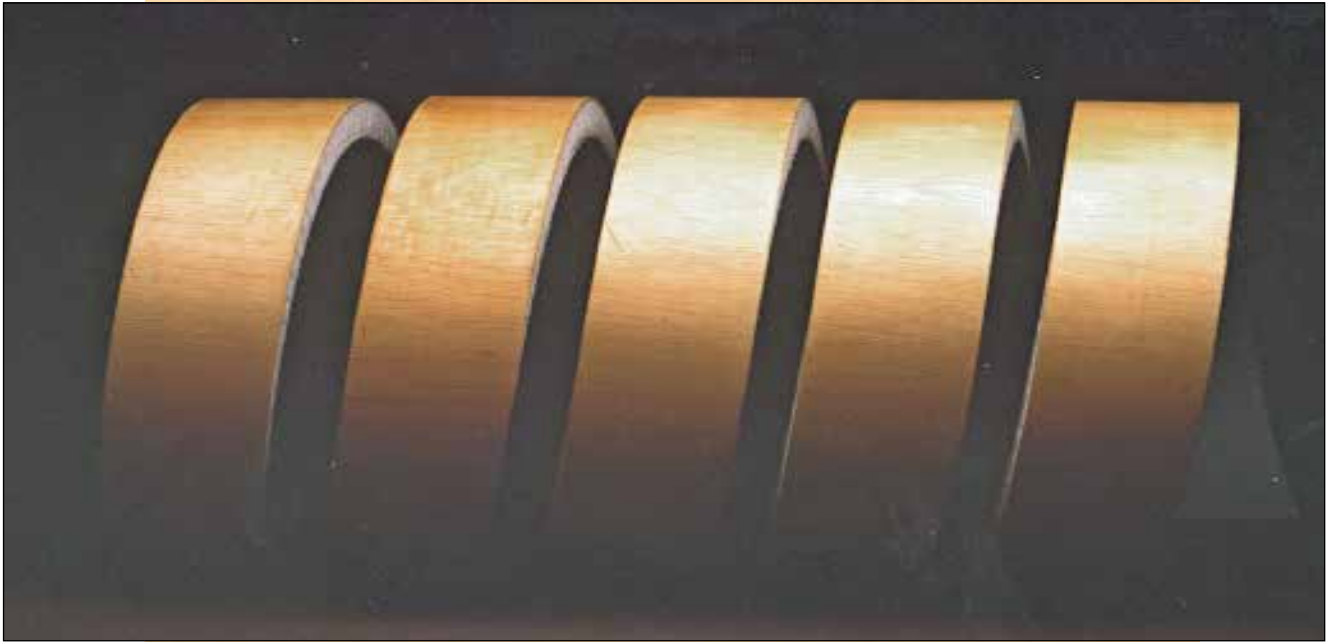


THE NEWOOD BUILDING SYSTEM®

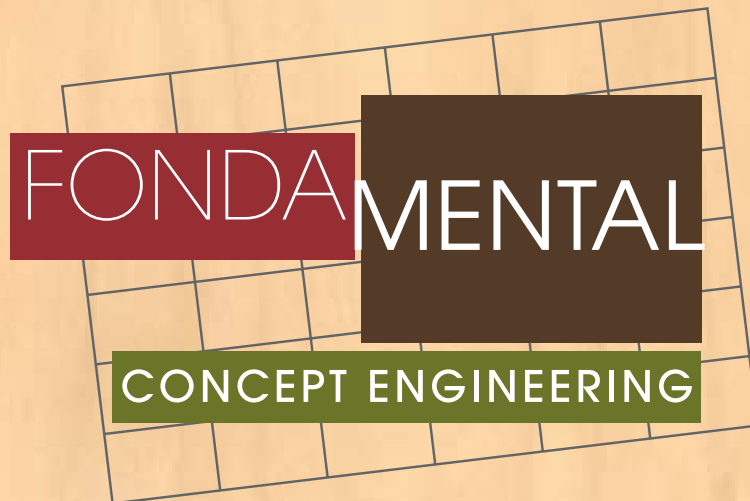


■ AN INTRODUCTION ■



The Newwood Building System® is a Fundamental concept

THE NEWOOD BUILDING SYSTEM®



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INTRODUCTION

At the origin of Fondamental one will find an informal network of engineers with a variety of professional experiences on a high international level. Fondamental SARL (Limited) is the tool they utilize to commercialize their new economic concepts.

