Appendix C

Global Positioning System Specifications

1. General Application

1.01.   The target *horizontal accuracy* is *5 metres*, at the *95%* confidence level.   This applies to *final map data* after averaging (for point features), approximating (for line features), and any editing.

1.02.   All GPS receiver systems must be approved for use in stream mapping by the SHIM mapping committee.   Only receiver models which have been tested and proven to be capable of meeting the above accuracy specification in field conditions (e.g. GPS test range) are approved.

1.03.   At least one person, who is responsible for the quality of the data, must act as a supervisor and have completed GPS-specific training acceptable to the SHIM mapping committee.

1.04.   Field operators must be trained to the satisfaction of the supervisor, including GPS training and other training as required.

2. Field Parameters and Procedures

2.01.   All positions fixes must use *at least four satellites*.   No height constraints can be applied.

2.02.   The *minimum* elevation angle to satellites is *15 degrees* above the horizon.

2.03.   The *maximum* Dilution of Precision (DoP) is:

    HDOP   5   (preferred in most cases)

PDOP   8

GDOP   10

VDOP   5   (only if elevations are required)

2.04.   For standard static point features, occupation time must be *at least 60 seconds AND* there must be *at least 30* individual position *fixes* for each feature.

2.05.   The *maximum* distance for point offsets is *25 metres*.   Directions must be accurate to *2 degrees* and distances accurate to *1 metre*. If the slope is over 10 percent and over 10 metres long, slope measurements (accurate to 5 percent or 3 degrees) must be made.

2.06.   For all line (and polygon) features, all *significant deflections* and meanders of the feature must be mapped.

2.07.   For line (and polygon) features surveyed in dynamic mode, *the majority* of the individual position fixes must be *no more than 2.5 metres* apart.   The *maximum* distance between successive position fixes is *15 metres*.

2.08.   The *maximum* distance for constant line offsets is *5 metres*.

2.09.   For line (and area) features surveyed in station-to-station mode, the *maximum* distance between stations is *15 metres*.

2.10.   Supplementary traverses (using compass and chain) must begin (Point of Commencement) and end (Point of Termination) on static GPS point features or on survey control monuments of 1 metre or better accuracy.

2.11.   Directions for supplementary traverses must be accurate to *2 degrees* and distances accurate to *1 metre*. If the slope is greater than 10 percent, slope measurements accurate to 5 percent or 2.5 degrees must be made. The maximum length of an *individual* traverse leg is *50 metres*. There is no limit on the *total length* of a supplementary traverse.

3. Feature Identification and Mapping

3.01.

4. Data Processing and Mapping

4.01.   All position fixes must be *differentially corrected* in real-time or post-processed. If position corrections are used, the same set of satellites must be used at the reference station as at the field receiver.

4.02.   *Reference stations* (real-time or post-processed) must be *approved* by the SHIM mapping committee.

4.03.   The *maximum age* of real-time corrections is *20 seconds* from the time the observations are made at the reference station to the time the computed corrections are applied at the field receiver.

4.04.   All directions from compass observations must be corrected for *declination* before offset or traverse computations. If applicable, correction for *grid convergence* must be made.

4.05.   Supplemental traverses must close to *better than 1 percent* (1/100) of the total traverse distance *plus 2.5 metres*. Traverse misclosures over 2.5 metres total must be adjusted ("balanced") using the standard compass rule method.

4.06.   If *true NAD 27* coordinates are required, NAD 83 coordinates must be converted using the Canadian National Transformation, version 2 (*NT v2*).

4.07.   If *elevations* are required, they must be converted from ellipsoidal to *orthometric* using the Canadian Geoid model HT-97.

4.08.   If data in any other coordinate system (e.g. ground coordinates) are required, procedures acceptable to the SHIM mapping committee and the owner of the mapping must be used.

4.09.   Any discrepancies between the GPS survey and existing mapping used as base maps must be resolved to the satisfaction of the SHIM mapping committee and the local agency(s) considered responsible for the mapping.

5. Deliverables and Archiving

5.01.   The following *digital* files must be archived and delivered to the SHIM mapping committee and other appropriate agency(s) in the following

formats:

Deliverable	Digital Format
Uncorrected GPS data	GPS manufacturer's proprietary
Reference station data	downloaded format
Originally corrected GPS	GPS manufacturer's proprietary
Final map	ArcView or other format as required
	hardcopy as required