A3

MATERIAL SPECIFICATION

CONCRETE NOTES:

C1. ALL WORKMANSHIP & MATERIALS SHALL BE IN ACCORDANCE WITH AS3600:2018 & as1379:2007

C2. SLEEPER CONCRETE IS TO BE:
- GRADE - N40
- SLUMP - 80 +/- 15
- MAX. AGGREGATE - 20mm
- ALL CONCRETE TO BE VIBRATED USING INTENSE TABLE VIBRATORS IN RIGID STEEL FORMWORK

C3. MAX. EXPOSURE CLASSIFICATION - B1

C4. ALL REINFORCEMENT TO HAVE MINIMUM 25mm COVER MIN. SLEEPERS FOR USE WITHIN 1.0km OF COASTAL AREAS ARE TO USE HOT DIP GALVANISED REINFORCEMENT
ALL REINFORCEMENT SHALL BE SUPPORTED IN ITS CORRECT POSITION DURING CONCRETE PLACEMENT & VIBRATION USING QPro PLASTIC BAR CHAIRS. BAR CHAIRS TO BE PLACED AT 2000mm CENTRES MAX.

C5. CURE ALL SLEEPERS FOR 14 DAYS MINIMUM BEFORE INSTALLATION. SLEEPERS SHALL BE STACKED VERTICALLY ON THE "SHORT" SIDE AFTER REMOVAL FROM THE SLEEPER MOLD

STEEL NOTES:

S1. ~~ALL WORKMANSHIP~~ & MATERIALS SHALL BE IN ACCORDANCE WITH AS4100:1998

S2. ALL REINFORCEMENT IS TO BE N CLASS DEFORMED BAR TO AS/NZS 4671:2019, NORMAL CLASS GRADE 500

S3. STEEL SHALL BE CLEAN AND FREE FROM RUST, DUST & OTHER DEBRIS AT INSTALLATION. ANY STEEL REINFORCEMENT WITH RUST OR STAINING TO BE WIRE BRUSHED CLEAN

DESIGN SPECIFICATION

D1. DESIGN IS IN ACCORDANCE WITH THE FOLLOWING STANDARDS:
AS3600:2018 - CONCRETE STRUCTURES
AS4678:2002 - EARTH RETAINING STRUCTURES
AS4100:1998 - STEEL STRUCTURES
AS1170.0:2002 - SDA - GENERAL PRINCIPLES
AS1170.1:2002 - SDA - IMPOSED LOADS
AS1170.4:2007 - SDA - EARTHQUAKE LOADS

D2. DESIGN ALLOWS FOR A MAXIMUM IMPOSED LOAD OF 5kPa

D3. A MAXIMUM RETAINED SLOPE OF 1V:10H (6°) HAS BEEN ALLOWED FOR IN THE DESIGN

D4. WALL HAS BEEN DESIGN WITH A 1:20 BACK LEAN. VERTICAL PLACEMENT OF POST WILL ALTER SLEEPER LOADS

D5. ALL HEAVY VEHICLES & PLANT EQUIPMENT MUST BE KEPT A CLEAR DISTANCE OF 1.5xWALL HEIGHT AWAY FROM THE RETAINING WALL

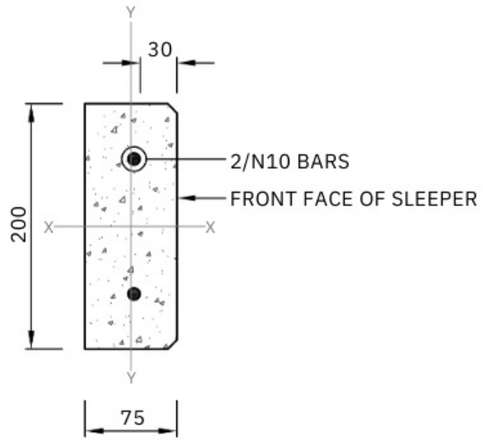
D6. NO ALLOWANCE HAS BEEN MADE FOR IMPOSED LOAD FROM ADJACENT STRUCTURES; HOUSES, DRIVEWAYS, SHEDS ETC. STRUCTURES IN THE LINE OF INFLUENCE TO BE DESIGN BY SUITABLY QUALIFIED ENGINEER
NO ALLOWANCE HAS BEEN MADE FOR WATER PRESSURE

