

**Tensar** THE COMPANY YOU CAN BUILD ON™

Tensar construction sequence CS/GreenSlope Issue date: 4 March 2014

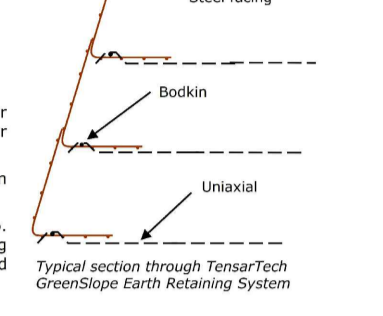
**TensarTech GreenSlope Earth Retaining Systems**

**Introduction**  
TensarTech GreenSlope System has been developed to provide Engineers, Architects and Builders with an attractive and economical earth retaining solution. The system, comprising proprietary steel facing units and Tensar uniaxial geogrid reinforcement is one of a range of earth retaining systems available from Tensar International in the UK.

**Construction Sequence**

Where applicable, the Contractor shall ensure that the installation fully complies with CDM Regulations 2002 and should refer to the Designer's Risk Assessment and COSHH statements.

- The Steel Facing Units are delivered to site bundled together and tied using steel tying wire, together with brace bars (3 per unit) and anchor pins. They may be stored outside.
- The primary geogrid reinforcement is delivered in either 75m or 50m long x 1.3m wide rolls and may be stored outside.
- HDPE bodkins are delivered in cardboard boxes of 40N. These may be stored outside but may benefit from being stored undercover to prevent water damage to the cardboard box.



- Prepare the formation to line and level in accordance with the contract documents.
- Cut the lengths of the required grade of geogrid from the roll as indicated by the design drawings. Place on to the formation with the leading edge at the front edge of the structure. Ensure that the geogrid is orientated in the correct direction.
- Position the facing units along the line of the structure, overlapping longitudinally by 100mm. Connect adjacent units using steel tying wire to locate.
- The system must be constructed in accordance with the contract drawings using the required number of grid layers.

- Lay the geogrid flat and pulling it by hand to ensure that no slack is left in the bodkin connection. Drive in to the ground two anchor pins behind the longitudinal bars on the base of the facing unit. This will ensure no movement of the steel facing unit when the geogrid is lightly tensioned using the beam supplied. Adjacent lengths of geogrid need only be butt-jointed, there is no necessity for overlap.
- Using the polymer bodkin, connect the uniaxial geogrid reinforcement to the horizontal base of the steel facing unit, at the first aperture away from the face. The geogrid should be lightly tensioned using the tensioning beam supplied so that all slack is removed from the bodkin joint. Whilst maintaining tension, place a layer of fill on the grid which is sufficient to restrain it in position when the load is released or alternatively retain the tension by driving 2 steel pins through the last row of apertures at the rear end of the geogrid.

- Cut and place the biodegradable mat or geotextile/net supplied inside the face, locating it temporarily with cable ties or tying wire if necessary. The face liner should lap back horizontally in to the structure by a minimum of 150mm. Care should be taken at this stage if using the biodegradable mat to avoid exposing it to naked flame or sparks, as it may be readily flammable until it has had the opportunity to absorb moisture. It is recommended that positive measures are taken to ensure the establishment of vegetation within 4 months of installation if the biodegradable mat liner option is chosen.
- Fix the brace bars in to position at a rate of 3 per facing unit. They should hook around a steel bar junction in the uppermost horizontal bar of the face and a junction point at the rear-most horizontal bar of the base.

- Where a vegetated face is specified, place horticultural topsoil in accordance with BS3882, behind the facing units at lift heights compatible with the structural fill compaction. This is continued up to the level of the next layer of reinforcement in tandem with the structural fill material, to a typical width in cross section not exceeding 150mm.
- If the Landscape Architects require a greater topsoil thickness than 150mm then they should consult Tensar International Ltd in advance who can then advise on an appropriate construction approach and facing detail.

