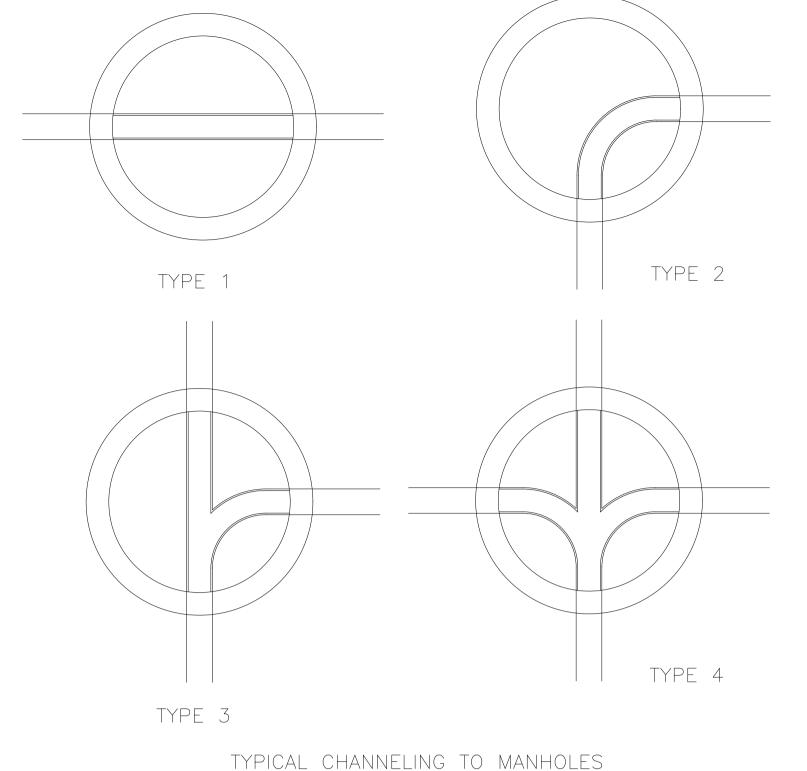
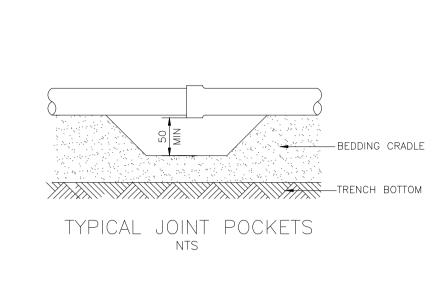


## GRAVITY SEWERAGE LINES STANDARD PIPE TEST (TO RE READ IN CONJUCTION WITH SANS 1200) 7.2 TESTS AND ACCEPTANCE / REJECTION CRITERIA 7.2.1 <u>AIR TEST</u> A) PIPELINES ABOVE THE WATER TABLE: AN APPROVED AIR-TESTING MACHINE SHALL BE USED TO RAISE THE GAUGE PRESSURE IN THE SECTION OF THE PIPELINE UNDER TEST FIRST TO 3,75 KPA. AFTER A 2 MIN STABILIZATION PERIOD THE PRESSURE SHALL BE REDUCED TO 2,5 KPA. THE MACHINE SHALL THEN BE SWITCHED OFF AND THE TIME TAKEN FOR THE PRESSURE TO DROP FROM 2,5 KPA TO 1,25 KPA SHALL BE DETERMINED. THE TIME TAKEN SHALL BE AT LEAST THE APPLICABLE OF THE FOLLOWING VALUES: NOMINAL DIAMETER MINIMUM TIME (IN MIN) TAKEN FOR PRESSURE TO DROP FROM 2,5 KPA TO 1,25 KPA OF PIPE(MM) 200 225 250 300 375 450 600 B) <u>PIPELINES BELOW THE WATER TABLE:</u> AN APPROVED AIR TESTING MACHINE SHALL BE USED TO RAISE THE GAUGE PRESSURE IN THE SECTION OF THE PIPELINE UNDER TEST TO 2,5 KPA ABOVE THE STATIC WATER PRESSURE. AFTER THIS PRESSURE HAS BEEN ATTAINED AND THE MACHINE STOPPED, ANY CHANGE IN PRESSURE SHALL BE NOTED. THERE SHALL BE

NO DISCERNIBLE LOSS FOR A PERIOD OF AT LEAST 5 MIN.