D7. BEHIND THE WALL. RETAINING WALLS ARE TO BE INSTALLED WITH APPROPRIATE DRAINAGE BEHIND THE WALL & ACROSS THE SITE

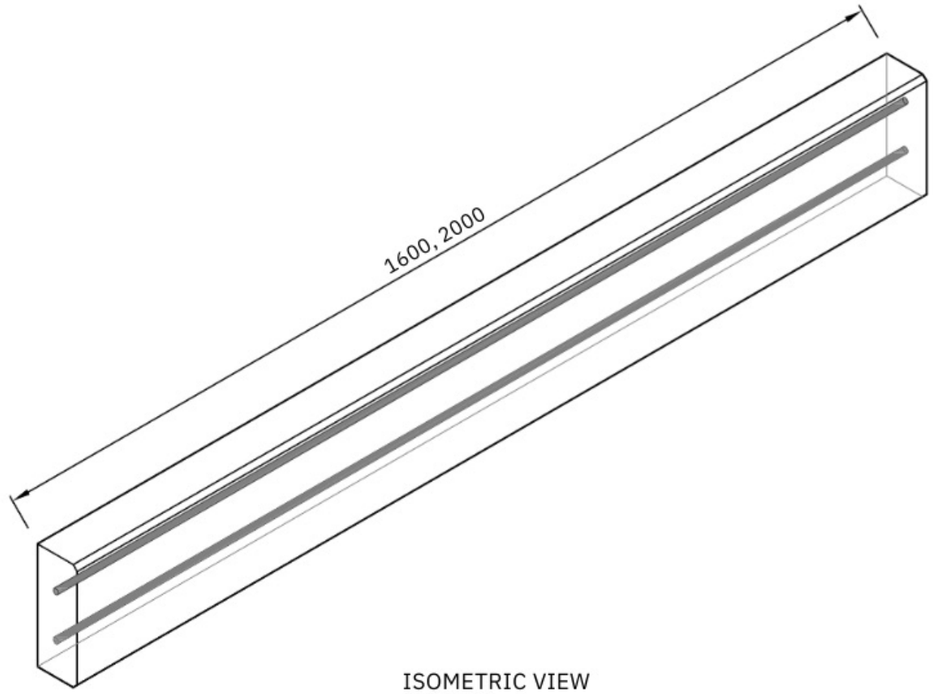
D8. MAXIMUM ALLOWABLE DEFLECT FOR CONCRETE SLEEPER IS THE LESSOR OF L/125 AND 16mm
FULL SCALE TESTING OF QPRO SLEEPERS HAS BEEN

D9. UNDERTAKEN AT ALFATEST Pty Ltd. ADOPTED DESIGN IS MOST CONSERVATIVE RESULT FROM TESTING & DESIGN IN ACCORDANCE WITH AS3600:2018

D10. ALL SLEEPERS CUT ON SITE TO BE TREATED WITH HIGH BUILD EPOXY OR INORGANIC ZINC SILICATE TO AS2312.1:2014. TREATED SURFACE IS TO BE DRY, CLEAN & FREE FROM DEBRIS OR CUTTING SLURRY



TYPICAL SLEEPER SECTION
SCALE 1:5



ISOMETRIC VIEW
SCALE 1:10

TECHNICAL PARAMETERS

ENGINEERING SPECIFICATION FOR SLEEPER AS NOTED ABOVE

φMu	φVu	CRACKED SECTION MODULUS, Iy
2.19 kNm	11.9 kN	0.824*106 mm4

MAXIMUM ULTIMATE LOAD UDL (kN/m)

ULS	6.85	4.39	3.05
SLEEPER LENGTH	1600	2000	2400

MAXIMUM SERVICABILITY LOAD UDL (kN/m)

UDLSHORT	4.37	2.32	1.2
UDLLONG	2.19	1.16	2
SLEEPER LENGTH	1600	2000	0.6 2400 1

THIS CERTIFICATION EXCLUDES THE DESIGN OF RETAINING WALL SYSTEM & COVERS THE DESIGN CAPACITY OF CONCRETE SLEEPERS ONLY.
THIS CERTIFICATION DOES NOT ALLEVIATE THE RESPONSIBILITY OF THE RETAINING WALL DESIGN ENGINEER TO UNDERTAKE NECESSARY DESIGN CHECKS, IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS & INDUSTRY PRACTICE, TO ENSURE COMPLIANCE WITH THE WALL SYSTEM BEING DESIGNED

CONCRETE SLEEPERS N.S.W

REV.	DATE	BY	DESCRIPTION
01	29/09/20	MC	FOR INFORMATION

DRAWING TITLE: TYPICAL CONCRETE SLEEPER - N10 BARS

DRAWING NUMBER: QPRO-STD-01

REVISION: 01

A3

MATERIAL SPECIFICATION

CONCRETE NOTES:

