality assurance having introduced or popularized several new technologies and we look forward to continue to do the same in the years to come. The first newsletter describes briefly about ourselves and the services that we provide. All subsequent newsletters will have a write up on a particular test method, geotechnical or structural topics and are intended to update the fraternity on good engineering practices.

Geo Dynamics is India's internationally acclaimed company in Quality Assurance (QA) of deep foundations with projects spread across the country and projects in Gulf, South Asia, Mauritius, Madagascar etc. We have significant experience in monitoring of steel piles, pre-cast piles, pre-stressed spun piles, bored piles etc. as well as performing drivability studies. Our super-structure experience for concrete includes testing of major structures like bridges, jetties, silos, chimneys, etc. The company is led by Mr. Ravikiran Vaidya who is on the various code committees and has significant international experience in this field during his working experience in Singapore and in South East Asia. We are technically supported by Pile Dynamics, Inc. (PDI), pioneers worldwide in QA of deep Foundations. We are also authorized trainers for their technologies and provide training services subject to availability. Geo Dynamics operates through its Head Office at Vadodara and regional testing offices at Mumbai, Delhi, Kolkata, and Chennai. Execution of complex projects, all the analysis and reporting, as well as commercial matters are handled by Head Office only.

**SERVICES OFFERED**

Geo Dynamics owns an array of Pile Driving Analyzers (PDA) and Pile Integrity Testers (PIT) located across the

country through our offices or nearby testing job locations. Cross Hole Analyzer (Cross Hole Sonic Logging) Tests and other exclusive testing services like CAPWAP, GRLWEAP, as well as independent analysis for other testing or client companies are offered through our Head Office at Vadodara.

We are fully equipped and experienced to provide NDT testing for concrete structures. Geo Dynamics has executed niche projects for testing of bridges, silos, chimneys, metro rails, industrial structures and apartments across the country. Geo Dynamics owns the complete range of PROCEQ equipments for concrete testing which are one of the best worldwide. Our expertise includes the following tests: UPV, Rebound Hammer, Half Cell Potential, Carbonation, Rebar Locator, core tests, condition surveys of super structures. We are continuously adding value to concrete testing as a result today we can test up to 5m thick concrete. Similarly other tools are being added on regular basis and future newsletters will help you keep track of newer developments in this field.

Geo Dynamics is also a re-seller of PROCEQ equipments for Northern and Western India and offers the entire range of concrete products at reasonable prices. Geo Dynamics has complete facility for in-house calibration of equipments and also offers third party calibration services for all PROCEQ concrete testing equipments. A brief summary of our services is listed as below.

**HIGH STRAIN DYNAMIC PILE TESTING (HSDPT)**

Geo Dynamics is a market leader in this testing and owns sets of Pile Driving Analyzers (PDA) for assessment of bored as well as driven concrete and steel piles. The testing is standardized as per ASTM D4945 and various codes worldwide. The test is a replacement of static load testing and with proper site arrangements two or more piles can be tested per day resulting in increased quality assurance and huge savings in time and cost. The method is also very effective where space is a constraint or for heavy loads and for offshore pile foundations. Extensive co-relation data is available worldwide as well as in India and more than 100 such studies have been conducted by us for bored piles for diameters ranging from 400mm to 1600mm and loads from 50 tons to 3000 tons to check the reliability of test

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**For all testing queries**  
Contact: Ms. Neeti Patel  
Mobile: +91 9227424754

**For all equipment sales**  
Contact: Mr. Dixit Nakum  
Mobile: +91 8000871666

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**GEO DYNAMICS**  
"Anand", 49 Atmajyoti Nagar Society  
Near Atmajyoti Ashram, Ellora Park  
Baroda - 390023 INDIA  
E-mail: [pilesupport@geodynamics.net](mailto:pilesupport@geodynamics.net)  
Telefax: +91-265-2388139, 2393205



method and confirm our expertise. Geo Dynamics is the only company to have conducted various such technical studies which are very important for acceptance of these tests. We also have extensive experience in testing of driven concrete and steel piles, micro piles, etc. having executed various challenging offshore jobs in India, Saudi Arabia, Madagascar, Mauritius, Jordan, Singapore etc.

KG-D6 Onshore Terminal Project for Reliance Industries at Kakinada, Deendayal Field Development Project for GSPC at Kakinada, Shell Container Terminal at Hazira, KANB project at Saudi Arabia, etc. The program is particularly useful to evaluate the appropriate type of hammer (i.e. hydraulic, diesel, or drop hammer etc.) used to drive a certain type of pile to the desired capacity and sets.



**LOW STRAIN PILE INTEGRITY TESTING**

We are considered an industry standard for Low Strain Pile Integrity Testing due to our consistent results and performance. The testing conforms to ASTM D5882. Our database and experience of testing more than 20,000 piles annually helps us to evaluate critical information like necking, soil inclusion, cold joints, concrete quality, other potential pile defects etc., in quick time. With minimal but proper site arrangements, up to 30-50 piles can be tested per day to have a complete quality assurance for the pile foundations. Testing is conducted through our offices or alongside major projects and across the country. Often our team is fully equipped to provide site reports and analysis so as to avoid delays in construction activity. Geo Dynamics has the complete setup and expertise in use of Pulse Echo, TDR and Force-Velocity approach, although the Pulse Echo is more preferred and recommended.

**CAPWAP**

Geo Dynamics has introduced CAsE Pile Wave Analysis Program (CAPWAP) for pile foundation testing in the country and is mandatory to verify field PDA results especially for bored piles and the first few driven piles at any site. The CAPWAP software models PDA data as the input boundary condition to provide useful information. Output like static pile capacity, skin friction along the pile, end bearing, pile integrity, total pile displacement etc. is quickly obtained and aids the designer and client to take quick decisions. Simulated static load test curve can be used for comparison with conventional tests and has shown excellent match for over 100 studies conducted by us and confirms our expertise in this form of testing.