SCALE 1 : 25



--- EYEBOLT ANCHORED IN

MARKER BLOCK

— END CAP

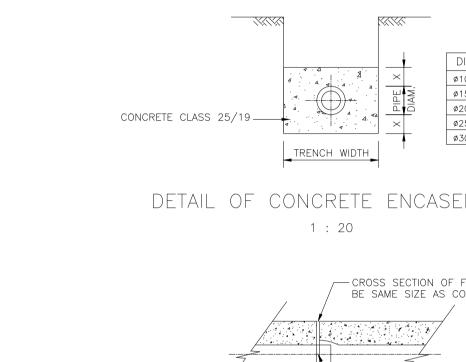
SEWER ERF CONNECTION

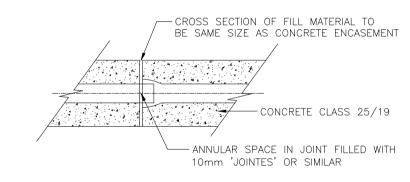
MARKER BLOCK

SCALE 1 : 20

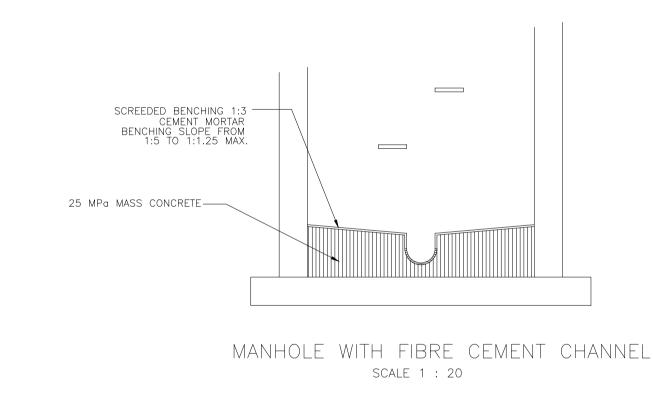
CLASS 20/19 CONCRETE

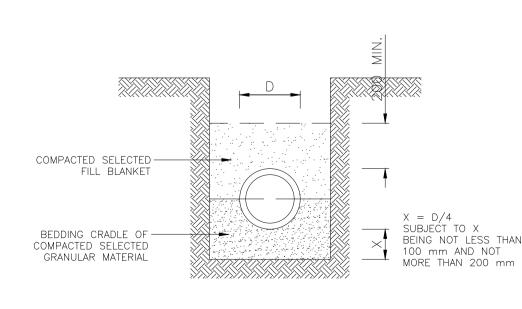
3mm WIRE ATTACHED TO MARKER BLOCK ——



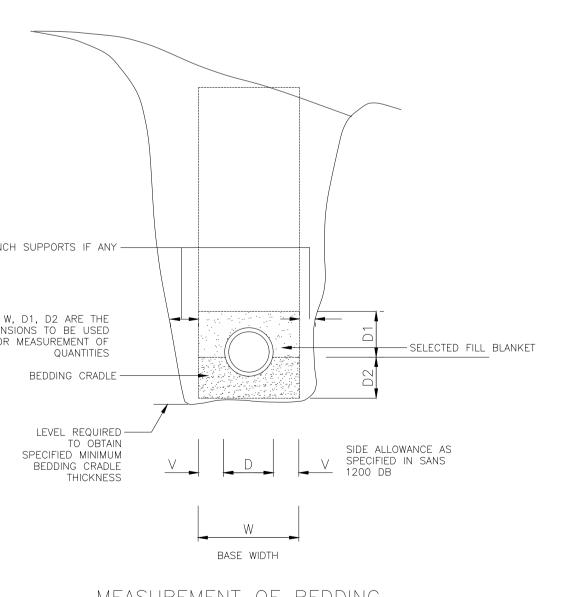


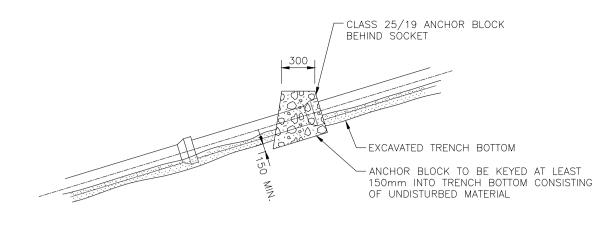




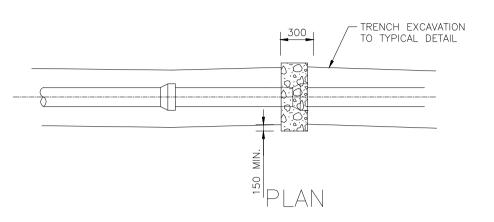


CLASS B BEDDING (MEASURED DETAILS) SCALE 1:20

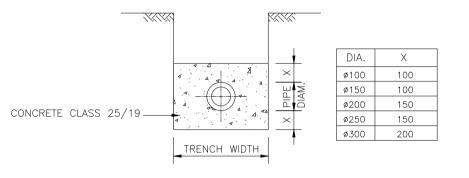




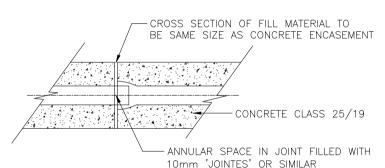




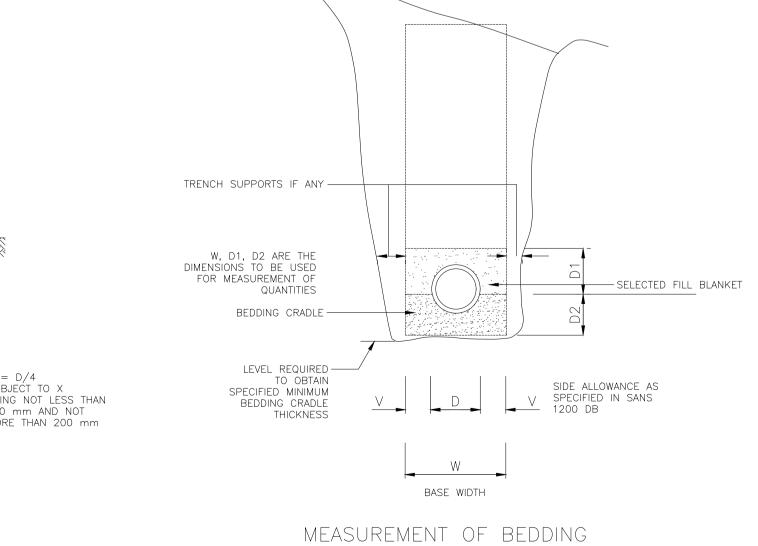
ANCHOR BLOCKS - TYPICAL DETAIL ANCHOR BLOCKS ON SLOPES STEEPER THAN 1:10 2m VERTICAL SPACING NOT TO SCALE

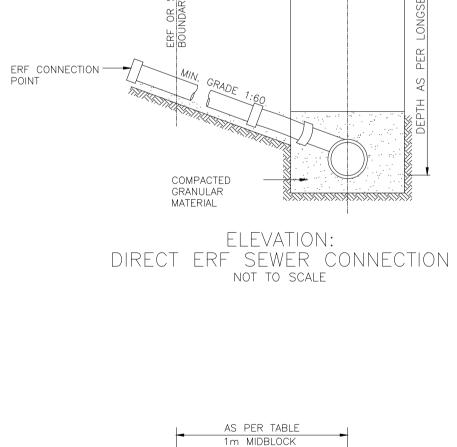


DETAIL OF CONCRETE ENCASEMENT



SECTION THROUGH ENCASEMENT





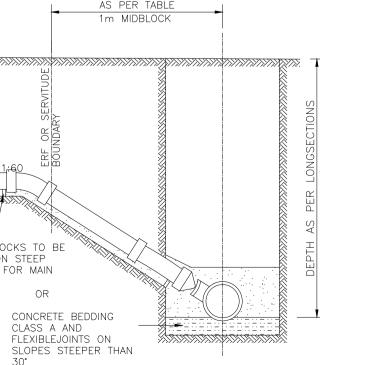
CONNECTION MIN. GRADE 1:60
POINT WITHIN ERF

