Supplementary Information

The following information is associated with Network Rail Standard:
NR CIV/SD/230 Rev D

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CAD Drawing

- CIV/SD/230

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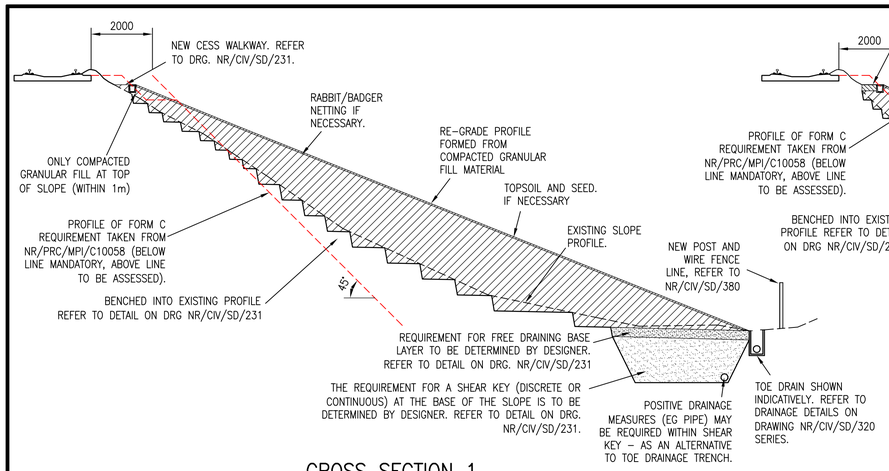
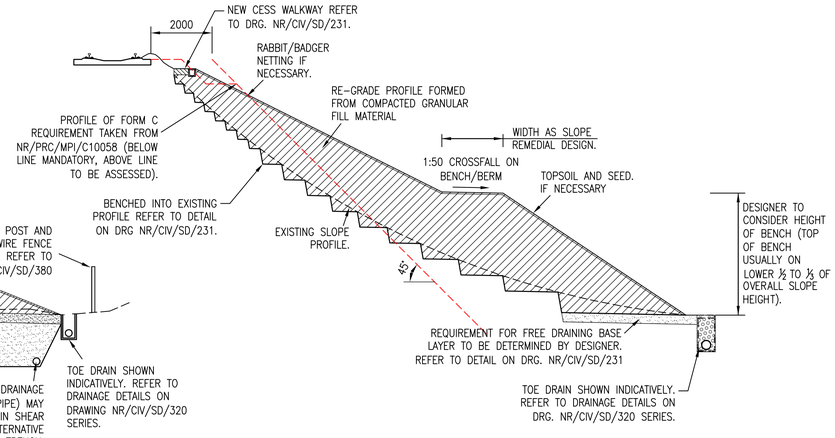
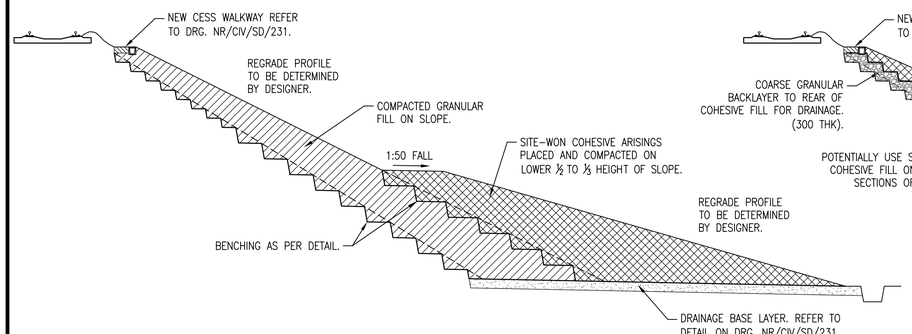