C1. ALL WORKMANSHIP & MATERIALS SHALL BE IN ACCORDANCE WITH AS3600:2018 & as1379:2007

C2. SLEEPER CONCRETE IS TO BE:
- GRADE - N40
- SLUMP - 80 +/- 15
- MAX. AGGREGATE - 20mm
- ALL CONCRETE TO BE VIBRATED USING INTENSE TABLE VIBRATORS IN RIGID STEEL FORMWORK

C3. MAX. EXPOSURE CLASSIFICATION - B1

C4. ALL REINFORCEMENT TO HAVE MINIMUM 25mm COVER MIN. SLEEPERS FOR USE WITHIN 1.0km OF COASTAL AREAS ARE TO USE HOT DIP GALVANISED REINFORCEMENT
ALL REINFORCEMENT SHALL BE SUPPORTED IN ITS CORRECT POSITION DURING CONCRETE PLACEMENT & VIBRATION USING QPro PLASTIC BAR CHAIRS. BAR CHAIRS TO BE PLACED AT 2000mm CENTRES MAX.

C5. CURE ALL SLEEPERS FOR 14 DAYS MINIMUM BEFORE INSTALLATION. SLEEPERS SHALL BE STACKED VERTICALLY ON THE "SHORT" SIDE AFTER REMOVAL FROM THE SLEEPER MOLD

STEEL NOTES:

S1. ~~ALL WORKMANSHIP~~ & MATERIALS SHALL BE IN ACCORDANCE WITH AS4100:1998

S2. ALL REINFORCEMENT IS TO BE N CLASS DEFORMED BAR TO AS/NZS 4671:2019, NORMAL CLASS GRADE 500

S3. STEEL SHALL BE CLEAN AND FREE FROM RUST, DUST & OTHER DEBRIS AT INSTALLATION. ANY STEEL REINFORCEMENT WITH RUST OR STAINING TO BE WIRE BRUSHED CLEAN

DESIGN SPECIFICATION

D1. DESIGN IS IN ACCORDANCE WITH THE FOLLOWING STANDARDS:
AS3600:2018 - CONCRETE STRUCTURES
AS4678:2002 - EARTH RETAINING STRUCTURES
AS4100:1998 - STEEL STRUCTURES
AS1170.0:2002 - SDA - GENERAL PRINCIPLES
AS1170.1:2002 - SDA - IMPOSED LOADS
AS1170.4:2007 - SDA - EARTHQUAKE LOADS
DESIGN ALLOWS FOR A MAXIMUM IMPOSED LOAD OF 5kPa

D2. A MAXIMUM RETAINED SLOPE OF 1V:10H (6°) HAS BEEN ALLOWED FOR IN THE DESIGN

D3. WALL HAS BEEN DESIGN WITH A 1:20 BACK LEAN. VERTICAL PLACEMENT OF POST WILL ALTER SLEEPER LOADS

D4. ALL HEAVY VEHICLES & PLANT EQUIPMENT MUST BE KEPT A CLEAR DISTANCE OF 1.5xWALL HEIGHT AWAY FROM THE RETAINING WALL

D5. NO ALLOWANCE HAS BEEN MADE FOR IMPOSED LOAD FROM ADJACENT STRUCTURES; HOUSES, DRIVEWAYS, SHEDS ETC. STRUCTURES IN THE LINE OF INFLUENCE TO BE DESIGN BY SUITABLY QUALIFIED ENGINEER

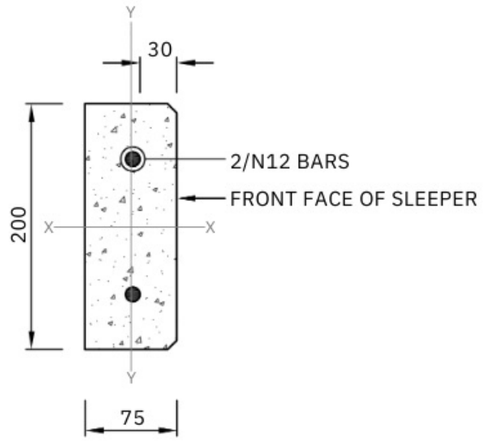
D6. NO ALLOWANCE HAS BEEN MADE FOR WATER PRESSURE BEHIND THE WALL. RETAINING WALLS ARE TO BE INSTALLED WITH APPROPRIATE DRAINAGE BEHIND THE WALL & ACROSS THE SITE