ANCHOR BLOCKS TO BE PROVIDED ON STEEP SLOPES AS FOR MAIN SEWERS

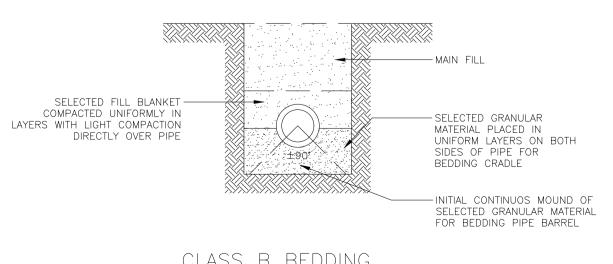
CONCRETE BEDDING CLASS A AND FLEXIBLEJOINTS ON

AS PER TABLE

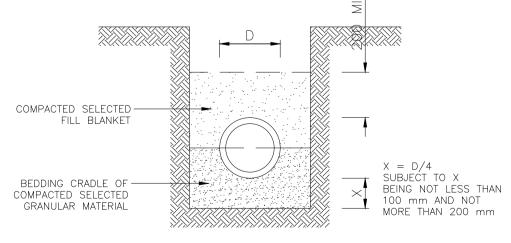
1 m MIDBLOCK



ELEVATION: DIRECT ERF SEWER CONNECTION STEEPER THAN 1:60 not to scale



CLASS B BEDDING (CONSTRUCTION DETAILS) SCALE 1:20



SCALE 1:20



- NO PART OF THIS DRAWING MAY BE SCALED.
- ALL DISCREPANCIES TO BE REPORTED TO ENGINEER IMMEDIATELY.
- REFER TO DRAWING NO .: D0121/SC-00 FOR STANDARD NOTES.
- ALL MATERIAL, TEST AND WORKMANSHIP TO BE
- ACCORDING TO SANS 1200 UNLESS OTHERWISE STATED.
- CONTRACTOR TO PROTECT ALL EXISTING SERVICES AGAINST ANY DAMAGE.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH ARCHITECT DRAWINGS.