- The topsoil should be consolidated by hand tamping or 'heeling-in' so as to avoid over compaction.
- Selected suitable fill material should be in full compliance with the needs of the design and have the approval of the engineer. Place and compact the fill in accordance with Contract specification, up to the level of the next geogrid layer. Fill should be placed by plant such as an excavator bucket or a dozer with an opening bucket, which causes the fill to cascade onto the grids. A minimum of 150mm thick cover of fill must be maintained between the tracks of any plant and the geogrid to avoid damage. Care should be taken during this operation to maintain the alignment of the facing units.

- Care should be taken to avoid compaction of the topsoil plant and contact with the facing units by any of the compaction plant and the following restrictions should apply:
- All construction plant, including compaction equipment with a mass exceeding 1000kg should be kept at least 2m from the face of the wall. Compaction plant within 2m of the wall should be restricted to vibrating rollers having a mass per metre width not exceeding 1300kg or plate compactors with a mass less than 1000kg.

- Compaction should always commence nearest the facing units, working away towards the free end of the grid.
- If secondary reinforcement is specified, this should be cut from the roll and laid in to the face area as required. The geogrid should be butt-up to the face of the steel facing unit but no connection is necessary.

- Placement of the topsoil layer and fill material should be continued as described in steps 12 - 18 up to the level of the next layer of primary reinforcement. At this point the next course of steel facing units may be installed to stretcher bond and construction of the reinforced slope continues to the required height.
- Upon completion further grass seed may be scattered on to the finished face of the structure.

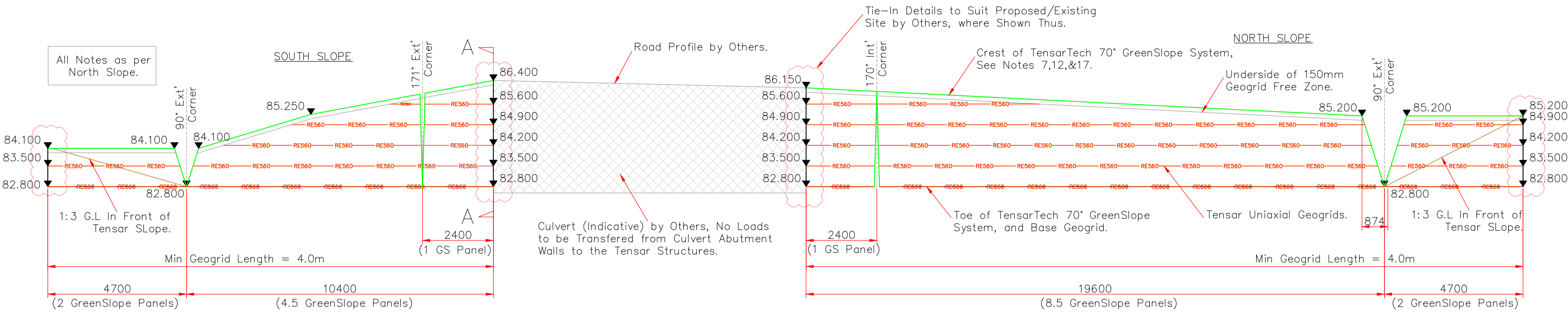
- Where there is step back or terrace to the next facing unit, it is recommended that the protruding vertical bars are bent down to the horizontal. This is to prevent the possibility of snagging when operatives are climbing on or abseiling down the face for planting or maintenance purposes. A short piece of scaffold tube may be improvised to bend the bars in question.
- The Contractor must fully assess the safety risk associated with working at height and where appropriate install any necessary temporary edge protection.

- As well as following procedures for health and safety, it is essential when handling wire products that suitable protective glasses and gloves are worn.