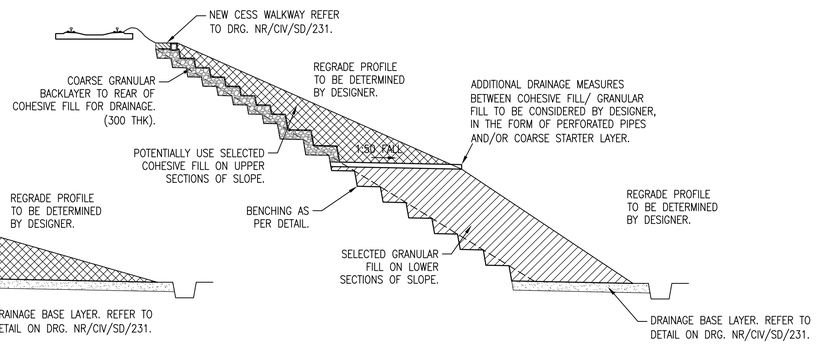
CROSS SECTION 1
TYPICAL CROSS SECTION FOR CONSTANT SLOPE REGRADE
(1:2.5 EMBANKMENT SHOWN – DETAILS CAN BE ADOPTED FOR CUTTINGS)



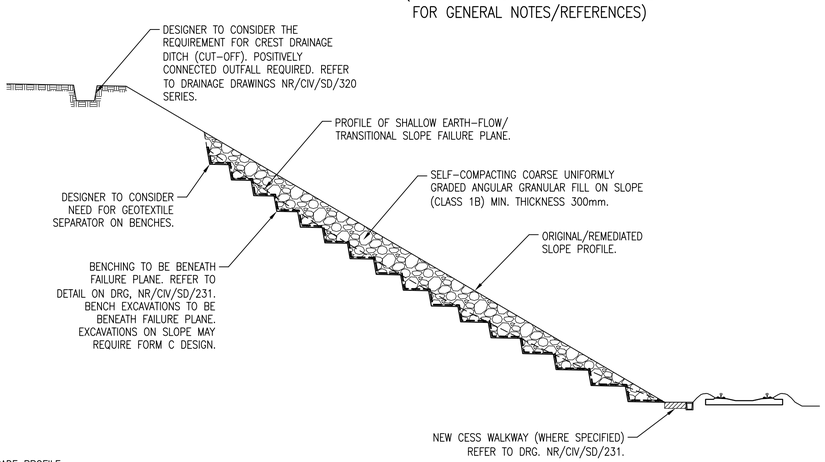
CROSS SECTION 2
TYPICAL CROSS SECTION FOR BENCHED SLOPE REGRADE
(EMBANKMENT SHOWN – DETAILS CAN BE ADOPTED FOR CUTTINGS)



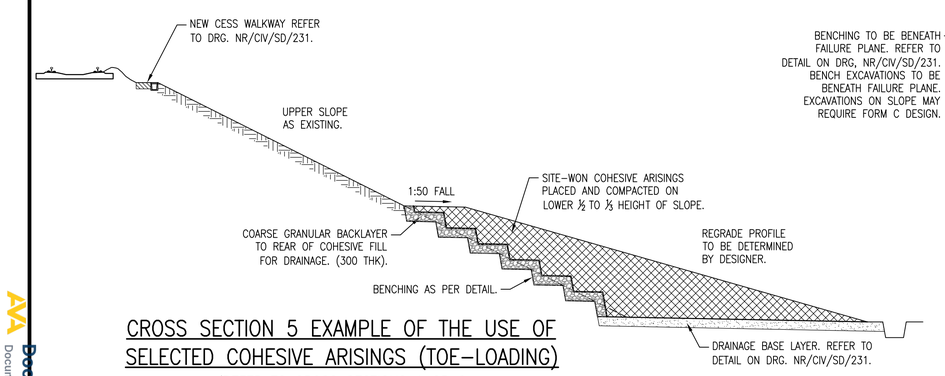
CROSS SECTION 3
EXAMPLE OF THE USE OF SELECTED COHESIVE ARISINGS (TOE-LOADING)
(REFER TO CROSS SECTIONS 1 OR 2 FOR GENERAL NOTES/REFERENCES)



