



# New Zealand's CORS Network

The operation, management and the role of New Zealand's CORS Network

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# Overview

- Introduction to the LINZ PositionNZ Network

- Purpose
- Operation
- Construction
- Equipment

- Products and Services

- PositionNZ RINEX archive, real time network and post processing service
- Uses and users of the network



# Purpose of the Network

Monitoring the New Zealand Geodetic Datum 2000 (NZGD2000)

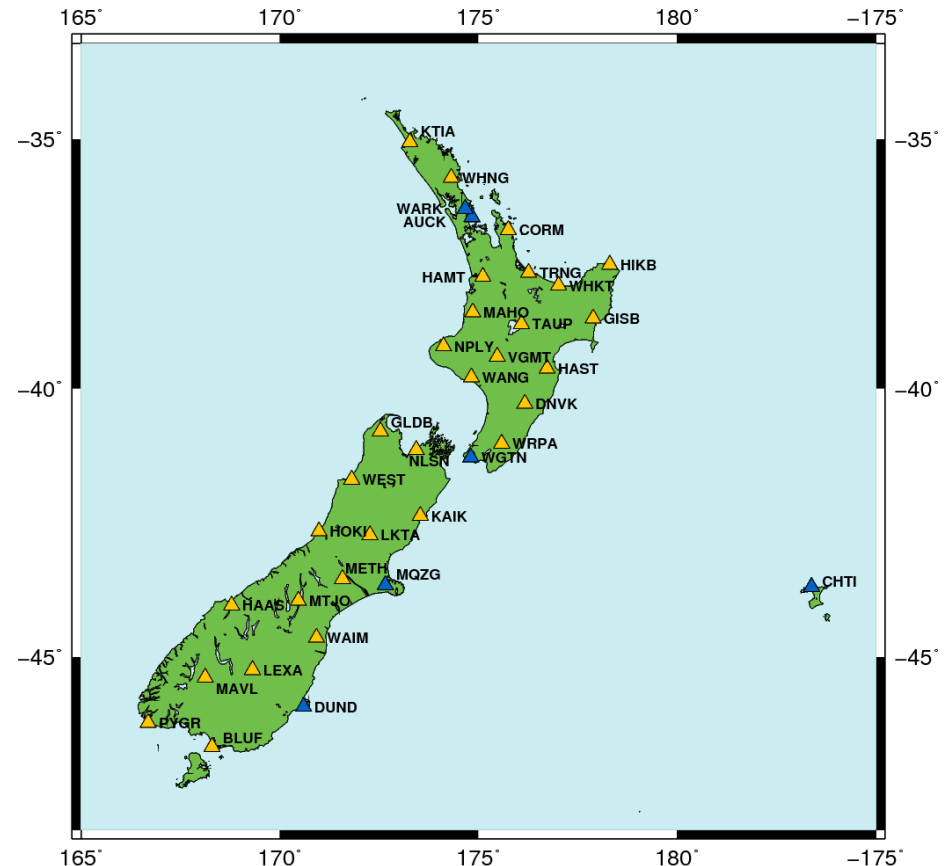
Updating the national deformation model

Recovery of spatial system following natural disaster (earthquake)

Maintaining New Zealand's relationship to the International Terrestrial Reference Frame (ITRF)

Providing data to the International GNSS Service (IGS)

