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Laser Interferometer Gravitational Wave Observatory (LIGO) Project

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Refer to: LIGO-L950210B
Date: March 17, 1995

Subject: Description of the Orientation of the LIGO Interferometer Planes Relative to the Surface of the Earth.
Ref: Action item following 30% DCCD Review, 27 February 1995.

Background

This memorandum addresses an action item resulting from a LIGO review of the Parsons 30% complete DCCD. In that document, the description of the orientation of the LIGO interferometer arms was not clearly described. The same issue was raised during the review of Parsons' Beam Tube Enclosure Design Report. Further information on coordinate systems may be found in LIGO Technical Document T950004A-E, "LIGO Global and Local Coordinate System Definitions."

Description

The existing site grading at Hanford and the eventual grading at Livingston result in "L" shaped berms that will accommodate the LIGO interferometer arms. The two arms lie along two intersecting lines oriented perpendicular to one another, and which,in turn, define the plane of the interferometer. The orientation of this plane with respect to the curved surface of the Earth has some leeway, and is ultimately determined by the local topography and the engineering constraint that the construction process will minimize the amount of earth which must be removed and/or moved in order to prepare the berms. In fact, the exact orientation of the interferometer plane relative to the surface of the Earth is slightly different for the two sites.

For both sites, however, the following holds. The arms of the interferometer form two sides of a square. In general,there will be a point within that square at which the local vertical is aligned along the normal to the interferometer plane. Referred to the center of this square, the interferometer normal is constrained to lie within $\pm 3.1 \times 10^{-4}$ radians of this local vertical. The direction of the component of the interferometer normal which lies in the local horizontal plane (at the center of the square) can point along any compass direction.

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To/Mail Code: Fred Asiri
From/Mail Code: Albert Lazzarini/102-33
Phone/FAX: 395-8444

Refer to: LIGO-L950210
Date: March 13, 1995

Subject: Description of the Orientation of the LIGO Interferometer Planes Relative to the Surface of the Earth.
Ref: Action item following 30% DCCD Review, 27 February 1995.

Background

This memorandum addresses an action item resulting from a LIGO review of the Parsons 30% complete DCCD. In that document, the description of the orientation of the LIGO interferometer arms was not clearly described. The same issue was raised during the review of Parsons' Beam Tube Enclosure Design Report. Further information on coordinate systems may be found in LIGO Technical Document T950004A-E, "LIGO Global and Local Coordinate System Definitions."

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For both sites, however, the following holds. The arms of the interferometer form two sides of a square. In general,there will be a point within that square at which the local vertical is aligned along the normal to the interferometer plane. Referred to the center of this square, the interferometer normal is constrained to lie within $\pm 0.31 \times 10^{-4}$ radians of this local vertical. The direction of the component of the interferometer normal which lies in the local horizontal plane (at the center of the square) can point along any compass direction.

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