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DESIGNED	M. SANYAUKE	
APPROVED PROFESSIONAL ENGINEER		

REFURBISHMENT OF TRANS KALAHARI BORDER TO A ONE STOP BORDER

POST



NAMIBIA REVENUE AGENCY 10 JOHN MEINERT & MOLKTE STREET, WINDHOEK TEL: (061) 209 2259

# FOR BIDDING

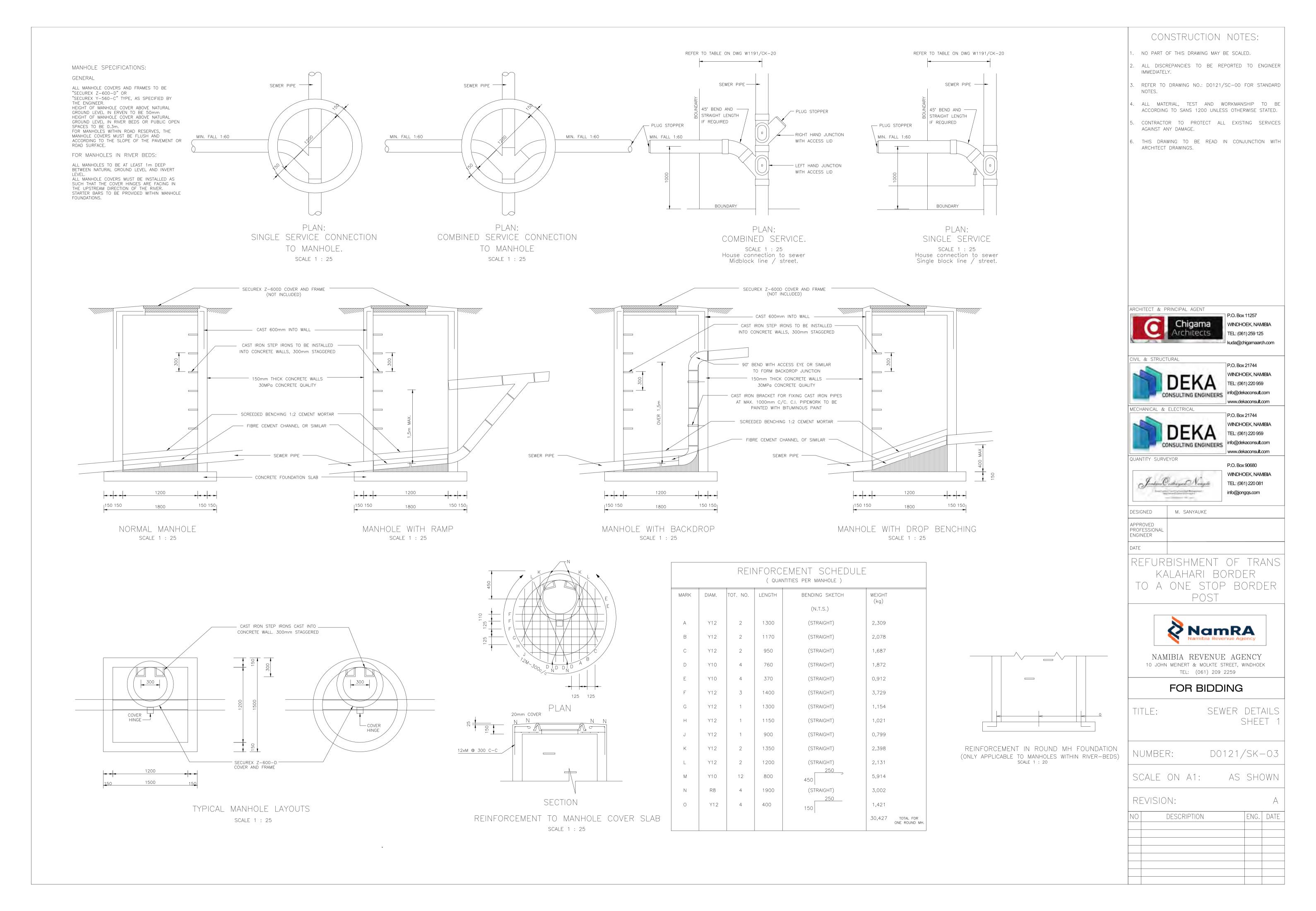
SEWER DETAILS TITLE: SHEET 2

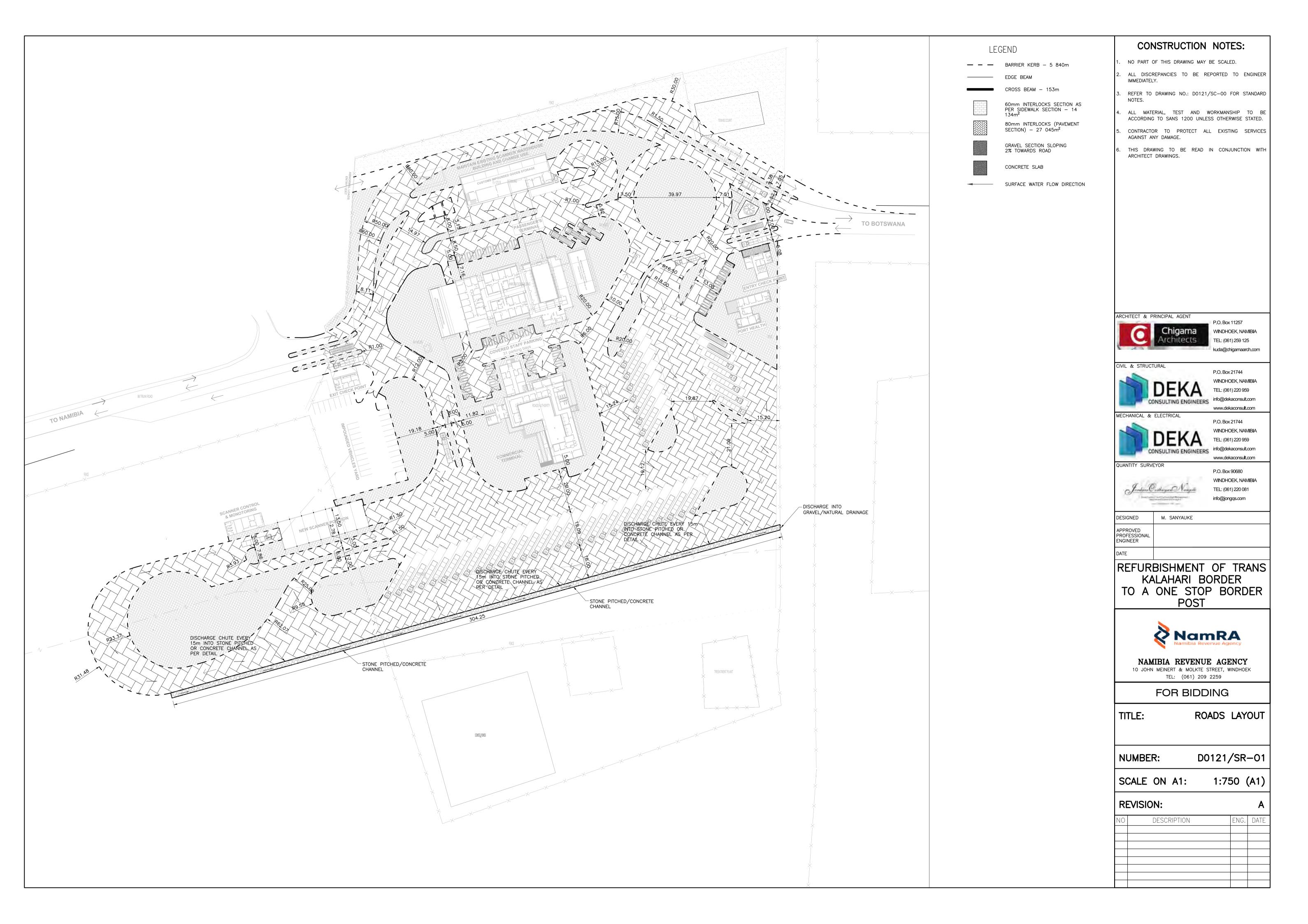
D0121/SK-04 NUMBER:

SCALE ON A1: AS SHOWN

REVISION:

DESCRIPTION ENG. DATE





## NOTES:

## 1. LAYER SPECIFICATION

## 1.1 ROAD LAYERS

CONTRACTOR TO CUT MINIMUM 100mm TOPSOIL AND SPOIL BEFORE EARTHWORKS COMMENCES.

EXPOSED SURFACES AFTER CUT AND BEFORE FILLING TO BE TREATED WITH TERMITE TREATMENT. PREMIS 200 OR TERMIDOR APPLIED AS PER MANUFACTURER'S SPECIFICATION.

COMPACTED IN LAYERS NOT EXCEEDING 150mm THICK TO A MINIMUM DENSITY OF 90% MODIFIED AASHTO. WITH A MINIMUM CBR VALUE OF MORE THAN 3 AT THE SPECIFIED DENSITY.

