PLANS AND DOCUMENTS referred to in the SDA APPROVAL

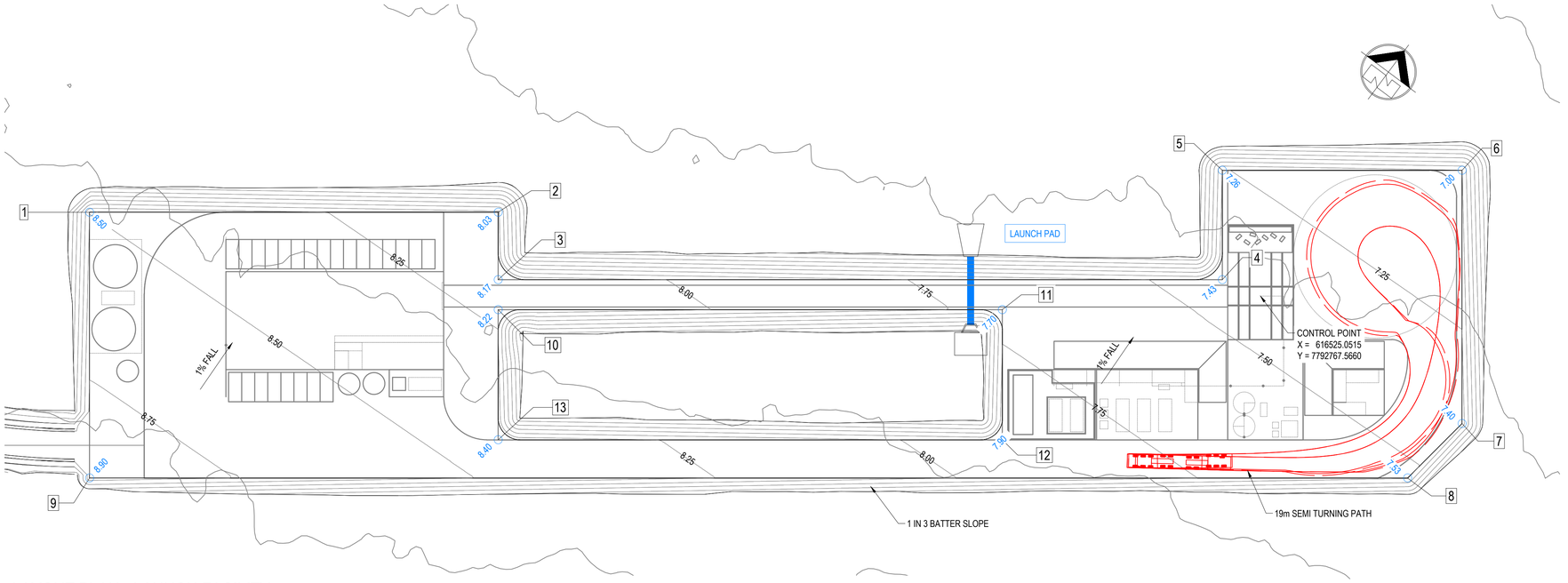
Queensland Government

SDA approval: AP2021/007

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

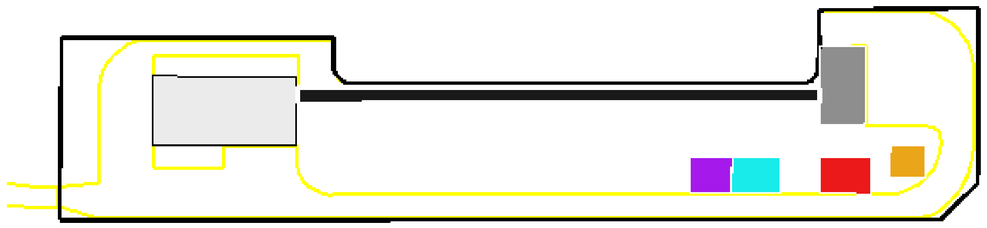
Queensland Government

SDA approval: APC2024/006



LAYOUT PLAN - LAUNCH FACILITY

SCALE 1:500



- VEHICLE ASSEMBLY BUILDING
- OXIDISER PAD
- CRYONGENIC PAD
- FUEL AND WATER PAD
- GASSES PAD
- LAUNCH PAD
- LAUNCH VEHICLE LANE

LEGEND

- EXISTING SURFACE CONTOURS (250m
- DESIGN CONTOURS - 250mm (FSL)
- 160.00 CONTOUR LABELS (FSL)
- 160.000 SPOT HEIGHTS (FINISHED SURFACE)

PAD SETOUT

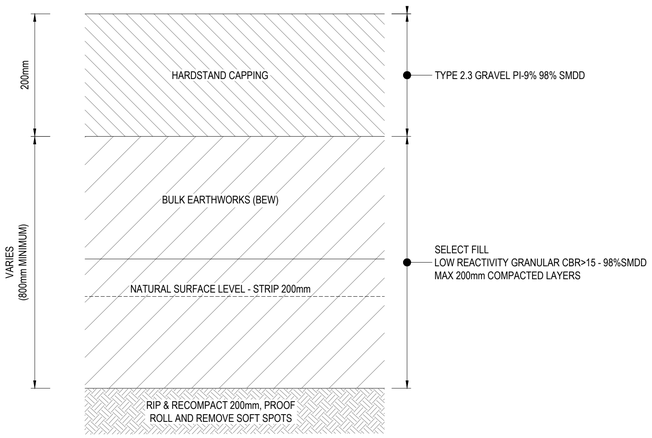
(GDA2020 / ZONE 55)

POINT	EASTING	NORTHING
1	616311.644	7792736.966
2	616384.973	7792752.895
3	616387.663	7792740.790
4	616517.574	7792769.011
5	616513.307	7792788.653
6	616556.322	7792797.998
7	616556.193	7792752.557
8	616558.544	7792740.662
9	616322.003	7792689.278
10	616388.773	7792735.403
11	616479.262	7792755.061
12	616484.336	7792731.705
13	616393.847	7792712.048

NOTES:
1. SURFACE IS TO BE GRADED LINEREARLY BETWEEN FINISHED SURFACE POINTS.
2. TOLERANCES REFER CONTRACT DOCUMENTATION.
3. INTERNAL INFRASTRUCTURE LAYOUT IS BASED ON THE DESIGN AVAILABLE ON THE DATE OF DRAWING REVISION

- PAD SURFACE (FSL)
- PAVEMENT BASECOURSE
- BULK EARTHWORKS (BEW)
- SELECT FILL
- EXISTING SURFACE (ESL)

LAYER REFERENCE SECTION



TYPICAL PAD PAVEMENT DETAIL

No	DESCRIPTION	DATE
E	FOR APPROVAL	09.02.2022
D	FOR APPROVAL	08.02.2022
C	FOR APPROVAL	02.02.2022
B	FOR APPROVAL	19.01.2022
A	FOR REVIEW	23.11.2021

REVISION HISTORY

i³ consulting pty ltd
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innovation, ingenuity, inspiration

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mail@i3cubed.com.au
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GILMOUR SPACE

Engineers Certification:
Travis Smith MIE Aust. CPEng.
NPER Civil
RPEQ 16400
CPESC 9500
Signature: T. Smith
Date: 09 / 02 / 2022

PROJECT
BOWEN LAUNCH FACILITY

DRAWING TITLE
BOWEN ORBITAL SPACE PORT
ACCESS ROAD
LAYOUT PLAN - LAUNCH FACILITY

DRAWN	T.J.S.	CHECKED	T.J.S.	APPROVED	T.J.S.
DRAWING STATUS	FOR APPROVAL				
SCALE	NTS	SIZE	A1		

DRAWING CODE
GSLF-I3C-CV-DWG-006-01

REV
E

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

SDA approval: AP2021/007

Queensland Government

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

SDA approval: APC2024/006

Queensland Government

REVISIONS			
REVISION	REVISION DESCRIPTION	DATE	APPROVED
A	ISSUED FOR DETAIL DESIGN	19/01/22	LDJ

PLANT NORTH

COMPACTED HARDSTAND AREA SUITABLE FOR VEHICLE ACCESS AND TEMPORARY WORKS OR TEMPORARY MATERIALS STORAGE DURING CAMPAIGN PREPARATION AND OPERATIONS

NOTE. CONDENSING WATER VAPOUR (STEAM) M
FALL OUTSIDE OF WATER BUND, BUT WITHIN TI
COMPOUND AREA. ANY CONDENSING WATER V
WILL BE PURE H2O AND IS TREATED AS IF RAIN
AND NO COLLECTION OF THIS WATER IS REQUI

NOTES.

1. SUMP AND BUND MANAGEMENT PROCEDURES TO BE DEVELOPED FOR PRE-LAUNCH CLEANING AND PREP ACTIVITIES.
2. HAZARDOUS AND DANGEROUS GOODS MANAGEMENT PLAN AND EMERGENCY RESPONSE PLAN FOR ANY RECOVERY AND SPILL MANAGEMENT ACTIVITIES.

LAUNCH PAD BUND + SUMP CAPACITY: 28 m3
(TOTAL VEHICLE LIQUIDS: ~ 20 m3)
(TOTAL WATER DELUGE: ~6 m3)

LP SUMP VOLUME: 20 m3

LP BUND WALL HEIGHT: 150mm

LP BUND VOLUME: 8 m3

EXHAUST BREAK BLOCKS
(1m L x 0.5m H x 0.5m W) TO DISPERSE
EXHAUST ENTRAINED WATER INTO BUND

WATER DELUGE DIVERTER FLOW
LINES OF CONTAINMENT

WATER DELUGE NOMINAL OUTPUT:
6m3 per OPERATION

12000

GRATED SUMP

5000

16000

21000

FLOW FROM WATER DELUGE DIVERTER

WATER COLLECTION CHANNELS
EMBEDDED INTO LAUNCH PAD
WITH GRADIENT TO BUND AREA

CONCRETE PAVED ROAD BETWEEN VEHICLE ASSEMBLY BUILDING AND THE LAUNCH PAD

LAUNCH PAD CENTRE
19° 57' 28.00" S
148° 06' 46.00" E

EARTHEN BATTER AND CONTAINMENT WALL BUILDUP 1V:2H

FLUIDS PIPING ALIGNMENT

MAIN OXIDISER DUMP

ISO TANK STORAGE LOCATION FOR H2O2

12900

DELUGE WATER STORAGE x 2
20m3 (20 kL) TANK.
TYPICAL DOMESTIC RAINWATER
COLLECTION POLY TANK

18400

FLUIDS PIPING ALIGNMENT

EARTHEN BATTER AND CONTAINMENT WALL BUILDUP 1V:2H

8400

9400

34900

13830

BOUNDED AREA IS THE 'COMPOUND' AREA FOR REFILLABLE GAS STORAGE COMPLIANT TO AS2030

BOUNDED AREA IS 'COMPOUND' AREA FOR HYDROGEN PEROXIDE STORAGE COMPLIANT TO AS 4326

BOUNDED AREA IS THE 'COMPOUND' AREA FOR CRYOGENIC LIQUID STORAGE COMPLIANT TO AS1894

BOUNDED AREA IS THE 'COMPOUND' AREA FOR WATER STORAGE, AND FLAMMABLE AND COMBUSTIBLE STORAGE COMPLIANT TO AS1940

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS
ANGULAR: ±0.00°
LINEAR NO DECIMAL ±0.20
LINEAR ONE DECIMAL ±0.10
LINEAR TWO DECIMAL ±0.05
SURFACE FINISH √ RA3.2
DO NOT SCALE DRAWING
BREAK ALL SHARP EDGES AND REMOVE BURRS

FIRST ANGLE PROJECTION

DRAWN: LUKE JACOBS
DRAWN DATE: 2022-01-18
APPROVED:
APPRVD DATE:

GILMOUR SPACE

TITLE: BOWEN ORBITAL SPACEPORT
WATER DELUGE SYSTEM
PROPOSED PAD LAYOUT

SIZE: A1 | DWG NO.: BOS-PADS-LAY | REV: A

SCALE: 1:100 | SHEET: 1 of 1

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

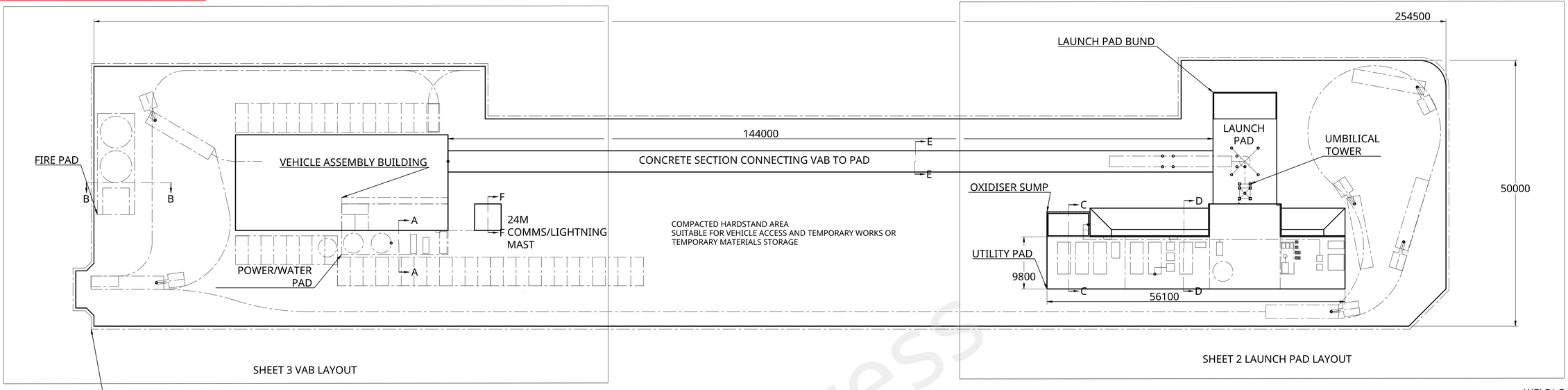
SDA approval: APC2022/007

Queensland Government

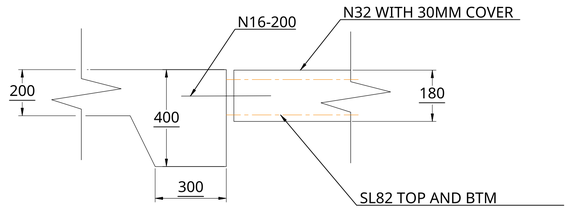
PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

SDA approval: APC2024/006

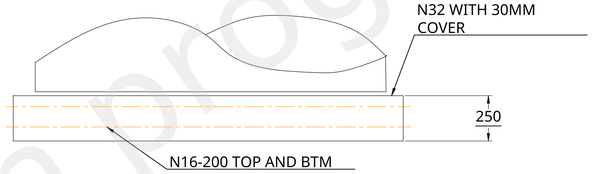
Queensland Government



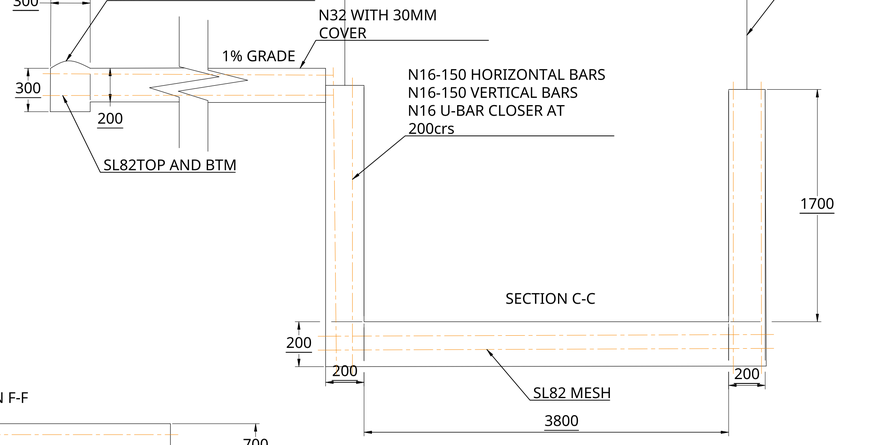
1:400



SECTION A-A

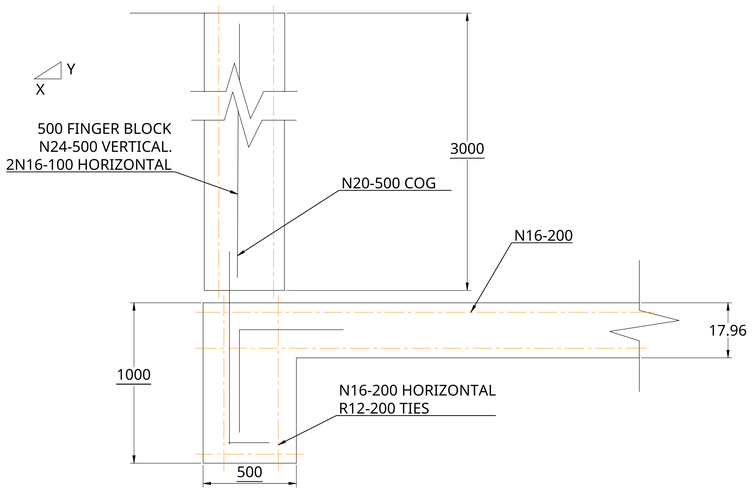


SECTION B-B

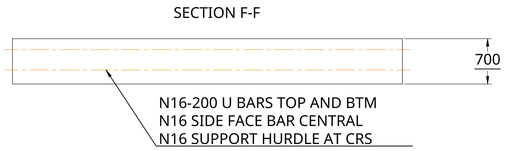


SECTION C-C

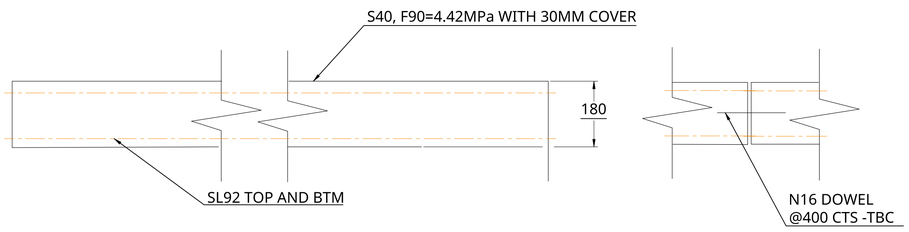
SLAB CROSS SECTIONS



SECTION D-D



SECTION F-F



SECTION E-E

JOINTING DETAIL

NOTES.
1. ENCIRCLING GRAVEL ROADWAYS CLEARANCE SUFFICIENT TO FIREBREAK ALL PROPOSED INFRASTRUCTURE.

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS
ANGULAR ± ±0.06°
LINEAR NO DECIMAL ±0.20
LINEAR ONE DECIMAL ±0.10
LINEAR TWO DECIMAL ±0.05
SURFACE FINISH √ RA3.2
DO NOT SCALE DRAWING
BREAK ALL SHARP EDGES AND REMOVE BURRS

THIRD ANGLE PROJECTION

DRAWN	ADAM WILLIAMS
DRAWN DATE	2022-09-07
APPROVED	
APPRVD DATE	

GILMOUR SPACE

TITLE: BOWEN ORBITAL SPACEPORT LAYOUT DESIGN

SIZE A1 | DWG NO. BOS PADS LAY | REV. 5

SCALE 1:400 | SHEET 1 of 3

NOTE.
NO AS/NZZS 60079 HAZARDOUS AREAS.
HOWEVER, PRACTICAL CONSIDERATIONS TO BE CONSIDERED FOR KEROSENE STORAGE.

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: APC2022/007

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SDA approval: APC2024/006

SECURITY FEBNCE
2.3M

COMPACTED HARDSTAND AREA
SUITABLE FOR VEHICLE ACCESS AND TEMPORARY WORKS OR TEMPORARY MATERIALS STORAGE

CONCRETE PAVED ROAD BETWEEN VEHICLE ASSEMBLY BUILDING AND THE LAUNCH PAD

LAUNCH PAD WATER BUND

12000

LAUNCH PAD

16000

0.5% GRADE FLOW FROM WATER DELUGE DIVERTER

CONTROL POINT
GDA2020
X = 616525.0515
Y = 7792767.5660

19m SEMI TURNING PATH

MAIN OXIDISER DUMP
26m3
HANDRAILS EXCLUSION

EARTHEN BERM
BUILDUP 1V:2H
RETAINED BY CONCRETE WALL

CONCRETE WALL 3m

FLUIDS PIPING ALIGNMENT

EARTHEN BATTER AND PARTITION WALL
BUILDUP 1V:2H
RETAINED BY CONCRETE WALL

CONCRETE WALL 3m

FLUIDS PIPING ALIGNMENT

9800

HP PUMP

AS4326 STORAGE BOUNDARY

LOX PUMP

LN2 VAPORISERS

AS1894 STORAGE BOUNDARY

WATER DELUGE PUMP

20 kL POLY TANK

AS1940 STORAGE BOUNDARY

GAS PUMPS

GAS MANPACKS

RP STORAGE

GENSET 65 kVA

DIESEL TANK

ISO TANK STORAGE LOCATION FOR H2O2

20ft ISO TANK STORAGE LOCATION FOR LIQUID NITROGEN

20ft ISO TANK STORAGE LOCATION FOR LIQUID OXYGEN

COMPOUND FOR FLAMMABLE AND COMBUSTIBLE STORAGE. AS 1940 COMPLIANT

14700 | 15900 | 13300 | 12200

3:1BATTER TRANSITION FROM ROADBASE HARDSTAND TO SWALE

GILMOUR SPACE

SIZE	DWG NO.	REV.
A1	BOS PADS LAY	5
SCALE 1:100	DO NOT SCALE DRAWING	SHEET 2 of 3

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

SDA approval: APC2024/006

Queensland Government

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

SDA approval: APC2022/007

Queensland Government

144kL FIREWATER TANK

144kL FIREWATER TANK

FIRE SHED

VEHICLE ASSEMBLY BUILDING
100KW SOLAR ON ROOF

18000

40000

ABLUTIONS

WORKBAYS GROUND LEVEL
OFFICE SPACES LEVEL 1

24M MAST LOCATION

5000

5000

LIGHT VEHICLE TURN

HEAVY VEHICLE TURN

19M SEMI

200KWh SOLAR BATTERY AND INVERTER

BURIED PUMP OUT SPETIC

20kL POTABLE WATER TANK

SELF BUNDED 3kL DEISEL TANK

176kVA BACKUP GENERATOR

COMPACTED ROADBASE AREA
SUITABLE FOR VEHICLE ACCESS AND TEMPORARY WORKS OR TEMPORARY MATERIALS STORAGE

SECURITY GATE WITH ACCESS CONTROL

3:1BATTER TRANSITION FROM ROADBASE HARDSTAND TO SWALE

SECURITY FEBNCE 2.3M

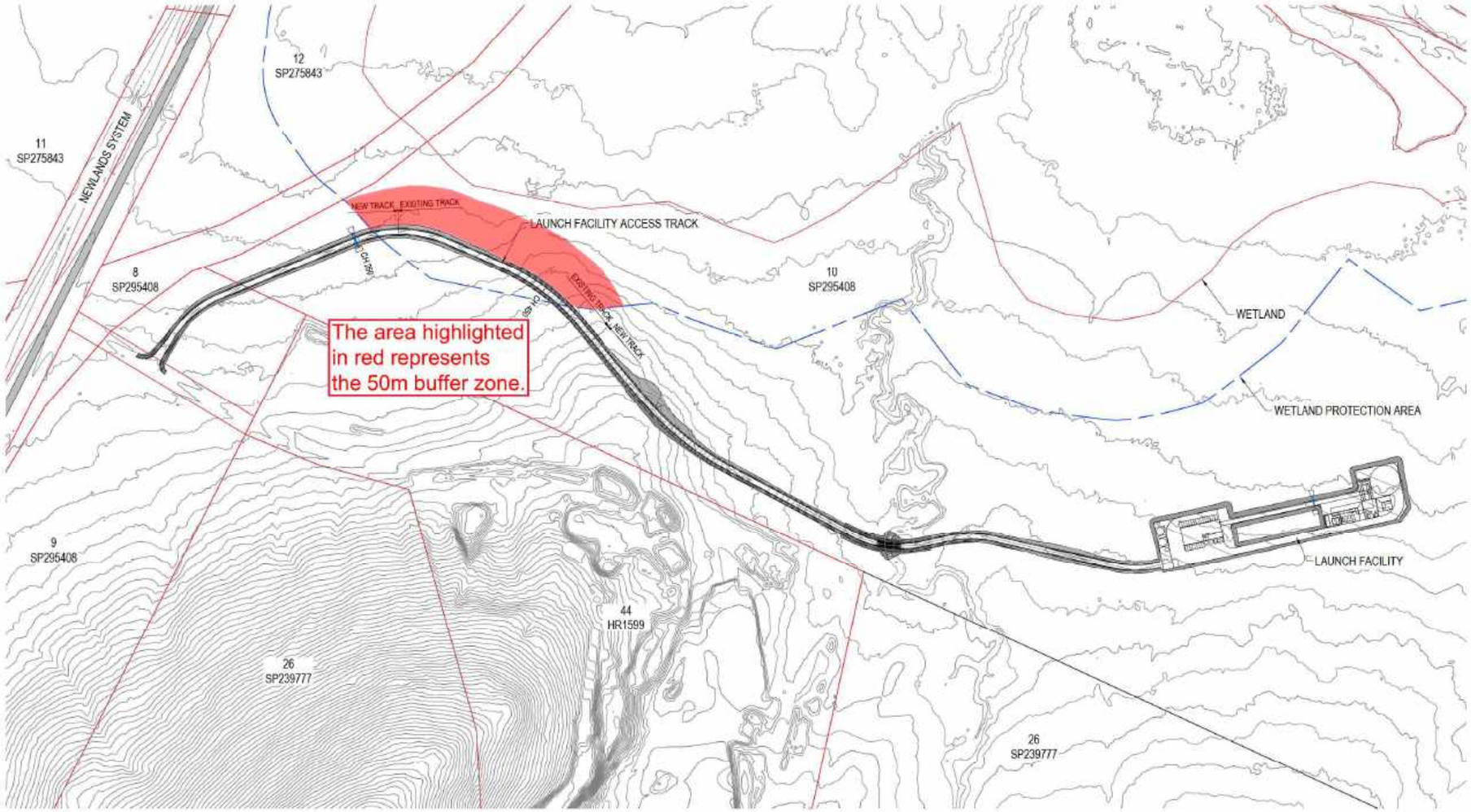
GILMOUR SPACE

SIZE	DWG NO.	REV
A1	BOS PADS LAY	5
SCALE 1:120	DO NOT SCALE DRAWING	SHEET 3 of 3

BOWEN ORBITAL SPACE PORT

BULK EARTHWORKS, ACCESS ROAD AND STORMWATER

Amended by the Department of Environment and Science to show approximate location of 50m buffer zone.
Date: 18/03/2022



LOCALITY PLAN
SCALE 1:2,500

ACCESS ROAD - DRAWING INDEX

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: APC2024/006

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: AP2021/007

No	DESCRIPTION	DATE
E	FOR APPROVAL	09.02.2022
D	FOR APPROVAL	08.02.2022
C	FOR APPROVAL	02.02.2022
B	FOR APPROVAL	19.01.2022
A	FOR REVIEW	23.11.2021

REVISION HISTORY

i³ consulting pty ltd
engineering consultants
innovation, ingenuity, inspiration

SUNMOUR SPACE

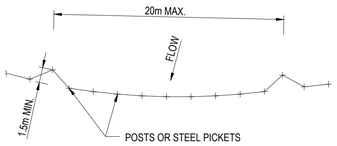
Engineers Certification:
Travis Smith MIE Aust. CPEng.
NPER Civil
RPEQ 16400
CPESC 9500
Signature: T. Smith
Date: 09 / 02 / 2022

PROJECT: BOWEN ORBITAL SPACE PORT

DRAWING TITLE: BOWEN ORBITAL SPACE PORT
ACCESS ROAD
LOCALITY PLAN AND DRAWING INDEX

DRAWN	T.J.S.	CHECKED	T.J.S.	APPROVED	T.J.S.
DRAWING STATUS	FOR APPROVAL				
SCALE	NTS	SIZE	A1		

DRAWING CODE: GSLF-I3C-CV-DWG-001-01
REV: E



SILT FENCE PLAN

ENSURE POST HOLES AND TRENCH ARE PROPERLY BACKFILLED AND COMPACTED

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

SDA approval: AP2021/007

Queensland Government

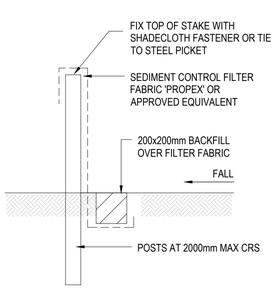
TABLE DRAINS & CUTOFF DRAINS - SCOUR PROTECTION TREATMENTS				
GRADE < 2.5%	2.5% < GRADE < 5%	5% < GRADE < 7%	7% < GRADE < 10%	GRADE > 10%
TOP SOILED & GRASSED	TOP SOILED & GRASSED WITH ROCK CHECK DAMS AT 20m CENTRES	TOP SOILED & GRASSED WITH ROCK CHECK DAMS AT 10m CENTRES	TOP SOILED & GRASSED WITH ROCK CHECK DAMS AT 5m CENTRES	ROCK LINED WITH COMPACTED D50=100mm CRUSHED ROCK (150mm THICK)

OPERATION & MAINTENANCE NOTES

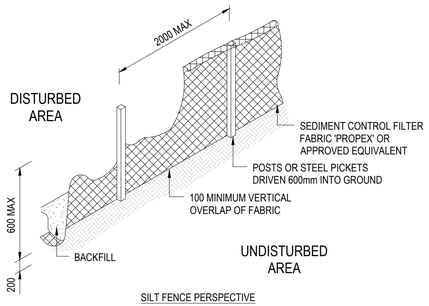
ALL ESC MEASURES MUST BE INSPECTED:
- AT LEAST DAILY (WHEN WORK IS OCCURRING ON SITE) OR WEEKLY (WHEN WORK IS NOT OCCURRING ON SITE);
- WITHIN 24 HOURS OF EXPECTED RAIN; AND
- WITHIN 18 HOURS OF A RAINFALL EVENT (ie AN EVENT OF SUFFICIENT INTENSITY AND DURATION TO MOBILISE SEDIMENT ON SITE).

ESC MEASURE	MAINTENANCE TRIGGER	TIMEFRAME FOR COMPLETION OF MAINTENANCE
OTHER ESC MEASURES	THE CAPACITY OF ESC MEASURES FALLS BELOW 30%.	WITHIN 7 DAYS OF THE INSPECTION.

PRIOR TO LONG PERIOD OF SHUT DOWN ALL ESC MEASURES TO BE INSPECTED AND CLEANED.