D7. MAXIMUM ALLOWABLE DEFLECT FOR CONCRETE SLEEPER IS THE LESSOR OF L/125 AND 16mm

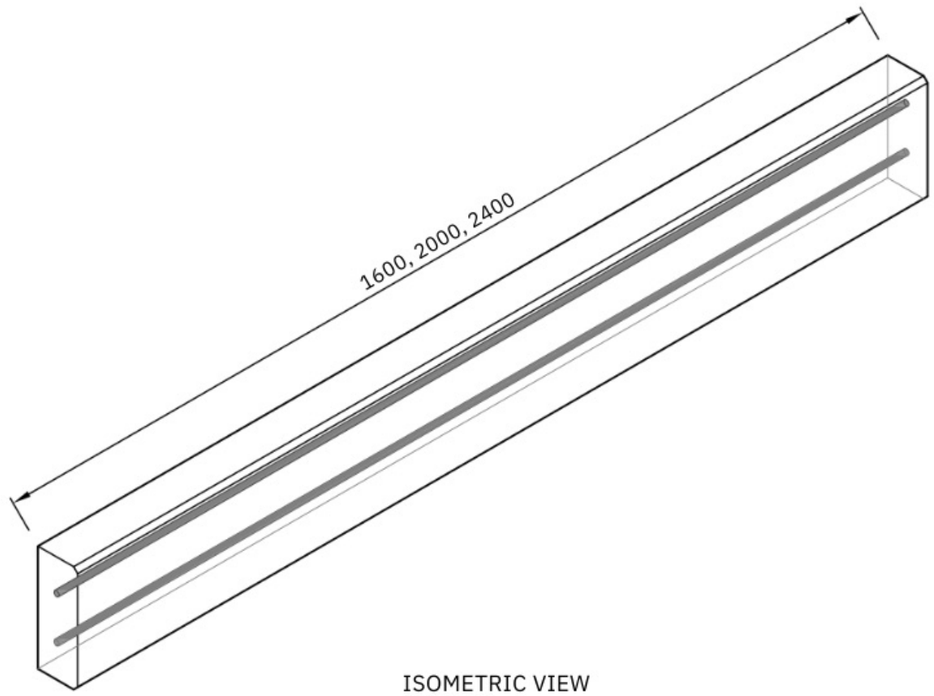
D8. FULL SCALE TESTING OF QPRO SLEEPERS HAS BEEN UNDERTAKEN AT ALFATEST Pty Ltd. ADOPTED DESIGN IS MOST CONSERVATIVE RESULT FROM TESTING & DESIGN IN ACCORDANCE WITH AS3600:2018

D9.

D10. ALL SLEEPERS CUT ON SITE TO BE TREATED WITH HIGH BUILD EPOXY OR INORGANIC ZINC SILICATE TO AS2312.1:2014. TREATED SURFACE IS TO BE DRY, CLEAN & FREE FROM DEBRIS OR CUTTING SLURRY



TYPICAL SLEEPER SECTION
SCALE 1:5



ISOMETRIC VIEW
SCALE 1:10

TECHNICAL PARAMETERS

ENGINEERING SPECIFICATION FOR SLEEPER AS NOTED ABOVE

φMu	φVu	CRACKED SECTION MODULUS, Iy
2.19 kNm	14.2 kN	0.995*106 mm4

MAXIMUM ULTIMATE LOAD UDL (kN/m)

ULS	6.85	4.38	3.05
SLEEPER LE NGTH	1600	2000	2400

MAXIMUM SERVICABILITY LOAD UDL (kN/m)

UDLSHORT	5.07	2.64	1.3
UDLLONG	2.54	1.32	4
SLEEPER LE NGTH	1600	2000	0.6 2400 7

THIS CERTIFICATION EXCLUDES THE DESIGN OF RETAINING WALL SYSTEM & COVERS THE DESIGN CAPACITY OF CONCRETE SLEEPERS ONLY.