Fundamental control for all other geodetic marks in New Zealand

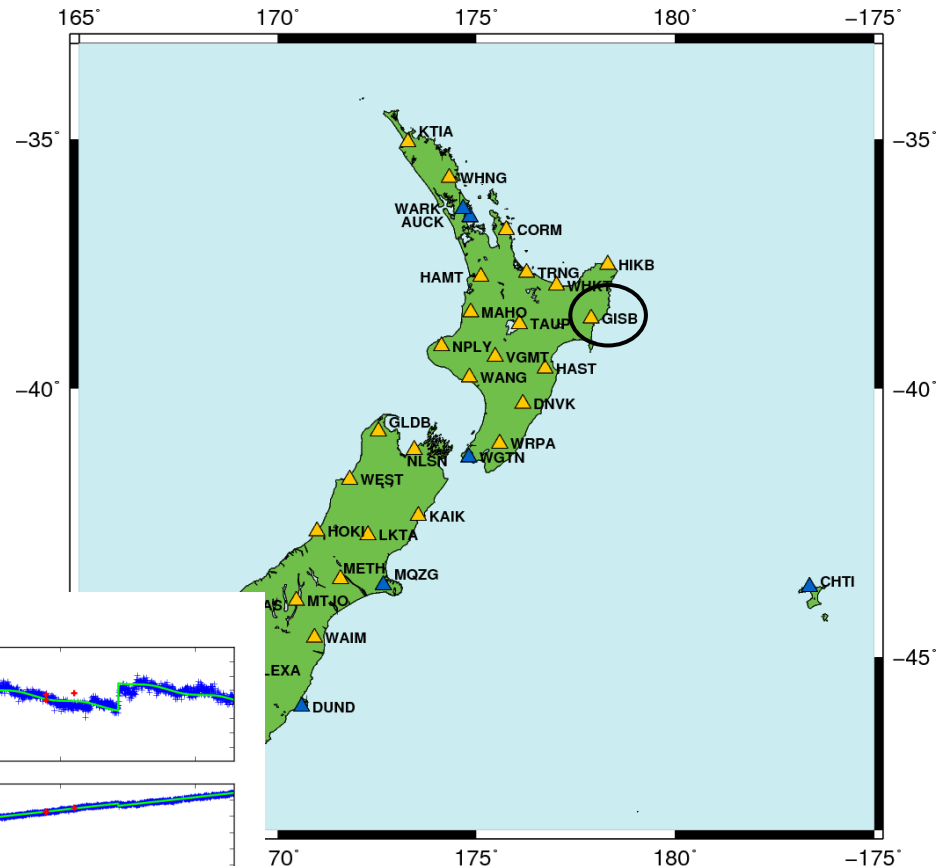


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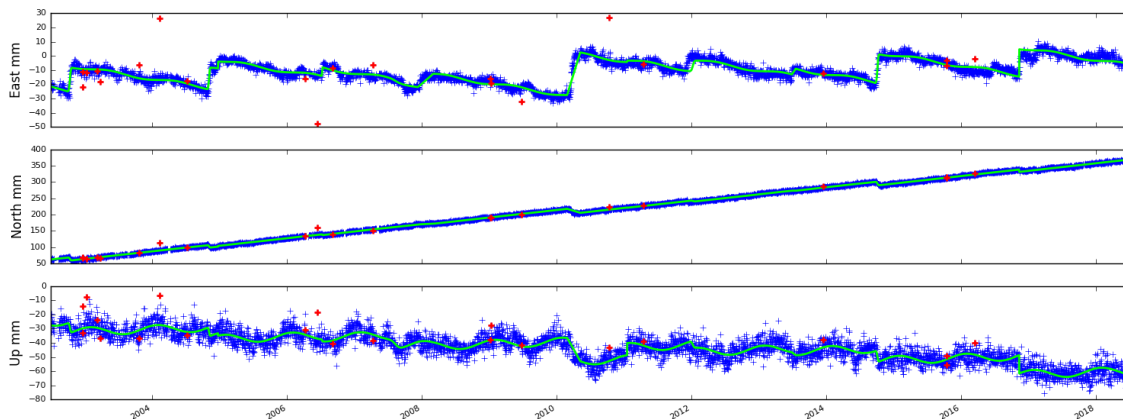
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GISB time series