On the Internet site www.fondamental.info one will be able to find the ins and outs of our engineering office as well as a shortlist of Fondamental concepts in progress and accomplished.

In this brochure, Fondamental presents the concept of the Newood Building System (hereafter NBS).

NEWOOD, THE BUILDING SYSTEM

The NBS is based on a composite building material with a core of expanded polystyrene (with thicknesses of 20 to 1250 mm and more) bonded all faces to «skins» of plywood or OSB panels of variable thicknesses) with one component structural polyurethane bond by a density of 50 kilos per cubic meter.



Coatings :

Left : cement projection on steel wire.

Center : polyuréthane lacquer.

Right : époxy - glass fibre.

The Newood building material enables the realization of highly resistant shell structures, **without skeletons or frames**, that include all the flat and curved shapes as well as hyperbolic parabolas and circular or elliptic domes.

The NBS also allows the realisation of all the existing architectural building forms and all of the contemporary structures with insulation values never reached before.

The structural values of the Newood building material combined with the assembling method of the NBS enables the building of dwellings for a diverse variety of markets.

The NBS allows to obtain particularly homogenous and cohesive building forms. In the building economy, the NBS belongs to the field of light weight wood composite construction.



NEWOOD, THE BUILDING REFERENCES



Around 1985, Jean-Yves Soria, physician and Willem A. van Wiligen, builder, decided to unite their knowledge and experience and started a period of research during which they developed and perfected the Newood building material as well as the necessary assembly systems for this particular composite. While they built numerous prototypes they became conscious of the fact that they were developing a new universal building system applicable in many different fields such as : furniture, stand and interior building, leisure houses, house building, industrial building, cool houses, emergency housing, modular housing and other applications in fields such as car bodies, boatbuilding, etc.

The Georges Pompidou Museum in Paris. Newood omega shaped passageway. Length: 26 m. Diameter: 4 m. At the end, curved 60 degrees with an emergency escape.

Right from the beginning they realized exceptional orders of which the omega shaped passageway for the George Pompidou Museum in Paris.

In the same period they were invited to participate at the International Building Fair of Utrecht in the Netherlands where they showed hyperbolic paraboloid roof elements.



They then moved on with the building of a small leisure house that allowed them to test the cohesion of the NBS in relation to its earthquake resistance. In the absence of cable separators, the fear of the crane operator was to see the roofing collapse. Nothing like that happened. Suspended by the crane, the door and the windows of the leisure house could be opened and closed without any problem, proof that the structure was not deformable by its own weight including the three concrete foundation beams bonded to the Newood structure.



Newood
leisure house
5 x 5 m
by 3,50 m
high.

While they were executing numerous orders of exceptional structures for most important companies such as ; IBM, Philips, DAF, Mercedes Benz, Cerutti, Marlboro and many others, the creators of the NBS designed a first industrial building with a free span of 15 meters by a height of 6 meters still without any skeleton or roof frame. In so doing, they opened the path of the first composite shell builders.



Newood, industrial building, shell segment 1,25 m large by a thickness of 400 mm. Free span is 15 meters.



Newwood industrial building, end of the shell segments assembly.



Newwood, industrial building, the inside building shape.



Newood, industrial building, length 30 m, free span 15 m, height 6 m, shell thickness 0,40 m, with a canopy and sliding Newood doors.



As soon as the building was finished the production of a giant pergola and 15 shops were started for the Floriade (national Dutch decennial flower exhibition that brings together all the professionals of this activity). In the foreground a production of slightly curved pannels.



Transportation of a beam of 12 m long by 1,60 m high en 0,50 m thick, of near 10 m³ and a weight inferior to 500 kg !



Floriade exhibition, 2 sided shops of 6 to 12 m front size.

The Floriade order included also a pergola of 144 m long by 45 m large and 5 m high. comprising some twenty shops of 5 x 5 m.



Shortly after, the NBS team started the realization of a high standard detached house of 160 m² of which the exterior design was limited by the existing building rules for new buildings in less than 600 mètres distance from an historic center what was the case. The imposed outside style corresponds to the one of the Roussillon region.