CROSS SECTION 4
EXAMPLE OF THE USE OF SELECTED COHESIVE FILL AND/OR SITE WON MATERIAL
(REFER TO CROSS SECTIONS 1 OR 2 FOR GENERAL NOTES/REFERENCES)



CROSS SECTION 6
TYPICAL REACTIVE SLOPE REINSTATEMENT FOR SHALLOW EARTH-FLOW/TRANSITIONAL FAILURE



CROSS SECTION 5 EXAMPLE OF THE USE OF SELECTED COHESIVE ARISINGS (TOE-LOADING)
(REFER TO CROSS SECTIONS 1 OR 2 FOR GENERAL NOTES/REFERENCES)

NOTES (CONT.)

A10 REFERENCE SHOULD BE MADE TO THE ECOLOGICAL DETAILS ON DRG. SERIES COMMENCING AT NR/CIV/SD/240 SERIES FOR THE ENVIRONMENTAL NETTING DETAILS.

A11 TYPICALLY THE EXTENT OF ANY REGRADE IS TO TERMINATE NO CLOSER THAN 1 METRE FROM THE NETWORK RAIL BOUNDARY FENCE

A12 ALL CESS WALKWAYS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH NETWORK RAIL COMPANY STANDARD NR/SP/OHS/069 LINESIDE FACILITIES FOR PERSONNEL SAFETY. IF THE TROUGHING LID IS TO FORM PART OF THE WALKWAY IT MUST COMPLY WITH NETWORK RAIL COMPANY STANDARD NR/SP/OHS/069.

A13 REFERENCE SHOULD BE MADE TO THE 'SELECTION GUIDE FOR EMBANKMENT REGRADES' (NR/CIV/SD/SG/230).

B ENVISAGED METHOD OF CONSTRUCTION FOR SLOPE REGRADE:-

B1 THE FOLLOWING METHODOLOGY ASSUMES ADEQUATE GROUND INVESTIGATIONS TO DETERMINE EXISTING GROUND CONDITIONS AND PARAMETERS WILL HAVE BEEN COMPLETED AHEAD OF THE MAIN CONSTRUCTION WORKS. THE CONSTRUCTION SEQUENCE IS LIKELY TO BE AS FOLLOWS:

- DESK STUDY TO VERIFY THE ANTICIPATED GROUND CONDITIONS AND PRESENCE OF BURIED STRUCTURES / SERVICES. LOCATE, EXPOSE AND IDENTIFY ANY BURIED SERVICES. PROTECT CABLES AS REQUIRED (3RD PARTY AND NETWORK RAIL).
- COMPLETE ANY FORM C DESIGNS AS DEEMED NECESSARY (INCLUDING CONSIDERING TYPE AND LOCATION OF PLANT TO BE USED).
- LIFT AND SHIFT ANY AFFECTED S&T CABLES TO TEMPORARY POSITION AS REQUIRED.
- REMOVE FENCES, NETTING I.E. RABBIT & TOPSOIL FROM SLOPE AREA.
- PREPARATION OF GROUND SURFACE (BENCHING-IN, STARTER LAYERS ETC).
- PLACE AND COMPACT FILL AND GRADE SLOPE TO REQUIRED FINAL PROFILE, COMMENCING FROM THE BASE UPWARDS.
- FIX NEW NETTING, PLACE TOPSOIL LAYER AND RESEED (IF A REQUIREMENT)
- REINSTATE CESS WALKWAYS INCORPORATING NEW/RECLAIMED CABLE TROUGH.
- LIFT AND SHIFT AFFECTED CABLES INTO REINSTATED TROUGH ROUTE.
- REINSTATE FENCING.