THIS CERTIFICATION DOES NOT ALLEVIATE THE RESPONSIBILITY OF THE RETAINING WALL DESIGN ENGINEER TO UNDERTAKE NECESSARY DESIGN CHECKS, IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS & INDUSTRY PRACTICE, TO ENSURE COMPLIANCE WITH THE WALL SYSTEM BEING DESIGNED

CONCRETE SLEEPERS N.S.W

REV.	DATE BY	DESCRIPTION
01	29/09/20 MC	FOR INFORMATION

DRAWING TITLE: TYPICAL CONCRETE SLEEPER - N12 BARS

DRAWING NUMBER: QPRO-STD-02

REVISION: 01

A3

MATERIAL SPECIFICATION

CONCRETE NOTES:

C1. ALL WORKMANSHIP & MATERIALS SHALL BE IN ACCORDANCE WITH AS3600:2018, AS5100.5:2017 & as1379:2007

C2. SLEEPER CONCRETE IS TO BE:
- GRADE - N50
- SLUMP - 80 +/- 15
- MAX. AGGREGATE - 20mm
- ALL CONCRETE TO BE VIBRATED USING INTENSE TABLE VIBRATORS IN RIGID STEEL FORMWORK

C3. MAX. EXPOSURE CLASSIFICATION - B2
ALL REINFORCEMENT TO HAVE 40mm COVER MIN.
SLEEPERS HAVE BEEN DESIGNED FOR A 100 YEAR DESIGN LIFE

C4. ALL REINFORCEMENT SHALL BE SUPPORTED IN ITS CORRECT POSITION DURING CONCRETE PLACEMENT & VIBRATION USING QPro PLASTIC BAR CHAIRS. BAR CHAIRS TO BE PLACED AT 1600mm CENTRES MAX.

C5. CURE ALL SLEEPERS FOR 14 DAYS MINIMUM BEFORE INSTALLATION. SLEEPERS SHALL BE STACKED VERTICALLY ON THE "SHORT" SIDE AFTER REMOVAL FROM THE SLEEPER MOLD

STEEL NOTES:

S1. ~~ALL WORKMANSHIP~~ & MATERIALS SHALL BE IN ACCORDANCE WITH AS4100:1998

S2. ALL REINFORCEMENT IS TO BE N CLASS DEFORMED BAR TO AS/NZS 4671:2019, NORMAL CLASS GRADE 500

S3. STEEL SHALL BE CLEAN AND FREE FROM RUST, DUST & OTHER DEBRIS AT INSTALLATION. ANY STEEL REINFORCEMENT WITH RUST OR STAINING TO BE WIRE BRUSHED CLEAN

DESIGN SPECIFICATION

D1. DESIGN IS IN ACCORDANCE WITH THE FOLLOWING STANDARDS:
AS3600:2018 - CONCRETE STRUCTURES
AS4678:2002 - EARTH RETAINING STRUCTURES
AS4100:1998 - STEEL STRUCTURES
AS1170.0:2002 - SDA - GENERAL PRINCIPLES
AS1170.1:2002 - SDA - IMPOSED LOADS
AS1170.4:2007 - SDA - EARTHQUAKE LOADS
DESIGN ALLOWS FOR A MAXIMUM IMPOSED LOAD OF 5kPa

D2. A MAXIMUM RETAINED SLOPE OF 1V:10H (6°) HAS BEEN ALLOWED FOR IN THE DESIGN

D3. WALL HAS BEEN DESIGN WITH A 1:20 BACK LEAN. VERTICAL PLACEMENT OF POST WILL ALTER SLEEPER LOADS

D4. ALL HEAVY VEHICLES & PLANT EQUIPMENT MUST BE KEPT A CLEAR DISTANCE OF 1.5xWALL HEIGHT AWAY FROM THE RETAINING WALL

D5. NO ALLOWANCE HAS BEEN MADE FOR IMPOSED LOAD FROM ADJACENT STRUCTURES; HOUSES, DRIVEWAYS, SHEDS ETC. STRUCTURES IN THE LINE OF INFLUENCE TO BE DESIGN BY SUITABLY QUALIFIED ENGINEER

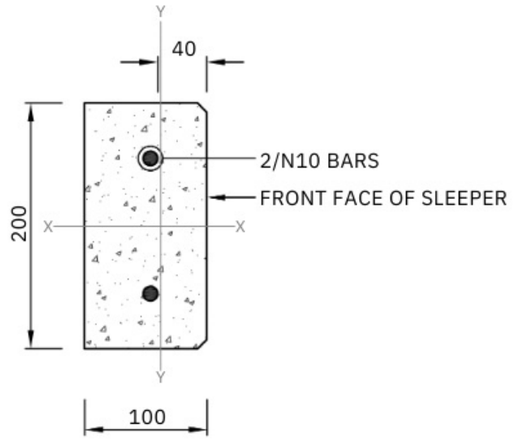
D6. NO ALLOWANCE HAS BEEN MADE FOR WATER PRESSURE BEHIND THE WALL. RETAINING WALLS ARE TO BE INSTALLED WITH APPROPRIATE DRAINAGE BEHIND THE WALL & ACROSS THE SITE