Villa Oykos, parking area. French window/door of an independant study with an acces ramp for handicaped. The main entry is situated at the left. The natural stones are a coating of the Newood building shape.



Villa Oykos, main entry side.



Villa Oykos, dining area and passage to the kitchen with basket-handle lintel and Newood stools.



Villa Oykos, large passage with basket-handle lintel from the dining area to the living room.



Villa Oykos, kitchen table without legs, build-in the wall.



Study. All of the doors of the villa are sliding inside the thickness of the walls.

Among the most recent buildings we here present a «jasse» (typical building shape of a French sheep barn) of the type built with arches. The building was finished with a wood coating for the gables and with natural stones for the side walls. Inside the walls and the ceilings are finished with BA 13 plasterboard. The building is designated for the activity of transformation of medicinal plants.



Newood/Jasse. Half-arch



Newood/Jasse, assembly of two half-arches.



Newood/Jasse.
On the foreground, standing, a wall element with half window opening. Free span 10 m., Height 4,50 m. Length 20 m.

NEWOOD, THE ECONOMICAL CONSIDERATIONS

One of the main characteristics of the NBS, and what brings its exceptional constructive homogeneity is the fact that the composite material is used for all of the floor, wall, and roof elements. Apart from the roofing (tiles, shingles or others) door and window frames, Newood buildings can be realized for over 90% with the same material. The other 10% concern the light weight foundations and the coatings. This, as an important difference compared to other building systems that employ numerous different materials such as ; steel, aluminium, concrete, wood, bricks, insulating foams etc. in a same construction. In the NBS we can say that there is question of a notable homogeneity of the constitutive materials of the buildings.

As we noted in the beginning of this brochure, the Newood composite building material is constituted of expanded polystyrene, wood panels (plywood, OSB) and structural polyurethane bonds. Basic materials of which the prices strictly follows world rates within the influence of energy costs for their production. In Australia, in France, in the USA, in Russia or elsewhere in the world, the prices of these materials are almost identical. as well as all materials largely used for building worldwide.

Through the concept, the costs of NBS buildings are in line with world bottom prices. This is what opens for the NBS numerous different house building markets. Prices from Newood dwellings will only varie through more or less complicated designs and more or less luxurious finishing systems.

Concerning the prefabrication of Newood building elements it is interesting to notice that they can be actualized with all the basic hand tools, portable electric tools, including all of the existing wood machinery in addition to numerical control and laser cutting. This is what gives the NBS a high degree of adaptability to the particular conditions of a region or a country. Depending on the degree of equipment, the part of the direct labor in the total costs will be from low to very low. Inversely, in countries where labor is inexpensive it is not essential to dispose of an important industrial park to be competitive.

The industrialization of the production of prefabricated Newood building elements makes it possible to inundate the markets, even of important countries, and face the demand, with yet immediate promptness, in situations of natural disasters and/or eco economic migrations.

NEWOOD, THE EARTHQUAKE RESISTANCE

The earthquake resistance of the NBS is due to the lightness of the Newood building material wherein vibrations dissipate on the contrary of vibrations in heavy materials. Evidence of the earthquake resistance of the NBS comes also from the structural bonding of the assembly of all the different constitutive elements. Please read the letter of Dr. Joel P. Conte, Ph.D., P.E., Professor of structural engineering in the field of earthquake resistant design.

If we bond together two Newood panels of 100 mm thick under a 90° angle over a length of 2500 mm we will obtain an adherence surface of 2 500 cm². A traditional assembly with screws every 10 cm, will give an adherence surface of only 25 cm². When testing the wrenching resistance of two pieces of wood bonded together with a structural bond it will always be the wood fibers that will give way and not the bond. Consequently, it is the legendary resistance of the wood fibers that finally determine the strength of Newood building assemblies.

The earthquake resistance of the NBS is inherent of our shell building concept. When one turns over a boat on a nearby beach or quay it will not collapse. The same, Newood buildings can be turned over without collapsing while doors and windows will open and close perfectly well. This clearly demonstrates the earthquake resistancy not simply lambda but perfectly superior of the NBS. Each time that a Newood building is erected whether it is necessary or not it will be earthquake resistant. This quality thus carries an increased advantage and value without any additional cost.