**GRLWEAP**

The GRL Wave Equation Analysis of Pile Driving (GRLWEAP) software is available with us which simulates pile driving using typical Wave Equation numerical analysis technique prior to actual pile installation for driven piles. For bored piles, it can be used to estimate hammer weight and drop height prior to the test program. Geo Dynamics has used this program for major driven piling projects like

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### CROSS HOLE SONIC LOGGING

Geo Dynamics is again at the fore front of introducing yet another technology that is getting popular worldwide. We are the first company in India to provide complete services for CSL testing. The method was successfully introduced by us and has been extensively used at projects like Bandra Worli Sea Link, Monorail Projects, Jetties etc. The method is particularly useful for large diameter pile foundations for major structures like river bridges, diaphragm walls, jetties, multi storey towers and eliminates the need to interpret the waveform unlike PIT or PDA tests. The method is standardized as per ASTM D6760 and determines the quality and consistency of concrete between pairs of PVC or steel tubes pre-installed in bored piles, diaphragm walls, concrete foundations. The output is in the form of waterfall map along with wave speed and energy or amplitude plot.



### NON DESTRUCTIVE TESTING FOR SUPER STRUCTURES

- **ULTRASONIC PULSE VELOCITY TEST**

UPV test is a very simple but effective tool to evaluate quality of concrete cracks or defects if any in the structure. Geo Dynamics is equipped with PROCEQ equipment that conforms to BS: 4408, ASTM C: 597 and IS: 13311 (Part 1)-1992 to provide UPV testing for both old and new concrete structures to evaluate potential problems.

- **REBOUND HAMMER TEST**

This is one of the most primitive and simplest tests to evaluate strength of concrete. Although results using this test vary significantly based on surface hardness, carbonation and variety of other factors, some consultants / clients prefer to use it primarily due to its speed and ease of use. Geo Dynamics offers this test using a rebound hammer for use on project sites and is equipped with an imported Controls Rebound Hammer that conforms to BS:1881:202, ASTM:C805 and IS:13311 (Part 2)-1992.



- **HALF CELL POTENTIAL TEST**

The test is used to estimate the probability of corrosion in steel reinforcement and is normally used in conjunction with the other tests. The method eliminates the requirement of hacking concrete to physically view rebar condition, however readings are weather sensitive and require that concrete is moist before conducting the test.

- **CARBONATION TEST**

This is another simple yet effective test to assess carbonation in concrete and particularly useful when assessing the risk of reinforcement corrosion, or for fire damaged structures to determine the extent of carbonation. The test is conducted by spraying phenolphthalein solution on concrete cores or by drilling holes into concrete.

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**REBAR LOCATOR**

The test is used to determine effective concrete cover, defective reinforcement and approximate bar diameter. It is very useful for corrosion testing and to locate rebars before hacking of concrete. It is also used to map rebars for old structures before re-designing etc. We are equipped with the latest PROCEQ covermeter available worldwide.



- **Corrosion Analysis** - Canin+
- **Ultrasonic Testing** - Pundit Lab
- **Permeability Analysis** - Torrent

**WHAT'S HAPPENING IN 2011?**

- Mr. Ravikiran Vaidya will present at National Seminar on Recent Advances in Geotechniques, Baroda, India. (18 June)
- Piling and Deep Foundation Expo, Shanghai, China. (23-25 August)
- Deep Foundations: Design, Construction and Quality Control (ASCE), Washington DC, USA. (29-30 September)
- Recent Advances in Civil Engineering, RACE-2011 Varanasi, India. (14-16 October)
- 36<sup>th</sup> Annual Conference on Deep Foundations (DFI), Boston, USA. (18-21 October)
- International Journal Conference in Recent Trends in Civil Engineering IJCRTCE 2011 Proc. Published by Academy Publishers Trivandrum, India. (30 October)
- Indian Geotechnical Conference organised by IGS-Kochi Chapter and Cochin University of Science and Technology (CUSAT), Kochi. Theme of the Conferences 'Geochallenges', Kochi, India. (15-17 December)
- Recent Advancements in Civil Engineering and Infrastructural Developments RACE-InD 2011 Jaypee University of Engineering & Technology, Gun, India. (21-22 December)

**EQUIPMENT SALES**

Geo Dynamics is pleased to announce its recent tie-up with PROCEQ SA world leaders for Non Destructive Testing Products for Concrete, Metal, Paper/Film industry. Geo Dynamics will represent PROCEQ SA for sales through North and Western India for their concrete testing products. Geo Dynamics is equipped to sell the equipments at short notice and competitive rates. Geo Dynamics also offers the advantage of sharing its expertise in Non Destructive Testing to potential customers who intend to buy this equipment. Wherever required, Geo Dynamics can also provide testing services using these equipments at project site. We look forward to your inquiry and assure you of our best services. The following products are currently on offer.

- **Rebar Detection** - Profometer 5+, Profoscope, Profoscope+
- **Concrete Test Hammer** - Silver Schmidt, Original Schmidt, Digi Schmidt
- **Pull Off Testing** - Dyna

**ACKNOWLEDGEMENT**

We would like express our sincere thanks to Mrs. Alpana Vaidya and Mr. Alpesh Kadam as well as the entire Geo Dynamics team for providing their valuable inputs. We would also like to thank Mr. N. V. Nayak, Advisor, Gammon India Ltd., Managing Director in Gammon Realty Ltd., Chairman, Geocon International Pvt. Ltd. for his Foreword.

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