D7. MAXIMUM ALLOWABLE DEFLECT FOR CONCRETE SLEEPER IS THE LESSOR OF L/125 AND 16mm

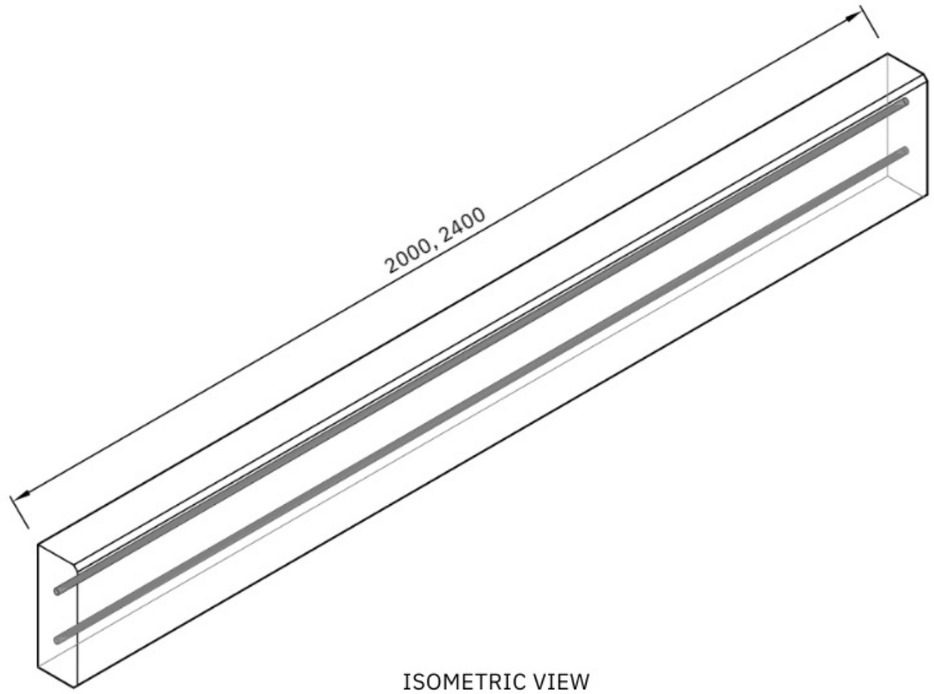
D8. FULL SCALE TESTING OF QPRO SLEEPERS HAS BEEN UNDERTAKEN AT ALFATEST Pty Ltd. ADOPTED DESIGN IS MOST CONSERVATIVE RESULT FROM TESTING & DESIGN IN ACCORDANCE WITH AS3600:2018

D9.

D10. ALL SLEEPERS CUT ON SITE TO BE TREATED WITH HIGH BUILD EPOXY OR INORGANIC ZINC SILICATE TO AS2312.1:2014. TREATED SURFACE IS TO BE DRY, CLEAN & FREE FROM DEBRIS OR CUTTING SLURRY



TYPICAL SLEEPER SECTION
SCALE 1:5



ISOMETRIC VIEW
SCALE 1:10

TECHNICAL PARAMETERS

ENGINEERING SPECIFICATION FOR SLEEPER AS NOTED ABOVE

φMu	φVu	CRACKED SECTION MODULUS, Iy
3.27 kNm	19.5 kN	1.625*106 mm4

MAXIMUM ULTIMATE LOAD UDL (kN/m)

ULS	10.22	6.54	4.54
SLEEPER LENGTH	1600	2000	2400

MAXIMUM SERVICABILITY LOAD UDL (kN/m)

UDLSHORT	9.38	5.03	2.7
UDLLONG	4.69	2.52	1
SLEEPER LENGTH	1600	2000	1.3 2400 6

THIS CERTIFICATION EXCLUDES THE DESIGN OF RETAINING WALL SYSTEM & COVERS THE DESIGN CAPACITY OF CONCRETE SLEEPERS ONLY.
THIS CERTIFICATION DOES NOT ALLEVIATE THE RESPONSIBILITY OF THE RETAINING WALL DESIGN ENGINEER TO UNDERTAKE NECESSARY DESIGN CHECKS, IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS & INDUSTRY PRACTICE, TO ENSURE COMPLIANCE WITH THE WALL SYSTEM BEING DESIGNED

CONCRETE SLEEPERS N.S.W

REV.	DATE BY	DESCRIPTION
01	29/09/20 MC	FOR INFORMATION

DRAWING TITLE: 100 YEAR CONCRETE SLEEPER - N10 BARS

DRAWING NUMBER: QPRO-STD-03

REVISION: 01

A3

MATERIAL SPECIFICATION

CONCRETE NOTES:

C1. ALL WORKMANSHIP & MATERIALS SHALL BE IN ACCORDANCE WITH AS3600:2018, AS5100.5:2017 & as1379:2007

C2. SLEEPER CONCRETE IS TO BE:
- GRADE - N50
- SLUMP - 80 +/- 15
- MAX. AGGREGATE - 20mm
- ALL CONCRETE TO BE VIBRATED USING INTENSE TABLE VIBRATORS IN RIGID STEEL FORMWORK

C3. MAX. EXPOSURE CLASSIFICATION - B2
ALL REINFORCEMENT TO HAVE 40mm COVER MIN.
SLEEPERS HAVE BEEN DESIGNED FOR A 100 YEAR DESIGN LIFE

C4. ALL REINFORCEMENT SHALL BE SUPPORTED IN ITS CORRECT POSITION DURING CONCRETE PLACEMENT & VIBRATION USING QPro PLASTIC BAR CHAIRS. BAR CHAIRS TO BE PLACED AT 1600mm CENTRES MAX.

C5. CURE ALL SLEEPERS FOR 14 DAYS MINIMUM BEFORE INSTALLATION. SLEEPERS SHALL BE STACKED VERTICALLY ON THE "SHORT" SIDE AFTER REMOVAL FROM THE SLEEPER MOLD

STEEL NOTES:

S1. ~~ALL WORKMANSHIP~~ & MATERIALS SHALL BE IN ACCORDANCE WITH AS4100:1998

S2. ALL REINFORCEMENT IS TO BE N CLASS DEFORMED BAR TO AS/NZS 4671:2019, NORMAL CLASS GRADE 500

S3. STEEL SHALL BE CLEAN AND FREE FROM RUST, DUST & OTHER DEBRIS AT INSTALLATION. ANY STEEL REINFORCEMENT WITH RUST OR STAINING TO BE WIRE BRUSHED CLEAN

DESIGN SPECIFICATION

D1. DESIGN IS IN ACCORDANCE WITH THE FOLLOWING STANDARDS:
AS3600:2018 - CONCRETE STRUCTURES
AS4678:2002 - EARTH RETAINING STRUCTURES
AS4100:1998 - STEEL STRUCTURES
AS1170.0:2002 - SDA - GENERAL PRINCIPLES
AS1170.1:2002 - SDA - IMPOSED LOADS
AS1170.4:2007 - SDA - EARTHQUAKE LOADS
DESIGN ALLOWS FOR A MAXIMUM IMPOSED LOAD OF 5kPa

D2. A MAXIMUM RETAINED SLOPE OF 1V:10H (6°) HAS BEEN ALLOWED FOR IN THE DESIGN

D3. WALL HAS BEEN DESIGN WITH A 1:20 BACK LEAN. VERTICAL PLACEMENT OF POST WILL ALTER SLEEPER LOADS

D4. ALL HEAVY VEHICLES & PLANT EQUIPMENT MUST BE KEPT A CLEAR DISTANCE OF 1.5xWALL HEIGHT AWAY FROM THE RETAINING WALL

D5. NO ALLOWANCE HAS BEEN MADE FOR IMPOSED LOAD FROM ADJACENT STRUCTURES; HOUSES, DRIVEWAYS, SHEDS ETC.

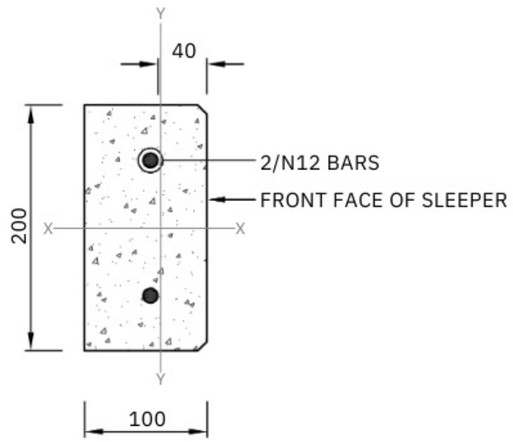
D6. STRUCTURES IN THE LINE OF INFLUENCE TO BE DESIGN BY SUITABLY QUALIFIED ENGINEER
NO ALLOWANCE HAS BEEN MADE FOR WATER PRESSURE BEHIND THE WALL. RETAINING WALLS ARE TO BE INSTALLED WITH APPROPRIATE DRAINAGE BEHIND THE WALL & ACROSS THE SITE