Newood buildings can be best founded on «floating» foundations that do not enter the ground. In most cases, an insulated reinforced concrete slab of about 150 mm thick will be sufficient. In exceptional situations where liquefaction occurs the use of a foam concrete foundation with a density of 350 k/m³ could be recommended.

For the designers of the NBS, the most serious consideration is the collapse of buildings on their inhabitants as the worse professional defeat. Therefore, they consider that of all of the NBS application fields the earthquake resistant building is the most noble one.

It is clear that compared to other earthquake resistant building systems, the prices of Newood buildings are unbeatable.

NEWOOD, PRODUCTS AND MARKETS

The polar qualities of the NBS reside in it's homogeneous constructiveness, the high insulation values, the formability of it's material and the speed of production and assembly. Qualities of such find their applications in the markets of :

- containerized housing (survival tubes),
- mobile housing (modular),
- instant housing (folded volumes),
- ultra social housing (self building),
- leisure houses (multi model),
- individual dwellings (classic),
- cool houses (and other industrial buildings),
- animal housing (horse boxes), and
- hurricane resistant housing (under active consideration).

In the NBS, for all of the products of these markets, the earthquake resistance is inherent.

CONTAINERIZED HOUSING (SURVIVAL TUBES)

The Newood housing (and storage) containers are designed to supply immediate short, medium and long term housing needs under all lattitudes. On demand they can be equipped for energy autonomy.

We have distinguished mainly four types of containerized housing :

- the Newood Standard Container,
- the Newood Heavy Duty container,
- the Newood Extensible Container, and
- the Newood Deluxe Container.

The models Newood Standard and Heavy Duty are built in the shape of a rectangular tube with a base of 3 meters by a height of 2,50 meters. The first one with rectangular and the second one with rounded design angles. The tube shape is built in an endless manner and then cut to the length of the client's demand, fit out with solid façades or french door/ windows, doors, windows and partitions. The containers are equipped with sliding beams to drag them in place. All of the containers float and can be moved on water by a motorboat. The exterior coatings can be realized with wood, synthetic resins or an hydraulic roughcast and others. The inside coatings can be done with wood panels, plasterboard, etc.

The Newood Extensible Container offers the possibility to extend from the inside on each side with an extra surface (volume) and in so doing double the living area.

The Newood Deluxe Container corresponds to more free measurements with tubular, oval, triangular, hexagonal and bended shapes designed by architects.

MOBILE HOUSING (MODULAR)

Mobile modular housing are designated for residence parks which are actually becoming more and more in vogue. Newwood modules can be freely designed by architects who will have however to take into account the transportation regulations. The modules will be assembled by bolting them together and on the floor slab. Each module will be fitted with internal an electric, water and sewage system.

INSTANT HOUSING (FOLDED VOLUMES)

In the field of individual or collective social housing and despite research on advanced prefabrication, one has to admit that the assemblies of houses still need numerous productions on site, in the open air.

In relation with individual dwellings, the actual tendency is to be able to by a new house in which the client can freely complete the inside finishing work and design. This tendency is what one can clearly observe in the do-it-yourself supermarkets. However, this specific market is very much in demand of instant building products and services.

In relation to collective social housing the tendency is to built instant HQE housing (Haute Qualité Environnementale = high environmental quality), with varied shapes and preferably belonging to the wood field.

To respond to this market, we conceived a prefabricated folded building element (including floor, walls and ceiling or roof) that allows to carry out in one handling up to 12,5 m² living area or 31 m³ interior volume. In the folded position, as they leave the factory, a truck with a plateau of 5 meters long can transport 4 elements for a total of 50 m² living area. Thus, the NBS allows to put at the disposition of the client the building form with the exterior coatings (walls and roofs) of a house of 100 m² living area in 5 open days with 6 assemblers.

ULTRA SOCIAL HOUSING (SELF BUILDING)

One cannot but notice that natural catastrophes grow through extreme occupation by man in sensitive areas. Among the markets concerned by the NBS we find also those in relation to eco economic migrations. In those cases, the concerned nations are confronted with extended homeless populations. Generally, the numbers of human beings concerned are so important and overwhelming that the industry is incapable to provide the necessary housing to protect them. In that case the good sense must call on the productive capacities of the populations themselves. The families concerned by such tragedies should have the advantage as an Human Right to rebuilt their homes by their own means.