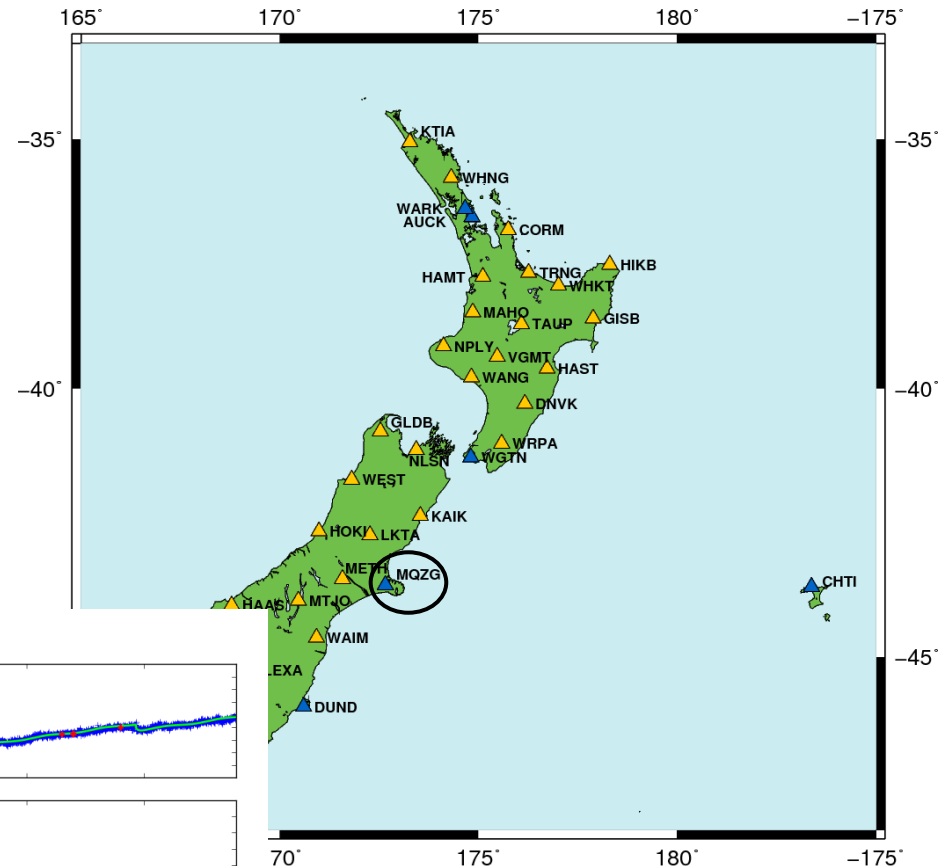


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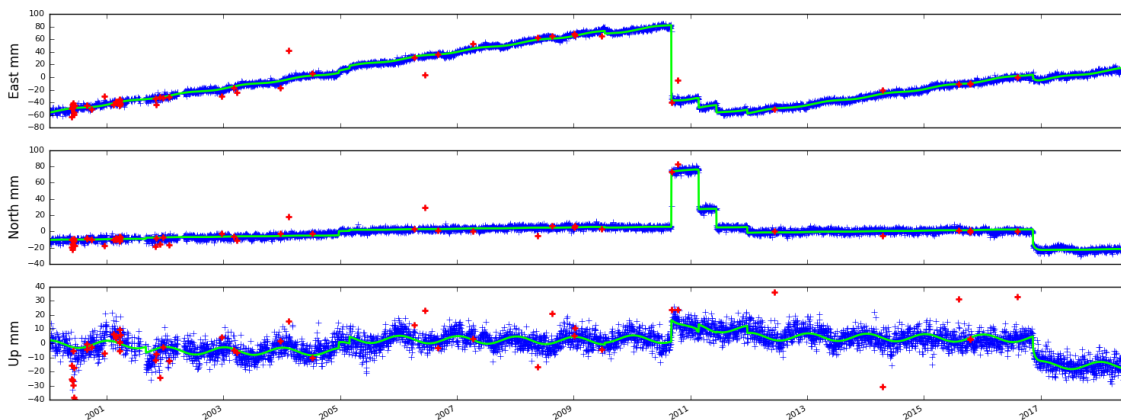
Monitoring the New Zealand Geodetic Datum 2000 (NZGD2000)