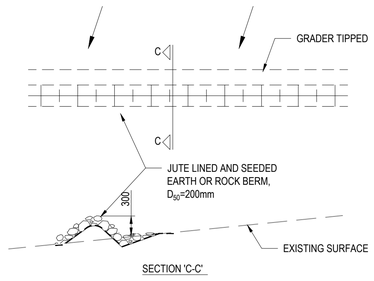
SILT FENCE SECTION



SILT FENCE PERSPECTIVE

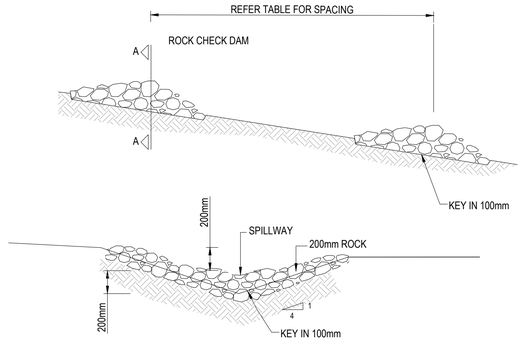
SILT FENCE

OR



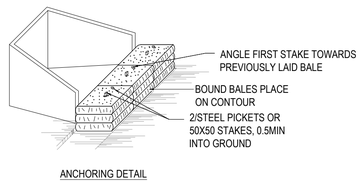
SECTION 'C-C'

CORNER TIP SILT TRAP

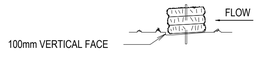


CROSS SECTION 'A-A' AT CREST OF CHECK DAM

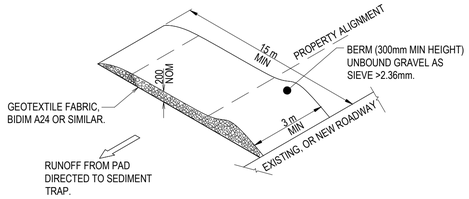
SILT ENTRAPMENT OPTIONS



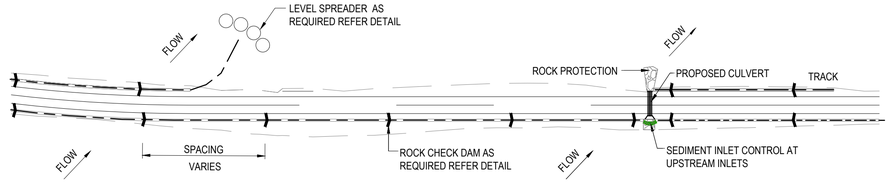
ANCHORING DETAIL



BEDDING DETAIL



ROCK CHECK DAM DETAIL



EROSION & SEDIMENT CONTROL NOTES

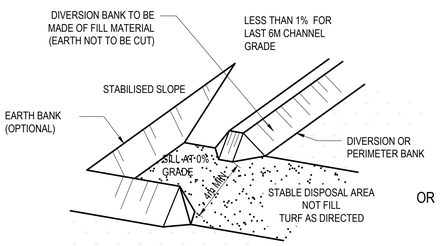
1. CONSTRUCTION OF ALL SEDIMENT MANAGEMENT DEVICES SHALL BE COMPLETED AND EFFECTIVE PRIOR TO:
   - STRIPPING OF TOPSOIL AND GRASS
   - BULK EARTHWORKS TO THE SITE .
   - SERVICE INSTALLATION
2. PRIOR TO CLEARING, AREAS OF PROTECTED VEGETATION AND SIGNIFICANT AREAS OF RETAINED VEGETATION SHALL BE CLEARLY IDENTIFIED (WITH HIGH VISIBILITY TAPE OR SIMILAR) FOR THE PURPOSES OF MINIMISING THE RISK OF UNNECESSARY CLEARING.
3. ESC FOR DRAINS AND DISTURBED AREAS SHOULD BE PROVIDED IN ORDER OF PREFERENCE FROM SITE ENGINEER
   - SCARIFY AND GRASS SEED
   - SCARIFY, JUTE MAT AND GRASS SEED
   - SHOT ROCK AROUND CULVERT INLETS AND OUTLETS
   - SHOT ROCK CHECK DAMS IN TABLE DRAINS WHERE REQUIRED
4. ENSURE NO RUN OFF OR SEDIMENT DISCHARGES TO ROAD, LAND, DRAINAGE LINES, WATER BODIES OR ADJOINING PROPERTIES.
5. CONTRACTOR TO NOMINATE SITE REPRESENTATIVE TO BE RESPONSIBLE FOR THE IMPLEMENTATION AND UP KEEP OF THE EROSION AND SEDIMENT MANAGEMENT CONTROLS.
6. ALL EROSION AND SEDIMENT CONTROLS ARE TO REMAIN UNTIL WRITTEN NOTICE FROM SUPERINTENDENT.
7. BOTH TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROLS SHALL BE MAINTAINED DURING CONSTRUCTION.
8. SEDIMENT FENCES ARE TO BE CLEANED OUT WHEN CAPACITY IS REDUCED BY 30%.
9. IF EROSION AND SEDIMENT CONTROL DEVICES HAVE BEEN FOUND TO BE DEFICIENT OR FAILED IN SERVICE, DUE TO UNFORESEEN CIRCUMSTANCES, CORRECTIVE ACTION IS TO BE UNDERTAKEN IMMEDIATELY WHICH MAY INCLUDE AMENDMENTS/ADDITIONS TO THE ORIGINAL APPROVED EROSION CONTROL PLANS. SUCH ADDITIONS OR AMENDMENTS ARE TO BE APPROVED BY SUPERINTENDENT.
10. THE INSTALLATION, REMOVAL, RELOCATION OR MODIFICATION TO EROSION AND SEDIMENT CONTROL DEVICES MAY BE MADE BY THE UNITED GREEN ENVIRONMENTAL ADVISOR/S, IF DEEMED NECESSARY AND RELEVANT.
11. ALL TEMPORARY EARTH BANKS, FLOW DIVERSION SYSTEMS AND EMBANKMENTS SHALL BE MACHINE-COMPACTED AND STABILISED WITH APPROPRIATE COVER APPROVED BY SUPERINTENDENT WITHIN 10 DAYS OF DISTURBANCE .
12. ALL EARTHWORKS ENVIRONMENTAL CONTROLS SHALL BE GENERALLY IN ACCORDANCE WITH 'MANAGING URBAN STORMWATER: SOILS AND CONSTRUCTION' BY LANDCOM.
13. SILT FENCE OR COIR LOGS MAY BE USED AS AN ALTERNATE TO HAY BALES AT DRAINAGE INLETS.
14. SHAKEDOWNS TO BE CONSTRUCTED AT EXITS TO COUNCIL ROADS OR WHERE DEEMED NECESSARY BY SUPERINTENDENT.

SOIL AND STOCKPILE MANAGEMENT

1. STOCKPILES SHALL BE APPROPRIATELY PROTECTED FROM THE WIND, RAIN, CONCENTRATED SURFACE FLOW AND EXCESSIVE UP-SLOPE STORMWATER SURFACE FLOWS.
2. STOCKPILES SHALL BE LOCATED UPSTREAM OF AN APPROPRIATE SEDIMENT CONTROL SYSTEM. IF THE MATERIALS ARE LIKELY TO BE STOCKPILED FOR LONGER THAN 28 DAYS THEY SHALL BE PROTECTED BY PROVIDING AN APPROPRIATE COVER APPROVED BY SUPERINTENDENT WITHIN 10 DAYS.

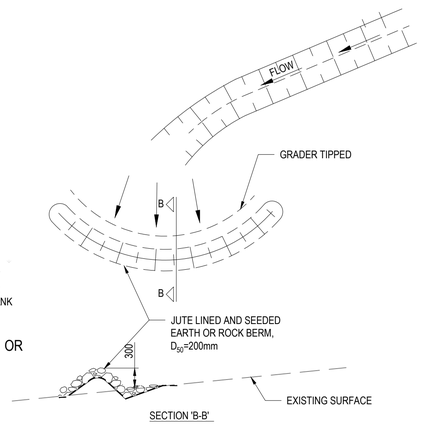
INLET CONTROL DETAIL

SHAKEDOWN DETAIL



BANK LEVEL SPREADER

OR



SECTION 'B-B'

CORNER TIP LEVEL SPREADER

TYPICAL ROAD/ CULVERT SEDIMENT AND EROSION CONTROL PLAN

SCALE 1:1000

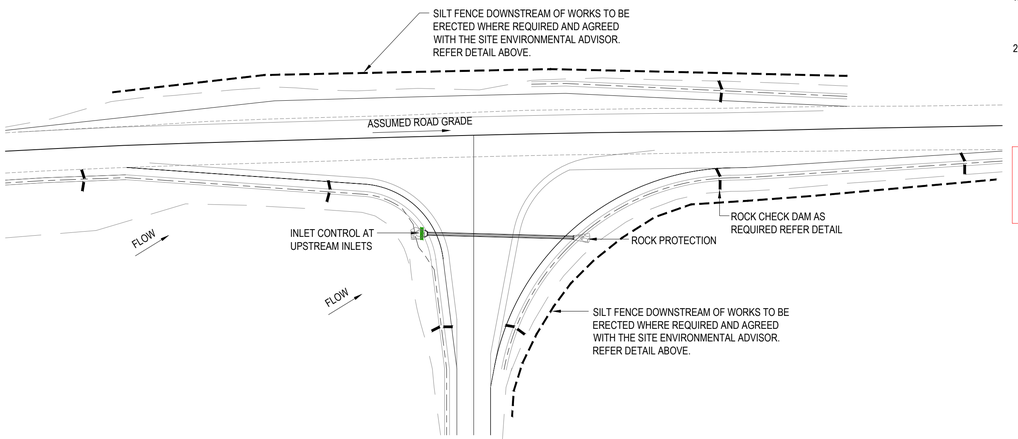


TABLE DRAINS, CATCH DRAINS AND DIVERSION DRAINS SHALL BE STABILISED WITH APPROPRIATE COVER APPROVED BY SUPERINTENDENT AND SUPPLEMENTED WITH ROCK WEIRS AS DETAILED.

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

SDA approval: APC2024/006

Queensland Government

LEVEL SPREADER OPTIONS

TYPICAL INTERSECTION SEDIMENT AND EROSION CONTROL PLAN

SCALE 1:500

No	DESCRIPTION	DATE
D	FOR APPROVAL	08.02.2022
C	FOR APPROVAL	02.02.2022
B	FOR APPROVAL	19.01.2022
A	FOR REVIEW	23.11.2021

REVISION HISTORY

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GILMOUR SPACE

Engineers Certification:
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NPER Civil
RPEQ 16400
CPESC 9500
Signature: T. Smith
Date: 08 / 02 / 2022

PROJECT
BOWEN ORBITAL SPACE PORT

DRAWING TITLE
BOWEN ORBITAL SPACE PORT
ACCESS ROAD
SEDIMENT AND EROSION CONTROL TYPICAL DETAILS

DRAWN	T.J.S.	CHECKED	T.J.S.	APPROVED	T.J.S.
DRAWING STATUS	FOR APPROVAL				
SCALE	NTS	SIZE	A1		

DRAWING CODE
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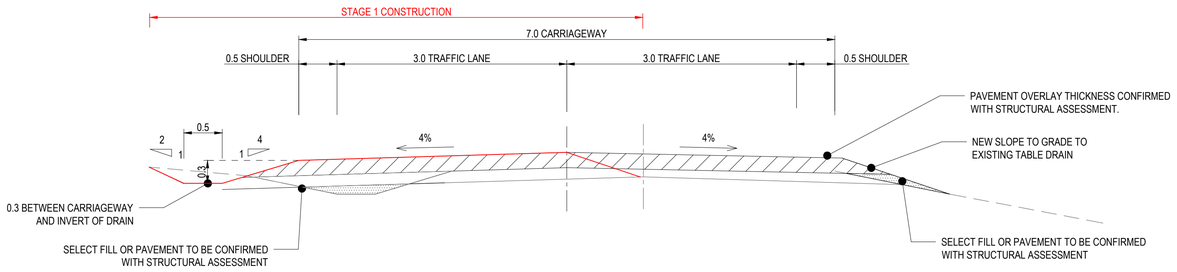
REV
D



TYPICAL CROSS SECTION 1 - GRAVEL SECTION

SCALE NTS

BEDDING LEGEND

- EVENLY GRADED BED, 20mm NOMINAL SIZE CLASS 2 FCR OR OTHER APPROVED BEDDING
- CLASS 3 FCR, 30mm NOMINAL SIZE OR OTHER APPROVED MATERIAL

GENERAL NOTES

1. ALL DIMENSIONS WITH DECIMALS ARE IN METRES, ALL THOSE WITHOUT ARE IN MILLIMETRES
2. BACKFILL SHALL BE COMPACTED TO 98% STANDARD MDD COMPACTED AT ± 3% OMC. PAVEMENT LAYERS SHALL BE AS PER TYPICAL ACCESS TRACK DRAWING ###

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: AP2021/007

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: APC2024/006

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GILMOUR SPACE

Engineers Certification:
Travis Smith MIE Aust. CPEng.
NPER Civil
RPEQ 16400
CPESC 9500
Signature: T.J.S.
Date: 08 / 02 / 2022

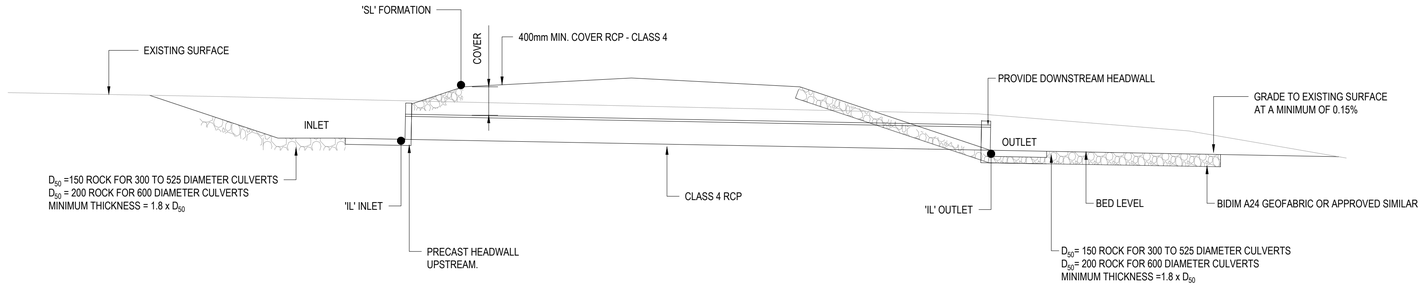
PROJECT
BOWEN ORBITAL SPACE PORT

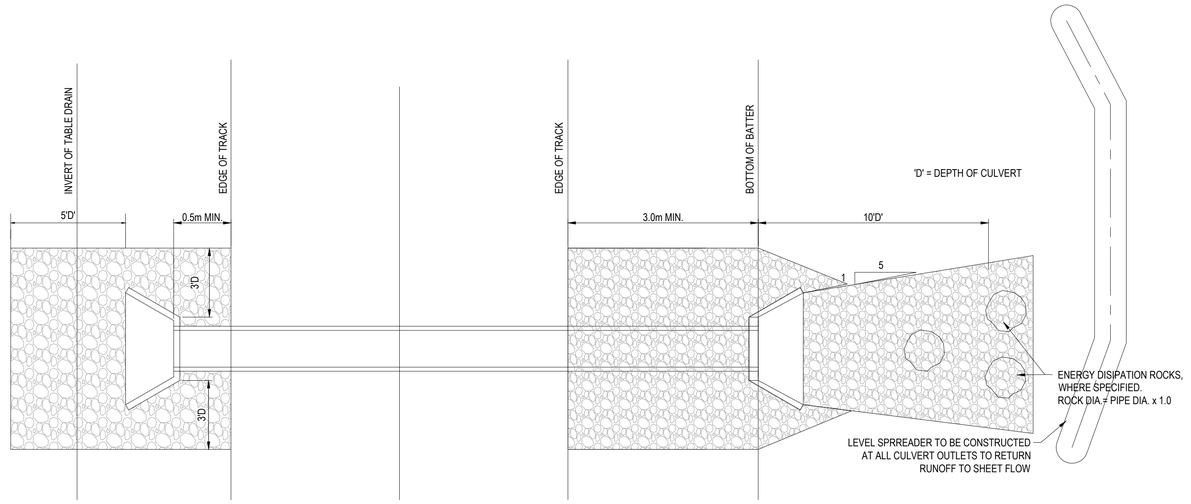
DRAWING TITLE
BOWEN ORBITAL SPACE PORT
ACCESS ROAD
TYPICAL NOTES AND DETAILS - SHEET 1 OF 3

DRAWN	J.M.	CHECKED	T.J.S.	APPROVED	T.J.S.
DRAWING STATUS	FOR APPROVAL				
SCALE	NTS	SIZE	A1		

DRAWING CODE
GSLF-I3C-CV-DWG-003-01

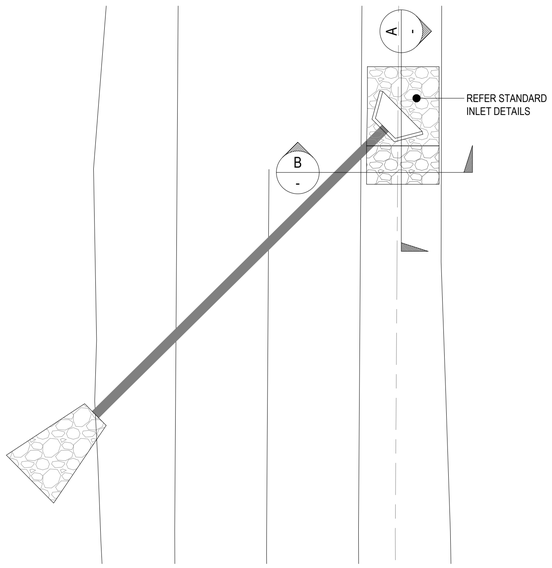
REV
D





STORMWATER RCP CULVERT DETAIL - 0.4m TO 2.0m COVER

NTS



STORMWATER BUND DETAIL

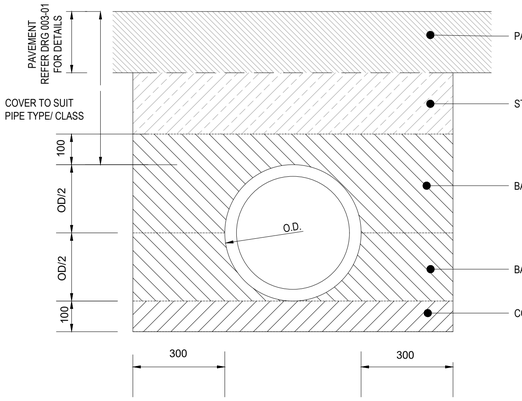
NTS

A - STORMWATER BUND SECTION

NTS

B - STORMWATER BUND SECTION

NTS



RCP TRENCH DETAIL

NTS

BEDDING LEGEND

EVENLY GRADED BED, 20mm NOMINAL SIZE CLASS 2 FCR OR OTHER APPROVED BEDDING

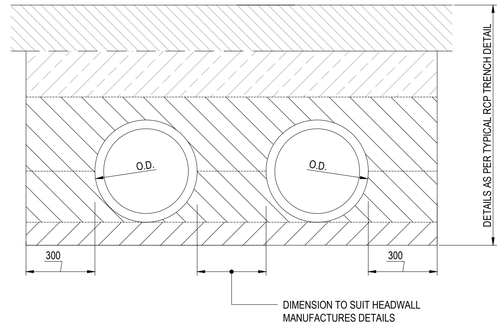
CLASS 3 FCR, 30mm NOMINAL SIZE OR OTHER APPROVED MATERIAL

DRAINAGE NOTES

1. THE USE OF FIBRE REINFORCED CONCRETE CULVERTS IS NOT APPROVED.
2. RCP-CLASS 4 PIPES WITH LESS THAN 400mm COVER MUST BE CONCRETE ENCASED.

GENERAL NOTES

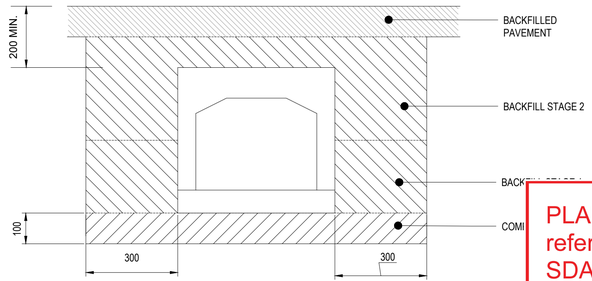
1. ALL DIMENSIONS WITH DECIMALS ARE IN METRES, ALL THOSE WITHOUT ARE IN MILLIMETRES
2. BACKFILL SHALL BE COMPACTED TO 98% STANDARD MDD COMPACTED AT ± 3% OMC. PAVEMENT LAYERS SHALL BE AS PER TYPICAL ROAD DETAILS.



TRENCH DIMENSIONS	
PIPE SIZE	'X' MINIMUM
300 DIA	0.15m
375 DIA	0.175m
450 DIA	0.2m

MULTI BARREL - RCP DETAIL

NTS



NOTE:
IF BOTTOM OF PAVEMENT IS ABOVE 100mm ABOVE THE TOP OF CULVERT,

RCBC TRENCH DETAIL

NTS

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

SDA approval: APC2024/006

Queensland Government

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

SDA approval: AP2021/007

Queensland Government

REVISION HISTORY

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GILMOUR SPACE

Engineers Certification:
Travis Smith MIE Aust. CPEng.
NPER Civil
RPEQ 16400
CPESC 9500
Signature: T. Smith
Date: 08 / 02 / 2022

PROJECT
BOWEN ORBITAL SPACE PORT

DRAWING TITLE
BOWEN ORBITAL SPACE PORT
ACCESS ROAD
TYPICAL NOTES AND DETAILS - SHEET 2 OF 3

DRAWN	T.J.S.	CHECKED	T.J.S.	APPROVED	T.J.S.
DRAWING STATUS	FOR APPROVAL				
SCALE	NTS	SIZE	A1		

DRAWING CODE
GSLF-I3C-CV-DWG-003-02

REV
D

GENERAL NOTES

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS. THE PROJECT SPECIFICATION SHALL TAKE PRECEDENCE OVER THESE GENERAL NOTES.
2. BEFORE PROCEEDING WITH THE WORK ANY DISCREPANCIES IN THE CONTRACT DOCUMENTS SHALL BE REFERRED FOR DECISION TO THE DESIGN ENGINEER.
3. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT EDITIONS INCLUDING AMENDMENTS OF THE RELEVANT GLADSTONE REGIONAL COUNCIL STANDARDS, TMR STANDARDS, QLD CODES OF PRACTICE.
4. PROVIDE AS-CONSTRUCTED SURVEY FOR ALL WORKS.

EROSION & SEDIMENT CONTROL NOTES

1. REFER TO SITE ENTRY INTERSECTION UPGRADE TYPICAL EROSION AND SEDIMENT CONTROL DRAWING GSLF-I3C-CV-DWG-002-01

PAVEMENT NOTES

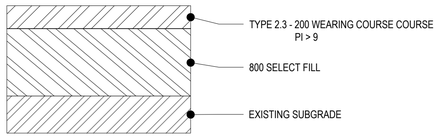
1. ALL PAVEMENTS ARE BASED ON A SOUND AND TRAFFICABLE SUBGRADE.
2. WET AND/ OR SOFT AREAS FAILING THE SUBGRADE PROOF ROLL TEST MAY REQUIRE SOME FORM OF SUBGRADE IMPROVEMENT.
3. THE DESIGN ENGINEER SHALL BE CONSULTED TO ASSESS OPTIONS SUCH AS;
   - LIME STABILISATION
   - GEOTEXTILE STRENGTHENING
   - COARSE ROCKFILL STRENGTHENING
   - SUBGRADE REPLACEMENT

   OR A COMBINATION OF ALL THESE OPTIONS.

STORMWATER NOTES AND DETAILS

1. REFER TO GSLF-I3C-CV-DWG-003-02 FOR TYPICAL STORMWATER NOTES AND DETAILS
2. REFER TO GSLF-I3C-CV-DWG-007-SERIES AND 008 SERIES FOR CAUSEWAY SPECIFIC NOTES. CAUSEWAY SPECIFIC NOTES TAKE PRECEEDENCE OVER GENERAL NOTES FOR THOSE ITEMS.

TYPICAL PAVEMENT SECTION - UNSEALED

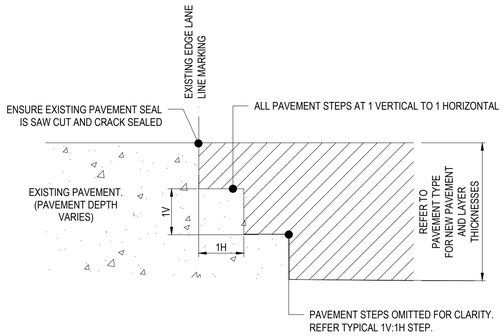


ROAD WORKS NOTES

1. GENERAL:
   - A. EACH PAVEMENT COURSE SHALL NOT TO BE COMMENCED UNTIL THE PREVIOUS COURSE (I.E. SUBGRADE, SUB-BASE, BASE OR EXISTING PAVEMENT) HAS BEEN INSPECTED AND APPROVED WITH RESPECT TO COMPACTION, FINISHED LEVELS AND TEXTURE OF FINISH.
   - B. COMPACTION TESTS OF EACH LAYER ARE REQUIRED, AND THE ENGINEER SHALL ENSURE THAT ALL TESTS MEET SPECIFICATION BEFORE PROCEEDING TO THE NEXT LAYER.
   - C. SUBGRADE AFFECTED BY RAINFALL AFTER FINAL TRIMMING SHALL NOT BE ACCEPTED UNTIL APPROPRIATE DRYING OUT, TESTING AND PROOF-ROLLING TREATMENT HAS BEEN EFFECTED.
   - D. UNBOUND PAVEMENT COURSE MATERIAL SHALL BE KEPT AT OPTIMUM MOISTURE CONTENT AT ALL TIMES.
   - E. MINIMUM COMPACTED LAYER THICKNESS SHALL BE 100 mm, WITH THE MAXIMUM COMPACTED THICKNESS NOT EXCEEDING 200 mm.
2. COMPACTION TESTING:
   - A. DETERMINATION OF THE COMPACTION PERFORMANCE OF THE EARTHWORKS, SUBGRADE AND PAVEMENT GRAVEL MATERIALS (I.E. LABORATORY REFERENCE DENSITY, FIELD DENSITY, OPTIMUM MOISTURE CONTENT, FIELD MOISTURE CONTENT) SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 1289 METHODS OF TESTING SOILS FOR ENGINEERING PURPOSES, IN PARTICULAR THE E SERIES TESTS.
   - B. THE FREQUENCY OF TESTING SHALL BE AS SPECIFIED IN THE DTMR GUIDELINES.
   - C. A LOT LAYOUT PLAN SHOWING THE LOCATION OF THE TESTS SHALL BE SUBMITTED TO THE ENGINEER WITH THE TEST RESULTS.
   - D. ALL TESTS ARE TO BE DISTRIBUTED REASONABLY EVENLY THROUGH THE FULL DEPTH AND AREA OF PAVEMENT.
   - E. FAILURE OF MATERIAL QUALITY TESTS WILL REQUIRE REMOVAL OF THE MATERIAL OR FURTHER IN SITU TESTING.
   - F. FAILURE OF COMPACTION TESTS WILL REQUIRE:
     RETESTING AT THE SAME DEPTH AND LOCATION IF THE FAILURE IS MINOR (E.G. LOCALISED SINGLE FAILURE BY 1%–3%)
     REMOVAL OR REWORKING OF MATERIAL IF THE FAILURE IS SIGNIFICANT OR WIDESPREAD.

BULK EARTHWORKS NOTES

1. WORKS SHALL BE EXECUTED BY THE CONTRACTOR IN ACCORDANCE WITH AS3798 - 2007, "GUIDELINES FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS" AND SHALL BE SUPERVISED BY AND APPROVED GEOTECHNICAL TESTING AUTHORITY, (GTA) AS DEFINED IN THE CODE TO A LEVEL 2 STANDARD.
2. FOLLOWING INITIAL MOBILISATION AND PRIOR TO STRIPPING OF THE SITE, THE CONTRACTOR SHALL IMMEDIATELY UNDERTAKE THE EROSION AND SEDIMENT RUNOFF PREVENTION MEASURES.
3. FOLLOWING THE STRIPPING OF THE UPPER ORGANIC SOIL, THE SITE SHALL BE PROOF ROLLED TO IDENTIFY ANY SOFT SPOTS OR FURTHER SIGNS OF UNSUITABLE MATERIAL. ANY SUCH AREAS SHALL BE RECTIFIED PRIOR TO COMMENCEMENT OF FILLING OPERATIONS.
4. FILLING SHALL BE COMPLETED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS
   -WORKS TO BE IN ACCORDANCE WITH AS3798-2007
   -DEGREE OF COMPACTION TO BE AS FOLLOWS.
   -SUBGRADE COURSES LESS THAN 300mm BELOW DESIGN SURFACE LEVEL 98% SMDD.
   -SUBGRADE COURSES 300mm OR MORE BELOW DESIGN SURFACE LEVEL 95% SMDD.
   -SUBBASE COURSES 98% SMDD
   -BASE COURSES 98% SMDD
   -MATERIAL MOISTURE CONTENT TO BE IN THE RANGE OF ±3% OF OPTIMAL MOISTURE CONTENT (OMC)
   -THE EXPENSE OF TESTING IS ON THE CONTRACTOR
5. IT IS THE CONTRACTORS RESPONSIBILITY TO PROTECT THE SITE AND SURROUNDING AREAS FROM DAMAGE RESULTING FROM STORMWATER RUNOFF. TEMPORARY DIVERSION DRAINS AND OR OTHER DRAINAGE CONTROL DEVICES ARE TO BE IMPLEMENTED BY THE CONTRACTOR DURING CONSTRUCTION TO MINIMISE THE EFFECTS OF WEATHER. NO EXTENSIONS OF TIME WILL BE GRANTED SHOULD DAMAGE TO THE WORKS AND SURROUNDING AREAS RESULT FROM THE CONTRACTOR'S NEGLIGENCE IN NOT PROVIDING ADEQUATE PROTECTION.
6. EXCESS SPOIL MATERIAL GENERATED DURING CONSTRUCTION SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR.