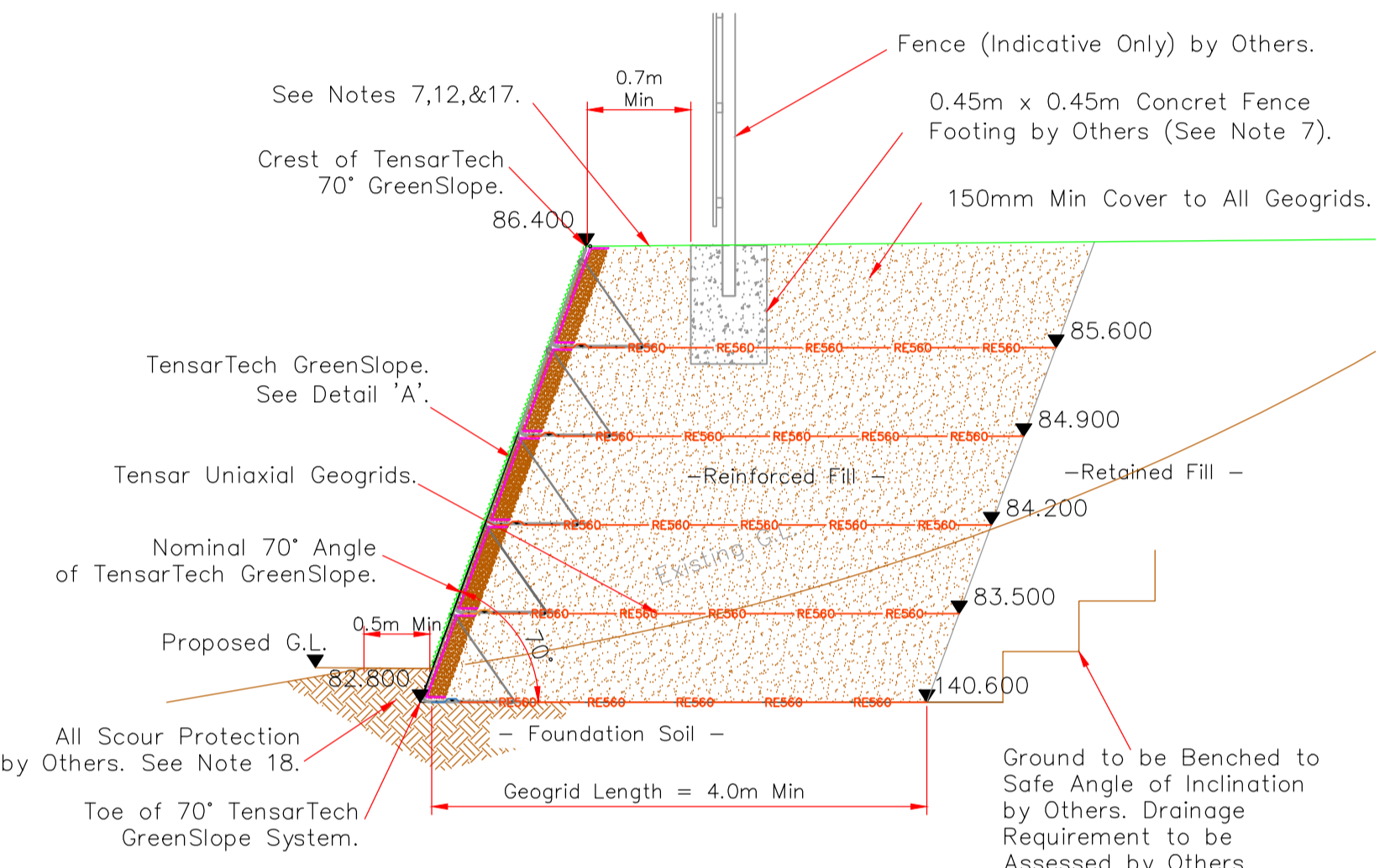
The information in this document supersedes any and all prior specifications for the product(s) designated above, is of an illustrative nature and applied to Tensar International Limited products only. Tensar reserves the right to amend product specifications, descriptions and availability at any time without prior notice. This document does not form part of any contract or intended contract. Tensar International Limited excludes all liability for any loss or damage whatsoever arising out of the use of or reliance upon the information in this document. It is to be used in accordance with the terms and conditions set out in the contract with a particular project. The liability of any Tensar International Limited product and/or service is limited to the contract with a particular project. Tensar and Tensar are registered trademarks. Copyright © Tensar International Limited 2014

Tensar International Limited UK Head Office  
Units 2 - 4 Cunningsham Court  
Shadsworth Business Park  
Blackburn  
BB1 2DX  
United Kingdom  
Tel: +44 (0) 1254 262431  
Fax: +44 (0) 1254 268867  
E-mail: sales@tensar.co.uk  
www.tensar-international.com