B2 CONSIDERATION WILL NEED TO BE MADE AS TO THE SAFETY OF WORKING ON A SLOPE BELOW (OR ABOVE) THE RAILWAY. EXCAVATIONS INTO A SLOPE, ALBEIT TYPICALLY FOR SHORT DURATIONS, WILL NEED TO CONSIDER THE STABILITY ASPECTS AND TEMPORARY WORKS DESIGNS (FORM C'S) AND SAFE WORKING METHODOLOGIES WILL NEED TO BE CONFIRMED TO AND AGREED BY NETWORK RAIL.

C INSTALLATION GUIDANCE

C1 ALL FILL MATERIAL IS TO BE PLACED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAYS WORKS. THE TYPE OF PLANT TO BE CONFIRMED PRIOR TO CONSTRUCTION AND BE SUITABLE FOR THE TYPE OF FILL TO BE COMPACTED.

C2 ALL SATURATED SOFT TOPSOIL TO BE REMOVED FROM THE SLOPE IN PREPARATION FOR THE REGRADE FILL MATERIAL. AT THE BASE OF THE REGRADE ANY LOCALISED SOFT SPOTS ARE TO BE EXCAVATED AND FILLED WITH COMPACTED BACKFILL.

TABLE 1

SAFETY, HEALTH & ENVIRONMENT RISK ASSESSMENT

DESIGNERS' NOTE – CDM REG. 11

THE FOLLOWING ARE SIGNIFICANT HAZARDS WHICH MIGHT AFFECT THE HEALTH AND SAFETY OF THOSE UNDERTAKING THE WORKS OUTLINED IN THIS SET OF DRAWINGS ON RAILWAY STRUCTURES OR THOSE AFFECTED BY THESE ACTIVITIES. A SITE SPECIFIC RISK ASSESSMENT SHOULD ALWAYS BE UNDERTAKEN PRIOR TO COMMENCING ANY OF THE WORKS DESCRIBED ON SITE.

IT IS ASSUMED THAT A COMPETENT CONTRACTOR IS AWARE OF THE RISKS ASSOCIATED WITH GENERAL CONSTRUCTION ACTIVITIES UNDERTAKEN WITHIN THE RAILWAY ENVIRONMENT.

HAZARD	STAGE	MITIGATING MEASURES
DETRIMENTAL CHANGES IN TRACK GEOMETRY.	C/O	WORKS THAT AFECT TRACK GEOMETRY SHALL BE MONITORED IN ACCORDANCE WITH NETWORK RAIL LETTER OF INSTRUCTION NR/BS/LI/045 MONITORING CIVIL ENGINEERING WORKS THAT MAY AFFECT TRACK GEOMETRY: PROCEDURE AND INTERVENTION LEVELS. TRACK QUALITY RISK ASSESSMENT TO BE COMPLETED AS NECESSARY.
LOCALISED/GLOBAL COLLAPSE OF THE SLOPE FROM THE BENCHING/EXCAVATION ACTIVITIES.	C	ALL WORKS TO BE IN ACCORDANCE WITH NR/PRC/MPI/CI0058. EXTENTS OF ANY PERMITTED EXCAVATIONS IN THE SLOPE OR AT THE TOE TO BE CONFIRMED BY DESIGNER. CONTRACTOR TO ENSURE COMPLIANCE ON SITE. EXCAVATIONS IN ACCORDANCE WITH WORK PACKAGE PLANS AND TEMPORARY WORK FORM C.
WORKING ON THE CREST OF THE SLOPE CAUSING SLOPE INSTABILITY.	D/C	DESIGNER TO ASSESS WHERE PLANT AND EQUIPMENT CAN BE POSITIONED ON THE SLOPE TO ENSURE STABILITY DURING CONSTRUCTION. CONTRACTOR TO ENSURE COMPLIANCE ON SITE.

NOTE : C=CONSTRUCTION, D=DESIGN, O=OPERATION

DRAWING No. NR/CIV/SD/230

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH NETWORK RAIL STANDARD DRAWING NR/CIV/SD/231.