PAVEMENT STEP DETAIL

NTS

LEGEND

- BOUNDARY
- EXISTING EDGE OF BITUMEN
- EXISTING EDGE OF TRACK
- EXISTING CULVERT
- NEW CULVERT
- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING TELSTRA
- EXISTING OVERHEAD POWERLINE
- EXISTING GAS MAIN
- EXISTING FENCE
- NEW STOCKPROOF FENCE
- DESIGN ROAD
- CULV - 1 — EXISTING CULVERT NOTATION
- CULV - 6036 — NEW CULVERT NOTATION
- MATCH LINE
- TABLE DRAIN OUTLET
- EXISTING CONTOURS (0.25m INTERVAL)
- DESIGN CONTOURS (0.05m INTERVAL)
- BH11 — BOREHOLE LOCATION AND IDENTIFIER
- SIGNPOST
- CONCRETE CAUSEWAY
- RIP RAP
- RIP RAP (LARGER ROCK - REFER DETAILS)

ROAD LAYOUT NOTES

1. ALL LINE MARKING, SIGNS, GUIDE POSTS, RRPM'S INSTALLATION SHALL BE IN ACCORDANCE WITH AS1742.2. (GUIDE POST SPACING SHOWN BELOW FOR REFERENCE).
2. ALL PAVEMENT MARKINGS SHALL BE WHITE AND RETRO-REFLECTIVE.
3. RRPM'S HAVE NOT BEEN SHOWN ON PLAN FOR CLARITY PURPOSES. RRPM'S SHALL BE INSTALLED IN ACCORDANCE WITH SECTION 5.6.5.2 OF AS1742.2.
4. CHEVRON ALIGNMENT MARKER SETOUT CURVES AS PER AS1742.2 FIGURE 4.8
5. CHEVRON ALIGNMENT MARKER SPACING AS PER AS1742.2 TABLE 4.3 (SHOWN BELOW FOR REFERENCE).
6. CURVE WIDENING TO BE DONE IN ACCORDANCE WITH AUSTROADS GUIDE TO ROAD DESIGN PART 3 (AGRDP3): SECTION 7.9 - PAVEMENT WIDENING ON HORIZONTAL CURVES, SPECIFICALLY TABLE 7.13 (SHOWN BELOW FOR REFERENCE). THE DESIGN VEHICLE IS A 19m PRIME MOVER AND SEMI TRAILER.

GUIDE POST SPACING (AS 1742.2)		
CURVE RADIUS (m)	OUTSIDE OF CURVE (m)	INSIDE OF CURVE (m)
LESS THAN 100	6	12
100-199	10	20
200-299	15	30
300-399	20	40
400-599	30	60
ON STRAIGHTS AND RADIUS 2000	300	300

SPACING OF CHEVRON ALIGNMENT MARKERS (AS 1742.2)		
CURVE RADIUS (m)	CAM SPACING (m) *	
	85th PERCENTILE APPROACH SPEED	
	LESS THAN 85 km/h	85 km/h AND GREATER
<50	10	6
50-99	12	8
100-149	18	12
150-199	24	16
200-249	30	20
250-300	36	24
>300	40	26

* THE SPACINGS IN THE TABLE ARE SUBJECT TO A TOLERANCE OF ± 10%

TABLE 7.13 AGRDP3 EXTRACT

19m PRIME MOVER AND SEMI TRAILER	
CURVE RADIUS (m)	WIDENING PER LANE (m)
<100	REFER AGRDP3
100-119	0.7
120-139	0.6
140-159	0.5
160-199	0.4
200-299	0.3
>=300	0

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: APC2024/006

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

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GILMOUR SPACE

Engineers Certification:
Travis Smith MIE Aust. CPEng.
NPER Civil
RPEQ 16400
CPESC 9500
Signature: T.
Date: 08 / 02 / 2022

PROJECT
BOWEN ORBITAL SPACE PORT

DRAWING TITLE
BOWEN ORBITAL SPACE PORT
ACCESS ROAD
TYPICAL NOTES AND DETAILS - SHEET 3 OF 3

DRAWN	T.J.S.	CHECKED	T.J.S.	APPROVED	T.J.S.
DRAWING STATUS	FOR APPROVAL				
SCALE	NTS	SIZE	A1		

DRAWING CODE
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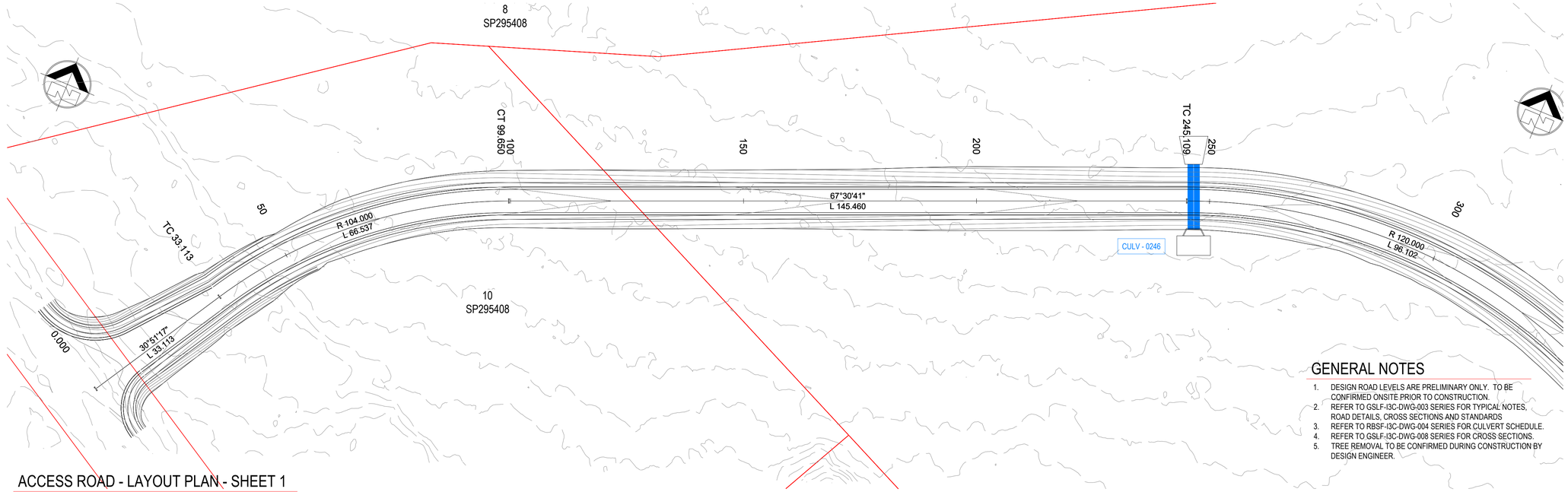

LEGEND

- BOUNDARY
- EXISTING EDGE OF BITUMEN
- EXISTING EDGE OF TRACK
- EXISTING CULVERT
- NEW CULVERT
- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING TELSTRA
- EXISTING OVERHEAD POWERLINE
- EXISTING GAS MAIN
- EXISTING FENCE
- NEW STOCKPROOF FENCE
- DESIGN ROAD
- CULV - 1 — EXISTING CULVERT NOTATION
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- EXISTING CONTOURS (0.25m INTERVAL)
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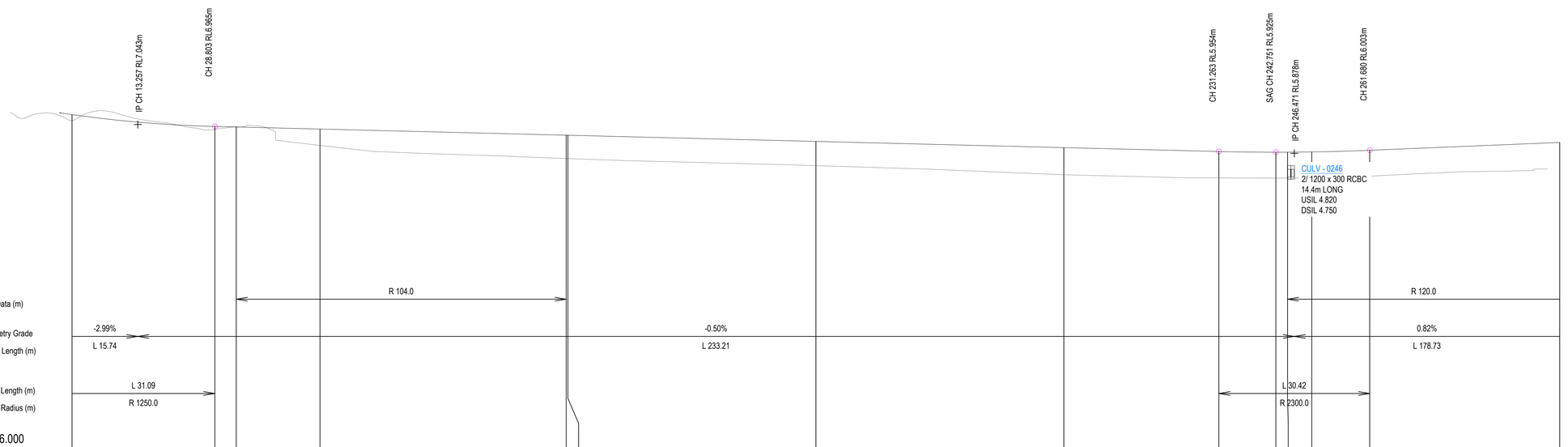
- BH11 — BOREHOLE LOCATION AND IDENTIFIER
- SIGNPOST
- CONCRETE CAUSEWAY
- RIP RAP
- RIP RAP (LARGER ROCK - REFER DETAILS)

GENERAL NOTES

1. DESIGN ROAD LEVELS ARE PRELIMINARY ONLY. TO BE CONFIRMED ONSITE PRIOR TO CONSTRUCTION.
2. REFER TO GSLF-I3C-DWG-003 SERIES FOR TYPICAL NOTES, ROAD DETAILS, CROSS SECTIONS AND STANDARDS
3. REFER TO RBSF-I3C-DWG-004 SERIES FOR CULVERT SCHEDULE.
4. REFER TO GSLF-I3C-DWG-008 SERIES FOR CROSS SECTIONS.
5. TREE REMOVAL TO BE CONFIRMED DURING CONSTRUCTION BY DESIGN ENGINEER.

ACCESS ROAD - LAYOUT PLAN - SHEET 1

SCALE 1:500



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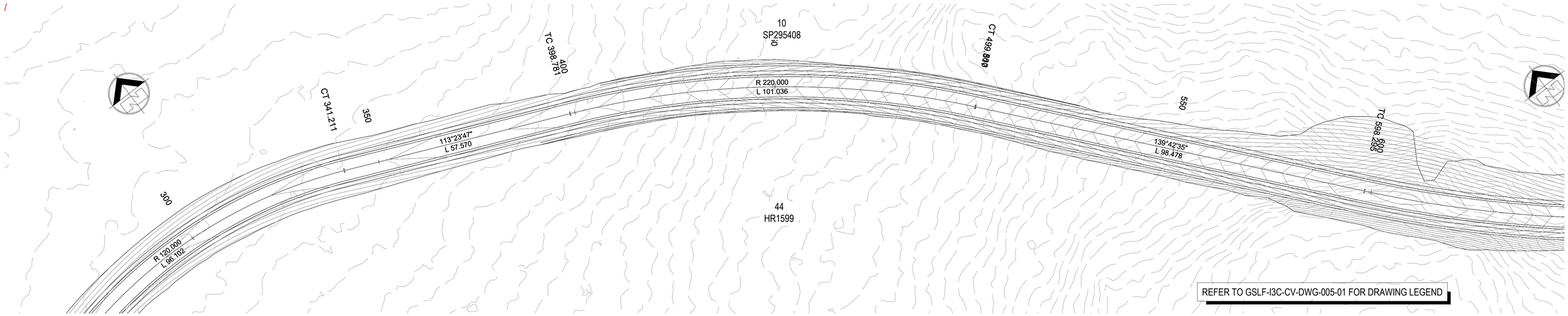
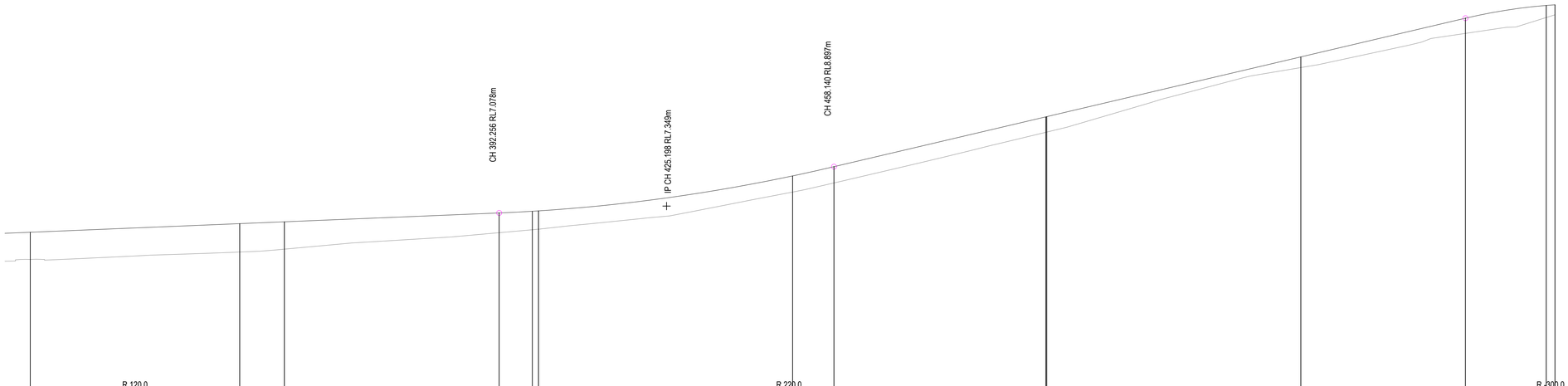


ACCESS ROAD - LAYOUT PLAN - SHEET 2

SCALE 1:500



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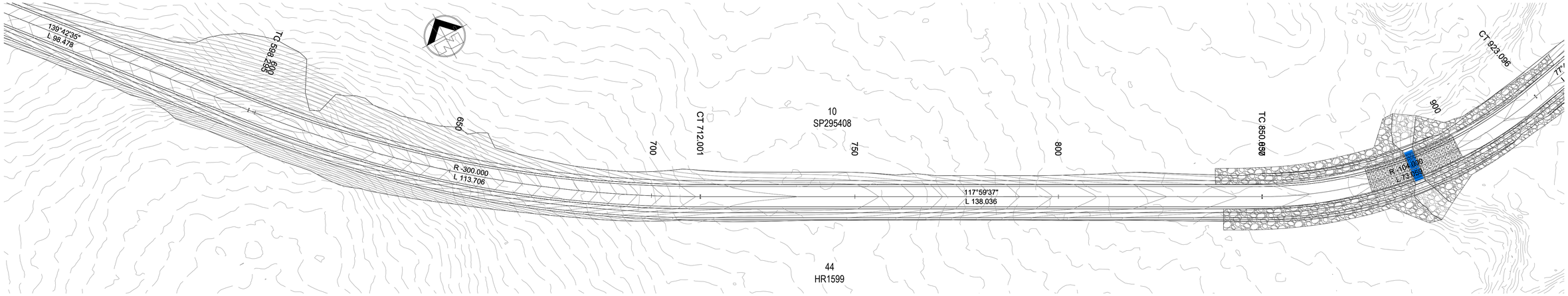
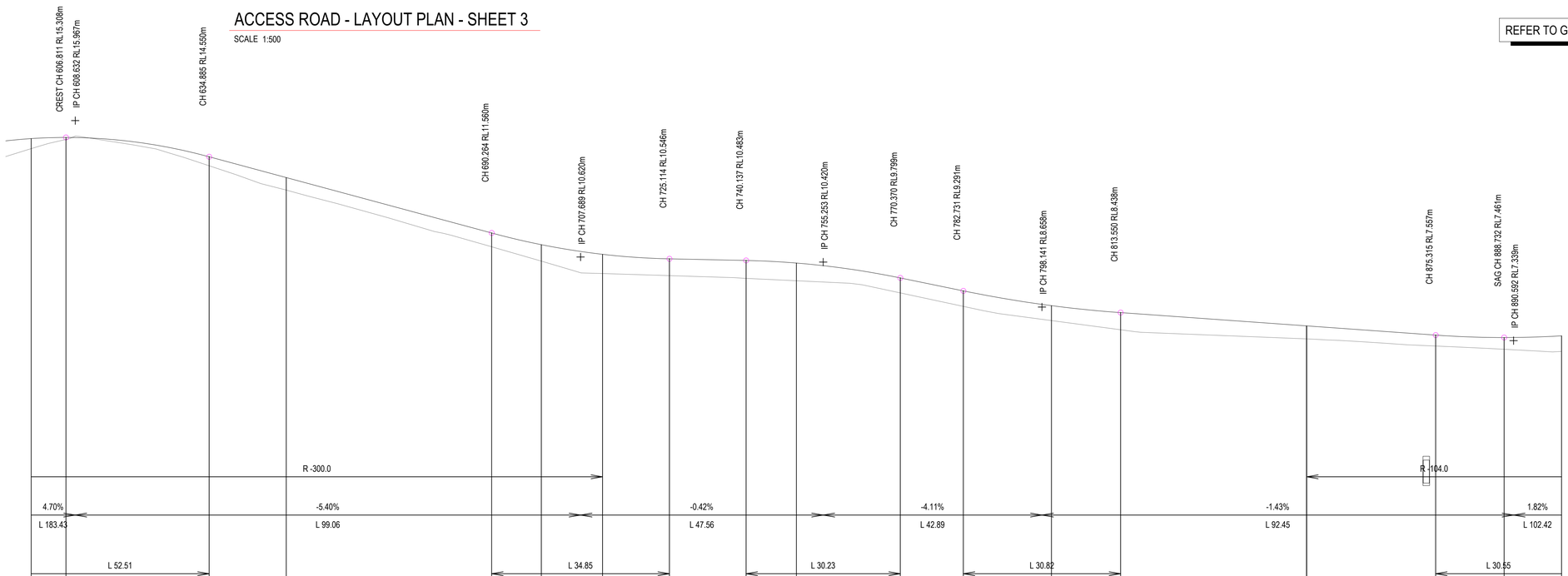


ACCESS ROAD - LAYOUT PLAN - SHEET 3

SCALE 1:500

REFER TO GSLF-I3C-CV-DWG-005-01 FOR DRAWING LEGEND

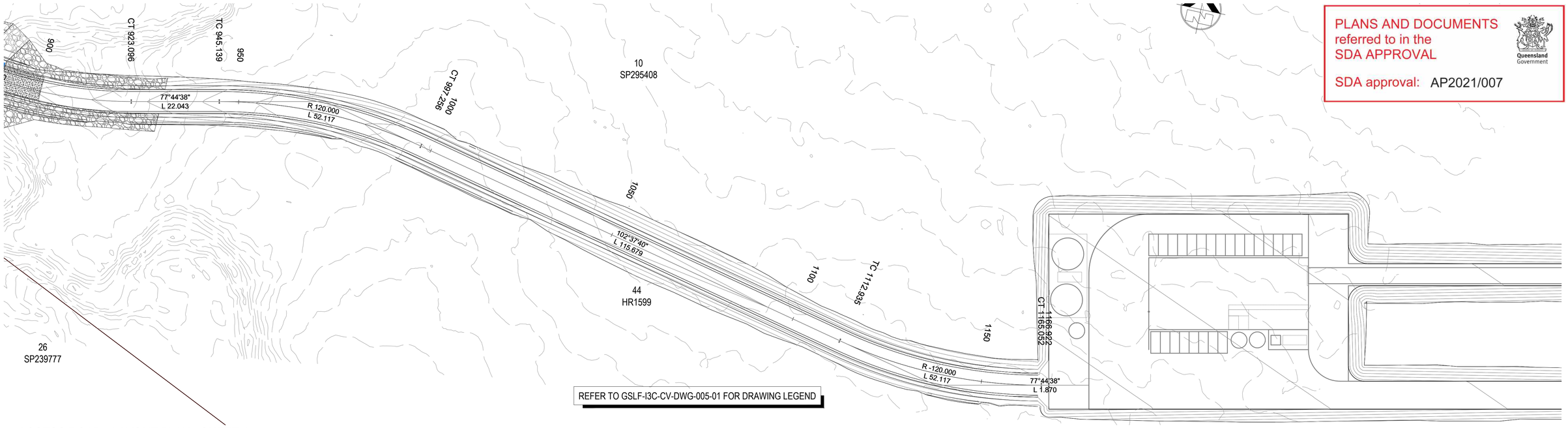


| | | |

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

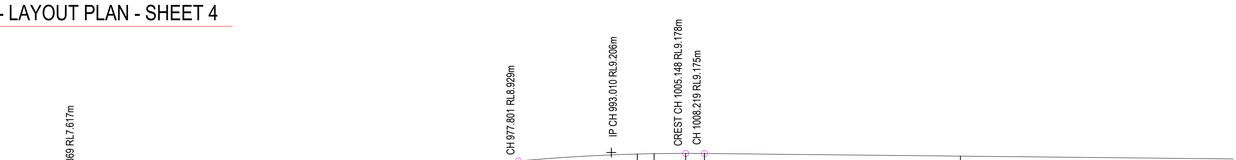
SDA approval: AP2021/007



REFER TO GSLF-I3C-CV-DWG-005-01 FOR DRAWING LEGEND

ACCESS ROAD - LAYOUT PLAN - SHEET 4

SCALE 1:500



DATUM R.L. -4.000

EXISTING SURFACE	6.918	6.977	7.221	7.750	7.888	8.176	8.514	8.508	8.596	8.621	7.913		
DEPTH TO DESIGN	0.610	0.640	0.710	0.583	0.553	0.752	0.643	0.661	0.582	0.554	1.176		
DESIGN C.L. SURFACE	7.528	7.617	7.931	8.333	8.422	8.929	9.157	9.169	9.178	9.175	9.089		
CHAINAGE	900.000	905.869	923.096	945.139	950.000	977.801	997.256	1000.000	1005.148	1008.219	1050.000		

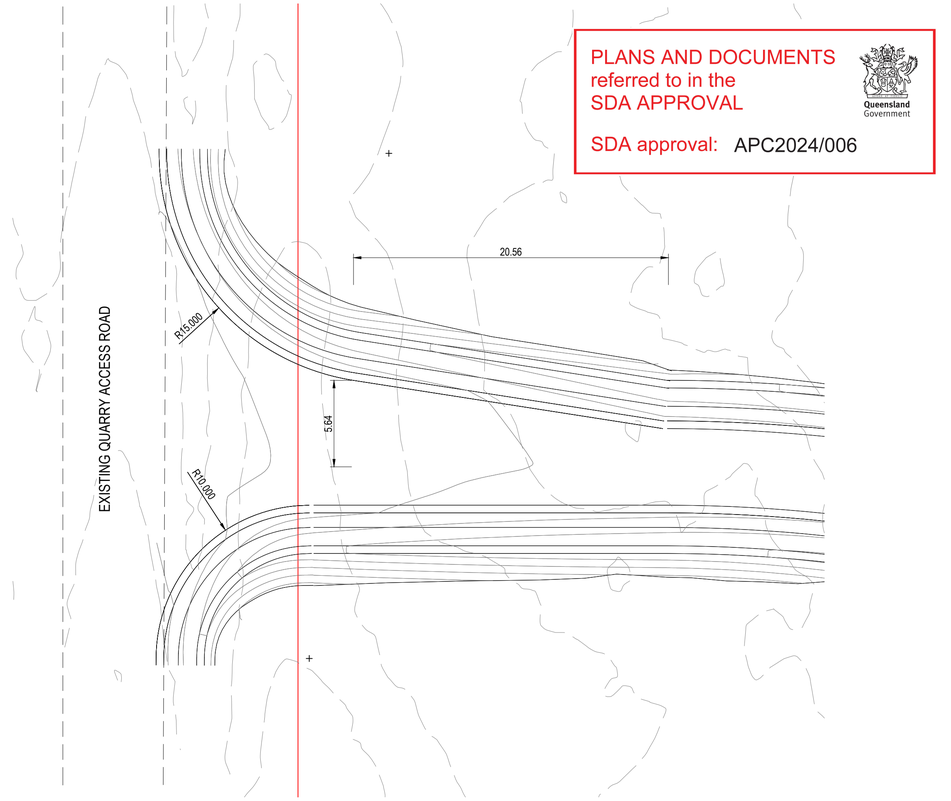
ACCESS ROAD - LONGSECTION - SHEET 4

HORIZ. SCALE 1:1000
VERT. SCALE 1:250

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: APC2024/006



ACCESS ROAD - INTERSECTION LAYOUT

SCALE 1:200

No	DESCRIPTION	DATE
D	FOR APPROVAL	08.02.2022
C	FOR APPROVAL	02.02.2022
B	FOR APPROVAL	19.01.2022
A	FOR REVIEW	23.11.2021

REVISION HISTORY

i³ consulting pty ltd
engineering consultants
innovation, ingenuity, inspiration

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ABN 89 106 675 156
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PO Box 878
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mail@iccbed.com.au
ACN 106 675 156

GILMOUR SPACE

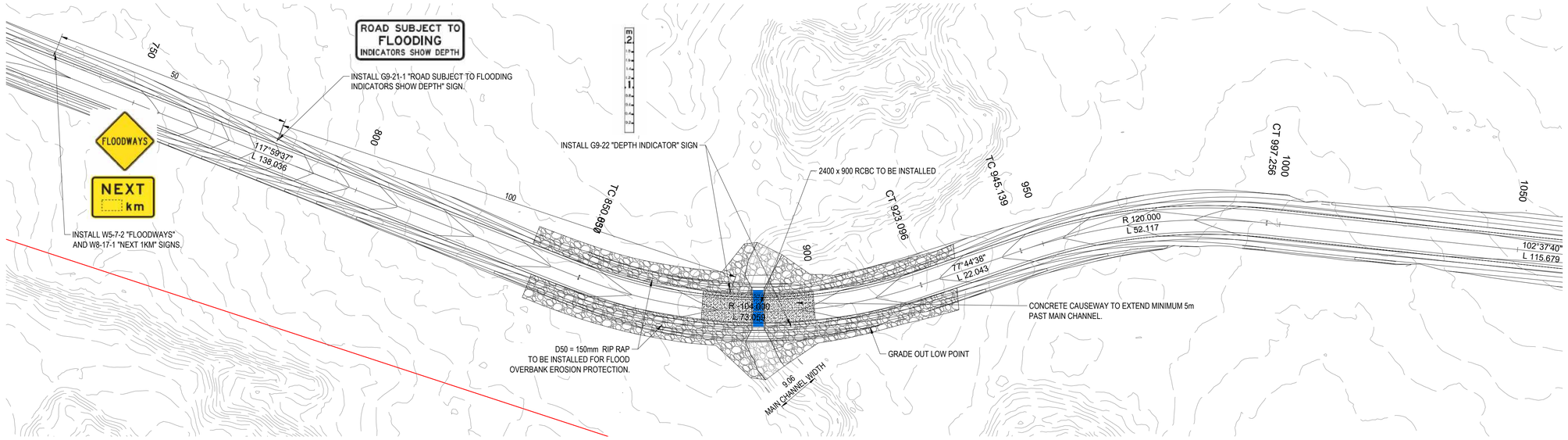
Engineers Certification:
Travis Smith MIE Aust. CPEng.
NPER Civil
RPEQ 16400
CPESC 9500
Signature: T.Smith
Date: 08 / 02 / 2022

PROJECT
BOWEN ORBITAL SPACE PORT

DRAWING TITLE
BOWEN ORBITAL SPACE PORT
ACCESS ROAD
LAYOUT AND LONGSECTION - SHEET 4 OF 4

DRAWN	T.J.S.	CHECKED	T.J.S.	APPROVED	T.J.S.
DRAWING STATUS	FOR APPROVAL				
SCALE	NTS	SIZE	A1		

DRAWING CODE: GSLF-I3C-CV-DWG-005-04
REV: D

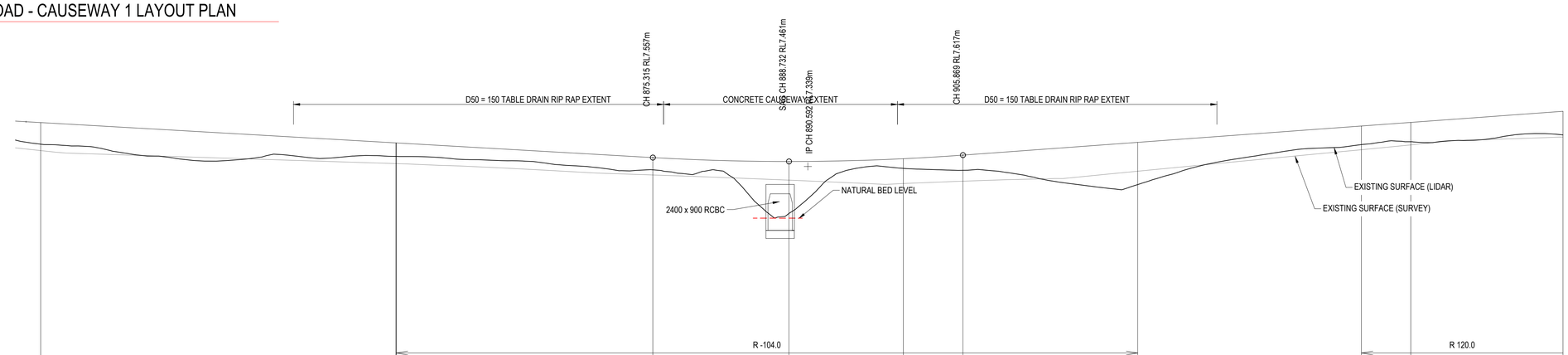


LEGEND

- BOUNDARY
- EXISTING EDGE OF BITUMEN
- EXISTING EDGE OF TRACK
- EXISTING CULVERT
- NEW CULVERT
- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING TELSTRA
- EXISTING OVERHEAD POWERLINE
- EXISTING GAS MAIN
- EXISTING FENCE
- NEW STOCKPROOF FENCE
- DESIGN ROAD
- CULV - 1 — EXISTING CULVERT NOTATION
- CULV - 6036 — NEW CULVERT NOTATION
- MATCH LINE
- TABLE DRAIN OUTLET
- EXISTING CONTOURS (0.25m INTERVAL)
- DESIGN CONTOURS (0.05m INTERVAL)
- BH11 — BOREHOLE LOCATION AND IDENTIFIER
- SIGNPOST
- CONCRETE CAUSEWAY
- RIP RAP

