

Section II: Schedule of Requirements

Project Background and Reason for Utilising Geo-cells

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Due to poor subgrade material and high traffic loading, the South Sudan Low Volume Roads Manual could not provide a reasonable engineered solution, and **an optimized pavement structure incorporating Geocells was specified in certain sections of the project roads**. Considerable distances between the project road and approved gravel borrow areas also contributed to the selection of this solution....

This pavement structure incorporates an additional, mechanically reinforced layer (utilizing geocells) either directly beneath the wearing course or as part of the wearing course with a significant overfill. The geocell will also be applied to the roadbed in areas with poor material and/or poor drainage conditions.

The specifications for the Geocells are based on the following design considerations:

- **Mechanistic design analysis** of the structural capacity of the pavement;
- **Consideration of the available infill material** for the geocells;
- **The overall stiffness requirement** to accommodate the stresses and strains within the layer; and
- **Limitation on allowable creep** within the layer to keep long term confinement during the pavement life cycle.

The application of geocells on this project is for a permanent solution, rather than a temporary solution, as is often the case with haul roads or access roads. This project specifically requires a long term stabilization of the layer to withstand high traffic loads, which correspond to the upper allowable envelope for gravel roads. This is the reason for the specification for long term creep of the geocell material.

Summary of Requirements

UNOPS requirements are comprised of the following Lots:

- **Lot 1: Supply and delivery of Geocell- PRS Neoloy Category B or approved equivalent** to Mombasa, Kenya or Kangi, Achol Pagong, Gok-Machar and Aluakluak in South Sudan;
- Lot 2: Supply and delivery of Synthetic Fibre Filler Fabric (Nonwoven, Continuous Filament, Needle Punched) to Mombasa, Kenya and or Kangi, Achol Pagong, Gok-Machar and Aluakluak in South Sudan
- Provision of staple guns for each site and staples for the required quantity of geocells

Technical specifications for Goods and Comparative Data Table

- **Introduction**

This invitation to bid (ITB) covers the supply and delivery of Geocell cellular soil confinement material at the locations as listed below. The GPS coordinates of the locations are as indicated below

Lot No 1: PRS Neoloy Category B Geocell or approved equivalent

Item No	UNOPS minimum technical requirements	Quantity	Is Bid compliant? Bidder to complete	Details of goods offered. Bidder to complete
1.1.1	Supply and delivery of Geocell- PRS Neoloy Category B or approved equivalent containerized for– Lots 1-4 (Total)	518,600 m2	<input type="checkbox"/> Yes <input type="checkbox"/> No	Insert details of goods offered, including specifications and brand/model offered if applicable

Specifications for GEOCELLS (CELLULAR CONFINEMENT SYSTEM)

Item No	UNOPS minimum technical requirements	Standard Grades	Units	Test Method	Bidder's offer <input type="checkbox"/> Yes <input type="checkbox"/> No
1.4	SYSTEM PHYSICAL DESCRIPTION				
1.4.1	Geocells - 3D honeycombed sections extruded from polymers into welded strips, which expand to form stiff yet flexible geocell mattress				<input type="checkbox"/> Yes <input type="checkbox"/> No
1.4.2	Material - Polymeric nano-composite alloy				<input type="checkbox"/> Yes <input type="checkbox"/> No
				
1.5	DIMENSION STABILITY				
1.5.1	Coefficient of Thermal Expansion (CTE)	≤ 135	ppm/ 1°C	ISO 11359-2 (TMA), ASTM E831	<input type="checkbox"/> Yes <input type="checkbox"/> No
1.6	SEAM WELD PROPERTIES				
1.6.1	Seam Weld Strength – Weld Splitting:	≥17	kN/m	ISO-13426-1 Part 1, Method C	<input type="checkbox"/> Yes <input type="checkbox"/> No
1.7	TENSILE PROPERTIES				
1.7.1	Material Strength at Yield:	≥20	MPa	ASTM D638, ISO 527	<input type="checkbox"/> Yes <input type="checkbox"/> No
1.7.2	Strength at Yield (Wide-Width – non-perforated)	≥21	kN/m	ISO 10319 - width wide	<input type="checkbox"/> Yes <input type="checkbox"/> No
1.7.3	Strength at Yield (Wide-Width – perforated):	≥16	kN/m	ISO 10319 - width wide	<input type="checkbox"/> Yes <input type="checkbox"/> No
1.8	PHOTOCHEMICAL & OXIDATION RESISTANCE				
1.8.1	UV Resistance minutes (Effective design life > 60 years)	≥ 400	(HPOIT @150°C)	ASTM D-5885 per GRI GM13	<input type="checkbox"/> Yes <input type="checkbox"/> No
1.9	LONG-TERM PLASTIC DEFORMATION				
1.9.1	Measured plastic deformation by accelerated method at load of 4.4 kN/m: • Step 1 at 44°C: • Step 2 at 51°C: • Step 3 at 58°C: • Step 4 at 65°C:	≤ 0.5 ≤ 0.6 ≤ 0.9 ≤ 1.0	%	ASTM D-6992 (SIM)	<input type="checkbox"/> Yes <input type="checkbox"/> No
1.10	PERFORMANCE AT VARYING TEMPERATURES				
1.10.1	Flexural Storage Modulus at sample elevated temperatures: • +30°C • +45°C • +60°C Brittle Temperature: ≤ minus 70°C	> 750 > 650 > 500	MPa	ISO 6721-1, ASTM E2254 – DMA	<input type="checkbox"/> Yes <input type="checkbox"/> No
1.11	CELL & SECTION NOMINAL DIMENSIONS				

1.11.1	Cell wall heights (depth): ($\pm 5\%$)	120	mm		<input type="checkbox"/> Yes <input type="checkbox"/> No
1.11.2	Cell weld distances (seams): ($\pm 3\%$)	330	mm		<input type="checkbox"/> Yes <input type="checkbox"/> No
1.11.3	Cell dimension (optimal opening) ($\pm 3\%$)	245x210	mm		<input type="checkbox"/> Yes <input type="checkbox"/> No
1.11.4	No of cells /m2: ($\pm 3\%$)	39			<input type="checkbox"/> Yes <input type="checkbox"/> No
1.11.5	section dimensions (expandable): ($\pm 3\%$)	2.5x8.0	m		<input type="checkbox"/> Yes <input type="checkbox"/> No
1.11.6	Section area (Expendable): ($\pm 3\%$)	20	m2		<input type="checkbox"/> Yes <input type="checkbox"/> No

EQUIVALENCY

Standards for workmanship, process, material, and equipment, as well as references to brand names or catalogue numbers specified by UNOPS in this tender are intended to be descriptive only and not restrictive. The Bidder may offer other standards of quality, brand names, and/or catalogue numbers, provided that it demonstrates, to UNOPS's satisfaction, that the substitutions ensure substantial equivalence or are superior to those specified products.

For any material to be considered equivalent to the geocell specified herein, it must meet or exceed all the above mentioned requirements without exception. Any bidder of proposed equivalent material must submit independent samples, documentation and test results to the Engineer that prove its equivalency.

Specifications for Knowledge Transfer and Site Training

Bidder should perform knowledge transfer and site training as per the manufacturer instruction.

- UNOPS will provide advance notice of 30 days to initiate this service
- All sites should be treated sequentially
- UNOPS will prepare all sites as per bidders' requirements

This training will include the following basic installation stages:

- Site preparation
- Availability of suitable tools
- Material availability
- Anchor stakes -
- Layout sections
- Fasten sections
- Expand sections
- Infill and compaction