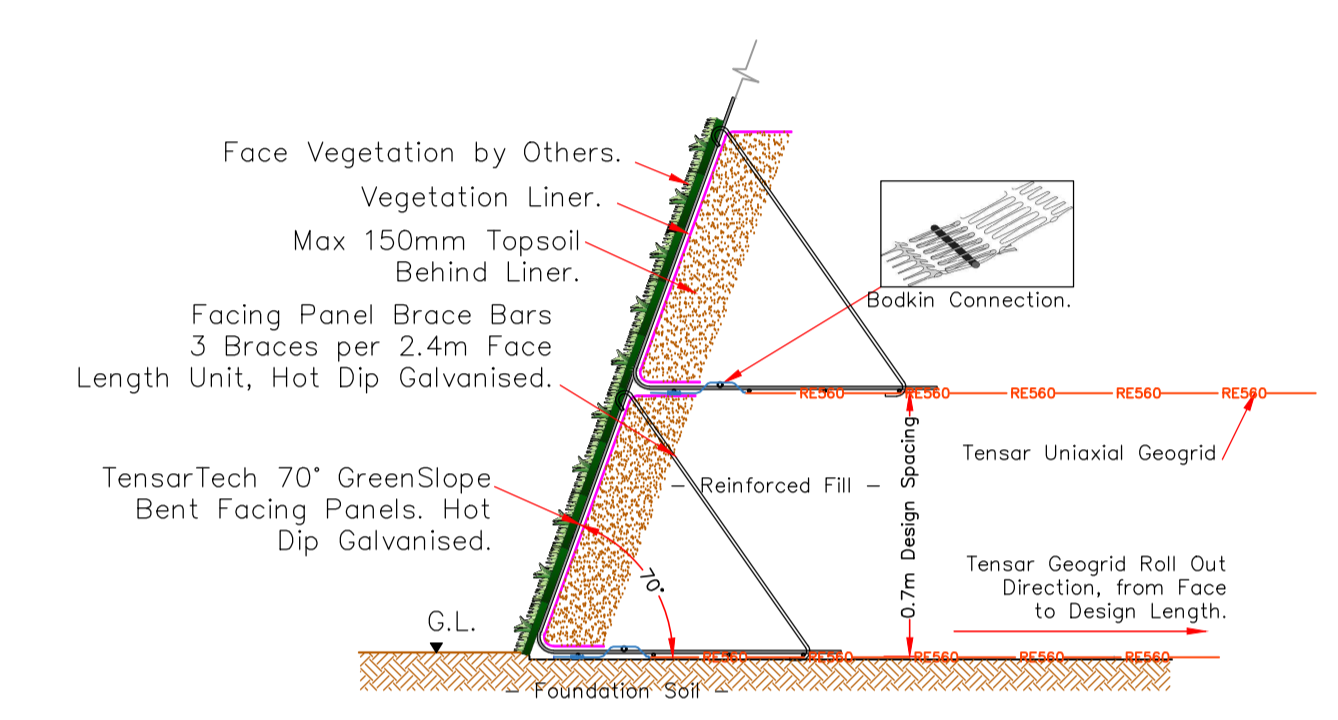
BSI  
ISO 9001:2008  
ISO 14001:2004



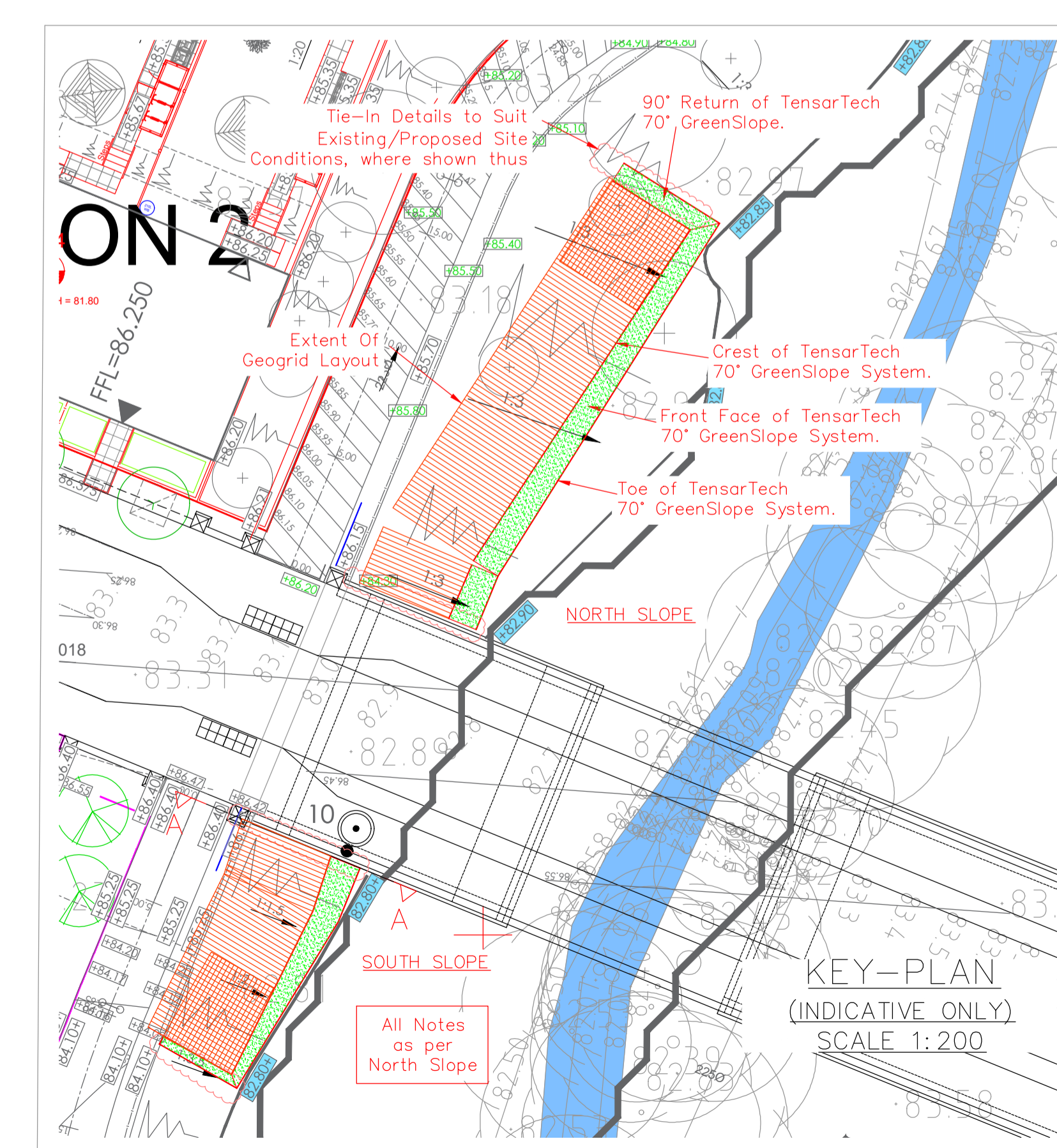
DEVELOPED ELEVATION ON FRONT FACE OF TENSARTECH 70° GREENSLOPE SYSTEM (View From 'EAST') Scale 1:100



SECTION AT 'A-A' THROUGH TENSARTECH 70° GREENSLOPE STRUCTURE Scale 1:50



DETAIL 'A' TENSARTECH 70° GREENSLOPE SCALE 1:20



Soil	Drained/Undrained	c'peak	φ'peak	γb	ru	Max Particle Size
Reinforced Fill - DoT 6I/6J Well Graded Granular	Drained	0	36°	20kN/m <sup>3</sup>	-	75mm
Free draining						
Retained Fill - Site Won Materials	Drained	0	26°	20kN/m <sup>3</sup>	0.15	
Foundation Soil - Engineered	Confirmed by listers Geotechnical Ltd as Competent & Stable					

SOIL TABLE Parameters adopted shown Above as the Minimum requirements.