A GENERAL

A1 ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

A2 ALL DETAILS ON THESE DRAWINGS ARE SUBJECT TO CONFIRMATION BY DETAILED SITE SPECIFIC DESIGN FOLLOWING A COMPREHENSIVE GROUND INVESTIGATION, SITE MONITORING AND TOPOGRAPHICAL SURVEY. DEPTH AND COVERAGE OF SITE INVESTIGATION TO BE SUITABLE FOR THE PROPOSED EARTHWORKS.

A3 THE PROFILES OF SLOPE FAILURE PLANES AND THE GROUND WATER CONDITIONS SHALL BE CONFIRMED BY THE GROUND INVESTIGATION AND THE PERIODIC MONITORING OF INSTALLED SITE INSTRUMENTATION. MONITORING INSTALLATIONS TO BE IN ACCORDANCE WITH THE INSTRUMENTATION DRAWINGS NR/CIV/SD/390 AND 391.

A4 THE DESIGN SHALL ASSESS WHETHER THE SITE HAS DEEP-SEATED AND/OR SHALLOW FAILURE INSTABILITY WHEN CONSIDERING PROFILE OF REMEDIATED SLOPE. THE DETAILS OF WHICH SHALL BE DEFINED IN THE PROJECT SPECIFIC FORM A.

A5 STANDARD DETAILS TO BE USED IN ACCORDANCE WITH NR/L3/CIV/151 'TECHNICAL APPROVAL OF STANDARD DESIGNS AND DETAILS FOR CIVIL ENGINEERING WORKS'.

A6 ALL WORKS TO BE COMPLETED IN ACCORDANCE WITH THE REQUIREMENTS OF NETWORK RAIL COMPANY PROCEDURES NR/L2/AMG/1030: WORKING SAFELY IN THE VICINITY OF BURIED SERVICES.

A7 GUIDANCE FROM NETWORK RAIL EARTHWORKS ENGINEER MUST BE SOUGHT FOR ANY PROPOSED CONSTRUCTIONS OR ALTERATION TO A SLOPE WHERE SIGNIFICANT DEFECTS OR MONITORING INSTRUMENTATION ARE PRESENT.

A8 ALL VEGETATION AND TOPSOIL TO BE REMOVED FROM THE RE-GRADED AREA AND BANK SLOPE PRIOR TO PLACING FILL. CONTRACTOR TO CONSIDER STORING SEPARATELY AND RE-USING TOPSOIL (IF SUITABLE) PRIOR TO MAIN EXCAVATION WORKS. LARGE TREES TO BE CUT DOWN FLUSH TO GROUND LEVEL AND TREATED TO PREVENT RE-GROWTH. ROOT BALLS REMOVED WHERE POSSIBLE.

A9 IT IS BEST PRACTICE THAT ON COMPLETION OF THE WORKS THE SLOPE REGRADE SHALL RECEIVE TOPSOIL (50MM MIN TO 100MM THICK) AND SEEDED TO ENCOURAGE A RAPID ESTABLISHED PROTECTIVE VEGETATION COVER. THE TYPE OF SEEDING, THE NEED FOR HYDROSEEDING OR ANY VEGETATION MATTING, AND/OR THE REQUIREMENT FOR ANY RABBIT / BADGER NETTING SHALL BE CONFIRMED BY THE DESIGNER IN THE SITE SPECIFIC FORM A AND/OR FORM B.

Rev	Date	Description of revision	Design'd	C'kd
D	MAY 2011	FOURTH ISSUE	RKA	AW
C	19.03.08	THIRD ISSUE	HCHS	NGAY

Network Rail

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	Name	Position	Signature	Date

Master copy with original signatures held by Network Rail HQ CIVIL ENGINEERING STANDARD DESIGN

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EMBANKMENT REGRADES

SLOPE REGRADE

Scale 1:100 @ A1

Drawing Number NR/CIV/SD/230 REV. D

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