REMOVE 100mm THICK TOPSOIL MATERIAL. RIP, SHAPE AND RE-COMPACT IN-SITU MATERIAL TO A MINIMUM DENSITY OF 93% MODIFIED AASHTO. WITH A MINIMUM CBR VALUE OF MORE THAN 3 AT THE SPECIFIED DENSITY. IF UN-SUITABLE IN-SITU MATERIAL IS FOUND, REMOVE TO A DEPTH OF 500mm (OR AS SPECIFIED BY THE ENGINEER ON-SITE) BELOW BULK EXCAVATION LEVEL, REPLACE WITH SSG MATERIAL AS SPECIFIED BELOW, COMPACTED TO A MINIMUM DENSITY OF 93% MODIFIED AASHTO, IN LAYERS OF 150mm, ROADBED PREPARATION IN FILL AREAS SHALL BE DONE BY RIPPING THE IN-SITU MATERIAL TO A DEPTH OF 150mm. WATERING, MIXING AND RE-COMPACTING TO MINIMUM

93% MODIFIED AASHTO DENSITY, WITH A MINIMUM CBR VALUE OF MORE THAN 3 AT THE SPECIFIED DENSITY.

150mm IMPORTED GRAVEL COMPACTED TO A MINIMUM DENSITY OF 93% MODIFIED AASHTO. WITH A MINIMUM CBR VALUE OF 15 AT THE SPECIFIED DENSITY. THE MAXIMUM DIMENSION OF COARSE AGGREGATE SHALL NOT EXCEED TWO-THIRDS OF THE THICKNESS OF THE COMPACTED LAYER. THE GRADING MODULUS (GM) SHALL BE AT LEAST 0.75 AND NOT MORE THAN 2,7. THE PLASTICITY INDEX (PI) SHALL BE NOT GREATER THAN 12. THE LINEAR SHRINKAGE SHALL BE NOT GREATER THAN 7.

150mm IMPORTED GRAVEL COMPACTED TO A MINIMUM DENSITY OF 95% MODIFIED AASHTO. WITH A MINIMUM CBR VALUE OF 45 AT THE SPECIFIED DENSITY. THE MAXIMUM DIMENSION OF COARSE AGGREGATE SHALL NOT EXCEED TWO-THIRDS OF THE THICKNESS OF THE COMPACTED LAYER. THE GRADING MODULUS (GM) SHALL BE AT LEAST 1,5 AND NOT MORE THAN 2,5. THE PLASTICITY INDEX (PI) SHALL BE NOT GREATER THAN 10. THE LINEAR SHRINKAGE

SHALL BE NOT GREATER THAN 5. THE LIQUID LIMIT SHALL BE NOT GREATER THAN 30. 150mm IMPORTED GRAVEL COMPACTED TO A MINIMUM DENSITY OF 98% MODIFIED AASHTO, WITH A MINIMUM CBR VALUE OF 80 AT THE

SPECIFIED DENSITY. THE MAXIMUM DIMENSION OF COARSE AGGREGATE SHALL NOT EXCEED 53mm. THE GRADING AS PER GRADING ENVELOPE

BELOW. THE PLASTICITY INDEX (PI) SHALL BE NOT GREATER THAN 6. THE LINEAR SHRINKAGE SHALL BE NOT GREATER THAN 3. THE LIQUID

LIMIT SHALL BE NOT GREATER THAN 25. BASE GRADING ENVELOPE: SEIVE SIZE % PASSING 53.0mm 37.5mm 85 - 100

26.5mm 19.0mm 60 - 90 13.2mm 4.75mm 30 - 65 2.00mm 20 - 50 0.425mm 10 - 30 0.075mm 5 - 15

150mm IMPORTED GRAVEL COMPACTED TO A MINIMUM DENSITY OF 95% MODIFIED AASHTO. WITH A MINIMUM CBR VALUE OF 25 AT THE SPECIFIED DENSITY. THE MAXIMUM DIMENSION OF COARSE AGGREGATE SHALL NOT EXCEED TWO-THIRDS OF THE THICKNESS OF THE COMPACTED LAYER. THE GRADING MODULUS (GM) SHALL BE AT LEAST 1,5. THE PLASTICITY INDEX (PI) SHALL BE AT LEAST 8 AND NOT GREATER THAN 15.

### 1.2 SIDEWALKS:

IMPORTED (OR IN-SITU, IF SUITABLE) GRAVEL COMPACTED IN LAYERS NOT EXCEEDING 150mm THICK TO A MINIMUM DENSITY OF 93% MODIFIED AASHTO. WITH A MINIMUM CBR VALUE OF 15 AT THE SPECIFIED DENSITY.

150mm IMPORTED GRAVEL COMPACTED TO A MINIMUM DENSITY OF 95% MODIFIED AASHTO. WITH A MINIMUM CBR VALUE OF 25 AT THE SPECIFIED DENSITY. THE MAXIMUM DIMENSION OF COARSE AGGREGATE SHALL NOT EXCEED TWO-THIRDS OF THE THICKNESS OF THE COMPACTED LAYER. THE GRADING MODULUS (GM) SHALL BE AT LEAST 1,5. THE PLASTICITY INDEX (PI) SHALL NOT BE LESS THAN 6 AND NO GREATER THAN 12.

## 2. CONSTRUCTION OF SEGMENTED PAVING:

CONSTRUCTION OF SEGMENTED PAVING SHALL COMPLY TO THE SPECIFICATIONS AS SET OUT IN SABS 1200 MJ: SEGMENTED PAVING IN ADDITION TO THE SPECIFICATIONS AS STATED BELOW.

SUBGRADE, SUBBASE AND BASE (WHICHEVER IS APPLICABLE TO THE DESIGN SPECIFICATION) SHALL BE CONSTRUCTED IN ACCORDANCE TO DETAILS AND THE REQUIREMENTS SPECIFIED IN SANS 1200, SANS 1200 ME, DM AND SANS 1200 MF, THE SUBGRADE, SUBBASE AND BASE (WHICHEVER IS APPLICABLE TO THE DESIGN SPECIFICATION) SHALL CONFORM TO THE TOLERANCE REQUIREMENTS OF THESE SPECIFICATIONS.

DEPRESSIONS SHALL BE FILLED WITH SPECIFIED BASE OR SUBBASE MATERIAL (WHICHEVER IS APPLICABLE TO THE DESIGN SPECIFICATION) AND COMPACTED TO THE SPECIFIED DENSITY. BEDDING SAND SHALL NOT, UNDER ANY CIRCUMSTANCES, BE USED FOR THIS PURPOSE.