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MQZG time series

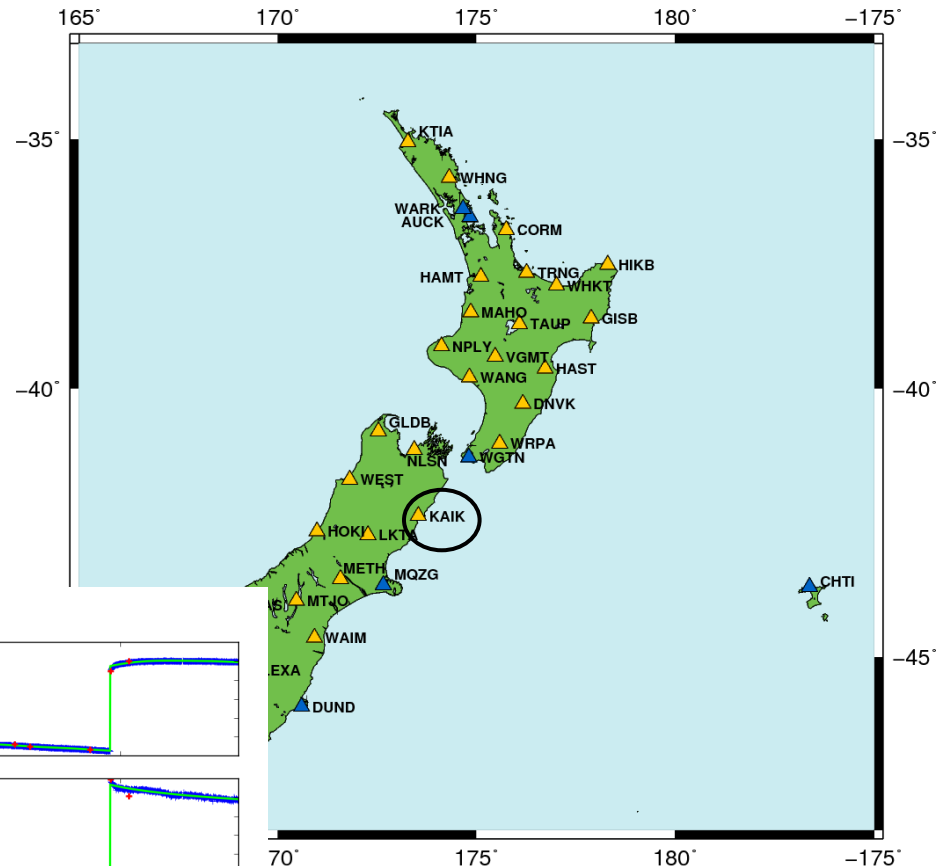


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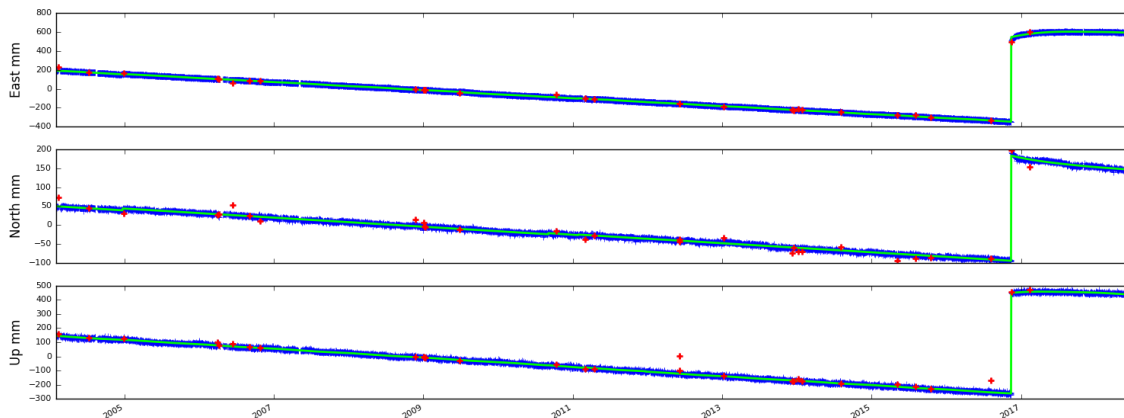
Monitoring the New Zealand Geodetic Datum 2000 (NZGD2000)