ACCESS ROAD - CAUSEWAY 1 LAYOUT PLAN

SCALE 1:500



Horiz. Curve Data (m): R -104.0 | R 120.0

Vertical Geometry Grade: -1.43% | 1.82%

Vertical Grade Length (m): L 92.45 | L 102.42

Vertical Curve Length (m): L 30.55

Vertical Curve Radius (m): R 940.0

DATUM R.L. -1.000

EXISTING SURFACE	7.729	7.409	7.408	7.129	7.001	6.918	6.977	7.221	7.750	7.868	8.063	
DEPTH TO DESIGN	0.689	0.509	0.509	0.427	0.459	0.610	0.640	0.710	0.583	0.553	0.632	
DESIGN C.L. SURFACE	8.418	7.918	7.917	7.557	7.461	7.528	7.617	7.931	8.333	8.422	8.695	
CHAINAGE	815.000	850.000	850.037	875.315	888.732	900.000	905.869	923.096	945.139	960.000	965.000	

ACCESS ROAD - CAUSEWAY 1 LONGSECTION

HORIZ. SCALE 1:250
VERT. SCALE 1:62.5

PLANS AND DOCUMENTS referred to in the SDA APPROVAL
Queensland Government
SDA approval: APC2024/006

PLANS AND DOCUMENTS referred to in the SDA APPROVAL
Queensland Government
SDA approval: AP2021/007

No	DESCRIPTION	DATE
D	FOR APPROVAL	08.02.2022
C	FOR APPROVAL	02.02.2022
B	FOR APPROVAL	19.01.2022
A	FOR REVIEW	23.11.2021

REVISION HISTORY

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engineering consultants
innovation, ingenuity, inspiration
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ABN 89 106 675 156
p 07 3870 8888
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mail@iscubed.com.au
ACN 106 675 156

GLAMOUR SPACE

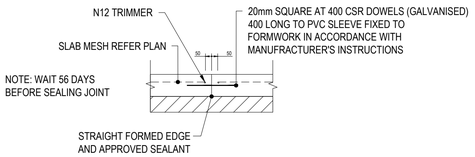
Engineers Certification:
Travis Smith MIE Aust. CPEng.
NPER Civil
RPEQ 16400
CPESC 9500
Signature: T.S.
Date: 08/02/2022

PROJECT
BOWEN ORBITAL SPACE PORT

DRAWING TITLE
BOWEN ORBITAL SPACE PORT
ACCESS ROAD
FLOODWAY LAYOUT PLAN

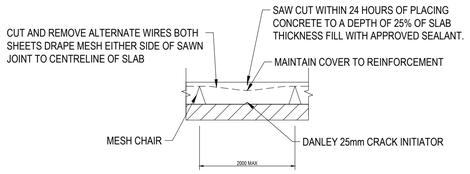
DRAWN	T.J.S.	CHECKED	T.J.S.	APPROVED	T.J.S.
DRAWING STATUS	FOR APPROVAL				
SCALE	NTS	SIZE	A1		

DRAWING CODE: GSLF-I3C-CV-DWG-007-01
REV: D



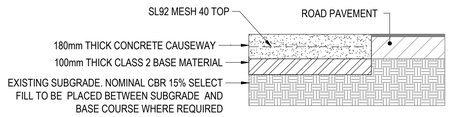
CAUSEWAY - DOWEL JOINT DETAIL (DJ)

NTS



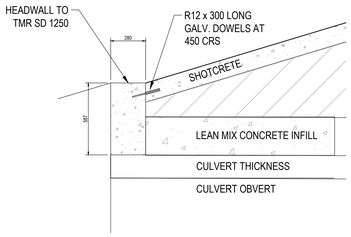
CAUSEWAY - SAWN JOINT DETAIL (SJ)

NTS



CAUSEWAY - LONGITUDINAL PAVEMENT JOINT DETAIL

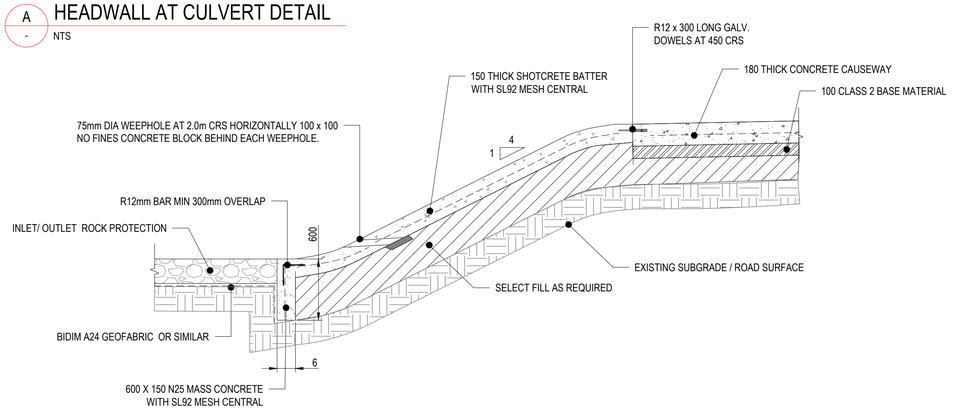
NTS



REFER TO TMR STANDARD DRWING SD 1250 (SHEETS 1 TO 3) FOR HEADWALL, BASE SLAB, APRON, HEADWALL AND WINGWALL DETAILS.

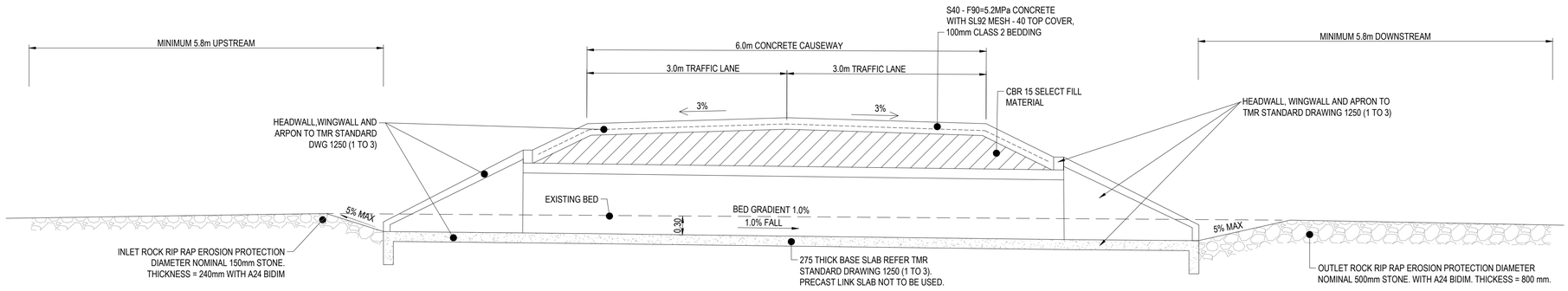
A - NTS

HEADWALL AT CULVERT DETAIL



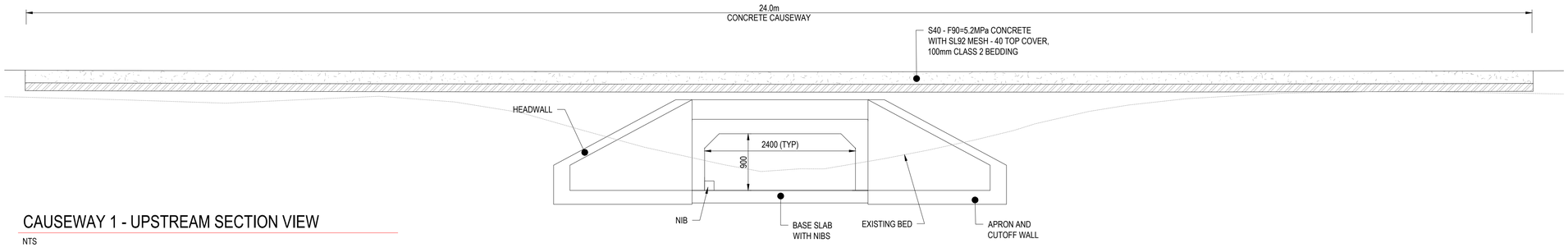
CAUSEWAY - SHOTCRETE BATTER SLOPE DETAIL

NTS



CAUSEWAY 1 - CULVERT LONGSECTION

NTS



CAUSEWAY 1 - UPSTREAM SECTION VIEW

NTS

CAUSEWAY TYPICAL NOTES

1. ALL CULVERTS TO SIT A MINIMUM 300mm BELOW TRUE STREAM LEVEL (REFER UPSTREAM VIEWS FOR FURTHER DETAILS).
2. CULVERT LINK BASE SLAB, HEADWALLS, WINGWALLS AND APRON TO BE AS PER TMR STD DWG 1250.
3. CAUSEWAY 1 TO HAVE SIDEWALL BAFFLES INSTALLED REFER TO TMR STD DWG 1270 FOR INSTALLATION AND CONSTRUCTION DETAILS AND SIDEWALL BAFFLE SETOUT PLAN FOR DETAILS.
4. CAUSEWAY EXTENTS SHOWN ON LONGSECTION VIEWS (REFER GSLF-I3C-CV-DWG-007-01 AND GSLF-I3C-CV-DWG-008-01).
5. TREE REMOVAL TO BE CONFIRMED BY DESIGN ENGINEER DURING CONSTRUCTION.

No	DESCRIPTION	DATE
D	FOR APPROVAL	08.02.2022
C	FOR APPROVAL	02.02.2022
B	FOR APPROVAL	19.01.2022
A	FOR REVIEW	23.11.2021

REVISION HISTORY

i³ consulting pty ltd
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PO Box 878 Toowong, Qld 4066 mail@i3cbed.com.au ACN 106 675 156

GLMOUR SPACE

Engineers Certification:
Travis Smith MIE Aust. CPEng.
NPER Civil
RPEQ 16400
CPESC 9500
Signature: T.S.
Date: 08 / 02 / 2022

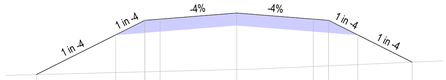
PROJECT
BOWEN ORBITAL SPACE PORT

DRAWING TITLE
BOWEN ORBITAL SPACE PORT
ACCESS ROAD
FLOODWAY DETAILS PLAN

DRAWN	T.J.S.	CHECKED	T.J.S.	APPROVED	T.J.S.
DRAWING STATUS	FOR APPROVAL				
SCALE	NTS	SIZE	A1		

DRAWING CODE
GSLF-I3C-CV-DWG-007-02

REV
D



Centreline Data
X = 615375.669
Y = 7792964.041
Z = 6.61

Datum 5

| | | |

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

SDA approval: APC2024/006

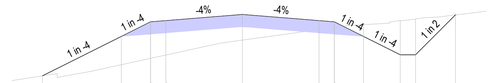
PLANS AND DOCUMENTS referred to in the SDA APPROVAL

SDA approval: AP2021/007

TYPICAL CROSS SECTION NOTES

1. REFER TO GLSF-I3C-DWG-005 SERIES FOR ROADWORKS UPGRADE SCHEDULE AND SPECIFIC LOCATIONS (CHAINAGES) WHERE TYPICAL CROSS SECTIONS APPLY.
2. TYPICAL CROSS SECTIONS MAY VARY THROUGH THE APPLICATION OF SUPERELEVATION, DRAINAGE ELEMENTS, EXISTING ROAD WIDTH OR PAVEMENT DESIGN.
3. REFER TO GLSF-I3C-DWG-007 AND 008 SERIES FOR CAUSEWAY DETAILS WHICH ALTER CROSS SECTION SURFACE.
4. REFER TO GLSF-I3C-DWG-003-002 FOR PAVEMENT TYPES.
5. REFER TO GLSF-I3C-DWG-005 FOR LOCATIONS OF PAVEMENT TYPES.

Centreline Data
X = 615769.034
Y = 7792898.019
Z = 13.213

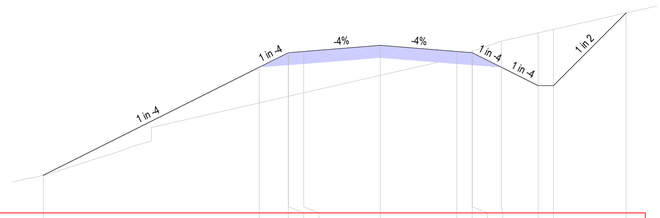


Datum 12

DESIGN LEVEL	12.211		12.855	13.093	13.093	13.113	13.213		13.113	13.093	13.093	12.855	12.555	12.555	13.207
DEPTH	0.000		-0.462	-0.596	-0.596	-0.582	-0.418		-0.146	-0.092	-0.092	0.192	0.556	0.584	0.000
EXISTING SURFACE	12.211		12.393	12.496	12.496	12.551	12.794		12.967	13.001	13.001	13.047	13.111	13.138	13.207
DESIGN OFFSET	-6.529		-3.953	-3.001	-3.000	-2.500	0.000		2.500	3.000	3.001	3.953	5.153	5.653	6.957

CHAINAGE 550.000

Centreline Data
X = 615836.925
Y = 7792824.81
Z = 13.734

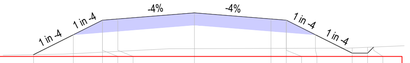


Datum 11

DESIGN LEVEL	11.614		13.376	13.614	13.614	13.634	13.734		13.634	13.614	13.614	13.376	13.076	13.076	14.263
DEPTH	0.000		-0.582	-0.712	-0.712	-0.675	-0.490		-0.081	0.022	0.022	0.426	0.862	0.918	0.000
EXISTING SURFACE	11.614		12.794	12.902	12.902	12.959	13.244		13.553	13.636	13.636	13.802	13.938	13.994	14.263
DESIGN OFFSET	-11.001		-3.953	-3.001	-3.000	-2.500	0.000		2.500	3.000	3.001	3.953	5.153	5.653	8.026

CHAINAGE 650.000

Centreline Data
X = 615965.99
Y = 7792748.974
Z = 8.711

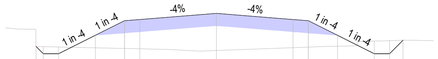


Datum 8

DESIGN LEVEL	8.030		8.353	8.591	8.591	8.611	8.711		8.611	8.591	8.591	8.353	8.053	8.053	8.153
DEPTH	0.000		-0.308	-0.522	-0.522	-0.529	-0.585		-0.481	-0.460	-0.460	-0.220	0.085	0.095	0.000
EXISTING SURFACE	8.030		8.046	8.070	8.070	8.083	8.127		8.131	8.132	8.132	8.133	8.138	8.149	8.153
DESIGN OFFSET	-5.248		-3.953	-3.001	-3.000	-2.500	0.000		2.500	3.000	3.001	3.953	5.153	5.653	5.852

CHAINAGE 800.000

Centreline Data
X = 615736.701
Y = 7792936.158
Z = 10.863

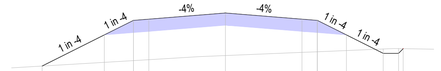


Datum 10

DESIGN LEVEL	10.323	10.205	10.205	10.505	10.743	10.743	10.763	10.863	10.763	10.743	10.743	10.505	10.205	10.205	10.424
DEPTH	0.000	0.115	0.109	-0.204	-0.453	-0.453	-0.478	-0.606	-0.459	-0.430	-0.430	-0.178	0.206	0.213	0.000
EXISTING SURFACE	10.323	10.320	10.315	10.302	10.291	10.291	10.285	10.258	10.304	10.313	10.313	10.327	10.411	10.419	10.424
DESIGN OFFSET	-5.888	-5.653	-5.153	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	5.153	5.653	6.091

CHAINAGE 500.000

Centreline Data
X = 615921.84
Y = 7792772.442
Z = 10.382

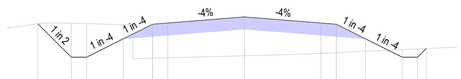


Datum 9

DESIGN LEVEL	9.517	10.024	10.262	10.262	10.282	10.382	10.282	10.262	10.262	10.024	9.724	9.724	9.800
DEPTH	0.000	-0.447	-0.656	-0.656	-0.661	-0.694	-0.543	-0.512	-0.512	-0.255	0.070	0.077	0.000
EXISTING SURFACE	9.517	9.578	9.606	9.606	9.621	9.688	9.740	9.750	9.750	9.770	9.795	9.801	9.800
DESIGN OFFSET	-5.983	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	5.153	5.653	5.805

CHAINAGE 750.000

Centreline Data
X = 615700.359
Y = 7792970.341
Z = 8.534

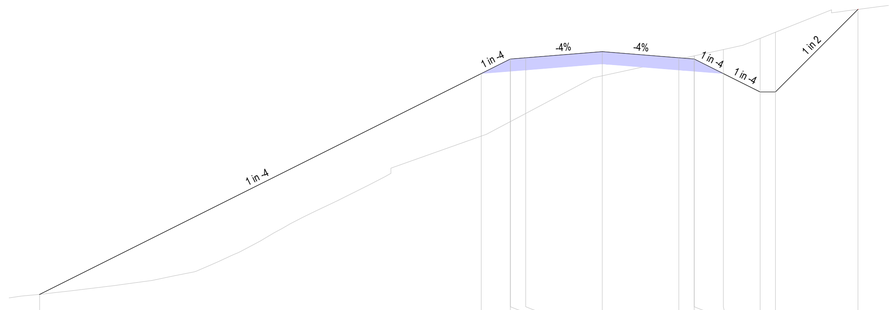


Datum 7

DESIGN LEVEL	8.422	7.876	7.876	8.176	8.414	8.434	8.534	8.434	8.414	8.414	8.176	7.876	7.876	8.018
DEPTH	0.000	0.555	0.549	0.232	-0.554	-0.567	-0.634	-0.495	-0.464	-0.464	-0.204	0.124	0.136	0.000
EXISTING SURFACE	8.422	8.431	8.425	8.408	7.860	7.867	7.899	7.938	7.950	7.950	7.972	8.000	8.011	8.018
DESIGN OFFSET	-6.747	-5.653	-5.153	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	5.153	5.653	5.938

CHAINAGE 450.000

Centreline Data
X = 615801.371
Y = 7792859.883
Z = 15.263

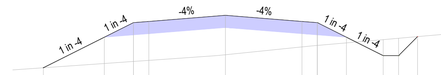


Datum 11

DESIGN LEVEL	11.302		14.905	15.143	15.143	15.163	15.263		15.163	15.143	15.143	14.905	14.605	14.605	15.953
DEPTH	0.000		-1.021	-1.022	-1.021	-0.909	-0.394		-0.023	0.051	0.051	0.393	0.875	0.975	0.000
EXISTING SURFACE	11.302		13.884	14.122	14.122	14.254	14.869		15.140	15.195	15.195	15.298	15.480	15.580	15.953
DESIGN OFFSET	-18.368		-3.953	-3.001	-3.000	-2.500	0.000		2.500	3.000	3.001	3.953	5.153	5.653	8.348

CHAINAGE 600.000

Centreline Data
X = 615877.805
Y = 7792796.121
Z = 11.102



Datum 10

DESIGN LEVEL	10.247	10.744	10.982	10.982	11.002	11.102	11.002	10.982	10.982	10.744	10.444	10.444	10.755
DEPTH	0.000	-0.428	-0.633	-0.633	-0.635	-0.643	-0.415	-0.371	-0.371	-0.091	0.261	0.283	0.000
EXISTING SURFACE	10.247	10.316	10.350	10.350	10.367	10.459	10.587	10.611	10.611	10.653	10.706	10.728	10.755
DESIGN OFFSET	-5.944	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	5.153	5.653	6.275

CHAINAGE 700.000

ACCESS ROAD - CROSS SECTIONS

HORIZ. SCALE 1:100
VERT. SCALE 1:100

No	DESCRIPTION	DATE
D	FOR APPROVAL	08.02.2022
C	FOR APPROVAL	02.02.2022
B	FOR APPROVAL	19.01.2022
A	FOR REVIEW	23.11.2021

REVISION HISTORY

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GLIMOUR SPACE

Engineers Certification:
Travis Smith MIE Aust. CPEng.
NPER Civil
RPEQ 16400
CPESC 9500
Signature: T.J.S
Date: 08 / 02 / 2022

PROJECT
BOWEN ORBITAL SPACE PORT

DRAWING TITLE
BOWEN ORBITAL SPACE PORT
ACCESS ROAD
CROSS SECTIONS - SHEET 2 OF 3

DRAWN	T.J.S.	CHECKED	T.J.S.	APPROVED	T.J.S.
DRAWING STATUS	FOR APPROVAL				
SCALE	NTS	SIZE	A1		

DRAWING CODE: GSLF-I3C-CV-DWG-008-02
REV: D

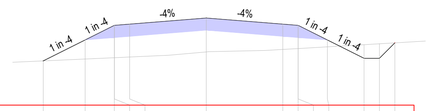
PLANS AND DOCUMENTS referred to in the SDA APPROVAL

SDA approval: AP2021/007

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

SDA approval: APC2024/006

Centreline Data
X = 616107.375
Y = 7792721.305
Z = 8.422

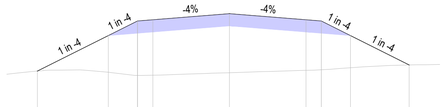


Datum 7

DESIGN LEVEL	7.722	8.064	8.302	8.302	8.322	8.422	8.322	8.302	8.302	8.064	7.764	7.764	8.016
DEPTH	0.000	-0.311	-0.528	-0.528	-0.536	-0.553	-0.413	-0.378	-0.378	-0.112	0.223	0.238	0.000
EXISTING SURFACE	7.722	7.753	7.774	7.774	7.785	7.868	7.908	7.923	7.923	7.951	7.987	8.001	8.016
DESIGN OFFSET	-5.321	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	5.153	5.653	6.158

CHAINAGE 950.000

Centreline Data
X = 616254.572
Y = 7792697.74
Z = 8.987

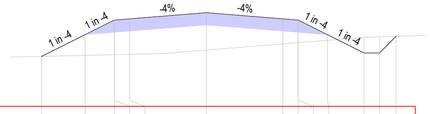


Datum 7

DESIGN LEVEL	8.050	8.629	8.867	8.867	8.887	8.987	8.887	8.867	8.867	8.629	8.150		
DEPTH	0.000	-0.598	-0.887	-0.887	-0.905	-0.964	-0.825	-0.796	-0.796	-0.525	0.000		
EXISTING SURFACE	8.050	8.030	7.979	7.979	7.982	8.023	8.062	8.071	8.071	8.104	8.150		
DESIGN OFFSET	-6.269	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	5.869		

CHAINAGE 1100.000

Centreline Data
X = 616058.138
Y = 7792713.323
Z = 7.528

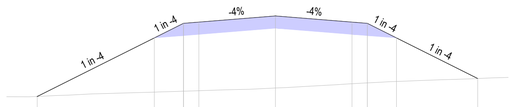


Datum 6

DESIGN LEVEL	6.815	7.170	7.408	7.408	7.428	7.528	7.428	7.408	7.408	7.170	6.870	6.870	7.143
DEPTH	0.000	-0.339	-0.566	-0.566	-0.580	-0.610	-0.409	-0.369	-0.369	-0.092	0.256	0.264	0.000
EXISTING SURFACE	6.815	6.832	6.843	6.843	6.848	6.918	7.019	7.039	7.039	7.078	7.126	7.135	7.143
DESIGN OFFSET	-5.373	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	5.153	5.653	6.198

CHAINAGE 900.000

Centreline Data
X = 616205.781
Y = 7792708.671
Z = 9.089

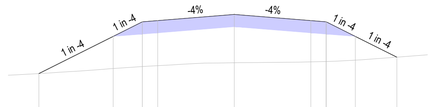


Datum 7

DESIGN LEVEL	7.776	8.731	8.969	8.969	8.989	9.089	8.989	8.969	8.969	8.731	8.068		
DEPTH	0.000	-0.885	-1.107	-1.107	-1.119	-1.176	-1.006	-0.972	-0.972	-0.711	0.000		
EXISTING SURFACE	7.776	7.846	7.862	7.862	7.870	7.913	7.983	7.997	7.997	8.020	8.068		
DESIGN OFFSET	-7.775	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	6.605		

CHAINAGE 1050.000

Centreline Data
X = 616318.037
Y = 7792694.56
Z = 8.855

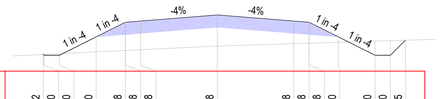


Datum 7

DESIGN LEVEL	7.891	8.497	8.735	8.735	8.755	8.855	8.755	8.735	8.735	8.497	8.158		
DEPTH	0.000	-0.524	-0.730	-0.730	-0.735	-0.788	-0.674	-0.648	-0.648	-0.388	0.000		
EXISTING SURFACE	7.891	7.973	8.006	8.006	8.020	8.067	8.082	8.088	8.088	8.110	8.158		
DESIGN OFFSET	-6.379	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	5.309		

CHAINAGE 1164.167

Centreline Data
X = 616010.14
Y = 7792725.505
Z = 7.918

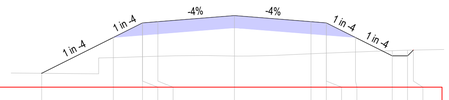


Datum 7

DESIGN LEVEL	7.272	7.260	7.260	7.560	7.798	7.798	7.818	7.918	7.818	7.798	7.798	7.560	7.260	7.260	7.505
DEPTH	0.000	0.013	0.025	-0.246	-0.460	-0.460	-0.468	-0.509	-0.369	-0.341	-0.341	-0.089	0.230	0.237	0.000
EXISTING SURFACE	7.272	7.273	7.285	7.314	7.338	7.338	7.350	7.409	7.449	7.457	7.457	7.471	7.490	7.497	7.505
DESIGN OFFSET	-5.678	-5.653	-5.153	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	5.153	5.653	6.142

CHAINAGE 850.000

Centreline Data
X = 616156.991
Y = 7792719.602
Z = 9.169

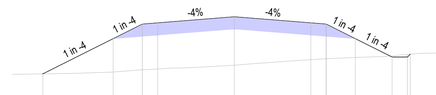


Datum 8

DESIGN LEVEL	8.226	8.811	9.049	9.049	9.069	9.169	9.069	9.049	9.049	8.811	8.511	8.511	8.605
DEPTH	0.000	-0.329	-0.551	-0.551	-0.564	-0.661	-0.524	-0.493	-0.493	-0.237	0.085	0.092	0.000
EXISTING SURFACE	8.226	8.482	8.498	8.498	8.505	8.508	8.545	8.556	8.556	8.574	8.596	8.603	8.605
DESIGN OFFSET	-6.291	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	5.153	5.653	5.842

CHAINAGE 1000.000

Centreline Data
X = 616304.032
Y = 7792692.479
Z = 8.884



Datum 7

DESIGN LEVEL	7.962	8.526	8.764	8.764	8.784	8.884	8.784	8.764	8.764	8.526	8.226	8.226	8.272
DEPTH	0.000	-0.545	-0.746	-0.746	-0.753	-0.792	-0.601	-0.555	-0.555	-0.307	0.019	0.042	0.000
EXISTING SURFACE	7.962	7.982	8.019	8.019	8.032	8.093	8.184	8.199	8.199	8.219	8.245	8.268	8.272
DESIGN OFFSET	-6.250	-3.953	-3.001	-3.000	-2.500	0.000	2.500	3.000	3.001	3.953	5.153	5.653	5.745

CHAINAGE 1150.000

ACCESS ROAD - CROSS SECTIONS

HORIZ. SCALE 1:100
VERT. SCALE 1:100

No	DESCRIPTION	DATE
D	FOR APPROVAL	08.02.2022
C	FOR APPROVAL	02.02.2022
B	FOR APPROVAL	19.01.2022
A	FOR REVIEW	23.11.2021

REVISION HISTORY

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GILMOUR SPACE

Engineers Certification:
Travis Smith MIE Aust. CPEng.
NPER Civil
RPEQ 16400
CPESC 9500
Signature: T. Smith
Date: 08 / 02 / 2022

PROJECT
BOWEN ORBITAL SPACE PORT

DRAWING TITLE
BOWEN ORBITAL SPACE PORT
ACCESS ROAD
CROSS SECTIONS - SHEET 3 OF 3

DRAWN	T.J.S.	CHECKED	T.J.S.	APPROVED	T.J.S.
DRAWING STATUS	FOR APPROVAL				
SCALE	NTS	SIZE	A1		

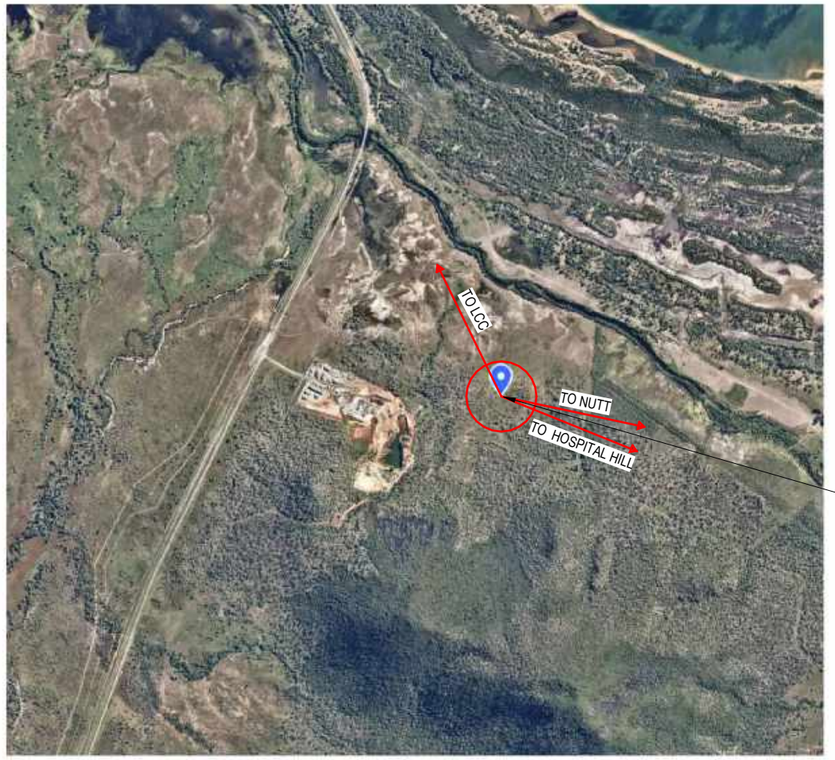
DRAWING CODE
GSLF-I3C-CV-DWG-008-03

REV
D

24m COMMUNICATION TOWER
BOWEN ORBITAL SPACEPORT

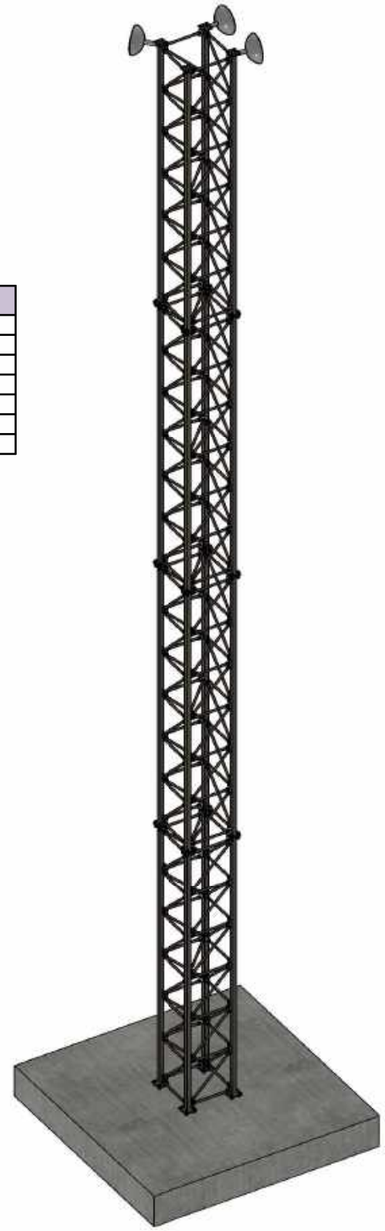
for

TELCO ANTENNAS



PROPOSED TOWER LOCATION
SITE COORDINATES
19°57'30.98"S
148°6'44.42"E

DRAWING LIST	
SHEET NUMBER	SHEET NAME
S00	COVER PAGE
S01	PROJECT NOTES
S50	GENERAL ARRANGEMENT AND ELEVATION
S100	FOOTING DETAILS
S400	TOWER FRAMING PLAN AND ELEVATIONS
S401	TOWER FRAMING DETAILS



PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

Queensland Government

SDA approval: APC2022/007

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

Queensland Government

SDA approval: APC2024/006

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REV	DESCRIPTION	DATE	BY
0	FOR CONSTRUCTION	04.07.22	D.J.