D7. MAXIMUM ALLOWABLE DEFLECT FOR CONCRETE SLEEPER IS THE LESSOR OF L/125 AND 16mm

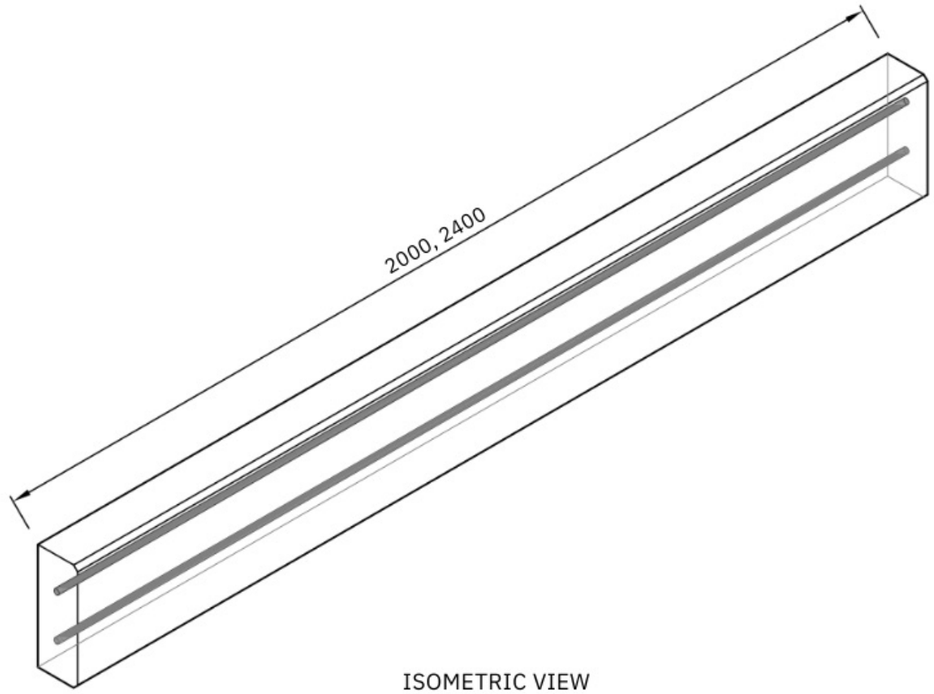
D8. FULL SCALE TESTING OF QPRO SLEEPERS HAS BEEN UNDERTAKEN AT ALFATEST Pty Ltd. ADOPTED DESIGN IS MOST CONSERVATIVE RESULT FROM TESTING & DESIGN IN ACCORDANCE WITH AS3600:2018

D9.

D10. ALL SLEEPERS CUT ON SITE TO BE TREATED WITH HIGH BUILD EPOXY OR INORGANIC ZINC SILICATE TO AS2312.1:2014. TREATED SURFACE IS TO BE DRY, CLEAN & FREE FROM DEBRIS OR CUTTING SLURRY



TYPICAL SLEEPER SECTION
SCALE 1:5



ISOMETRIC VIEW
SCALE 1:10

TECHNICAL PARAMETERS

ENGINEERING SPECIFICATION FOR SLEEPER AS NOTED ABOVE

φMu	φVu	CRACKED SECTION MODULUS, Iy
4.36 kNm	22.8 kN	2.033*106 mm4

MAXIMUM ULTIMATE LOAD UDL (kN/m)

ULS	13.63	8.72	6.06
SLEEPER LE NGTH	1600	2000	2400

MAXIMUM SERVICABILITY LOAD UDL (kN/m)

UDLSHORT	11.18	5.86	3.0
UDLLONG	5.59	2.93	3
SLEEPER LE NGTH	1600	2000	1.5 2400 1

THIS CERTIFICATION EXCLUDES THE DESIGN OF RETAINING WALL SYSTEM & COVERS THE DESIGN CAPACITY OF CONCRETE SLEEPERS ONLY.
THIS CERTIFICATION DOES NOT ALLEVIATE THE RESPONSIBILITY OF THE RETAINING WALL DESIGN ENGINEER TO UNDERTAKE NECESSARY DESIGN CHECKS, IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS & INDUSTRY PRACTICE, TO ENSURE COMPLIANCE WITH THE WALL SYSTEM BEING DESIGNED

CONCRETE SLEEPERS N.S.W

REV.	DATE	BY	DESCRIPTION
01	29/09/20	MC	FOR INFORMATION

DRAWING TITLE: 100 YEAR CONCRETE SLEEPER - N12 BARS

DRAWING NUMBER: QPRO-STD-04

REVISION: 01