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KAIK time series



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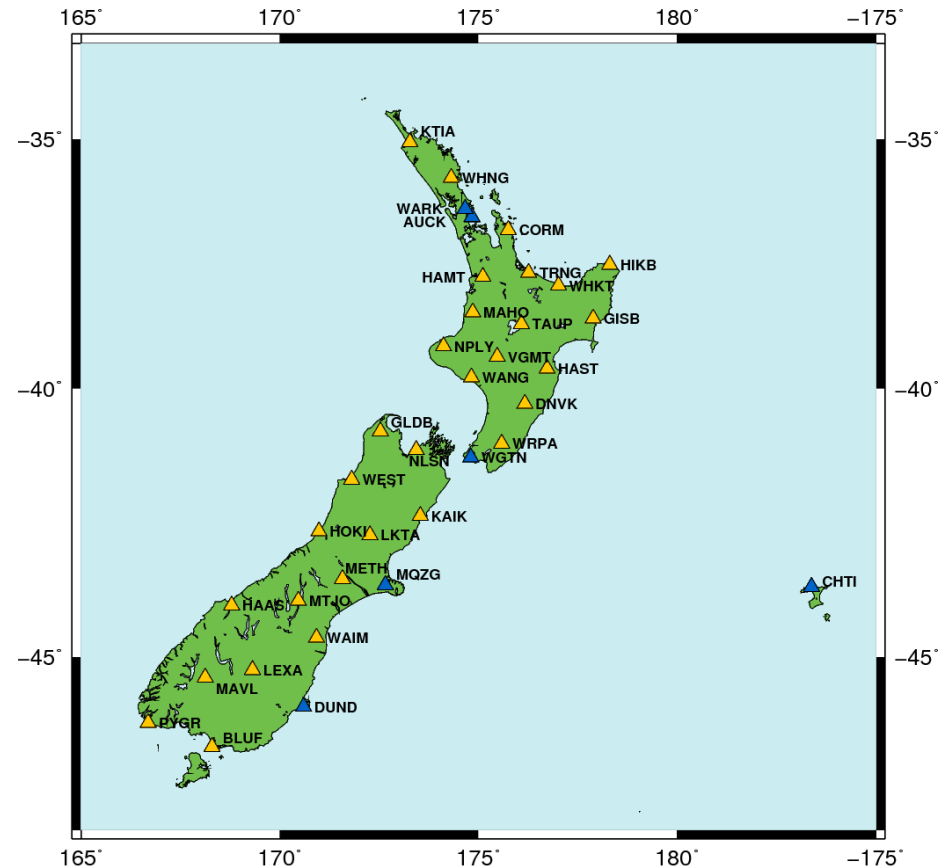
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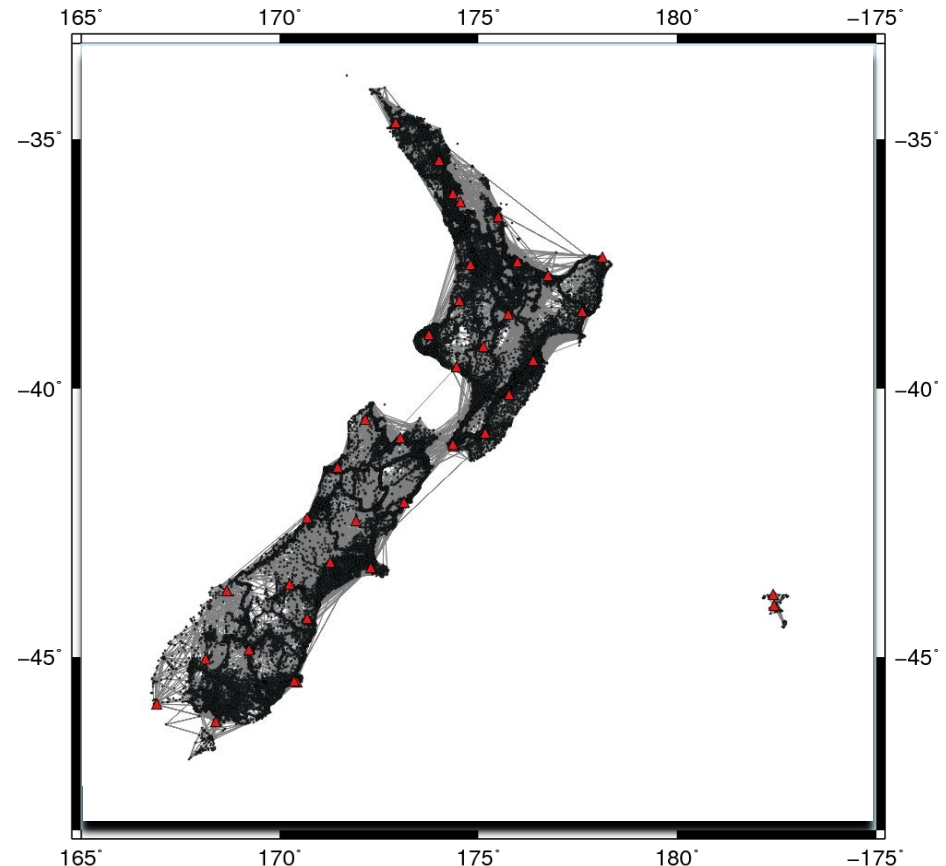
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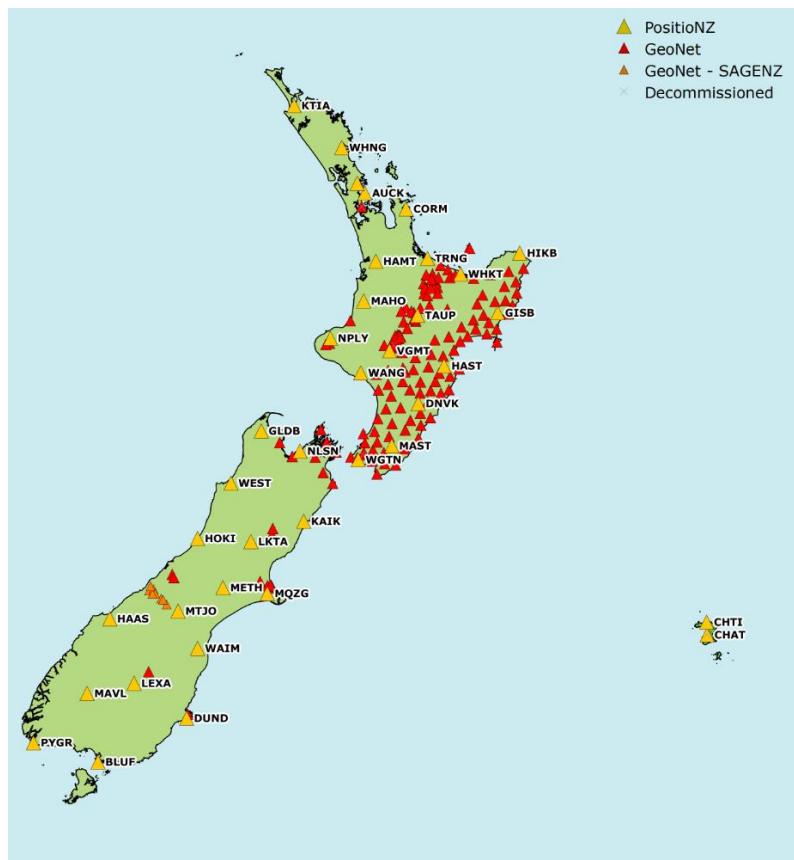
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# Operation of the Network