Status
FOR CONSTRCUTION

Project
24m COMMUNICATION TOWER
BOWEN ORBITAL SPACEPORT

for
TELCO ANTENNAS

Title
COVER PAGE

Drawn	Date	Chkd	Date
DJ		RL	
Design	Date	Apprd	Date
MF		LS	
Scale	A3	Certif	Date
NTS		LS	

Project No.	Dwg. No.	Rev
22-055	S00	0

4/07/2022 3:40:45 PM

GENERAL NOTES

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS.
2. BEFORE PROCEEDING WITH THE WORK ANY DISCREPANCIES IN THE CONTRACT DOCUMENTS SHALL BE REFERRED FOR DECISION TO THE ENGINEER.
3. SETTING OUT DIMENSIONS AND SIZES OF STRUCTURAL MEMBERS SHALL NOT BE OBTAINED BY SCALING THE STRUCTURAL DRAWINGS.
4. ANY SETTING OUT DIMENSIONS SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR BEFORE CONSTRUCTION COMMENCES.
5. THE STRUCTURE HAS BEEN DESIGNED FOR THE FINAL INSERVICE CONDITION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND CERTIFICATION OF ALL TEMPORARY WORKS REQUIRED TO COMPLETE THE WORKS INCLUDING, RIGGING METHODOLOGY, TEMPORARY BRACING, PROPPING, SHORING, ASSESSMENT OF CONSTRUCTION LOADS AND ASSOCIATED WORK METHOD STATEMENTS, SUCH THAT THE CONSTRUCTION LOADS DO NOT EXCEED THE CAPACITY OF THE STRUCTURE. THE STRUCTURAL ENGINEER WILL NOT ASSESS, OR APPROVE ANY TEMPORARY WORKS, NOR ADVISE ON THE TIMING FOR THEIR REMOVAL.
6. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT EDITIONS INCLUDING AMENDMENTS OF THE RELEVANT SAA STANDARDS, SAA CODES OF PRACTICE EXCEPT AS VARIED BY THE CONTRACT DOCUMENTS AND OF THE BY-LAWS OF THE LOCAL GOVERNMENT AUTHORITY.

DESIGN CRITERIA

1. GENERAL PRINCIPLES:
   - IMPORTANCE LEVEL **2**
   - DESIGN LIFE **50 YEARS**
2. SELF-WEIGHT OF THE STEEL MEMEBERS AND CONNECTIONS HAVE BEEN ASSESSED IN ACCORDANCE WITH AS1170.1 PERMANENT ACTION DESIGN LOADS.
3. WIND LOADS HAVE BEEN ASSESSED IN ACCORDANCE WITH AS1170.2:
   - REGION **C**
   - TERRAIN CATEGORY **TC2.0**
   - WIND DIRECTION MULTIPLIER **Md = 0.9**
   - CLIMATE CHANGE MULTIPLIER **Mc = 1.05**
   - TERRAIN/HEIGHT MULTIPLIER **Mz,cat = 1.1**
   - SHIELDING MULTIPLIER **Ms = 1.0**
   - TOPOGRAPHICAL MULTIPLIER **Mt = 1.0**
   - DESIGN WIND SPEED (ULS) **Vdes = 67.9m/s**
   - DESIGN WIND PRESSURE (ULS) **qzu = 2.77kPa**

FOUNDATION NOTES

1. FOOTINGS SHALL BE PLACED CENTRALLY UNDER COLUMNS UNLESS NOTED OTHERWISE.
2. EXCAVATIONS SHALL BE KEPT FREE OF PONDED WATER BEFORE PLACING CONCRETE.
3. FOOTINGS HAVE BEEN DESIGNED BASED ON THE FOLLOWING GEOTECHNICAL REPORT:

GEOTECHNICAL DETAILS

GEOTECHNICAL REPORT BY	CQ Soil Testing
REPORT JOB NUMBER	CQ20875
REPORT DATE	6/04/2022
SITE CLASSIFICATION TO AS2870	H2
CHARACTERISTIC SURFACE MOVEMENT (Ys)	60-70 mm
MIN. BEARING CAPACITY (ULS)	350kPa
EXPECTED FOUNDING MATERIAL	VERY STIFF SILTY CLAY

4. GEOTECHNICAL ENGINEER TO CONFIRM FOUNDATION DESIGN PARAMETERS PRIOR TO PLACING CONCRETE BLINDING.
5. PLACE BLINDING CONCRETE TO BASE OF FOOTING EXCAVATION TO ACHIEVE DESIGN AND / OR UNIFORM BEARING MATERIAL.

EARTHWORKS NOTES

1. REMOVE ALL TOPSOIL FROM THE AREA OF THE WORKS. TOPSOIL TO BE STOCKPILED AND REUSED AS REQUIRED OR REMOVED FROM SITE.
2. REMOVE BOULDERS AND ROCKS WITHIN 100mm OF UNDERSIDE OF OCNCRETE SLABS AND PAVEMENTS.
3. CUT SURFACE TO BE COMPACTED TO 98% STANDARD COMPACTION.
4. ANY SETTING OUT DIMENSIONS SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR BEFORE CONSTRUCTION COMMENCES.

GROUT NOTES

1. DUE TO HIGHLY REACTIVE SOIL FOUNDATION THE TOWER MAY NEED RESETTING VERTICALLY FROM TIME TO TIME BY REMOVING THE GROUT, ADJUSTING THE ANCHOR BOLT NUTS AND RE-GROUTING THE BASE PLATES.
2. GROUT IS TO BE CEMENTITIOUS. HIGH STRENGTH AND NON-SHRINK (FOSROC CONBEXTRA BB92 OR EQUIVALENT).
3. INSTALLATION IS TO BE IN ACCORDANCE WITH MANUFACTURES SPECIFICATION.

CONCRETE NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 & AS 1379.
2. CONCRETE QUALITY:

ELEMENT	MAX SIZE AGGREGATE	CONCRETE GRADE
FOOTING	**20mm**	**N32**

3. CLEAR CONCRETE COVER TO REINFORCEMENT (OUTSIDE OF STIRRUPS AND TIES) SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE .

ELEMENT	CLEAR COVER
FOOTING	**50 COVER**

4. SPECIFIED STRUCTURAL THICKNESSES FOR CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.
5. CONSTRUCTION JOINTS OR POUR BREAKS WHERE NOT SHOWN ON PLANS OR DETAILS SHALL BE LOCATED AND FORMED TO THE APPROVAL OF THE ENGINEER.
6. NO PENETRATIONS, RECESSES OR CHASES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT APPROVAL OF THE ENGINEER.
7. AT PENETRATIONS IN SLABS UNLESS OTHERWISE DETAILED REINFORCEMENT MUST NOT BE CUT BUT SHALL BE GATHERED EQUALLY TO EACH SIDE OF PENETRATION AND EXTRA REINFORCEMENT PROVIDED BETWEEN THE PENETRATIONS AS DIRECTED BY THE ENGINEER.
8. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY. IT IS NOT NECESSARILY SHOWN IN TRUE PROJECTION.
9. PROVIDE THE ENGINEER WITH 48 HOURS NOTICE OF REINFORCEMENT BEING READY FOR INSPECTION. NO CONCRETE IS TO BE POURED WITHOUT THE APPROVAL OF THE ENGINEER. THIS IS TO BE CONFIRMED AT A LATER DATE.
10. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN THE POSITIONS SHOWN. WHERE LAP LENGTH IS NOT SHOWN IT SHALL BE SUFFICIENT TO DEVELOP THE FULL STRENGTH OF THE REINFORCEMENT. THE FOLLOWING MINIMUM SPLICE LENGTHS SHALL BE USED UNLESS NOTED OTHERWISE.

   THE FOLLOWING MINIMUM BAR SPLICE LENGTHS ARE APPLICABLE FOR f'c >= 25MPa.

   A - FOR VERTICAL OR HORIZONTAL BARS WITH LESS THAN 300mm OF CONCRETE CAST BELOW

BAR DIAMETER	N10	N12	N16	N20	N24	N28
LAP LENGTH	360mm	440mm	605mm	865mm	1165mm	1485mm
BAR DIAMETER	N32	N32				
LAP LENGTH	1835mm	2210mm				

   B - FOR HORIZONTAL BARS GREATER THAN OR EQUAL TO 300mm OF CONCRETE CAST BELOW

BAR DIAMETER	N10	N12	N16	N20	N24	N28
LAP LENGTH	470mm	570mm	785mm	1125mm	1550mm	1958mm
BAR DIAMETER	N32	N36				
LAP LENGTH	2385mm	2870mm				

11. WELDING OF REINFORCEMENT WILL ONLY BE PERMITTED WITH THE PRIOR APPROVAL OF THE ENGINEER.
12. REINFORCEMENT MUST NOT BE CONTINUOUS THROUGH CONTRACTION JOINTS.
13. PLACE SUFFICIENT STOOLS UNDER MAIN BOTTOM REINFORCING RODS AND TOP CROSS RODS IN SLABS TO ALLOW THEM TO BE SUPPORTED IN THEIR CORRECT POSITIONS DURING CONCRETING (NOT GREATER THAN 900mm).
14. REINFORCEMENT SYMBOLS:

SYMBOL	SPECIFICATION
N	GRADE D500N DEFORMED BAR
R	STRUCTURAL GRADE ROUND BAR
RF AND SL	HARD DRAWN SHEET RIBBED WIRE REINFORCING FABRIC

   THE NUMBER FOLLOWING THESE SYMBOLS IS THE BAR DIAMETER IN MILLIMETERS.
15. SLABS TO BE CURED BY COVERING WITH 0.20mm BLACK POLYETHYLENE SHEETING AND KEPT MOIST FOR 7 DAYS MINIMUM.
16. NO CONCRETE TO BE POURED WHEN SITE TEMPERATURE EXCEEDS 35°C OR FALLS BELOW 5°C.
17. SUPPLY AND LAY FABRIC IN FLAT SHEETS AT SPLICES. FABRIC SHALL BE LAPPED AS SPECIFIED IN AS 3600.

COATING NOTES

1. THE FOLLOWING COATING REQUIREMENTS HAVE BEEN DETERMINED BY AS4312.
2. ALL FABRICATED STRUCTURAL STEELWORK TO BE PREPARED WITH ABRASIVE BLAST CLASS 2.5.

3 SURFACES REQUIRING ONSITE TREATMENT ARE TO BE PRIMED IN ACCORDANCE WITH SURFACE TREATMENT MANUFACTURERS REQUIREMENTS.

4. COATINGS HAVE BEEN SPECIFIED BASED ON THE FOLLOWING:

CORROSIVITY CATERGORY	**C3 (MEDIUM)**
STEEL CORROSION RATE µm/y	**25-50**
TYPICAL ENVIRONMENT	**COASTAL OR INDUSTRIAL**
DURABILITY CLASS	**EL (EXTRA LONG TERM)**
LIFE TO FIRST MAINTENANCE	**50 YEARS**

STRUCTURAL STEELWORK NOTES

1. ALL STEELWORK TO BE IN ACCORDANCE WITH AS4100 UNO.
2. ALL WELDING TO BE IN ACCORDANCE WITH AS 1554 EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS. WELDING CONSUMABLES TO HAVE A MINIMUM NOMINAL TENSILE STRENGTH fuw = 490MPa. ALL WELDS NOT DESIGNATED ON PLAN SHALL BE 6mm GENERAL PURPOSE FILLET WELDS. COMPLETE PENETRATION BUTT WELDS (CPBW) SHALL BE STRUCTURAL PURPOSE WELDS.
3. UNLESS NOTED OTHERWISE, ALL STEEL SHALL BE IN ACCORDANCE WITH:

BHP GRADE 300 PLUS	FOR UNIVERSAL BEAMS AND COLUMNS
GRADE 250 PLUS	FOR ALL PLATES AND CLEATS
AS 1163	FOR SHS AND RHS SECTIONS GR350 OR 450 AS APPLICABLE
AS1163	FOR CHS SECTIONS GR250 OR 350 AS APPLICABLE

4. THE CONTRACTOR SHALL PREPARE FABRICATION DRAWINGS AND SUBMIT TO THE ENGINEER FOR REVIEW. FABRICATION IS NOT TO COMMENCE UNTIL FABRICATION DRAWINGS HAVE BEEN APPROVED.
5. ALL STEELWORK THAT WILL BE EXPOSED TO VIEW IS TO HAVE WELD SPATTER, FLUX, DAGS AND BURRS REMOVED, AND ALL SEALING AND BUTT WELDS GROUND FLUSH.
6. THE BUILDER SHALL PROVIDE ALL CLEATS AND HOLES FOR FIXING ALL BUILDING ELEMENTS TO STEEL AS REQUIRED BY THE DRAWINGS WHETHER OR NOT SHOWN.
7. BOLTS:

4.6/S	COMMERCIAL BOLT GRADE 4.6 TO AS1111 SNUG TIGHT.
8.8/S	HIGH STRENGTH STRUCTURAL BOLT GRADE 8.8 TO AS1252 SNUG TIGHT.
8.8/TB	HIGH STRENGTH STRUCTURAL BOLT GRADE 8.8 TO AS1252 TENSIONED TO AS4100 BEARING JOINT.
8.8/TF	HIGH STRENGTH STRUCTURAL BOLT GRADE 8.8 TO AS1252 TENSIONED TO AS4100 FRICTION JOINT.

8. ALL BOLTS TO BE HOT DIP GALVANISED EXCLUDING PURLIN BOLTS.
9. ALL BOLTED CONNECTIONS OF FRICTION GRIP TYPE SHALL HAVE CONNECTION SURFACES UNPAINTED.
10. MECHANICAL PROPERTIES AND PROCEDURES CERTIFICATES FOR ALL MATERIALS, BOLTS AND WELDS SHALL BE MAINTAINED BY THE MAIN CONTRACTOR AND PROVIDED ON DEMAND.
11. REFER TO ARCHITECTURAL DETAILS FOR ADDITIONAL NON-STRUCTURAL STEELWORK.

ERECTION NOTES

1. INSTALLATION / ERECTION BY OTHERS.
2. THE CONTRACTOR / INSTALLER IS TO ENSURE THE TOWER IS MAINTAINED IN A STABLE CONDITION AND THAT NO PART OF THE STRUCTURE IS OVERSTRESSED DURING CONSTRUCTION.
3. INSTALLATION OF TOWER TO BE ERECTED IN ACCORDANCE WITH AS4100.
4. ENSURE ALL BOLT HEADS & NUTS SIT FLAT ON FLANGES.
5. ALL FLANGES MUST MAKE FULL CONTACT AT EACH BOLT PRIOR TO 'SNUG-TIGHT' BOLTS. ADVISE DESIGNER IF THIS IS NOT ACHIEVED.
6. ERECTION TOLERANCES SHALL BE LIMITED TO:
   VERTICALITY - LESS THAN H/360
   TWIST - LESS THAN 2° PER MODULE
7. TOWER EARTHING DESIGNED & SPECIFIED BY OTHERS.

TOWER ACCESS

STRUCTURAL ELEMENTS HAVE BEEN ASSESSED FOR LOADS GENERATED FROM CLIMBING/WORKING AT HEIGHTS. A SINGLE PERSON LOAD OF 15kN IS APPLIED IN ACCORDANCE WITH TABLE 3.1 IN AS1891.4.

AS1891.4 REQUIRES THAT SIGNAGE BE INSTALLED AT THE TOWER BASE DESCRIBING WHICH AREAS OF THE STRUCTURE CAN BE USED FOR ANCHORAGE.

1. THE TOWER SHALL ONLY BE ASCENDED BY QUALIFIED AND COMPETENT PERSONNEL.
2. FALL ARREST DEVICES MUST ONLY BE ATTACHED TO THE LEG MEMBER OR A DIAGONAL CROSS BRACES OR FALL ARREST ATTACHMENT POINT NOMINATED ON THE DRAWINGS.
3. PERSONNEL CLIMBING THE TOWER ARE TO HAVE APPROPRIATE CLIMBING GEAR TO SUIT THE LEG OR BRACING MEMBERS.
4. ONLY THE BRACE MEMBERS SHOWN IN Purple IN THE GENERIC DIAGRAM BELOW CAN BE USED AS A CLIMBING/WORK AT HEIGHTS ANCHOR POINT.
5. THE SPECIFIED ANCHOR POINTS ARE LIMITED TO ONE (1) PERSON AT ANY TIME.
6. PRIOR TO ANCHORING TO ANY ELEMENT, VISUALLY CHECK CONNECTIONS ARE COMPLETE AND HAVE NO DAMAGE. ANY DEFECTS SHOULD BE REPORTED TO THE MANUFACTURER.
7. ANY STRUCTURAL MEMBER MAY BE USED TO PHYSICALLY MOVE AROUND THE STRUCTURE.
8. DO NOT ATTACH FALL ARREST DEVICES TO HORIZONTAL CROSS BRACING.
9. DO NOT ATTACH FALL ARREST DEVICES TO BRACING OR ATTACHMENT POINTS THAT EXHIBITS DAMAGE, RUST OR CRACKING.

FIGURE 1
FIGURE 1 - LANYARD HOOK SAFE PLACEMENT (PURPLE SHADING)

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: APC2022/007

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

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SDA approval: APC2024/006

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REV	DESCRIPTION	DATE	BY
0	FOR CONSTRUCTION	04.07.22	D.J.

Status: FOR CONSTRCUTION

Project: 24m COMMUNICATION TOWER
BOWEN ORBITAL SPACEPORT

for: TELCO ANTENNAS

Title: PROJECT NOTES

Drawn	Date	Chkd	Date
DJ		RL	
Design	Date	Apprd	Date
MF		LS	
Scale	A3	Certif	Date
NTS		LS	

Project No.	Dwg. No.	Rev
22-055	S01	0

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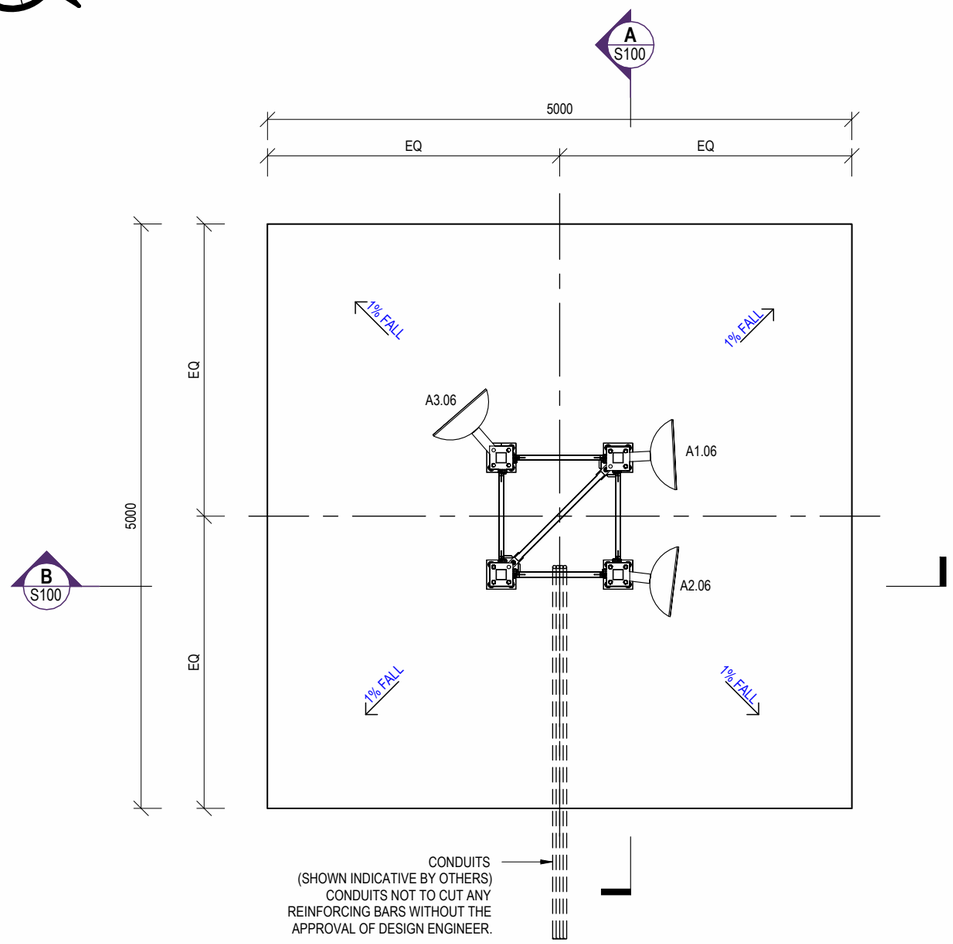

GENERAL ARRANGEMENT

1 : 50

ANTENNA SCHEDULE				
ID	SIZE / STYLE	BEARING	WEIGHT (kg)	ABOVE GROUND LEVEL (AGL)
A1.06	600 DIAMETER PARABOLIC ANTENNA	102°	8	24m
A2.06	600 DIAMETER PARABOLIC ANTENNA	112°	8	24m
A3.06	600 DIAMETER PARABOLIC ANTENNA	334°	8	24m
FUTURE	600 DIAMETER PARABOLIC ANTENNA	(TBC)	8	22m
FUTURE	600 DIAMETER PARABOLIC ANTENNA	(TBC)	8	22m

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

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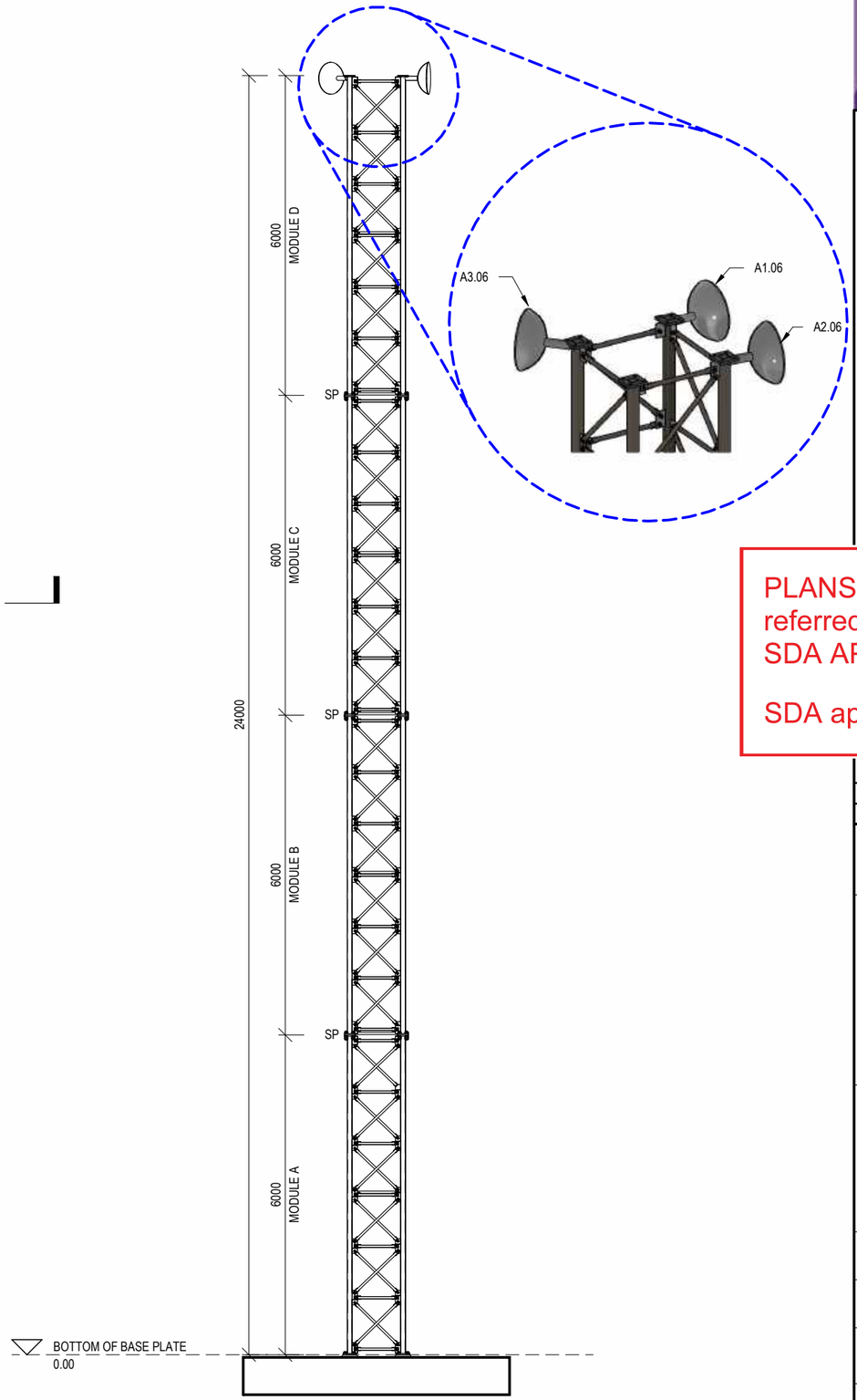

ELEVATION

1 : 100

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SDA approval: APC2024/006

REV	DESCRIPTION	DATE	BY
0	FOR CONSTRUCTION	04.07.22	D.J.

Status
FOR CONSTRCUTION

Project
24m COMMUNICATION TOWER
BOWEN ORBITAL SPACEPORT

for
TELCO ANTENNAS

Title
GENERAL ARRANGEMENT AND ELEVATION

Drawn DJ	Date	Chkd RL	Date
Design MF	Date	Apprd LS	Date
Scale NTS	A3	Certif LS	Date
Project No. 22-055		Dwg. No. S50	Rev 0

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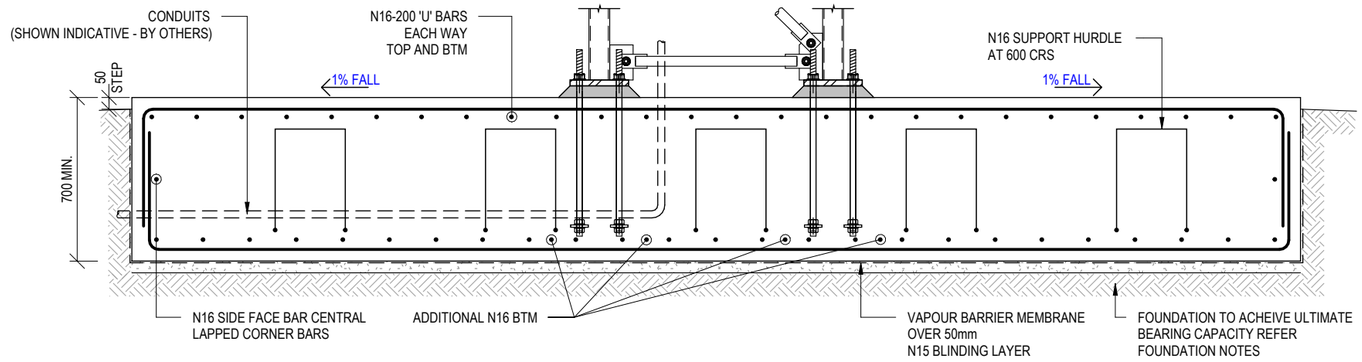
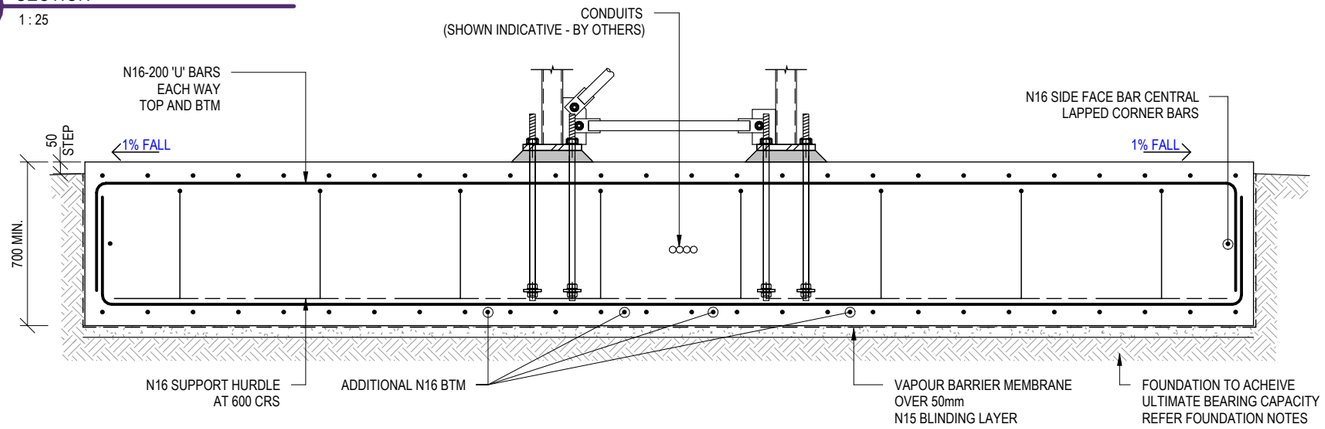


A S50 SECTION
1 : 25



B S50 SECTION
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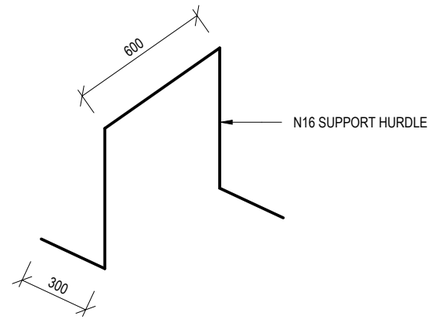
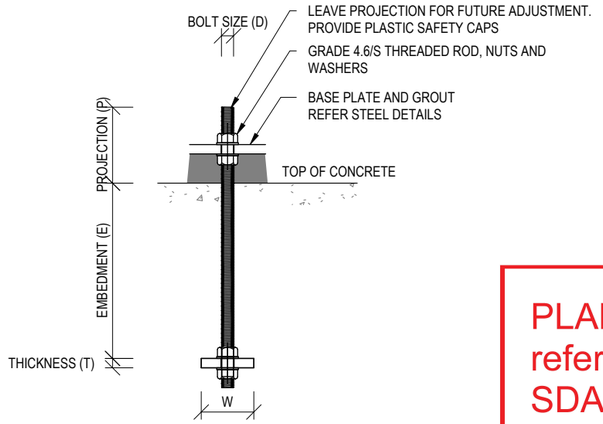


SUPPORT HURDLE DETAIL
1 : 25



HD BOLT DETAIL - THREADED ROD
1 : 10

HOLD DOWN BOLT				
	BOLT		WASHER	
BOLT DIAMETER (D)	EMBEDMENT (E)	PROJECTION (P)	SQUARE WASHER (W)	THICKNESS (T)
30	550	200	100	25

PLANS AND DOCUMENTS
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0	FOR CONSTRUCTION	04.07.22	D.J.