Note: Refer to Tensar Design Submission document for maximum un-factored Bearing Pressure at the Base of the Tensar structure. The Client's Geotechnical Engineer needs to assess that the Foundation Soil will be able to support the imposed Load from Reinforced Soil structure safely and within the required serviceability limit of settlement.

**GEOGRID LEGEND**

— RE560 — RE560 — TENSAR GEOGRID — ORANGE

THIS DESIGN IS SPECIFIC TO THE UNIQUE CHARACTERISTICS OF THE TENSAR GEOGRIDS. ANY SUBSTITUTION OF THE SPECIFIED PRODUCTS OR CHANGES FROM THE DETAILS SHOWN WILL INVALIDATE THE DESIGN. ALL RIGHTS STRICTLY RESERVED. REPRODUCTION OR ISSUE TO THIRD PARTIES IN ANY FORM WHATSOEVER IS NOT PERMITTED WITHOUT WRITTEN AUTHORITY FROM THE PROPRIETORS.

- NOTES:**
- All Dimensions in Millimetres, Unless Otherwise Stated.
  - All Levels in Metres A.O.D.
  - Refer to Tensar Construction Sequence's - CS/GreenSlope 4th March 2014
  - Construction in Accordance with DoT Current Specification for Highway Works.
  - Setting Out by Contractor.
  - Contractor to verify Design Parameters & other T&C, Refer to Design Submission doc P-34224
  - Any Fence/Barriers & Associated Foundations to be designed self-stable not to exert any horizontal load & to be at a Min of 700mm Back from the Crest edge of TensarTech Structure. The Geogrids to be Cut Locally to Minimum using hand auger for the installation of Fence Footings.
  - Temporary works by Contractor.
  - Any External Loads should not be Transferred onto the Face of the TensarTech Structures.
  - Establishment of Vegetation on slope face by Others.
  - Appropriate surface Drainage measures to be Designed and Constructed by Listers Geotechnical Ltd.
  - As Confirmed Appropriate Measures have been Assessed & will be Implemented by Client, to Minimise Excess Rain/any Water Ingress Into the Reinforced Soil Area's, Both During Construction & the Design Life of the Structures. The reinforced soil slope have been assessed for dry conditions and should remain relatively dry both during construction and during its design life.
  - Any Drainage requirements below & behind the reinforced Soil Block to be assessed and implemented by others. Refer to Design Submission doc P-34224.
  - Contractor to ensure, Construction Traffic load does not exceed 10kPa.
  - This Tensar Drawing is prepared with Information from Client's Drawings - 15-1859-03-04-Levels & AL6157C\_3032/Rev A
  - The customer has confirmed the foundation soil will be engineered and made competent & stable prior to the construction of Tensar Structure.
  - The houses & earth retaining structures next to the Tensar Structures are already built and the houses are on Piled foundations. The TensarTech Slopes are designed as independent structures not to support any external loading. Appropriate protection measures for any customer's earth retaining structures at the boundary of the houses need to be designed & implemented by the Customer.
  - Scour protection Measures at the Slope faces to be Designed & Implemented by Others.
  - No Excavation at or below the toe level of the slope should be carried out during the design life of the slope.
  - Scale this drawing with caution, if in Doubt ask.

Rev	Date	Revision Description
B	24.03.17	North Slope rotated Clockwise to Clients instruction.
-	-	Issued 'FOR CONSTRUCTION'.
A	20.03.17	Design changed to GreenSlope system.

Drawing Status  
**FOR CONSTRUCTION**

**Tensar**

Tensar International Limited  
Cunningham Court,  
Shadsworth Business Park,  
Shadsworth, Blackburn, BB1 2DX UK  
Tel: +44 (0)1254 262431  
Fax: +44 (0)1254 268873  
Email: sales@tensar.co.uk  
www.tensar-international.com

Project  
**NW Bicester Phase 2  
Oxfordshire**

Drawing Title  
**Developed Elevation on Front Face  
of TensarTech 40° NaturalGreen  
System**

Drawn PM	Date 08/02/2017	Designed By AH	Scale @ A1 AS Shown
CAD File td17002d1b.dwg	Drawing No TD17002D1B	Checked By MD	Rev B
Tensar Ref P-34224			