Our 17 year partnership to provide  
the LINZ PositionZ Network



# Operation of the Network

## Specification for Continuously Operating Reference Stations



3 Site Requirements		IGS CORS	geostatic CORS	real time only CORS	tide gauge CORS	continuous reference stations
<b>3.1 Site selection</b>						
(a)	A CORS site shall have no obstructions above 10° elevations, where 10° is not possible, a CORS site shall have no obstructions above 15°	•	•	○	•	-
(b)	A CORS site shall have no foreseen changes to sky visibility from tree growth or developments on adjacent sites	•	•	○	•	-
(c)	A CORS site shall not be selected if the local area is adversely affected by site specific conditions including but not limited to: (i) signal obstruction, (ii) radio frequency interference, (iii) multipath Where the site conditions are questionable GNSS data shall be collected on site and assessed before final approval is granted by LINZ.	•	•	-	•	-
(d)	CORS shall only be established at sites that are stable, in cases where the stability is questionable a geotechnical report shall be provided to LINZ.	•	•	-	•	-
<b>3.2 Permission to build and operate</b>						
(a)	The Supplier shall obtain written permission from the land owner prior to any construction commencing. The document shall include: i) permission to construct ii) permission to operate iii) access and supervision procedures and/or requirements for periodic and urgent maintenance.	•	•	-	•	-
(b)	Upon change of land ownership written permission shall be sought from the new land owner to replace permissions from (a).	•	•	-	•	-
(c)	The supplier shall provide a station establishment report within 20 working days of a new site being operational using the form from Appendix A.2	•	•	-	•	-

Specification for Continuously Operating Reference Stations | Version 2.0  
A2655972 | Published 15 September 2017  
Location Information | Land Information New Zealand



Specification can be made available on request

# Construction of the Network



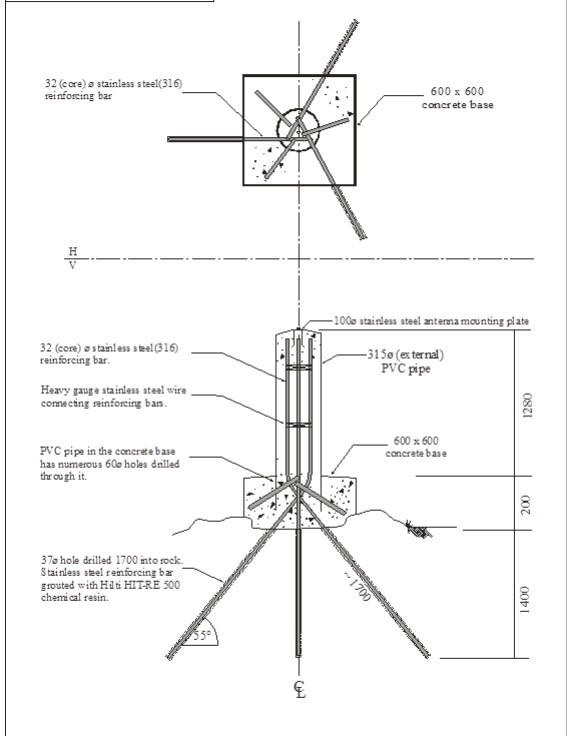
Pillar monument: TAUP - Taupo Airport



Braced monument: WRPA - Wairarapa

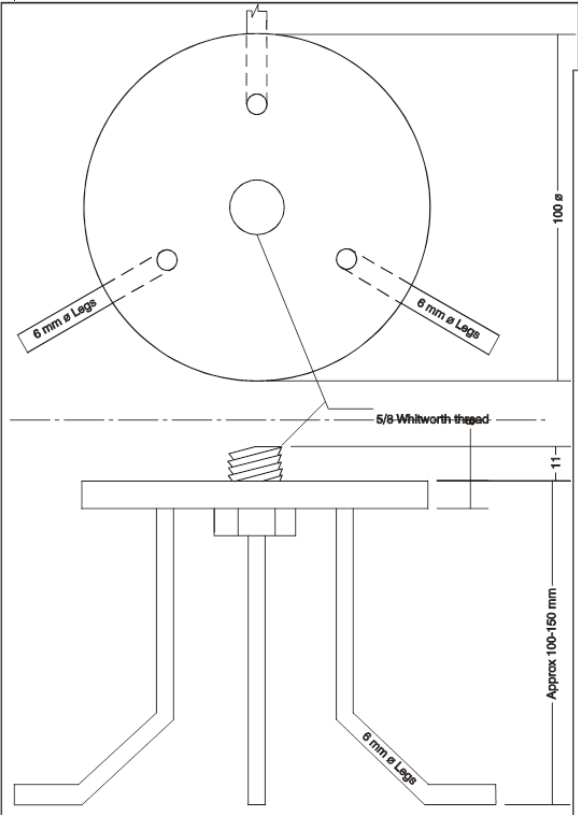
# Construction of the Network Pillar monument