Status
FOR CONSTRCUTION

Project
24m COMMUNICATION TOWER
BOWEN ORBITAL SPACEPORT

for
TELCO ANTENNAS

Title
FOOTING DETAILS

Drawn	Date	Chkd	Date
DJ		RL	
Design	Date	Apprd	Date
MF		LS	
Scale	A3	Certif	Date
NTS		LS	

Project No.	Dwg. No.	Rev
22-055	S100	0

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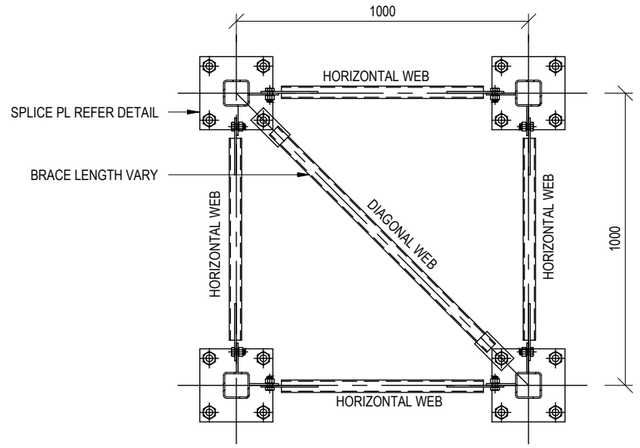
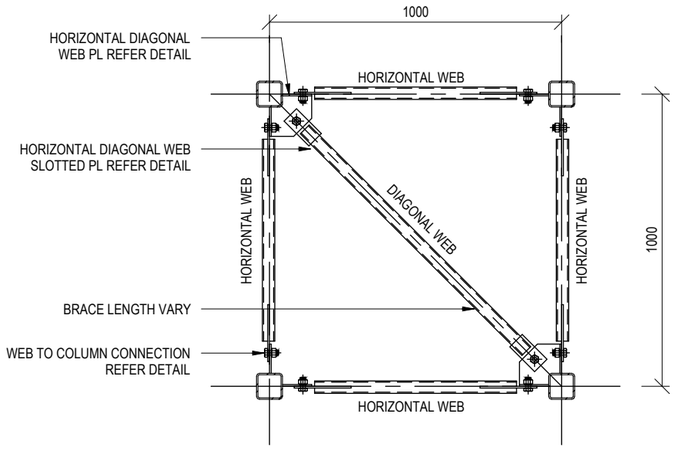


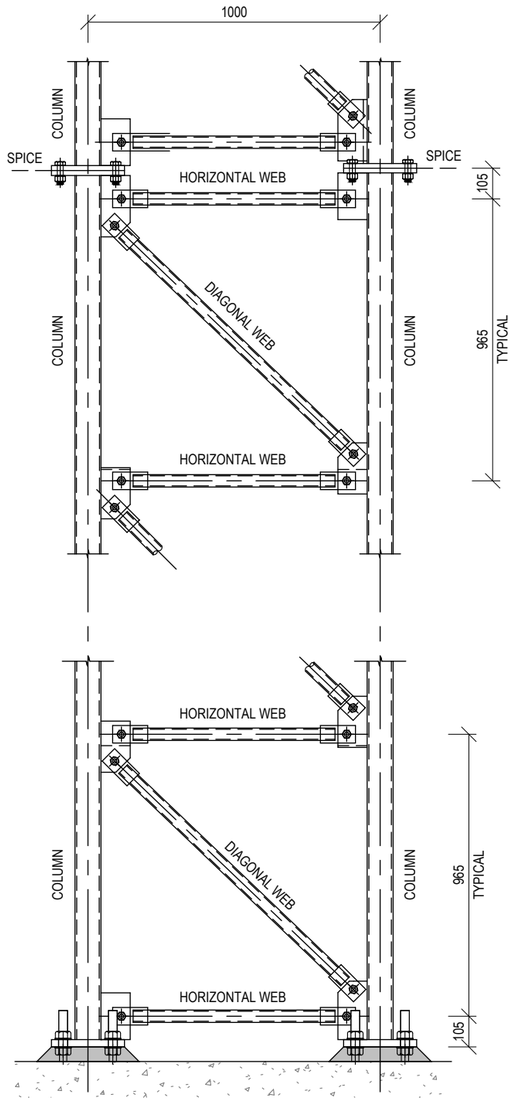
TYPICAL SECTION AT SPLICE

1 : 20



TYPICAL SECTION AT MID-SECTION

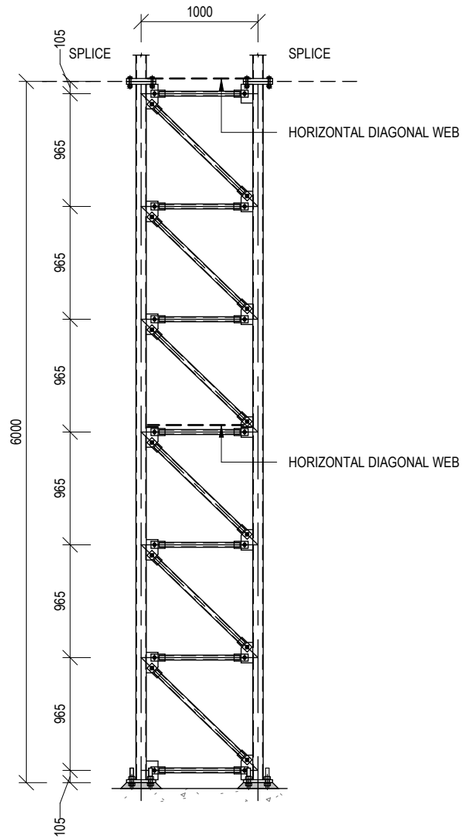
1 : 20



LEG AND WEB MEMBER SET OUT

1 : 20

NOTE:
ALL LEG TO SPLICE/BASE PLATE CONNECTIONS
TO BE COMPLETE PENETRATION BUTT WELDS.
ALL OTHER WELDS TO REMAIN 6mm CFW (U.N.O.).



TYPICAL MODULE

1 : 50

MEMBER SCHEDULE			
MODULE	MEMBER	DESCRIPTION	GRADE
MODULE A	COLUMN	89x89x6.0 SHS	350
MODULE B TO D	COLUMN	89x89x3.5 SHS	350
MODULE A TO D	HORIZONTAL AND DIAGONAL WEB	42.4x3.2 CHS	250

PLANS AND DOCUMENTS
referred to in the
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Queensland Government

SDA approval: APC2024/006

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REV	DESCRIPTION	DATE	BY
0	FOR CONSTRUCTION	04.07.22	D.J.

Status
FOR CONSTRCUTION

Project
24m COMMUNICATION TOWER
BOWEN ORBITAL SPACEPORT

for
TELCO ANTENNAS

Title
TOWER FRAMING PLAN AND ELEVATIONS

Drawn	Date	Chkd	Date
JAW		RL	
Design	Date	Apprd	Date
LS		LS	
Scale	A3	Certif	Date
		LS	

Project No.	Dwg. No.	Rev
22-055	S400	0

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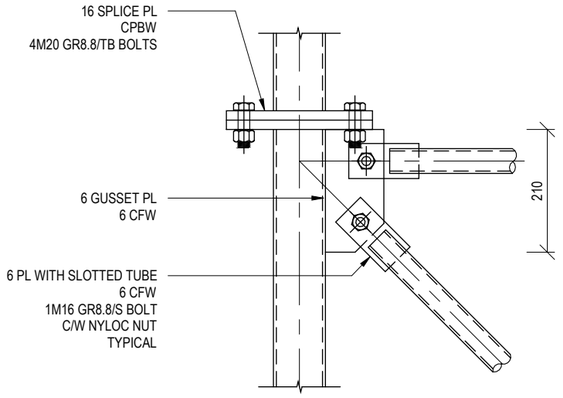
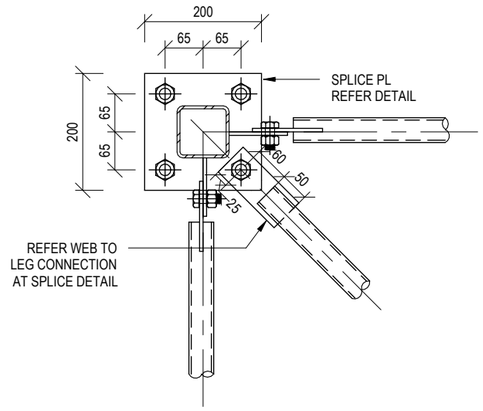


WEB TO LEG CONNECTION AT SPLICE

1 : 10



DIAGONAL WEB TO SPLICE PLAN DETAIL

1 : 10

PLANS AND DOCUMENTS
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PLANS AND DOCUMENTS
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SDA approval: APC2024/006

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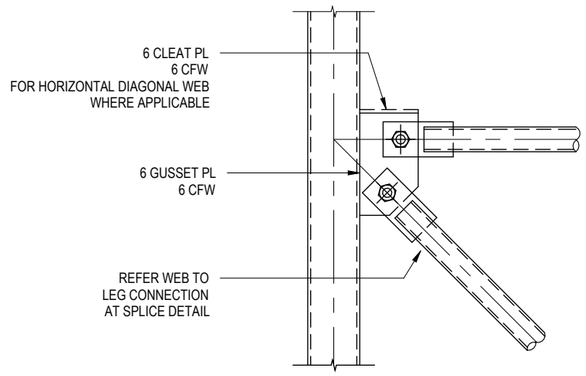


WEB TO LEG CONNECTION

1 : 10

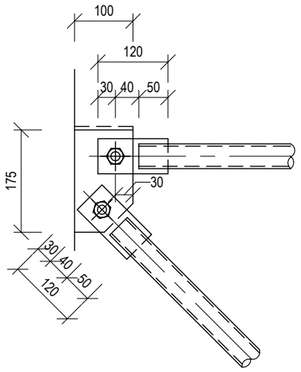
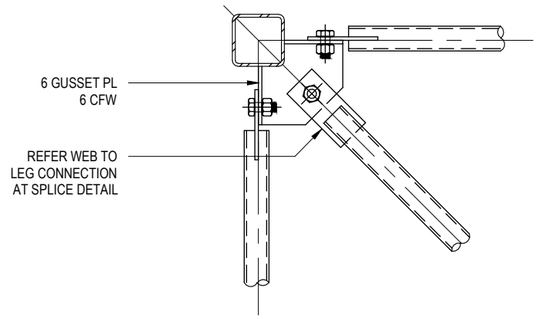


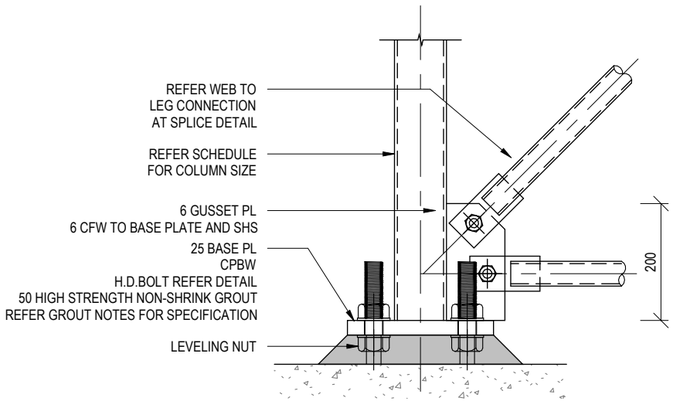
PLATE SET OUT

1 : 10



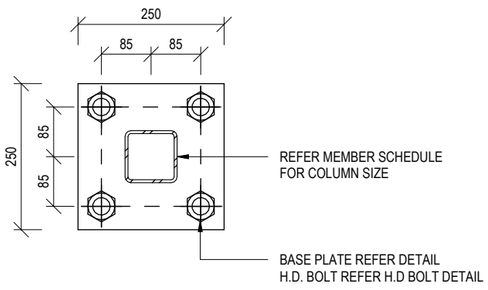
DIAGONAL WEB TO LEG PLAN DETAIL

1 : 10



BASE PLATE DETAIL

1 : 10



TYPICAL BASE PLATE

1 : 10

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REV	DESCRIPTION	DATE	BY
0	FOR CONSTRUCTION	04.07.22	D.J.

Status

FOR CONSTRCUTION

Project

24m COMMUNICATION TOWER
BOWEN ORBITAL SPACEPORT

for

TELCO ANTENNAS

Title

TOWER FRAMING DETAILS

Drawn	Date	Chkd	Date
JAW		RL	
Design	Date	Apprd	Date
LS		LS	
Scale	A3	Certif	Date
		LS	

Project No.	Dwg. No.	Rev
22-055	S401	0

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STRUCTURAL COMPUTATION REPORT

22-055 –24m COMUNICATION TOWER AT BOWEN ORBITAL SPACEPORT

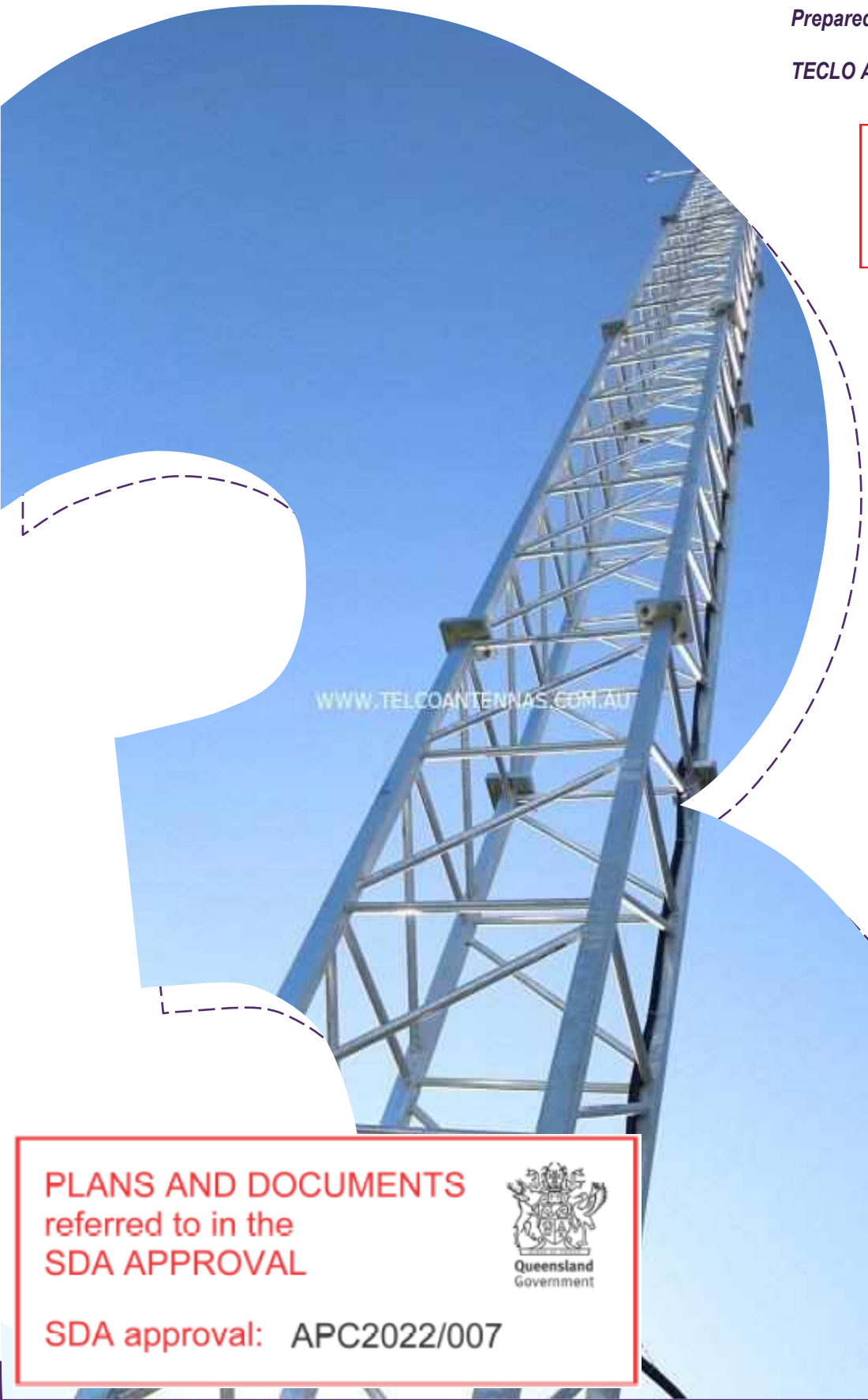
Prepared for:

TECLO ANTENNAS

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

SDA approval: APC2024/006

Queensland Government



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referred to in the
SDA APPROVAL

SDA approval: APC2022/007

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Doc Reference: 22-055

Document1	
Prepared By	**MF**
Approved By	**LS**
Date	**04/07/22**
Job Number	**22-055**
Document Name	**Structural Computation Report**
Version	**V 1.0**

Document Revision History

Version	Revision History
1.0	**Initial issue**

Leonel Sobral
Senior Structural Engineer
MIEAust CPEng NER RPEQ APECEng IntPE(Aust)

Matthew Falcke
Graduate Structural Engineer

STATEMENT OF LIMITATION

TABLE OF CONTENTS

1 Scope

I3 consulting was engaged by Telco Antennas to undertake a structural design and certification of the 1m face steel tower and footing for the proposed project at Orbital Spaceport Bowen QLD. This 24m high tower is to support communication equipment (ie. parabolic antennas)

1.1 Design scope:

The following structural design and certification was performed on the steel tower structure, connections and concrete footing:

- Calculate wind loads for the proposed orbital spaceport site in accordance with AS1170.2-2021
- Determine wind loads on the tower and the specific set of antennas.
- Structural model and analysis of the proposed tower
- Design check steel member sizes and connections for the bolted web members
- Design reinforced concrete pad footing
- Structural drawings of the footings, steel towers and connection details
- Design computation report and design compliance statement (form 15)

1.2 Structural Assessment & Certification Limitations

This design and certification is based on the fabrication and installation of the steel tower being carried out in accordance with i3 computation report and drawings 22-055 – S00, S01, S50, S100, S400 and S401.

2 Client Specification

Client provided information for the proposed 24m steel framed tower

- Geometry of 1m square steel frame tower
- Proposed antennas size, above ground level and bearings – refer antenna schedule in section 4.2

2.1 Site Location

The proposed steel tower is to be installed at Orbital Spaceport Bowen, Queensland with the following GPS co-ordinates:

3 Applicable Design Standards

AS/NZS 1170.0:2002	Structural Design Actions – General principles
AS/NZS 1170.1-2002	Structural Design Actions – Permanent, imposed, and other actions
AS/NZS 1170.2-2011	Structural Design Actions – Wind actions
AS 1891.4:2009	Industrial fall-arrest systems and devices – selection, use and maintenance
AS 3995 -2009	Design of steel lattice masts & Masts (Section E1)
AS/NZS 3678 2011	Structural Steel – hot-rolled plates, floorplates and slabs
AS/NZS 3679.1 2016	Structural Steel – hot rolled bars and sections
AS 1163 2016	Cold-formed structural steel hollow sections
AS/NZS 4100 2020	Steel Structures
AS/NZS 1554.1 2014	Structural Steel Welding – Welding of Steel Structures
AS 3600 2018	Concrete Structures

4 Design Actions

The following design parameters were adopted in the structural analysis and design of the steel tower and concrete footing

4.1 General Principals

- Importance level 2
- Design working life 50 years

4.2 Permanent Actions

- Deign loads based on AS1170.1
- Self-weight of steel tower members and connections
- Self-weight of concrete footing
- Antenna details as tabled below

ANTENNA SCHEDULE				
ID	**SIZE / STYLE**	**BEARING**	**WEIGHT (kg)**	**ABOVE GROUND LEVEL (AGL)**
A1.06	600 DIAMETER PARABOLIC ANTENNA	102°	8	24m
A2.06	600 DIAMETER PARABOLIC ANTENNA	112°	8	24m
A3.06	600 DIAMETER PARABOLIC ANTENNA	334°	8	24m
FUTURE	600 DIAMETER PARABOLIC ANTENNA	(TBC)	8	22m
FUTURE	600 DIAMETER PARABOLIC ANTENNA	(TBC)	8	22m

4.3 Imposed Actions

- Design loads based on AS1891.4 Industrial fall arrest systems and devices; part 4
- Single point anchorage - 15kN applied at 5° from vertical to simulate real world conditions

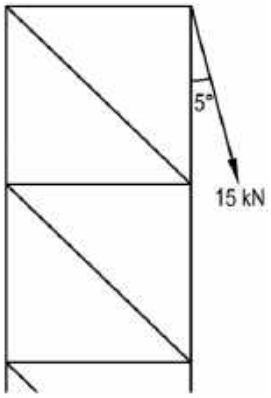


Figure 1 – Fall Arrest Load

4.4 Wind Actions

The following wind parameters were used based on AS3995 and AS1170.2:

- Regions: C (refer map below for Australian wind regions)
- Terrain category: 2
- Terrain / height multiplier: 1.098
- Wind directional multiplier mast / antennas: 0.9
- Topographical Multiplier: 1.0
- Climate Change Multiplier: 1.05
- Shielding Multiplier: 1.0
- Lateral deflection to allow continuous communication is taken from AS3995 Appendix E1 which specifies a wind speed of 27m/s
- The ultimate wind speed and pressures (without the aerodynamic shape factors C_{fig}) are listed in the following table:

Region	V_R (m/s)	V_{des} (m/s)	P_w (kpa)
C	65.6	67.9	2.77

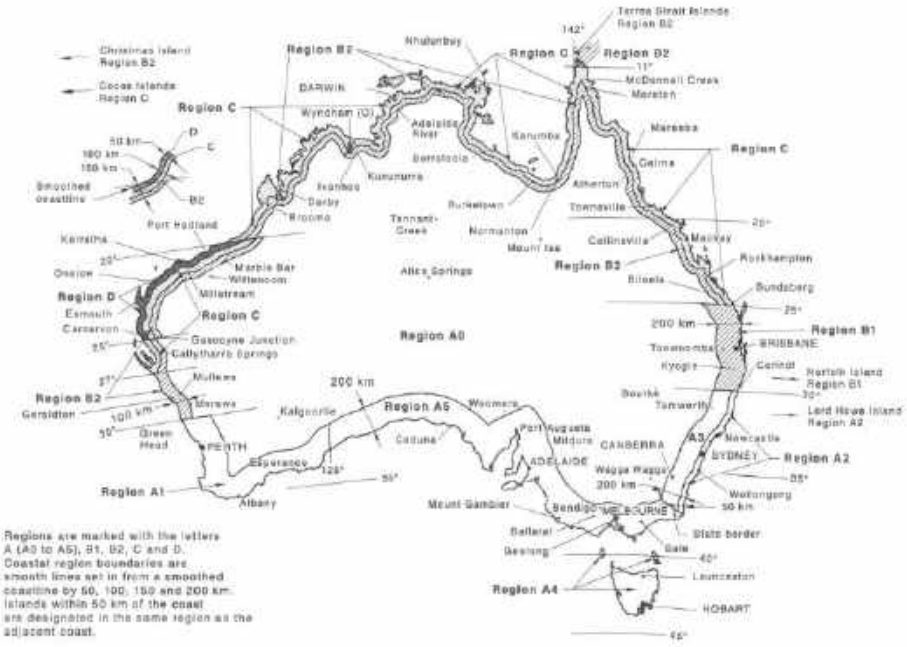


Figure 3.1(A) — Wind regions — Australia

Figure 2 – AS1170.2 - Wind Regions - Australia

5 Tower Climbing Adequacy

Structural elements have been assessed for loads generated from climbing / working at heights. A single person load of 15kN is applied in accordance with Table 3.1 in AS1891.4.

AS1891.4 requires that signage be installed at the tower base describing which elements of the structure can be used for anchorage.

Any climber / worker at heights must be competent and qualified to do so.

Two (2) climbers / workers at heights can be supported by the tower with adherence to the following specifications.

a. **ONLY** the members shown in purple in the generic diagram below can be used as a climbing / work at heights anchor point.
b. The specified anchor points are limited to one (1) person at any time.
c. Prior to anchoring to any element, visually check connections are complete and have no damage. Any defects should be reported to the manufacturer.
d. Do not attach fall arrest devices to horizontal cross bracing.
e. Any anchor point is limited to the tower leg above the brace connection points.

Generic Tower Anchor points

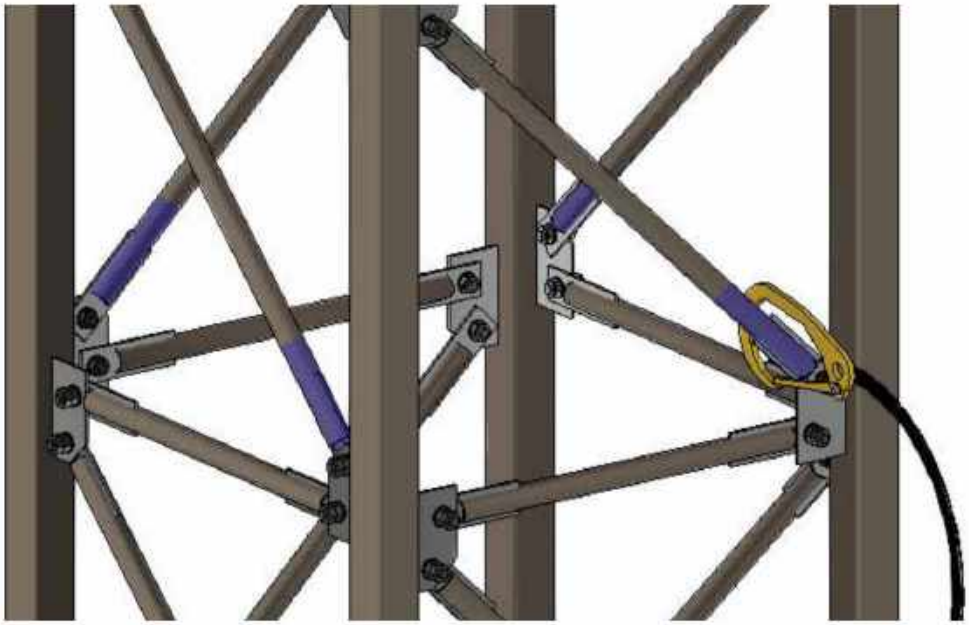


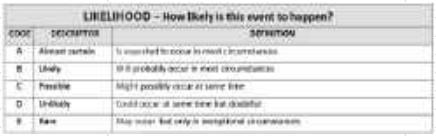
Figure 3 – Lanyard Hook must be placed around diagonal tower web above bracing connections only (purple shading)

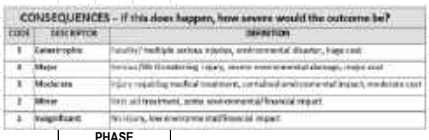
6 Safety In Design

Safety in Design (SID) is a statutory requirement on construction projects. In all jurisdictions within Australia there is a general requirement that the safety of a design is reviewed where non-standard construction techniques or novel building or structural designs are proposed.

4.2.1.1 DESIGN RISK ASSESSMENT

PROJECT NAME / NUMBER:		24m Tower at Bowen Orbital Spaceport / 22 - 055
DRAWING NUMBERS:	icubed consulting drawings (DRAWING LIST)	S00 - S401
PARTICIPANTS:	icubed consulting (NAMES)	Matthew Falcke, Leonel Sobral
DATE OF REVIEW:		15/06/2022
DISTRIBUTION:		





				PHASE				RESIDUAL RISK					
PRA Ref	Hazard	Risk	Site / Building Location	CON	OP / US	MAINT	Suggested Treatment - Change or specify new control	L	C	SCORE	Responsibility	Status (Open / Closed)	
1	Structural Collapse	The tower could collapse under an extreme wind event	ALL	✓	✓	✓	Tower designed to AS/NZS 1170.1-2002 and AS/NZS 4100 2020. The design was also peer reviewed and signed off by a senior engineer.	E	2	L	i3	CLOSED	
2	Working at Heights	Worker could fall from height when climbing the tower	TOWER	✓	✖	✓	Instruction have been provided for climbing the tower/signage will be installed at the base of the tower describing which areas of the structure can be climbed and used as an anchor point/ climbers must be working from heights trained	C	3	M	Telco Antennas	OPEN	
3	Dangerous Weather Conditions	personal injury / commercial loss during high winds / thunderstorms / Earthquake	ALL	✓	✓	✓	Avoid working on or around the tower during extreme weather events	C	2	M	Telco Antennas	OPEN	
4	Exposed Steel during construction	A worker could fall onto the slab reo causing personal injury	TOWER	✓	✖	✖	Warn workers of the potential hazard.	D	2	L	Telco Antennas	OPEN	
5	Falling objects	Someone working at the top of the tower could drop something from a height and hit someone.	ALL	✓	✖	✓	Hard hats are to be warn within the near vicinity of the tower and workers are to use the proper anchoring points when lifting is required.	D	5	M	Telco Antennas	OPEN	
6	Manual handling issue	A worker manipulating steel members or antennas could possibly injure themselves whilst doing so	ALL	✓	✖	✓	Proper lifting technique is to be carried out at all times and workers are to use appropriate lifting tools/devices when required.	C	2	M	Telco Antennas	OPEN	
7	PPE	Personal injury / fatigue / stress	ALL	✓	✓	✓	Standard work health and safety methods are to be implemented and all works must wear required PPE.	C	4	H	Telco Antennas	OPEN	
8	Improper Foundation	The soil under the foundations cannot resist the forces applied to it causing failure	ALL	✓	✓	✓	Soil tests required to confirm minimum bearing capacity	C	3	M	Telco Antennas	OPEN	
9	Trip Hazards	There is potential for someone to trip whilst walking around the site. Both around the tower and at the edge of the concrete slab	ALL	✓	✓	✓	Workers to take care when moving around the site	D	1	L	Telco Antennas	OPEN	
10	Access/Egress	Limited Acces to rescue someone from the tower during an emergency	TOWER	✓	✖	✓	2 working from heights trained people must be on site when the tower needs to be climbed	E	4	M	Telco Antennas	OPEN	
11	Electricty	Potential electocution	TOWER	✓	✓	✓	If a faulty or exposed wire/conection is discovered work on the tower is to stop and a certified electrition must repair the issue before work can commence.	E	5	M	Telco Antennas	OPEN	

7 Structural Analysis & Results

Below are the analysis and capacity results from the structural modelling for the 24m high, 1m face steel tower:

- The tower was analysed with the calculated ultimate and serviceability design loads
- Antenna loads were applied as a concentrated load at the specified AGL and bearing orientation as noted in section 4.2.