THE TOP OF THE LAST LAYER (LAYER UNDER BEDDING SAND LAYER) SHALL BE SO CONSTRUCTED THAT SURFACE WATER CANNOT POND.

## 2.2 EDGE RESTRAINTS

EDGE RESTRAINTS CONSISTING OF KERBS, CHANNELS AND OTHER EDGE STRIPS (AS DETAILED) SHALL BE CONSTRUCTED ON THE SUBBASE BEFORE ANY UNITS ARE LAID.

# 2.3 PLACING AND COMPACTING OF SAND BED

BEDDING SAND SHALL BE SPREAD OVER THE SUBBASE AND EVENLY SCREEDED IN THE LOOSE CONDITION AS TO ACHIEVE A COMPACTED THICKNESS OF 25 ± 10 mm. WHEN THE SAND IS SPREAD, THE MOISTURE CONTENT SHALL BE 6 ± 2%. THE SAND BED SHALL BE LAID SLIGHTLY IN ADVANCE OF THE PLACEMENT OF THE UNITS BUT ONLY TO THE EXTENT THAT THE PARTICULAR AREA OF PAVEMENT CAN BE COMPLETED ON THE SAME DAY. WHERE THE SAND BED IS ACCIDENTALLY COMPACTED BEFORE THE UNITS ARE LAID, IT SHALL BE RAKED AND EVENLY RESCREEDED IN A LOOSE CONDITION.

## 2.3.1 BEDDING SAND GRADING ENVELOPE

SEIVE SIZE	% PASSING
9.52mm	100
4.75mm	95-100
2.36mm	80-100
1.18mm	50-85
0.600mm	25-60
0.300mm	10-30
0.150mm	5-15
0.075mm	0-10

### 2.4 WEED KILLER BEDDING SAND LAYER TO BE TREATED WITH WEED KILLER, APPROVED BY ENGINEER BEFOREHAND.

THE PRINCIPAL LINES OF THE PAVING UNIT PATTERN AS LAID SHALL BE SPECIFIED IN THE PROJECT SPECIFICATIONS OR GIVEN ON THE DRAWINGS, AND AS AGREED WITH THE ENGINEER BEFORE LAYING COMMENCES. EXCEPT WHERE CURVED PATTERNS ARE REQUIRED, THE LINES OF THE UNIT PATTERN SHALL BE STRAIGHT AND PARALLEL TO MAJOR KERBS OR BUILDINGS OR OTHER STRUCTURES, AS MOST APPROPRIATE AND AS APPROVED

WHERE APPROPRIATE, LINES SHALL BE SET UP AT RIGHT ANGLES TO EACH OTHER TO CONTROL THE ALIGNMENT OF THE UNITS. JOINT WIDTHS SHALL BE BETWEEN 2 mm AND 6 mm.

WHOLE UNITS SHALL BE LAID FIRST, FULL DEPTH CLOSURE UNITS OF SPECIAL SIZE OR CUT OR PART UNITS SPLIT FROM WHOLE UNITS. SHALL BE FITTED INTO GAPS AROUND THE PERIMETER AND AROUND SERVICE INSTALLATIONS SUCH AS MANHOLES.

WHERE PLANT HAS TO BE MOVED OVER AN UNCOMPACTED NEWLY LAID PAVEMENT, BOARDS SHALL BE LAID TO PREVENT DISTURBANCE OF

THE MANNER OF COMPACTION SHALL BE SUCH THAT DAMAGE TO THE UNITS IS PREVENTED. AT LEAST TWO COMPACTION PASSES SHALL BE MADE OVER THE PAVING AS SOON AS PRACTICABLE AFTER LAYING, AND BEFORE THE INTRODUCTION OF ANY JOINTING SAND. BY THE END OF EACH DAY, COMPACTION SHALL BE COMPLETED TO NOT CLOSER THAN 1 m FROM ANY FREE EDGE. A UNIFORM EVEN SURFACE SHALL BE OBTAINED OVER THE PAVED AREAS.

DAMAGED UNITS SHALL BE REPLACED AND COMPACTED BEFORE JOINT FILLING IS CARRIED OUT.

NO VEHICULAR TRAFFIC SHALL BE ALLOWED OVER THE PAVING UNTIL ALL JOINTS HAVE BEEN FILLED WITH SAND.

THE JOINTS SHALL NOT BE FILLED UNTIL ALL THE CLOSURE UNITS HAVE BEEN INSERTED, ALL THE NECESSARY ADJUSTMENTS TO LINE AND LEVEL HAVE BEEN MADE AND THE PAVEMENT HAS BEEN SUBJECTED TO AT LEAST TWO PASSES OF THE COMPACTOR.

SAND THAT COMPLIES TO SPECIFIED GRADING SHALL BE BROOMED INTO THE JOINTS UNTIL THEY ARE FULL, AND SUFFICIENT PASSES OF THE PLATE COMPACTOR SHALL BE MADE TO SETTLE THE JOINT FILLING. THE PROCEDURE SHALL BE REPEATED UNITL THE JOINTS REMAIN FULL AFTER COMPACTION.

ON COMPLETION OF COMPACTION, ALL EXCESS SAND SHALL BE BROOMED OFF AND DISPOSED OF. DAMAGE CAUSED DURING COMPACTION SHALL BE MADE GOOD BY THE CONTRACTOR AT HIS OWN EXPENSE.

## 2.6.1 FILLER SAND GRADING MODULUS:

JOINT FILLING SAND SHALL PASS A 1.18mm SIEVE AND SHALL CONTAIN 10-50% (m/m) OF MATERIAL THAT PASSES A 0.075 mm SIEVE. (SANS 1200MJ CLAUSE 3.3)

### 3. QUALITY ASSURANCE

3.1 EARTHWORKS

3.1.1 CONTRACTOR TO SUBMIT:

3.1.1.1 ROADBED: CONTRACTOR TO SUBMIT GRADING, ATTERBERG LIMITS AND CBR RESULTS TO THE ENGINEER TO DETERMINE PAVEMENT DESIGN AND DENSITY TESTS AFTER PAVEMENT DESIGN WAS APPROVED.