Notes:  
- All dimensions are in millimetres



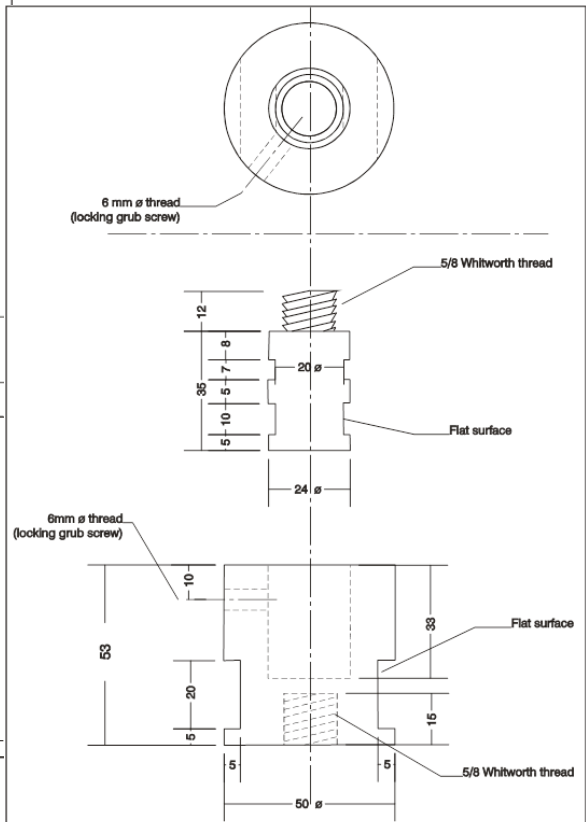
Drawn: D. Matheson  
Date: August 2004  
Not to Scale

**LKTA - Pillar Construction**



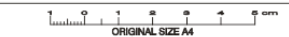
Scale: 1:1  
Drawn: D.Matheson  
Date: November 2002

**CGPS ANTENNA PILLAR PLATE**

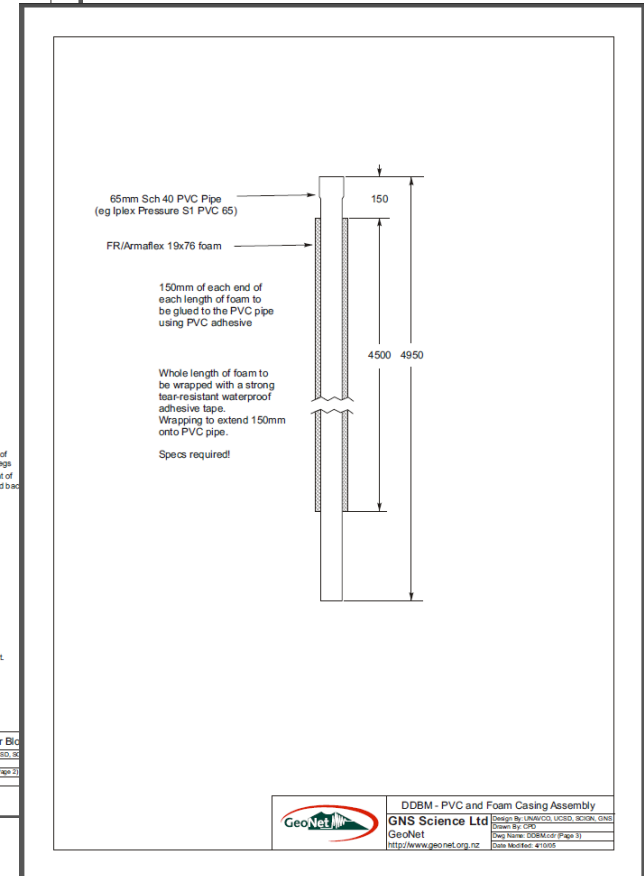
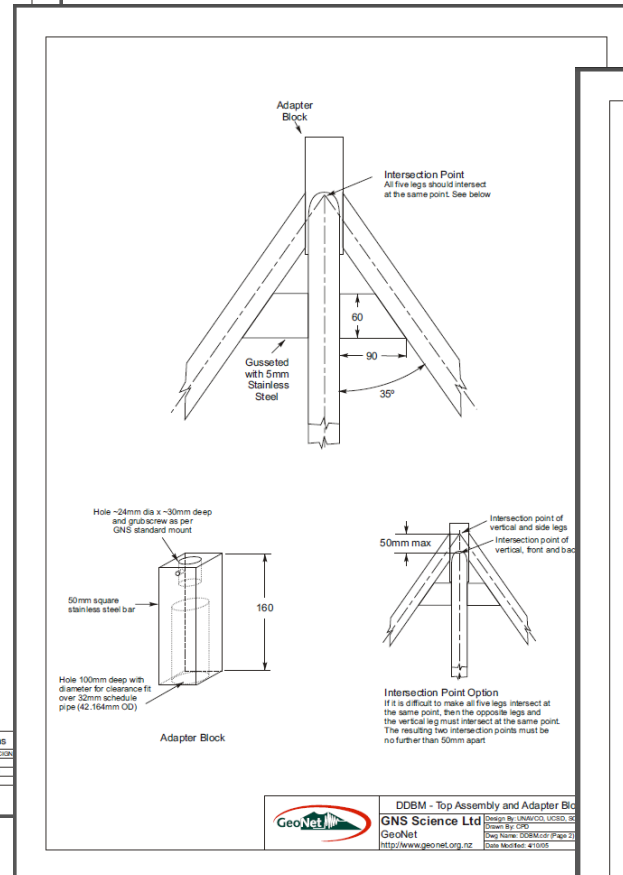
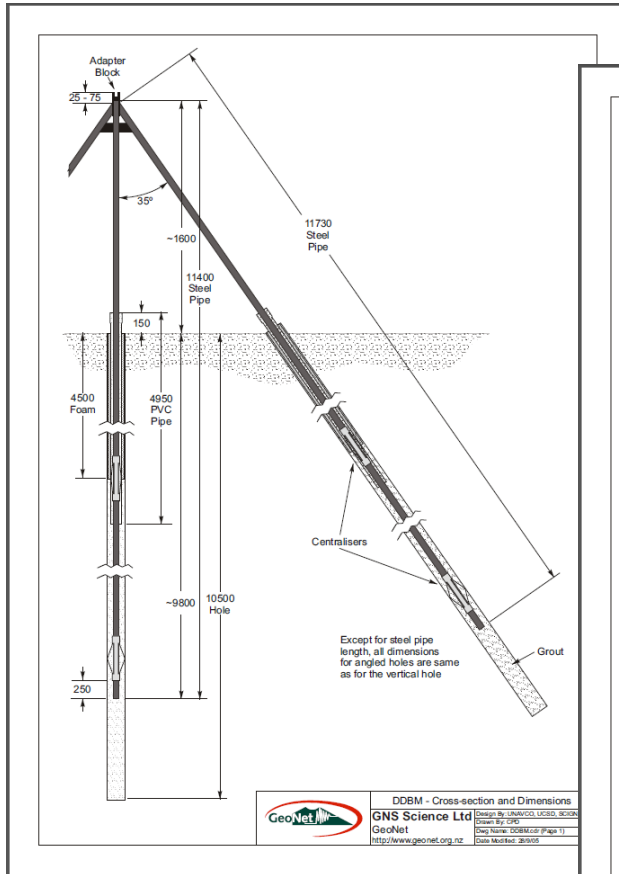