1m Face Lattice Tower – 24m high	
Wind region	C
Material	Steel
Tower leg - module A - module B, C and D	 89 x 6 SHS (G350) 89 x 3.5 SHS (G350)
Tower web	42.4 x 3.2 CHS (G250)
leg centre to centre	1000 mm
max tower design height	24 m
No. of modules	4 x 6.0m
Leg max design stress (Mpa)	171.27
Grade 350 steel stress capacity (Mpa)	350
Web max design stress (Mpa)	94.52
Grade 250 steel stress capacity (Mpa)	250

It can be seen from the table above that the stress capacity of the tower framing members are greater than the maximum design stress. Therefore, the steel tower is deemed structurally adequate.

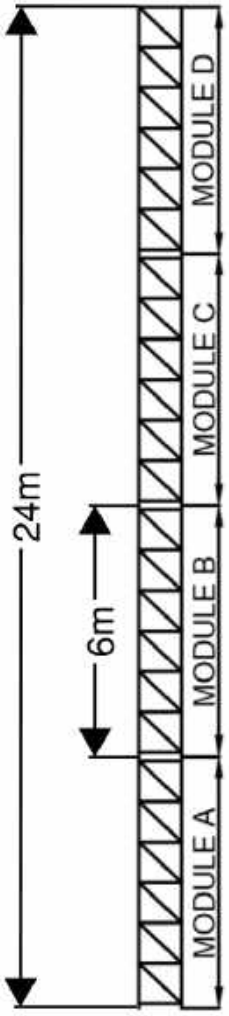


Figure 4 – Tower Layout

7.1 Lateral Displacement

Tower lateral displacement at the top of the tower is tabled below

24m Tower at Bowen Orbital Spaceport	Lateral shift	Rotation
Lateral displacement at top of tower based on 27m/s wind	42.5mm	1.1°

Notes:

- Deflections for communication serviceability taken as 27m/s as per AS3995 appendix E1
- Actual deflections are subject to the antenna size, shape, orientation and placement on the tower.

7.2 Tower Base Reactions

From the structural analysis model, the table below provides the base reaction forces per leg to be supported by the footing system.

1m Face Lattice Tower – 24m high – Design Actions				
Location	**Uplift**	**Shear**	**Bearing**	**Bending**
Max tower base reaction ULS (kN)	498.28	14.97	509.76	-

7.3 Geotechnical Parameters

Geotechnical data of soil properties and conditions were obtained in the Site Classification & Geotechnical Recommendations report from CQ Soil Testing number CQ20875, dated 06/04/22. The results are shown below.

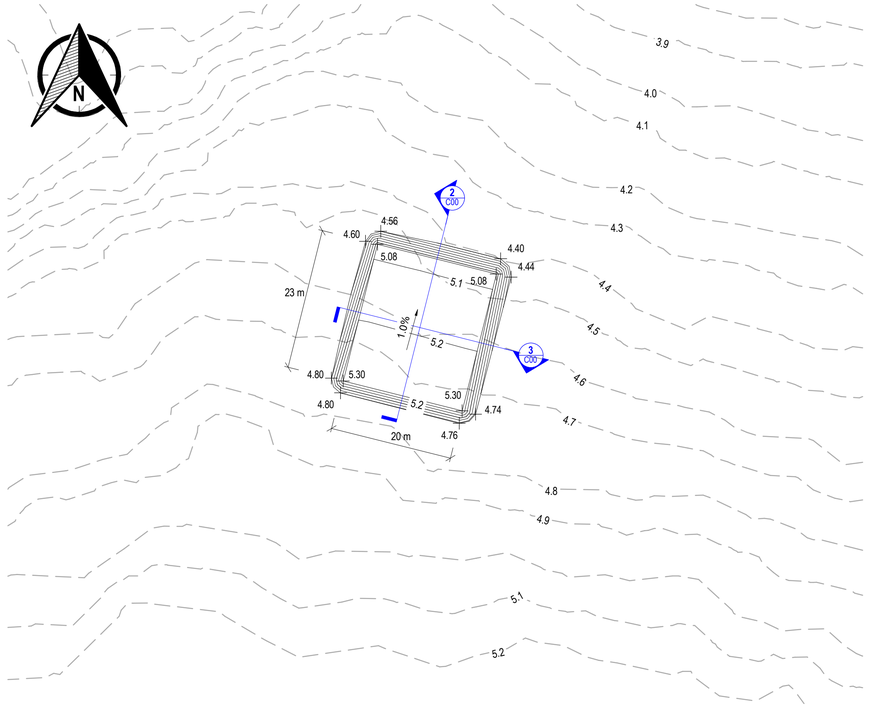
Soil Description & Assumed Design Parameters	
Soil type / description	silty clay / very stiff
Friction angle Φ	19°
Undrained shear strength Cu (kPa)	350 kPa(ULS)
Static Stress-Strain Es (MPa)	8-30

7.4 Footing Design

See the below capacity summary of the concrete footing.

Concrete footing Design Actions	Design Load	Design Capacity	Capacity Utilisation
Bearing	50.9 kPa	150 kPa	33.9 %
Sliding	51.42 kN	263.01 kN	19.6 %
Bending Moment	213.5 kN-m	481.4 kN-m	44.3 %
Shear	304.4 kN	522.6 kN	58.3 %
Punching Shear	509.76 kN	3078.6 kN	16.6 %
Minimum Steel	5313mm^2	6232mm^2	85.3%

As seen in the above table, the footing resistance against the design actions is satisfactory and therefore can be concluded that the footing system will be adequate for the conditions at Bowen Orbital Spaceport.



1 LAYOUT PLAN

1 : 500

BULK EARTHWORKS NOTES

THE CONTRACTOR SHALL CARRY OUT FIELD DENSITY TESTING OF BULK FILLED AREAS INCLUDING BUILDING PLATFORMS AND REPLACED INSITU MATERIAL AS PER THE FOLLOWING REQUIREMENTS:

1. WORKS TO BE IN ACCORDANCE WITH AS 3798 - 2007.

2. TESTING TO BE IN ACCORDANCE WITH AS 1289 (RELEVANT PORTIONS).

3. SPECIFIC TESTING REQUIREMENTS
- LEVEL ONE TESTING TO BE PROVIDED BY GEOTECHNICAL TESTING AUTHORITY (GTA).
- A DAILY GEOTECHNICAL SITE RECORD IS TO BE KEPT, REFER AS 3798, APPENDIX C

4. QUANTITY OF TESTING TO BE NOT LESS THAN ANY OF THE FOLLOWING
- 1 TEST PER LAYER PER 2500sqm
- 1 TEST PER 500cub.m DISTRIBUTED EVENLY THROUGHOUT THE DEPTH AND AREA OF OF THE FILLING
- 3 TESTS PER VISIT BY THE GEOTECHNICAL TESTING AUTHORITY (GTA)

5. DEGREE OF COMPACTION TO BE AS FOLLOWS
- NSL TO 500mm BELOW FSL = 95% STANDARD COMPACTION
- 500mm BELOW FSL TO FSL OR FPL = 100% STANDARD COMPACTION

6. MATERIAL MOISTURE CONTENT TO BE IN THE RANGE OF 85% TO 115% OF OPTIMAL MOISTURE CONTENT (OMC)

7. COMPACT SUBGRADE SURFACES IN CUT AREAS OF THE PLATFORM SHALL HAVE DRY DENSITY TESTING PERFORMED AT INTERVALS NOT LESS THAN 1 PER 2000sq.m

8. THE EXPENSE OF THE TESTING IS THE RESPONSIBILITY OF THE CONTRACTOR.

PAVEMENT NOTES

1. ALL PAVEMENTS ARE BASED ON A SOUND AND TRAFFICABLE SUBGRADE.

2. WET AND/ OR SOFT AREAS FAILING THE SUBGRADE PROOF ROLL TEST MAY REQUIRE SOME FORM OF SUBGRADE IMPROVEMENT.

3. THE DESIGN ENGINEER SHALL BE CONSULTED TO ASSESS OPTIONS SUCH AS;
   - LIME STABILISATION
   - GEOTEXTILE STRENGTHENING
   - COARSE ROCKFILL STRENGTHENING
   - SUBGRADE REPLACEMENT

   OR A COMBINATION OF ALL THESE OPTIONS.

GENERAL NOTES

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS. THE PROJECT SPECIFICATION SHALL TAKE PRECEDENCE OVER THESE GENERAL NOTES.

2. BEFORE PROCEEDING WITH THE WORK ANY DISCREPANCIES IN THE CONTRACT DOCUMENTS SHALL BE REFERRED FOR DECISION TO THE DESIGN ENGINEER.

3. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT EDITIONS INCLUDING AMENDMENTS OF THE RELEVANT GLADSTONE REGIONAL COUNCIL STANDARDS, TMR STANDARDS, QLD CODES OF PRACTICE.

4. PROVIDE AS-CONSTRUCTED SURVEY FOR ALL WORKS.

5. THE SURVEY OF EXISTING SURFACE LEVELS HAS BEEN DERIVED FROM PUBLICLY AVAILABLE LIDAR AND MAY NOT BE 100% ACCURATE. CONFIRM EXISTING SURFACE LEVELS PRIOR TO CONSTRUCTION.

6. ACCESS RAMPS TO THE LAUNCH PAD TO BE DESIGNED BY OTHERS

7. AS PER GEOTECHNICAL REPORT GE_2211.1150, ACID SULPHATE HAS BEEN IDENTIFIED AND NEEDS TO BE TREATED APPROPRIATELY. REFER TO ACID SULPHATE TREATMENT PLAN.

8. CONCRETE SLAB DESIGNS FOR THE STORAGE TANKS ARE TO BE DESIGNED BY OTHERS.

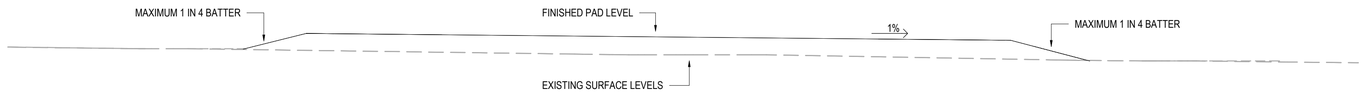
HOLD POINT:
PROOF ROLL TO BE CONDUCTED ON THE SUBGRADE. CONTACT ENGINEER FOR AN INSPECTION 24 HOURS PRIOR TO THE REQUIRED INSPECTION TIME.

FOR A SUCCESSFUL PROOF ROLL INSPECTION:
1. NO SOFT SPOTS ARE TO BE FOUND - CONTRACTOR TO CONDUCT A PROOF ROLL ON SITE PRIOR TO CONTACTING ENGINEER TO ENSURE PAVEMENT WILL PASS.
2. THE PROOF ROLL IS ASSUMED TO BE CONDUCTED IN A SINGLE STAGE. IF A DIFFERENT APPROACH IS NEEDED, CONTACT THE ENGINEER.

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

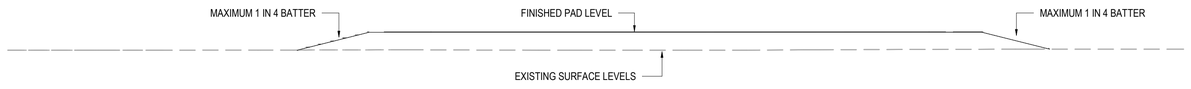
Queensland Government

SDA approval: APC2024/006



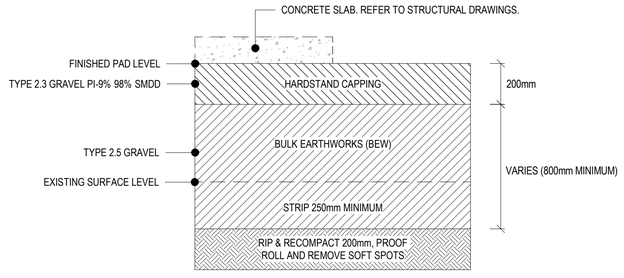
2 BULK EARTHWORKS SECTION 1
C00

1 : 100



3 BULK EARTHWORKS SECTION 2
C00

1 : 100



4 TYPICAL PAD PAVEMENT DETAILS

1 : 150

BULK EARTHWORKS LEGEND

LINE	DESCRIPTION
———	FINISHED PAD LEVEL
- - - - - -	EXISTING SURFACE CONTOURS
- - 12.00 - -	EXISTING SURFACE CONTOUR LABEL
12.00	BULK EARTHWORKS SPOT ELEVATIONS

NOTES:

1. BULK EARTHWORKS ARE TO BE GRADED LINEARLY BETWEEN EARTHWORKS POINTS.
2. REFER SEDIMENT AND EROSION CONTROL NOTES AND DETAILS.
3. REFER EARTHWORKS PLAN FOR PAVEMENT ALLOWANCES.
4. TOLERANCES REFER CONTRACT DOCUMENTATION
5. SITE BOUNDARIES TO BE CONFIRMED BY SURVEY
6. SITE SERVICES PROVIDED BY SUBDIVISION DOCUMENTATION ONLY AND IT IS THE CONTRACTORS RESPONSIBILITY TO CONFIRM ALL LOCATIONS AND HEIGHTS BEFORE COMMENCING WORK

LRE LAUNCH PAD EARTHWORK VOLUMES	
STRIP	166.0 cub.m
CUT	123.9 cub.m
TYPE 2.5 GRAVEL	854.5 cub.m
TYPE 2.3 GRAVEL	106.3 cub.m

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Client:

Gilmour Space
All Orbits, All Planets®
https://www.gpsace.com

REV	DESCRIPTION	DATE	BY
A	PRELIMINARY	03.03.2023	L.K.

Status
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project
BOWEN ORBITAL SPACE PORT
BOWEN QUEENSLAND

for
GILMORE SPACE TECH

Title
LRE LAUNCH PAD
EARTHWORKS PLAN

Drawn	Date	Chkd	Date
L.K.	03.03.2023	T.J.S	
Design	Date	Apprd	Date
L.K.		T.J.S	
Scale A1		Certif	Date
As indicated		T.J.S	

Project No.	Dwg. No.	Rev
21-307	C00	A

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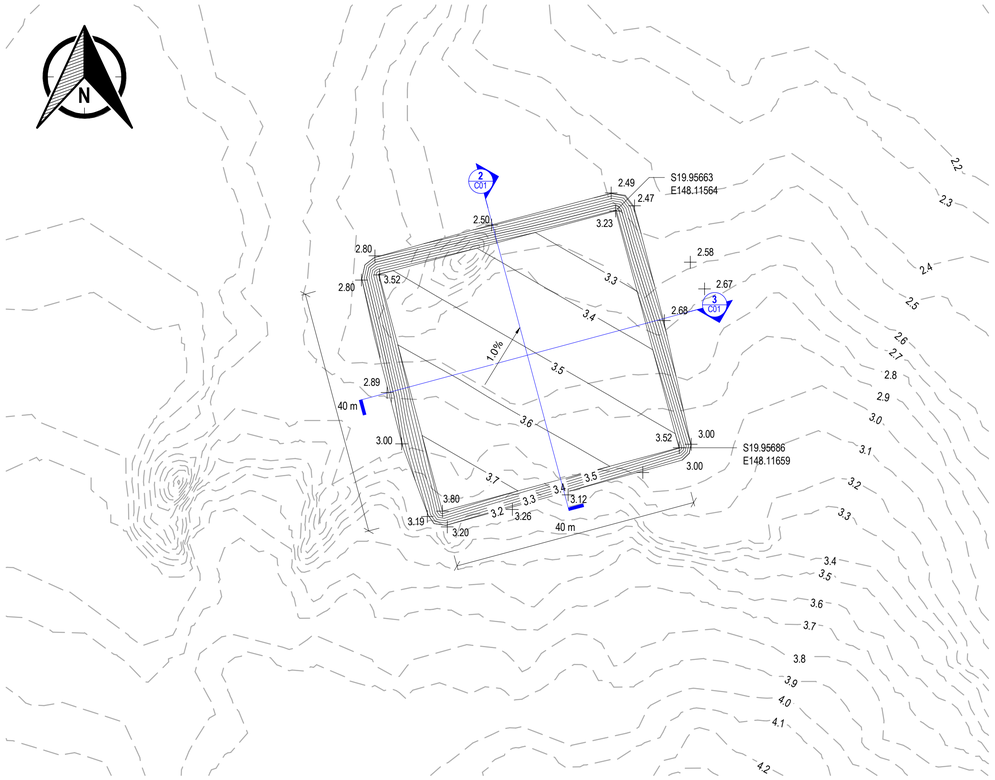

1 LAYOUT PLAN

1 : 500

2 C01 BULK EARTHWORKS SECTION 3

1 : 150

3 C01 BULK EARTHWORKS SECTION 4

1 : 150

GENERAL NOTES

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4. PROVIDE AS-CONSTRUCTED SURVEY FOR ALL WORKS.
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   - LIME STABILISATION
   - GEOTEXTILE STRENGTHENING
   - COARSE ROCKFILL STRENGTHENING
   - SUBGRADE REPLACEMENT

   OR A COMBINATION OF ALL THESE OPTIONS.

BULK EARTHWORKS NOTES

1. WORKS SHALL BE EXECUTED BY THE CONTRACTOR IN ACCORDANCE WITH AS3798 - 2007, 'GUIDELINES FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS' AND SHALL BE SUPERVISED BE AN APPROVED GEOTECHNICAL TESTING AUTHORITY, (GTA) AS DEFINED IN THE CODE TO A LEVEL 2 STANDARD.

2. FOLLOWING INITIAL MOBILISATION AND PRIOR TO STRIPPING OF THE SITE, THE CONTRACTOR SHALL IMMEDIATELY UNDERTAKE THE EROSION AND SEDIMENT RUNOFF PREVENTION MEASURES.

3. FOLLOWING THE STRIPPING OF THE UPPER ORGANIC SOIL, THE SITE SHALL BE PROOF ROLLED TO IDENTIFY ANY SOFT SPOTS OR FURTHER SIGNS OF UNSUITABLE MATERIAL. ANY SUCH AREAS SHALL BE RECTIFIED PRIOR TO COMMENCEMENT OF FILLING OPERATIONS.

4. FILLING SHALL BE COMPLETED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS
- WORKS TO BE IN ACCORDANCE WITH AS3798 - 2007
- DEGREE OF COMPACTION TO BE AS FOLLOWS
  - SUBGRADE COURSES LESS THAN 300mm BELOW DESIGN SURFACE LEVEL 98% SMDD.
  - SUBGRADE COURSES 300mm OR MORE BELOW DESIGN SURFACE LEVEL 95% SMDD.
  - SUBBASE COURSES 98% SMDD
  - BASE COURSES 98% SMDD
- MATERIAL MOISUTRE CONTENT TO BE IN THE RANGE OF ±3% OF OPTIMAL MOISTURE CONTENT (OMC)
- THE EXPENSE OF TESTING IS ON THE CONTRACTOR

5. IT IS THE CONTRACTORS RESPONSIBILITY TO PROTECT THE SITE AND SURROUNDING AREAS FROM DAMAGE RESULTING FROM STORMWATER RUNOFF. TEMPORARY DIVERSION DRAINS AND OR OTHER DRAINAGE CONTROL DEVICES ARE TO BE IMPLEMENTED BY THE CONTRACTOR DURING CONSTRUCTION TO MINIMISE THE EFFECTS OF WEATHER. NO EXTENSIONS OF TIME WILL BE GRANTED SHOULD DAMAGE TO THE WORK AND SURROUNDING AREAS RESULT FROM THE CONTRACTORS NEGLIGENCE IN NOT PROVIDING ADEQUATE PROTECTION.

6. EXCESS SPOIL MATERIAL GENERATED DURING CONSTRUCTION SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR.

HOLD POINT:
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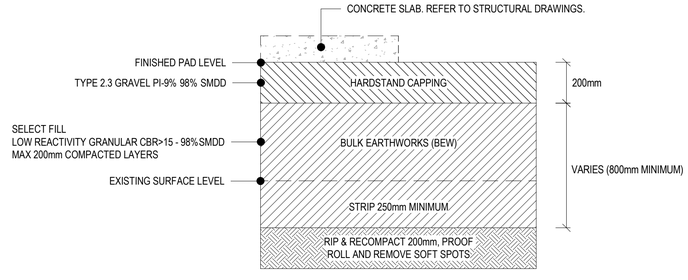
PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: APC2024/006



4 TYPICAL PAD PAVEMENT DETAILS

1 : 150

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Development Services | Engineering | Project Delivery

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Client:

GILMOUR SPACE

BULK EARTHWORKS LEGEND

LINE	DESCRIPTION
———	FINISHED PAD LEVEL
- - - - - -	EXISTING SURFACE CONTOURS
- - 12.00 - -	EXISTING SURFACE CONTOUR LABEL
12.00	BULK EARTHWORKS SPOT ELEVATIONS

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4. TOLERANCES REFER CONTRACT DOCUMENTATION
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6. SITE SERVICES PROVIDED BY SUBDIVISION DOCUMENTATION ONLY AND IT IS THE CONTRACTORS RESPONSIBILITY TO CONFIRM ALL LOCATIONS AND HEIGHTS BEFORE COMMENCING WORK

SIRIUS LAUNCH PAD EARTHWORK VOLUMES	
STRIP	525.9 cub.m
CUT	0 cub.m
SELECT FILL	1478 cub.m
TYPE 2.3 GRAVEL	346.112 cub.m

REV	DESCRIPTION	DATE	BY
1	PAD AMENDED	29.02.2024	T.J.S.
0	FOR CONSTRUCTION	21.04.2023	P.J.M.
A	PRELIMINARY	03.03.2023	L.K.

Status

FOR CONSTRUCTION

Project

BOWEN ORBITAL SPACE PORT
BOWEN QUEENSLAND

for
GILMORE SPACE TECH

Title

SIRUIS LAUNCH PAD
EARTHWORKS PLAN

Drawn	Date	Chkd	Date
L.K.	03.03.2023	T.J.S	
Design	Date	Apprd	Date
L.K.		T.J.S	
Scale	A1	Certif	Date
As indicated		T.J.S	
Project No.		Dwg. No.	Rev
21-307		C01	1

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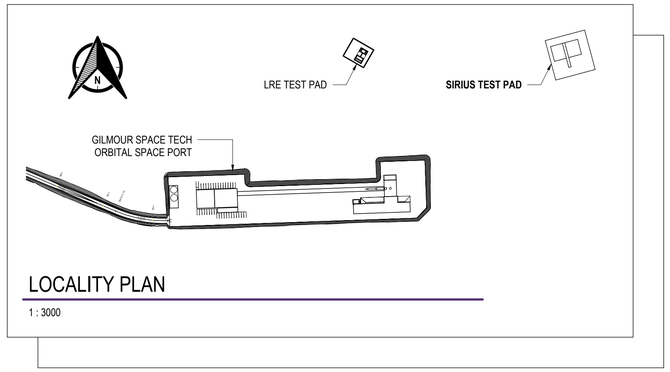
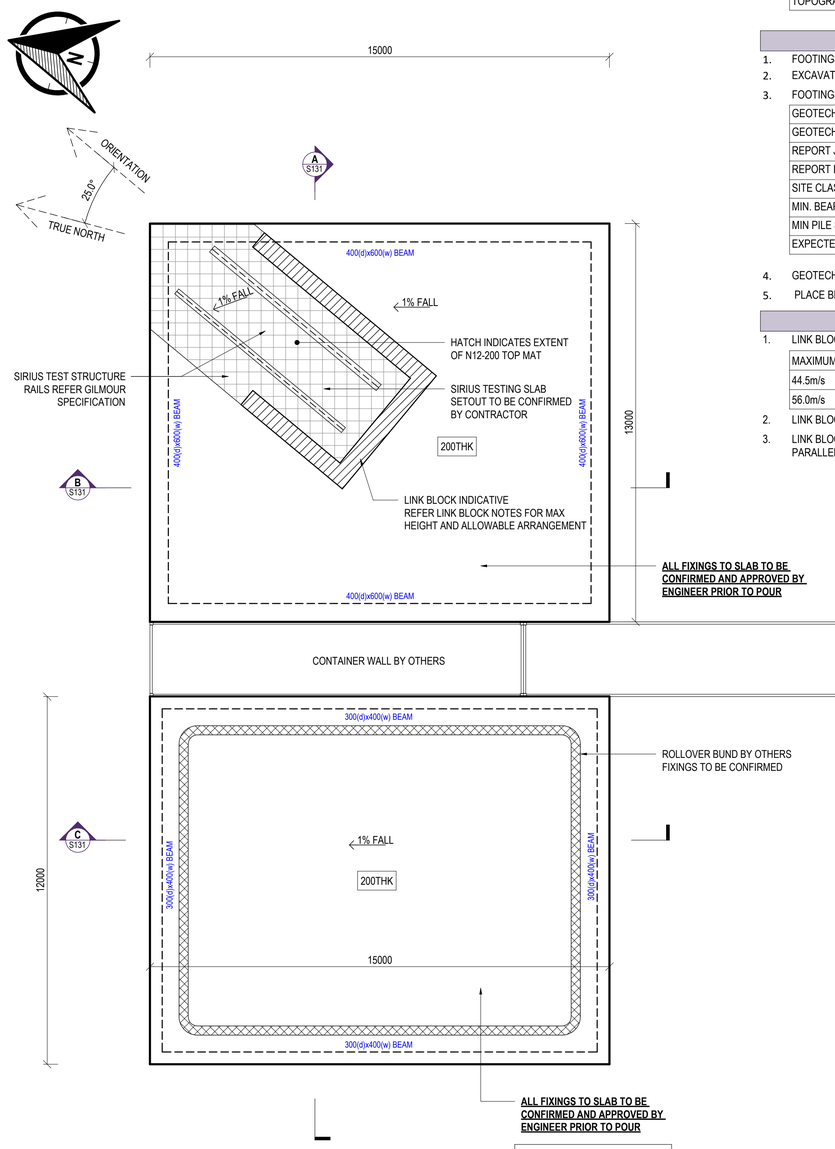


LOCALITY PLAN

1 : 3000

SANDBAGS INDICATIVE



SIRIUS PAD SLAB PLAN

1 : 100

ONLY FORKLIFT VEHICLE LOAD HAS BEEN ALLOWED ON SLAB.

DESIGN CRITERIA

1. GENERAL PRINCIPLES HAVE BEEN ASSESSED IN ACCORDANCE WITH AS1170.0:

IMPORTANCE LEVEL	IL2
DESIGN LIFE	50 YEARS

2. PERMANENT ACTIONS HAVE BEEN ASSESSED IN ACCORDANCE WITH AS1170.1:

LINK BLOCK	3m HIGH SELF-WEIGHT
20,000L ISO TANK	5t DRY, 30t WET
HTP BUND	26kL STORAGE
CYLINDER MAN PACK	16kN POINT LOAD
VARIOUS STORAGE TANKS	MAX 5t

3. IMPOSED ACTIONS HAVE BEEN ASSESSED IN ACCORDANCE WITH AS1170.1:

SIRIUS THRUST LOAD	5t SELF WEIGHT 180kN THRUST DIRECTION 15kN LATERAL SHOCK 45kN OVERTURN SHOCK
VEHICLE LOADING	2.5t FORKLIFT
FOOT TRAFFIC	5kPA

4. WIND LOADS HAVE BEEN ASSESSED IN ACCORDANCE WITH AS1170.2:

REGION	C
TERRAIN CATEGORY	TC2
WIND DIRECTION MULTIPLIER	0.9
SHIELDING MULTIPLIER	1.0
TOPOGRAPHICAL MULTIPLIER	1.0

FOUNDATION NOTES

1. FOOTINGS SHALL BE PLACED CENTRALLY UNDER COLUMNS UNLESS NOTED OTHERWISE.
2. EXCAVATIONS SHALL BE KEPT FREE OF PONDED WATER BEFORE PLACING CONCRETE.
3. FOOTINGS HAVE BEEN DESIGNED BASED ON THE FOLLOWING GEOTECHNICAL REPORT:

GEOTECHNICAL DETAILS	
GEOTECHNICAL REPORT BY	GROUND ENVIRONMENTS PTY LTD
REPORT JOB NUMBER	GE_2211.1150
REPORT DATE	11.01.2023
SITE CLASSIFICATION	H1
MIN. BEARING CAPACITY (ULS)	200kPa
MIN PILE SKIN FRICTION (ULS)	N/A
EXPECTED FOUNDING MATERIAL	CONTROLLED FILL

4. GEOTECHNICAL ENGINEER TO CONFIRM FOUNDATION DESIGN PARAMETERS PRIOR TO PLACING CONCRETE.
5. PLACE BLINDING CONCRETE TO BASE OF FOOTING EXCAVATION TO ACHIEVE DESIGN AND / OR UNIFORM BEARING MATERIAL.

LINK BLOCK NOTES

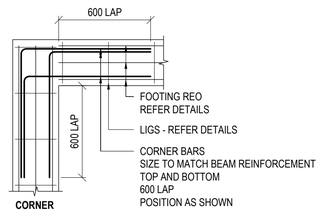
1. LINK BLOCK MAX HEIGHT DURING WIND EVENTS:

MAXIMUM WIND GUST SPEED	MAX WALL HEIGHT
44.5m/s	1.8m (DURING SERVICE)
56.0m/s	1.2m

2. LINK BLOCK WALLS SHALL BE UNSTACKED PRIOR TO STORM EVENTS AND OUT OF SERVICE.
3. LINK BLOCK WALLS CAN BE RELOCATED AND ARRANGED TO SUIT SERVICE OPERATIONS. DO NOT ARRANGE LINK BLOCK WALLS IN PARALLEL ROWS AT LESS THAN 1m CENTRES.