3.1.1.2 ROADBED: DENSITY TESTS AND AS-BUILT LEVELS OF ROADBED AFTER PAVEMENT DESIGN WAS APPROVED.

3.1.1.3 FILL/SELECTED LAYERS: INFORMATION ON PROPOSED MATERIAL TO BE USED FOR FILL OR SELECTED LAYERS: GRADING, ATTERBERG

3.1.1.4 SUBBASE, BASE AND WEARING COURSE (NON-CEMENTED): DENSITIES, AS-BUILT LEVELS, GRADING, ATTERBERG LIMITS AND CBR RESULTS.

3.1.1.5 SUBBASE, BASE AND WEARING COURSE (CEMENTED): DENSITIES, AS-BUILT LEVELS, GRADING, ATTERBERG LIMITS, CBR, STABILIZER CONTENT, DESIGN UCS AND MAXIMUM UNIFORMITY UCS.

3.1.1.6 INDICATORS, GRADING MODULUS AND CBR RESULTS OF ALL MATERIALS TO BE SUBMITTED BEFORE MATERIAL IS BROUGHT ONTO SITE. 3.1.2 ENGINEER TO INSPECT:

3.1.2.1 THE CONTRACTOR TO ENSURE THAT VISUAL INSPECTIONS ARE DONE BY THE ENGINEER OR HIS REPRESENTATIVE BEFORE THE NEXT LAYER IS PLACED. 3.1.2.2 THE CONTRACTOR TO ENSURE THAT THE ENGINEER OR HIS REPRESENTATIVE ATTENDED THE TERMITE POISONING APPLICATION ON THE

### 3.2 SEGMENTED PAVING

ROADBED LAYER.

3.2.1 COMPRESSIVE STRENGTH TEST TO BE DONE AND RESULTS SUBMITTED TO THE ENGINEER BEFORE PAVERS ARE BROUGHT TO SITE.

3.2.2 SAMPLES OF PAVERS TO BE APPROVED BY THE ENGINEER BEFORE PAVERS ARE BROUGHT TO SITE.

3.2.3 THE CONTRACTOR TO LAY 10m x 10m PAVING AREA TO BE APPROVED BY THE ENGINEER BEFORE THE CONTRACTOR CONTINUE WITH THE REST OF THE PAVING.

3.2.4 THE CONTRACTOR TO ENSURE THAT THE ENGINEER OR HIS REPRESENTATIVE ATTEND THE APPLICATION OF THE WEEDKILLER BEFORE PAVING BLOCKS ARE LAID.

3.2.5 CONTRACTOR TO SUBMIT GRADING MODULUS OF THE FILLER AND BEDDING SAND TO THE ENGINEER BEFORE SUCH MATERIAL IS BROUGHT ONTO SITE.

3.2.6 LAB TO MEASURE AND CONFIRM THICKNESS OF OF BEDDING SAND UNDER PAVERS.

3.2.7 COMPRESSIVE STRENGTH OF PAVERS SAMPLED ON SITE. RESULTS TO BE SUBMITTED TO THE ENGINEER.

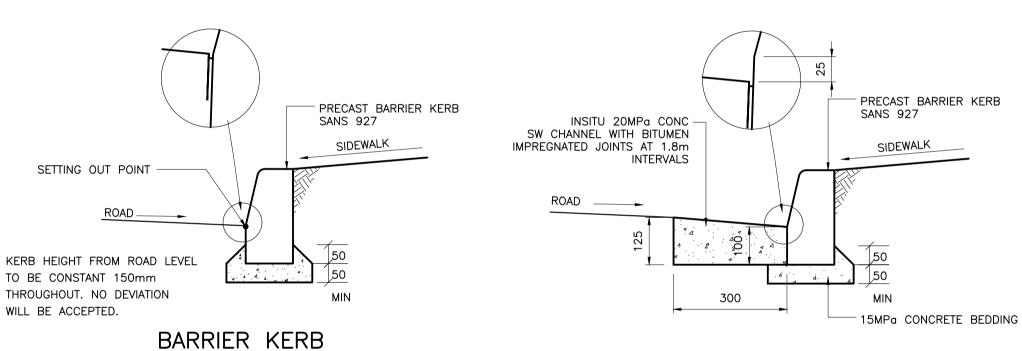
3.3 KERBING AND CHANNELING

3.3.1 CONTRACTOR TO SUBMIT BREAKING STRENGTH TEST.

3.3.2 CONTRACTOR AND ENGINEER TO CONFIRM SHAPE CODE COMPLIES WITH THAT SPECIFIED.

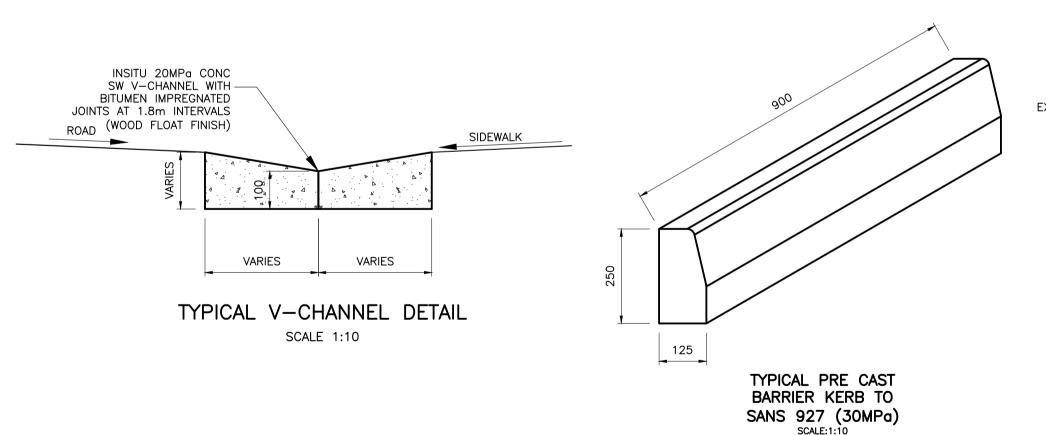
3.3.3 ENGINEER TO INSPECT:

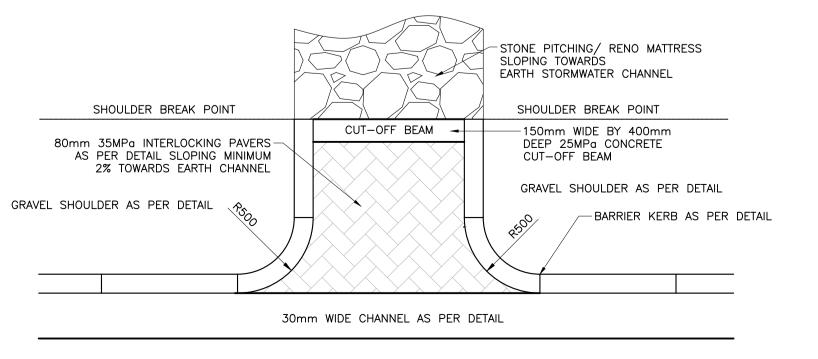
3.3.3.1 HEIGHT OF KERB ABOVE FINAL SURFACE. 3.3.3.2 CONCRETE BACKING TO KERBS.



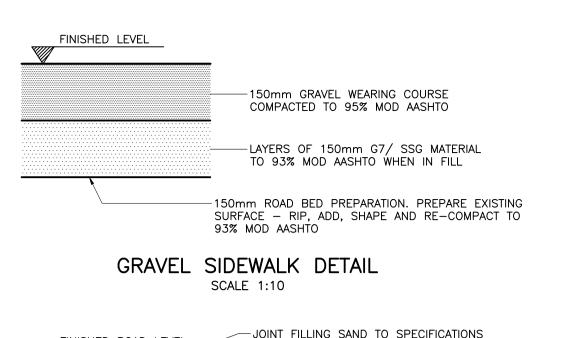
## BARRIER KERB AND CHANNEL SCALE 1:10

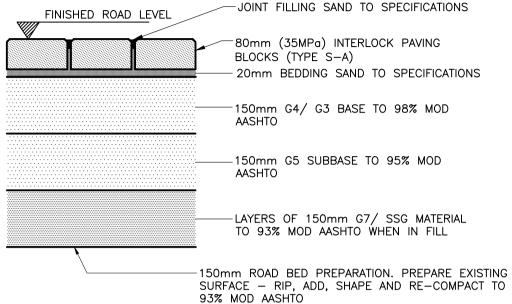
SCALE 1:10



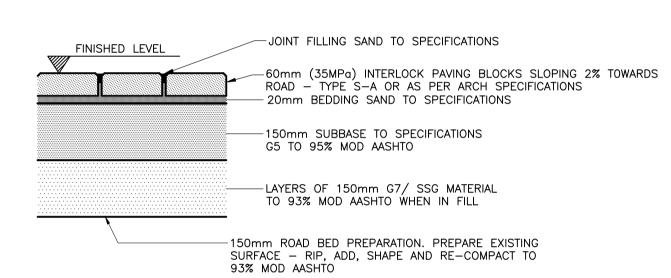


CHUTE LAYOUT SCALE:1:25

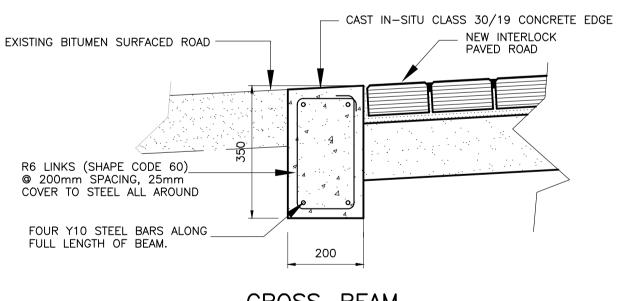




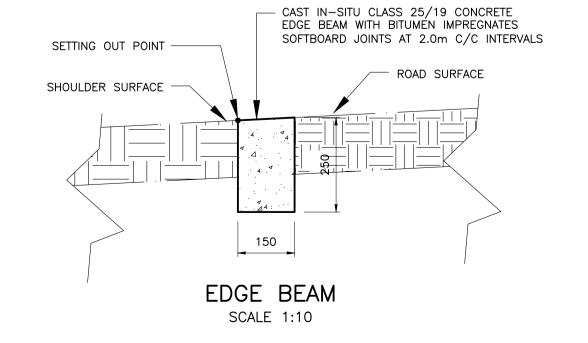
## PAVEMENT SECTION (NEW ROADS, PARKING AND ACCESSES) SCALE 1:10



PAVED SIDEWALK SECTION SCALE 1:10



CROSS-BEAM SCALE 1:10



**CONSTRUCTION NOTES:** 

- NO PART OF THIS DRAWING MAY BE SCALED.
- ALL DISCREPANCIES TO BE REPORTED TO ENGINEER
- REFER TO DRAWING NO.: D0121/SC-00 FOR STANDARD
- ALL MATERIAL, TEST AND WORKMANSHIP TO BE
- ACCORDING TO SANS 1200 UNLESS OTHERWISE STATED. CONTRACTOR TO PROTECT ALL EXISTING SERVICES AGAINST ANY DAMAGE.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH ARCHITECT DRAWINGS.



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DESIGNED	M. SANYAUKE
APPROVED PROFESSIONAL ENGINEER	
DATE	

# REFURBISHMENT OF TRANS KALAHARI BORDER TO A ONE STOP BORDER **POST**



10 JOHN MEINERT & MOLKTE STREET, WINDHOEK TEL: (061) 209 2259

FOR BIDDING

**ROAD NOTES:** TITLE: DETAILS AND SECTIONS

D0121/SR-02 NUMBER:

AS SHOWN SCALE ON A1:

**REVISION:** 

ENG. | DATE DESCRIPTION