Scale: 1:10  
Drawn: D.Matheson  
Date: November 2002

**CGPS ANTENNA MOUNTING ADAPTER**



# Construction of the Network Deep-drill braced monument



# GNSS equipment

- Current GNSS equipment used by the Network
  - Trimble NetR9
  - Trimble Zephyr Geodetic 2  
(No longer available)



Equipment will be replaced – GNS Science with assistance from LINZ are currently reviewing proposals from potential suppliers

# Auxiliary equipment

- Communications
- Power



# PositionNZ Products and Services

LINZ offers three Products and Services to customers

## RINEX Data

### **PositionNZ RINEX archive**

- - Static Data is collected and made available within a few hours

## PositionNZ-RT

### **PositionNZ Real Time Service**

- **(PositionNZ-RT)** - Connect to the PositionNZ network to get 1 sec data in real time

## PositionNZ-PP

### **PositionNZ GNSS Post Processing Service**

- **(PositionNZ-PP)**  
- A free service for processing GNSS data to obtain coordinates in terms of NZGD 2000 and ITRF2008 (NZ only)



## RINEX Data

<b>Observation Period</b>	24 hr	1 hr	15 min	1 hr
<b>RINEX Version:</b>	2.11	2.11	2.11	3.02
<b>Frequency/Epoch:</b>	30 sec	30 sec	1 sec	30 sec
<b>Availability from end of observation period (95% of the time)</b>	24 hrs	2 hrs	15 min	24 hrs
<b>Available for</b>		6 months	2 months	
<b>Stations</b>	All Stations	All Stations	Streaming stations only	All stations
<b>Constellations</b>	GPS/GLONASS	GPS/GLONASS	GPS/GLONASS	All available constellations

Downloadable from LINZ website

Available on request

## PositionNZ Real Time Service PositionNZ-RT

- PositionNZ-RT provides GNSS data in an open format designed to be streamed via the internet in real time
- 1 second streaming data available from the network
- Now streaming multi-gnss (RTCM 3.2)
- Is available at no cost to users
- User registration required to access real time data
- Used by commercial services



<http://www.linz.govt.nz/positionz-rt>

## PositionNZ Post Processing Service PositionNZ-PP

PositionNZ-PP is a free automated service that processes GNSS data to obtain local and international coordinates.

- Provides accurate positioning information from PositionNZ Network
- Users upload GNSS RINEX files collected at survey marks that require coordinates
- Users do not need specialised GNSS processing software
- Results produce coordinates in terms of NZGD2000, meridional circuit, vertical datum NZVD2016 and ITRF2008
- Results also provided in SINEX
- Results sent via email to the user
- Currently only available in NZ

<http://www.linz.govt.nz/positionz-pp>

# Summary

- PositionNZ network is operated in partnership with GNS Science and requirements given by our specification document
- The network has many purposes including monitoring New Zealand's national datum, maintaining a connect to the International Terrestrial Reference Frame and to aid in spatial recovery following a natural disaster
- The network is the basis for a number of products and services LINZ provides for free to survey and wider communities

‘The  
power  
of  
where’

DRIVES NEW ZEALAND'S SUCCESS

Questions?