SLAB ON GROUND NOTES

1. SUBGRADE TO BE CONSTRUCTED AS PER EARTHWORKS NOTES.
2. SLAB TO BE PLACED ON 50mm BEDDING SAND WITH WATERPROOF MEMBRANE AS PER CONRETE NOTES.
3. PROVIDE 2N12 TRIMMER BARS 1000 LONG TO ALL RE-ENTRANT CORNERS.
4. SLAB TO HAVE A NOMINAL 1% FALL FOR SURFACE DRAINAGE OF SLAB.



STRIP FOOTING WITH REINFORCEMENT BARS

TYPICAL FOOTING CORNER DETAIL

FOOTING CORNER DETAILS

NTS

CONCRETE NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 & AS 1379.
2. CONCRETE QUALITY AND CLEAR CONCRETE COVER TO REINFORCEMENT (OUTSIDE OF STIRRUPS AND TIES) SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:

ELEMENT	CONCRETE GRADE	CLEAR COVER	SLUMP
BEAMS	N32	30 TOP COVER 50 BTM COVER 50 SIDE COVER	SLUMP 90 PLUS 20 MINUS 20
SLABS	REFER SLAB ON GROUND SCHEDULE ON DRAWINGS	30 TOP COVER 50 BTM COVER 50 SIDE COVER	SLUMP 90 PLUS 20 MINUS 20

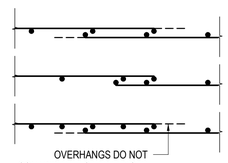
3. CONCRETE MIX TO HAVE A MAXIMUM AGGREGATE SIZE OF 20mm.
4. SPECIFIED STRUCTURAL THICKNESSES FOR CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.
5. CONSTRUCTION JOINTS OR POUR BREAKS WHERE NOT SHOWN ON PLANS OR DETAILS SHALL BE LOCATED AND FORMED TO THE APPROVAL OF THE ENGINEER.
6. NO PENETRATIONS, RECESSES OR CHASES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT APPROVAL OF THE ENGINEER.
7. AT PENETRATIONS IN SLABS UNLESS OTHERWISE DETAILED REINFORCEMENT MUST NOT BE CUT BUT SHALL BE GATHERED EQUALLY TO EACH SIDE OF PENETRATION AND EXTRA REINFORCEMENT PROVIDED BETWEEN THE PENETRATIONS AS DIRECTED BY THE ENGINEER.
8. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY. IT IS NOT NECESSARILY SHOWN IN TRUE PROJECTION.
9. PROVIDE THE ENGINEER WITH 48 HOURS NOTICE OF REINFORCEMENT BEING READY FOR INSPECTION. NO CONCRETE IS TO BE POURED WITHOUT THE APPROVAL OF THE ENGINEER. THIS IS TO BE CONFIRMED AT A LATER DATE.
10. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN THE POSITIONS SHOWN. WHERE LAP LENGTH IS NOT SHOWN IT SHALL BE SUFFICIENT TO DEVELOP THE FULL STRENGTH OF THE REINFORCEMENT. THE FOLLOWING MINIMUM SPLICE LENGTHS SHALL BE USED UNLESS NOTED OTHERWISE:
THE FOLLOWING MINIMUM BAR SPLICE LENGTHS ARE APPLICABLE FOR f'c >= 25MPa TO 65MPa.
A - FOR VERTICAL OR HORIZONTAL BARS WITH LESS THAN 300mm OF CONCRETE CAST BELOW

BAR DIAMETER	LAP LENGTH (mm)	BAR DIAMETER	LAP LENGTH (mm)
N10	360	N24	1165
N12	440	N28	1485
N16	605	N32	1835
N20	865	N36	2210

B - FOR HORIZONTAL BARS GREATER THAN OR EQUAL TO 300mm OF CONCRETE CAST BELOW

BAR DIAMETER	LAP LENGTH (mm)	BAR DIAMETER	LAP LENGTH (mm)
N10	470	N24	1550
N12	570	N28	1960
N16	785	N32	2385
N20	1125	N36	2870

11. SUPPLY AND LAY FABRIC IN FLAT SHEETS AT SPLICES. FABRIC SHALL BE LAPPED AS SPECIFIED IN AS 3600. STEEL MESH SHOULD BE LAPPED AS SHOWN BELOW IE THE TWO OUTERMOST CROSS-WIRES OF ONE SHEET SHOUD OVERLAP THE TWO OUTERMOST WIRES AT THE OTHER.



12. MAINTAIN 30 MIN. COVER TO REINFORCEMENT AT SERVICES AND CAST IN ITEMS THROUGH SLABS AND FOOTINGS. ALL SERVICES THROUGH FOOTING TO BE WRAPPED WITH COMPRESSIBLE MATERIAL MINIMUM 10mm ABLEFLEX OR SIMILAR.
13. WELDING OF REINFORCEMENT WILL ONLY BE PERMITTED WITH THE PRIOR APPROVAL OF THE ENGINEER.
14. REINFORCEMENT MUST NOT BE CONTINUOUS THROUGH CONTRACTION JOINTS.
15. PLACE SUFFICIENT SUPPORT HURDLES/CHAIRS UNDER MAIN BOTTOM REINFORCING BARS AND TOP CROSS BARS IN SLABS AND FOOTINGS TO ALLOW THEM TO BE SUPPORTED IN THEIR CORRECT POSITIONS AND ALIGNMENT DURING CONCRETING (NOT GREATER THAN 900mm CENTRES UNLESS SHOWN OTHERWISE).
16. REINFORCEMENT SYMBOLS:

SYMBOL	SPECIFICATION
N	GRADE D500N DEFORMED BAR
R	STRUCTURAL GRADE ROUND BAR
RF AND SL	HARD DRAWN SHEET RIBBED WIRE REINFORCING FABRIC

THE NUMBER FOLLOWING THESE SYMBOLS IS THE BAR DIAMETER IN MILLIMETERS.

17. SLABS TO BE CURED BY COVERING WITH 0.20mm BLACK POLYETHYLENE SHEETING AND KEPT MOIST FOR 7 DAYS MINIMUM OR APPROVED ALTERNATIVE CURING METHOD.
18. NO CONCRETE TO BE POURED WHEN SITE TEMPERATURE EXCEEDS 35°C OR FALLS BELOW 5°C.

STRUCTURAL GROUT NOTES

1. GROUT IS TO BE HIGH STRENGTH AND NON-SHRINK.
2. ALL GROUT TO BE CEMENTITIOUS UNLESS NOTED OTHERWISE.
3. MINIMUM 20MPa COMPRESSIVE STRENGTH FLOWABLE GROUT TO BE APPROVED BY ICUBED
4. WHERE ALTERNATIVE GROUT PRODUCTS ARE USED THE FOLLOWING PROPERTIES ARE TO BE ACHIEVED:

COMPRESSIVE STRENGTH (AS1478.2:2005)	55MPa AT 1 DAYS
	80MPa AT 7 DAYS
FLEXURAL STRENGTH (MODULUS OF RUPTURE AS1012.2.11:2000)	11.4MPa AT 7 DAYS
INDIRECT TENSILE STRENGTH (AS1012.2.10:2000)	5.1MPa AT 7 DAYS

5. TOP OF CONCRETE TO HAVE A CONCRETE SURFACE PROFILE (CSP) OF MIN 2.0 (GRIND AND WATER BLAST SURFACE) IN ACCORDANCE WITH ICRI TECHNICAL GUIDELINE NO. 310.2R2013.
6. ALL GROUT PRODUCTS ARE TO BE STORED, HANDLED AND PLACED STRICTLY IN ACCORDANCE WITH MANUFACTURERS CURRENT TECHNICAL DATA SHEET AND INSTRUCTIONS.

COATING NOTES

1. THE FOLLOWING COATING REQUIREMENTS HAVE BEEN DETERMINED BY AS4312.
2. ALL FABRICATED STRUCTURAL STEELWORK TO BE PREPARED WITH ABRASIVE BLAST CLEANING CLASS 2.5.
3. SURFACES REQUIRING ONSITE TREATMENT ARE TO BE PRIMED IN ACCORDANCE WITH SURFACE TREAMENT MANUFACTURERS REQUIREMENTS.
4. COATINGS HAVE BEEN SPECIFIED BASED ON THE FOLLOWING:

CORROSIVITY CATERGORY	C3
STEEL CORROSION RATE µm/y	25 - 50
TYPICAL ENVIRONMENT	COASTAL/INDUSTRIAL
DURABILITY CLASS	LONG TERM
LIFE TO FIRST MAINTENANCE	10 YEARS TBC BY GILMOUR SPACE TECH

5. SURFACE TREATMENT:

EXPOSED STRUCTURAL STEEL	**HDG390/ILG100/ZB100**
INTERNAL STRUCTURAL STEEL	**HDG390/ILG100/ZB100**

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GILMOUR SPACE

CONSTRUCTION NOTES:

1. REFER GENERAL CONSTRUCTION NOTES ON DWG S01
2. REFER DRAWING ABBREVIATIONS ON S01
3. REFER EARTHWORKS NOTES ON DWG S01

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: APC2024/006

REV	DESCRIPTION	DATE	BY
1	FOR CONSTRUCTION	26.02.2024	J.A.W.
0	FOR CONSTRUCTION	17.05.2023	J.A.W.
B	FOR APPROVAL	03.05.2023	J.A.W.
A	FOR COMMENT	10.03.2023	J.A.W.

Status
FOR CONSTRUCTION

Project
BOWEN ORBITAL SPACE PORT
SIRIUS TEST PAD
BOWEN QUEENSLAND

for
GILMOUR SPACE TECH

Title
SIRIUS TEST PAD SLAB PLAN

Drawn	Date	Chkd	Date
JAW		RM	
Design	Date	Apprd	Date
LV		RM	
Scale	A1	Certif	Date
As indicated			

Project No.	Dwg. No.	Rev
21-307	S130	1

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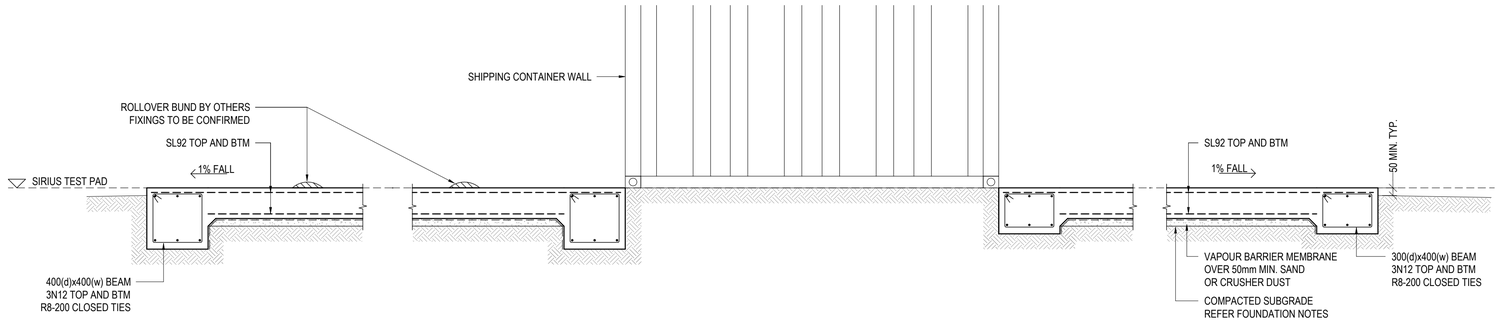

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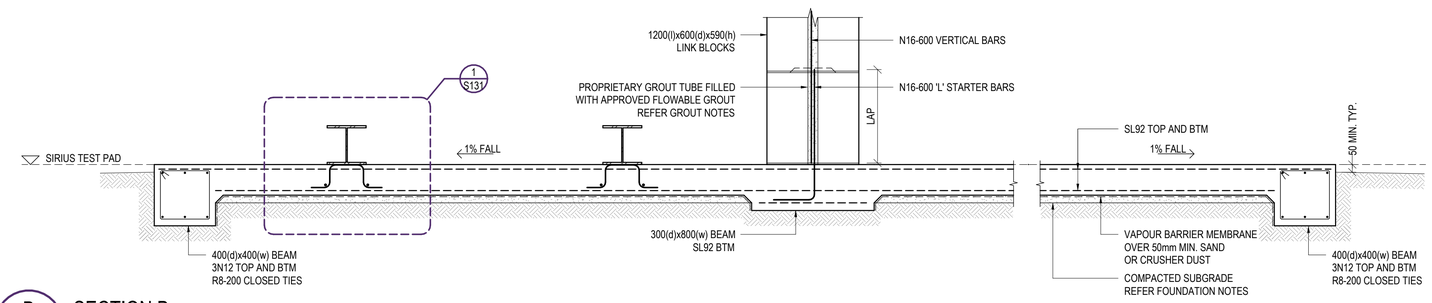

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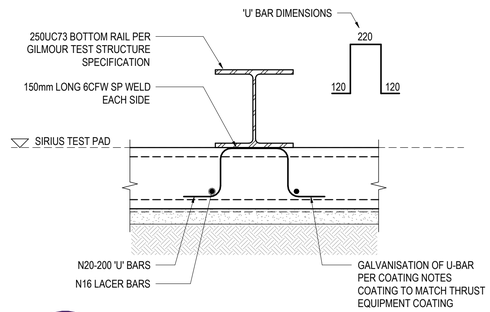
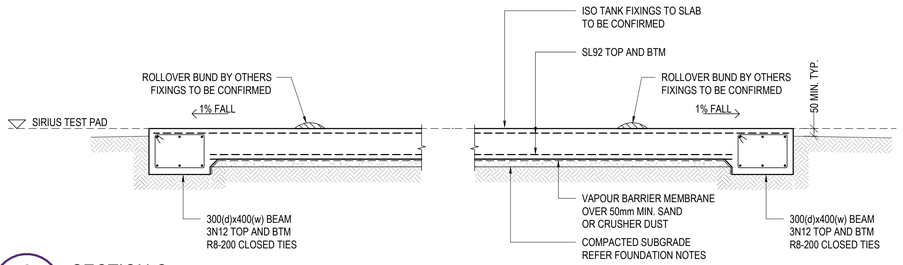


1 S131 RAIL DETAIL

1 : 10



C S130 SECTION C

1 : 20

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

SDA approval: APC2024/006

Queensland Government

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GILMOUR SPACE

REV	DESCRIPTION	DATE	BY
A	FOR COMMENT	10.03.2023	J.A.W.

Status

FOR COMMENT

NOT TO BE USED FOR CONSTRUCTION

Project

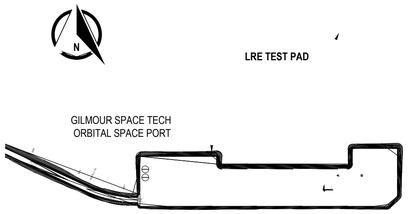
BOWEN ORBITAL SPACE PORT
SIRIUS TEST PAD
BOWEN QUEENSLAND

for
GILMOUR SPACE TECH

Title

SIRIUS TEST PAD CONCRETE DETAILS

Drawn	Date	Chkd	Date
JAW		RM	
Design	Date	Apprd	Date
LV		RM	
Scale A1		Certif	Date
As indicated			
Project No.		Dwg. No.	Rev
21-307		S131	A



LOCALITY PLAN

1 : 3000

ONLY FORKLIFT VEHICLE LOAD HAS BEEN ALLOWED ON SLAB

ALL FIXINGS TO SLAB TO BE CONFIRMED AND APPROVED BY ENGINEER PRIOR TO POUR

ALLOWED FIXINGS:
- HTP STORAGE TANK HOLD DOWN - 1M16 CHEMSET ANCHOR EACH LEG (4 TOTAL)
  100 MIN. EMBEDMENT
  150 MIN. EDGE DISTANCE
- LRE BASE ANCHORS - 2M16 CHEMSET ANCHOR EACH LEG (6 TOTAL)
  - 100 MIN. EMBEDMENT
  - 150 MIN. EDGE DISTANCE

SIRIUS PAD SLAB PLAN

1 : 100

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: APC2024/006

DESIGN CRITERIA

1. GENERAL PRINCIPLES HAVE BEEN ASSESSED IN ACCORDANCE WITH AS1170.0:

IMPORTANCE LEVEL	IL2
DESIGN LIFE	50 YEARS

2. PERMANENT ACTIONS HAVE BEEN ASSESSED IN ACCORDANCE WITH AS1170.1:

LINK BLOCK	3m HIGH SELF-WEIGHT
CYLINDER MAN PACK	16kN POINT LOAD
VARIOUS STORAGE TANKS	26kL STORAGE
HTP STORAGE TANK	7t EMPTY, 13t FULL

3. IMPOSED ACTIONS HAVE BEEN ASSESSED IN ACCORDANCE WITH AS1170.1:

LRE THRUST LOAD	1.5t SELF WEIGHT 60kN THRUST DIRECTION
VEHICLE LOADING	2.5t FORKLIFT
FOOT TRAFFIC	5kPA

4. WIND LOADS HAVE BEEN ASSESSED IN ACCORDANCE WITH AS1170.2:

REGION	C
TERRAIN CATEGORY	TC2
WIND DIRECTION MULTIPLIER	0.9
SHIELDING MULTIPLIER	1.0
TOPOGRAPHICAL MULTIPLIER	1.0
DESIGN WIND SPEED (ULS)	55.90m/s
DESIGN WIND PRESSURE (ULS)	1.875kPa

FOUNDATION NOTES

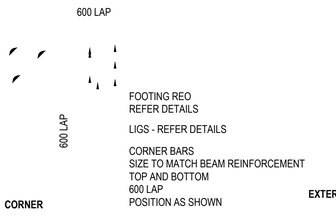
1. FOOTINGS SHALL BE PLACED CENTRALLY UNDER COLUMNS UNLESS NOTED OTHERWISE.
2. EXCAVATIONS SHALL BE KEPT FREE OF PONDED WATER BEFORE PLACING CONCRETE.
3. FOOTINGS HAVE BEEN DESIGNED BASED ON THE FOLLOWING GEOTECHNICAL REPORT:

GEOTECHNICAL DETAILS	
GEOTECHNICAL REPORT BY	GROUND ENVIRONMENTS PTY LTD
REPORT JOB NUMBER	GE_2211.1150
REPORT DATE	11.01.2023
SITE CLASSIFICATION	H1
MIN. BEARING CAPACITY (ULS)	200kPa
MIN PILE SKIN FRICTION (ULS)	N/A
EXPECTED FOUNDING MATERIAL	CONTROLLED FILL

4. GEOTECHNICAL ENGINEER TO CONFIRM FOUNDATION DESIGN PARAMETERS PRIOR TO PLACING CONCRETE.
5. PLACE BLINDING CONCRETE TO BASE OF FOOTING EXCAVATION TO ACHIEVE DESIGN AND / OR UNIFORM BEARING MATERIAL.

SLAB ON GROUND NOTES

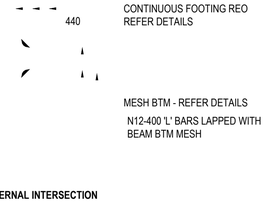
1. SUBGRADE TO BE CONSTRUCTED AS PER EARTHWORKS NOTES.
2. SLAB TO BE PLACED ON 50mm BEDDING SAND WITH WATERPROOF MEMBRANE AS PER CONRETE NOTES.
3. PROVIDE 2N12 TRIMMER BARS 1000 LONG TO ALL RE-ENTRANT CORNERS.
4. SLAB TO HAVE A NOMINAL 1% FALL FOR SURFACE DRAINAGE OF SLAB.



CORNER

STRIP FOOTING WITH REINFORCEMENT BARS

TYPICAL FOOTING CORNER DETAIL



EXTERNAL INTERSECTION

STRIP FOOTING WITH REINFORCEMENT BARS

TYPICAL FOOTING INTERSECTION DETAIL

FOOTING CORNER DETAILS

NTS

CONCRETE NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 & AS 1379.
2. CONCRETE QUALITY AND CLEAR CONCRETE COVER TO REINFORCEMENT (OUTSIDE OF STIRRUPS AND TIES) SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:

ELEMENT	CONCRETE GRADE	CLEAR COVER	SLUMP
BEAMS	N32	30 TOP COVER 50 BTM COVER 50 SIDE COVER	SLUMP 90 PLUS 20 MINUS 20
SLABS	REFER SLAB ON GROUND SCHEDULE ON DRAWINGS	30 TOP COVER 50 BTM COVER 50 SIDE COVER	SLUMP 90 PLUS 20 MINUS 20

3. CONCRETE MIX TO HAVE A MAXIMUM AGGREGATE SIZE OF 20mm.
4. SPECIFIED STRUCTURAL THICKNESSES FOR CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.
5. CONSTRUCTION JOINTS OR POUR BREAKS WHERE NOT SHOWN ON PLANS OR DETAILS SHALL BE LOCATED AND FORMED TO THE APPROVAL OF THE ENGINEER.
6. NO PENETRATIONS, RECESSES OR CHASES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT APPROVAL OF THE ENGINEER.
7. AT PENETRATIONS IN SLABS UNLESS OTHERWISE DETAILED REINFORCEMENT MUST NOT BE CUT BUT SHALL BE GATHERED EQUALLY TO EACH SIDE OF PENETRATION AND EXTRA REINFORCEMENT PROVIDED BETWEEN THE PENETRATIONS AS DIRECTED BY THE ENGINEER.
8. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY. IT IS NOT NECESSARILY SHOWN IN TRUE PROJECTION.
9. PROVIDE THE ENGINEER WITH 48 HOURS NOTICE OF REINFORCEMENT BEING READY FOR INSPECTION. NO CONCRETE IS TO BE POURED WITHOUT THE APPROVAL OF THE ENGINEER. THIS IS TO BE CONFIRMED AT A LATER DATE.
10. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN THE POSITIONS SHOWN. WHERE LAP LENGTH IS NOT SHOWN IT SHALL BE SUFFICIENT TO DEVELOP THE FULL STRENGTH OF THE REINFORCEMENT. THE FOLLOWING MINIMUM SPLICE LENGTHS SHALL BE USED UNLESS NOTED OTHERWISE:
    THE FOLLOWING MINIMUM BAR SPLICE LENGTHS ARE APPLICABLE FOR f'c >= 25MPa TO 65MPa.
    A - FOR VERTICAL OR HORIZONTAL BARS WITH LESS THAN 300mm OF CONCRETE CAST BELOW

BAR DIAMETER	LAP LENGTH (mm)	BAR DIAMETER	LAP LENGTH (mm)
N10	360	N24	1165
N12	440	N28	1485
N16	605	N32	1835
N20	865	N36	2210

    B - FOR HORIZONTAL BARS GREATER THAN OR EQUAL TO 300mm OF CONCRETE CAST BELOW

BAR DIAMETER	LAP LENGTH (mm)	BAR DIAMETER	LAP LENGTH (mm)
N10	470	N24	1550
N12	570	N28	1960
N16	785	N32	2385
N20	1125	N36	2870

11. SUPPLY AND LAY FABRIC IN FLAT SHEETS AT SPLICES. FABRIC SHALL BE LAPPED AS SPECIFIED IN AS 3600. STEEL MESH SHOULD BE LAPPED AS SHOWN BELOW IE THE TWO OUTERMOST CROSS-WIRES OF ONE SHEET SHOUD OVERLAP THE TWO OUTERMOST WIRES AT THE OTHER.

OVERHANGS DO NOT CONTRIBUTE TO LAP LENGTH

12. MAINTAIN 30 MIN. COVER TO REINFORCEMENT AT SERVICES AND CAST IN ITEMS THROUGH SLABS AND FOOTINGS. ALL SERVICES THROUGH FOOTING TO BE WRAPPED WITH COMPRESSIBLE MATERIAL MINIMUM 10mm ABLEFLEX OR SIMILAR.
13. WELDING OF REINFORCEMENT WILL ONLY BE PERMITTED WITH THE PRIOR APPROVAL OF THE ENGINEER.
14. REINFORCEMENT MUST NOT BE CONTINUOUS THROUGH CONTRACTION JOINTS.
15. PLACE SUFFICIENT SUPPORT HURDLES/CHAIRS UNDER MAIN BOTTOM REINFORCING BARS AND TOP CROSS BARS IN SLABS AND FOOTINGS TO ALLOW THEM TO BE SUPPORTED IN THEIR CORRECT POSITIONS AND ALIGNMENT DURING CONCRETING (NOT GREATER THAN 900mm CENTRES UNLESS SHOWN OTHERWISE).
16. REINFORCEMENT SYMBOLS:

SYMBOL	SPECIFICATION
N	GRADE D500N DEFORMED BAR
R	STRUCTURAL GRADE ROUND BAR
RF AND SL	HARD DRAWN SHEET RIBBED WIRE REINFORCING FABRIC

    THE NUMBER FOLLOWING THESE SYMBOLS IS THE BAR DIAMETER IN MILLIMETERS.
17. SLABS TO BE CURED BY COVERING WITH 0.20mm BLACK POLYETHYLENE SHEETING AND KEPT MOIST FOR 7 DAYS MINIMUM OR APPROVED ALTERNATIVE CURING METHOD.
18. NO CONCRETE TO BE POURED WHEN SITE TEMPERATURE EXCEEDS 35°C OR FALLS BELOW 5°C.

STRUCTURAL GROUT NOTES

1. GROUT IS TO BE HIGH STRENGTH AND NON-SHRINK.
2. ALL GROUT TO BE CEMENTITIOUS UNLESS NOTED OTHERWISE.
3. THE FOLLOWING GROUT PRODUCT IS TO BE USED UNLESS NOTED OTHERWISE:
    CEMENTITIOUS FLOWABLE GROUT
4. WHERE ALTERNATIVE GROUT PRODUCTS ARE USED THE FOLLOWING PROPERTIES ARE TO BE ACHIEVED:

COMPRESSIVE STRENGTH (AS1478.2:2005)	55MPa AT 1 DAYS 80MPa AT 7 DAYS
FLEXURAL STRENGTH (MODULUS OF RUPTURE AS1012.2.11:2000)	11.4MPa AT 7 DAYS
INDIRECT TENSILE STRENGTH (AS1012.2.10:2000)	5.1MPa AT 7 DAYS

5. TOP OF CONCRETE TO HAVE A CONCRETE SURFACE PROFILE (CSP) OF MIN 2.0 (GRIND AND WATER BLAST SURFACE) IN ACCORDANCE WITH ICRI TECHNICAL GUIDELINE NO. 310.2R2013.
6. ALL GROUT PRODUCTS ARE TO BE STORED, HANDLED AND PLACED STRICTLY IN ACCORDANCE WITH MANUFACTURERS CURRENT TECHNICAL DATA SHEET AND INSTRUCTIONS.

PROJECT TEAM

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GILMOUR SPACE

CONSTRUCTION NOTES:

1. REFER GENERAL CONSTRUCTION NOTES ON DWG S01
2. REFER DRAWING ABBREVIATIONS ON S01
3. REFER EARTHWORKS NOTES ON DWG S01

REV	DESCRIPTION	DATE	BY
A	FOR COMMENT	10.03.2023	J.A.W.

Status

FOR COMMENT

NOT TO BE USED FOR CONSTRUCTION

Project

BOWEN ORBITAL SPACE PORT
LRE TEST PAD
BOWEN QUEENSLAND

for

GILMOUR SPACE TECH

Title

LRE TEST PAD SLAB PLAN

Drawn	Date	Chkd	Date
JAW		RM	
Design	Date	Apprd	Date
LV		RM	
Scale	A1	Certif	Date
As indicated			
Project No.		Dwg. No.	Rev
21-307		S140	A

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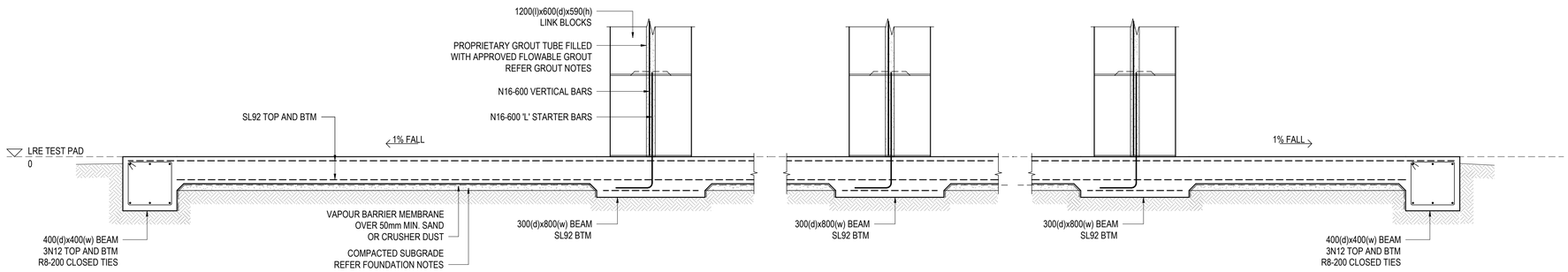

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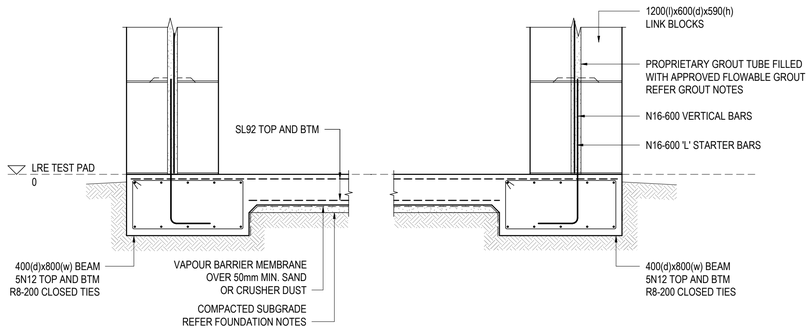

B S140 SECTION B

1 : 20

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

Queensland Government

SDA approval: APC2024/006

10/03/2023 1:11:04 PM

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GILMOUR SPACE

REV	DESCRIPTION	DATE	BY
A	FOR COMMENT	10.03.2023	J.A.W.

Status

FOR COMMENT
NOT TO BE USED FOR CONSTRUCTION

Project

BOWEN ORBITAL SPACE PORT
LRE TEST PAD
BOWEN QUEENSLAND

for
GILMOUR SPACE TECH

Title

LRE TEST PAD CONCRETE DETAILS

Drawn	Date	Chkd	Date
JAW		RM	
Design	Date	Apprd	Date
LV		RM	
Scale	A1	Certif	Date
1 : 20			

Project No.	Dwg. No.	Rev
21-307	S141	A