In terms of earthquakes, most of the concerned nations are situated on seashores. The Newwood company conceived mobile production units of prefab elements, provided with the basic materials (wood panels, EPS and bonds) by a boat at the most nearby harbors. Each unit will be composed of some ten sea containers. Each container will be detailed to one sole activity (sawing, gluing, pressing, tool storage, office, etc.). The concerned families, helped by friends and volunteers, in groups of about 4 persons, will be able to produce in one week all the necessary elements to be assembled the week after, under the guiding of an instructor. Several experiences showed that individuals without any experience can acquire in a short time all the main tasks of sawing, gluing, pressing and assembling.

A boat will be needed for the supply of an EPS production unit and the storage of OSB panels, structural bonds, wood planks, cement (for the floor slabs) as well as for the containers of the mobile factories. In another type of set-up it is possible to envisage the production on a boat of three different essential prefab elements allowing a population to start directly the assembly of their houses.

LEISURE HOUSES (MULTI MODEL)

Through its formability, the Newood building material and the NBS lends itself particularly well to numerous different models. In the field of leisure houses one can often observe the monotony of the designs for series economy. Nevertheless, depending on the quality of the holiday sites, differentiation of the designs are strived for. In this market segment, the NBS has a place to take from the «wooden tent» of 9 m² for six persons to upscale leisure houses.

INDIVIDUAL DWELLINGS (CLASSIC)

With the NBS it is possible to realize all the different traditional building forms (cottage, dacha, pagode, igloo, buron, mazet, bungalow, etc.) and also most and any of the advanced contemporary building designs. In this important market segment we get into the classical house building with individual designs by architects from modest to upscale. Here also, the NBS enables an infinite choice of different shapes and volumes.

COOL HOUSES (AND OTHER INDUSTRIAL BUILDINGS)

Due to the world demography and the emergence of new industrialized countries the need for cool houses is growing fast and will continue for the coming century. In the tropical and subtropical countries the need for excellent insulation values come into play. With the actual technologies, all the cool houses (and other industrial buildings) suffer from cold leaks through cold bridges at the periphery (walls and roofs) all of which specifically harms fresh agricultural products. At the periphery the products have a tendency to decompose while they get «burned» in the center by excessive cold. The NBS allows to build cool storage volumes from 10 to 500 m³ and more without cold bridges and with insulation values up to $R = 17$ that guarantee in any case the total separation of inside and outside atmosphere. This allows us to offer a perfect internal homogeneous isothermal condition and cut out all condensing.

In the field of current industrial buildings the NBS offers all the necessary free spans up to 50 meters (see hereafter the exceptional spans up to 100 meters).

ANIMAL HOUSING (HORSE BOXES)

For the realisation of a Horses of the World Park, the Newood company designed a new type of insulated box with dimension of 2m50 x 2m50 (6,25 m² living area) to 3m60 x 3m60 (13 m² living area) and up to 4m80 x 4m80 (23 m² living area) by a height of 3,50 meters and a total thickness of the walls and roofs of 150 mm. This model includes 2 large sliding doors. One giving access to an adjacent small paddock with a canopy which allows the horse to choose for staying in or outside. The other door being used for direct access outside. The Newood material will be composed of double OSB «skins» for a final skin thickness of 20 mm. Once the panels are assembled, these walls will reflect instantly the vibrations due to horses kicking the walls what they fear most. Besides the structural value of these boxes the insulation brings a protection against high and low temperatures.

HURRICANE RESISTANT HOUSING (UNDER ACTIVE CONSIDERATION)

At present we are studying tornado and hurricane resistant housing and the way to design aeropassive dwellings. The most concerned markets being located essentially in the USA (Tornado alley and the south east).

LAST MINUTE INFO

Our most recent research enabled us to develop what we call Newood polyhedron building blocs. These specific prefab elements allow us to build circular and elliptic domes as well as tunnel shapes with free spans up to 100 meters.

CONCLUSION

In the field of general building, the NBS provides important technological steps forward on the levels of prefabricated building elements, insulation and implementation.

Today we can assure that the NBS joined the technical and economical level of the three existing universal building systems that is to say ; steel, reinforced concrete and wood.

The main progress of the NBS is situated in the concept of shell building without skeletons and/or frames applied to house and general building what will necessarily need a change of paradigm from the professional builders.

FAQ's

(Frequently Asked Questions)

Has the Newood Building System been tested ?

