BI-ET&R Test Facility May 4, 2011 student project

Building Interior Evacuated Tubes and Reflectors

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Several architectural schematics with integral BI-ET&R collectors have been developed (1)(2). BI-ET&R advance requires promising results from simulation and evaluation studies correlated with test results from a test facility. This design project is for a modest size BI-ET&R test facility at a site near your campus with: one or two ET collectors, interior reflectors, and exterior glazing aperture.

A rectangular collector flat-plate (F-P) aperture (Wo x L) is at the outlet of interior reflectors. Solar thermal collectors suggested for this project are evacuated tubes with matching involute reflector for each tube. Collector tubes are NS inclined, transverse to an EW line CPC trough. Interior reflector parts are: EW line CPC upper and lower side reflector panels, and east and west non-exact tracking end reflectors. The collector cover-roof is with a standard size monolithic one-glaze tempered high-transmittance solar glass plate supported on a rafter frame. Determine CPC characterization and end reflector tracking positions, and design a drive-control mechanism with a PV-battery system fitting the test facility schematic building structure. Size the PV-battery system for the solar thermal fluid pumping as well. Estimate: solar thermal monthly and annual collection performance, and costs for main parts of the test facility.

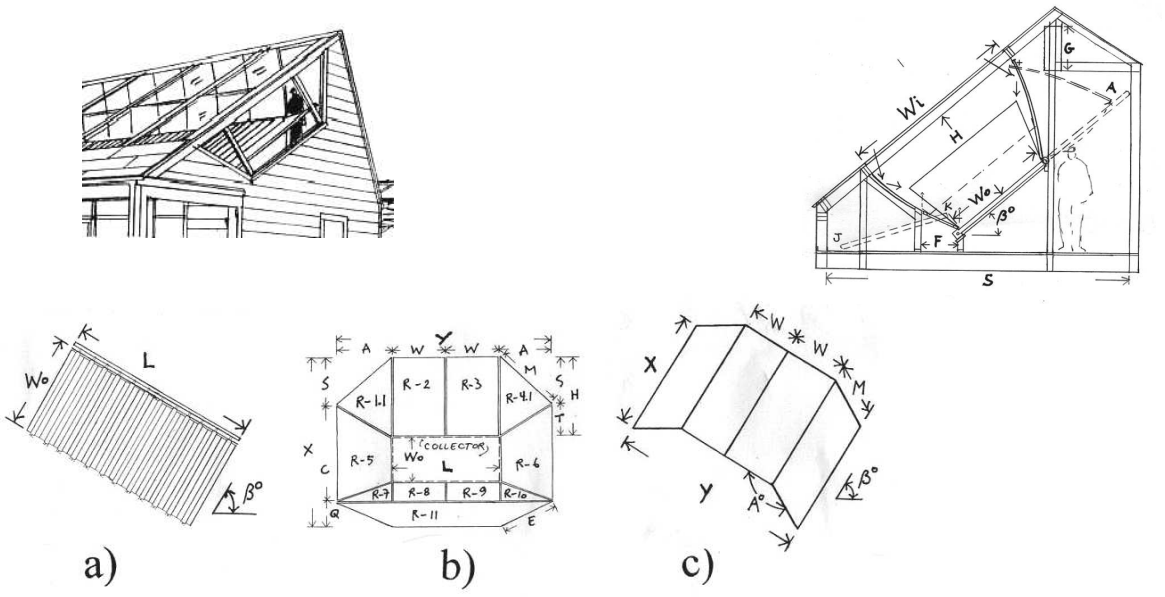
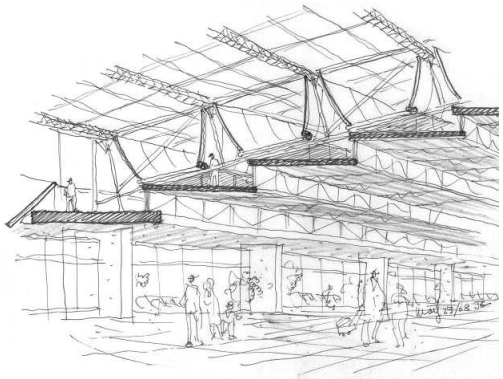


Fig. - BI-ET&R test facility components: a) Solar Collector (evacuated tubes, etc.); b) Interior Reflectors; c) Exterior Glazing Aperture (EGA)



(1) Goodman, J.H., *Building Integrated CSP Selected Studies*, SOLAR 2010 ASES Conf., 5-2010, Phoenix, Arizona
(2) Goodman, Joel H., *"Architectonic Studies with Selected Reflector Concentrating Solar Collectors"*, 2007, Journal of Green Building, Vol. 2 Number 2, Spring, College Publishing, pp 78-108