Yes. The Newood building material has been tested in France at the CSTB (Centre Scientifique et Technique du Bâtiment = Scientific and Technical Building Center) for its fire resistance (see hereafter). The mechanical resistance of the Newood building material has been tested by TNO in the Netherlands (Toegepast Natuurwetenschappelijk Onderzoek = organization for applied physical scientific research). The result shows in particular the very high shearing, flexion, rupture and buckling resistances.

What is the fire resistance of the Newood building material ?

The fire resistance of the Newood building material is largely sufficient for all buildings up to two storeyed houses. If the interior coatings of the buildings are composed of plasterboard it is without a doubt possible to built up to four or five levels (and more) without increased fire danger. Moreover, plasterboard is also an excellent humidity regulator. Burning EPS produces the same gases as that of burning pine. The NBS also include expanded clay balls fire layers and walls.

What is the durability of the Newood building material ?

The aging resistance of the Newood building material is excellent and depends directly on the chosen wood panels, most often OSB of which the aging resistance is very well known and unanimously appreciated. The most ancient Newood buildings are now over twenty years old et don't show any sign of structural aging. Newood buildings are perfectly perennial and most ideal for future housing solutions for mankind the world over.

Is expanded polystyrene eco friendly ?

The chemical formula of expanded polystyrene is exclusively based on carbon and water. Expanded polystyrene does not contain any ozone depleting substances and none is used in its manufacture. EPS has no nutritional value to support fungal, bacteriological or animal growth. EPS is user friendly non toxic and non irritant.

Are OSB panels eco friendly ?

OSB panels can be manufactured from a wide range of fast-growing species and from relatively small trees. The production process utilizes a maximum amount of wood fiber from each tree that is harvested. Due to the type of resins used in wood-based structural use panels like OSB, they emit very low levels of formaldehyde.

What about recycling the Newood building material ?

The Newood building material can be easily recycled by shredding the OSB or plywood skins and reintroduce the shredded material in the production of new OSB panels. Expanded polystyrene is able to be recycled, it can be granulated for use in construction applications.

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Fondamental SARL
Willem A. van Willigen

Rue Pierre Sémard 38

34200 Sète, France

Berlin, 31.05.2012

Fondamental SARL – Newood Shell Composite Building System

Dear Sir,

having sent us a booklet about the Newood Building System, that you developed, we have had the pleasure to receive you in our office in Berlin for an extensive discussion regarding the best way to develop this new building material.

We agree on the fact that your shell building system is very interesting wherein it allows most building forms with an innovating light, highly resistant and insulating composite building material.

We also concur that your building system is very adaptable and can be largely customized. It seems to us that your technology can be suitable for so called system and instant housing.

You have shown us your latest development in the field of polyhedron prefab elements that has retained our attention. As soon as you are in the position of an industrial production of these elements we will be glad to see what we can do together in the field of architectural applications.

Wishing you a succesfull future,
best regards.

J. MAYER H.
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March 3, 2015

Fondamental SARL

Attention:

M. W. A. van Willigen, General Manager
38, rue Pierre Sépard
34200 Sète
France

Dear Mr. Willigen:

It was a pleasure to meet you at our large outdoor shake table facility last January and learn about your new and very interesting seismic resistant structural concepts and systems. From your documents and presentation, I retained the following main advantages of your proposed system:

- the high and favorable strength-to-weight ratio;
- the low inertia of the Newood shell buildings;
- the full application of high strength bonding techniques which result in the distribution of the internal forces along the joints between the structural components glued together instead of their local concentration as in traditional wood skeleton systems;
- the importance of your innovation for a last century without striking evolutions in the area of residential construction.

These are the reasons that make me believe that your four-story Newood building specimen will behave very well, with low damage or possibly damage-free, during seismic tests representative of the earthquake ground motion intensity of the high seismic regions of California. As a researcher in the field of earthquake engineering and earthquake-resistant design, I think that your new technology has potentially a bright future in California and other seismic regions in the world.

I also retained that you plan to test seismically one of your building specimens on our large outdoor shake table sometime this fall. As soon as you have secured funding for the specimen and the tests, I suggest that you get in touch with us to discuss all the technical and practical details.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Joel P. Conte", written on a white rectangular background.

Joel P. Conte