



WESTERN MICHIGAN UNIVERSITY

Bronco Construction
Research Center

Estimate

Date	Invoice #
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Bill To

ShipTo

N/A

P.O. Number	S.O. No.	Terms	Due Date	Up25%	Rep
NET 30					
Total					
Balance Due					
Description					
Item Code	Description	Quantity	\$ Each		Amount
Staff Compensation					
Center Director	Director	1	\$72.84/hour		
Labor- Research Associate	R3 Research Associate	1	\$33.76/hour		
Labor- Carpenter	Carpenter/General Labor	1	\$30.00/hour		
Labor- Mechanical Engineer	\$30/hour	1	\$30.00/hour		
Student Worker	\$20/hour	1	\$20.00/hour		
Load Frame (Force Displacement)					
Load or Displacement Control	22kip servo-hydraulic, 7.42" area	1	\$923.07/test*		
Load or Displacement Control	110kip servo-hydraulic, 38.48" area	1	\$923.07/test*		
110kip servo-hydraulic configuration fee (flat fee)	Mechanical adjustments necessary to utilize equipment (Flat Fee)	1	\$500.00/Fee		
Finite Elemental Analysis	Staff @ \$88.23/hour + Operating Expenses \$80.29/day	1	TBD		

Tension & Compression					
Tensile Testing 22kip, 15gpm	ASTM E8 metallic materials	EA	\$64.00/each*		
Tensile	ASTM B557 wrought and cast aluminum/magnesium alloy products	EA	\$64.00/each*		
Wire Tensile	ASTM B557 wrought and cast aluminum/magnesium alloy products	EA	\$80.00/each*		
Weld Tensile	CSA W47.1 fusion welding of steel, CSA W47.2 fusion welding of aluminum, ASME IX QW-150 welding general requirements – tension tests, ASME IX QB-150 welding general requirements – tension tests	EA	\$60.00/each*		
Bending and Ductility					
Weld Bend	CSA W47.1 fusion welding of steel, CSA W47.2 fusion welding of aluminum, ASME IX QW-160 welding general requirements – tension tests, ASME IX QB-160 welding general requirements – tension tests	EA	\$60.00/each*		
Filet-Weld Bend	CSA W47.1 fusion welding of steel, CSA W47.2 fusion welding of aluminum, ASME IX QW-180 welding general requirements – fillet weld tests	EA	\$64.00/each*		
Impact					
Charpy Notched bar impact testing of metallic materials	ASTM E23 Notched bar impact testing of metallic materials	EA	\$40.00/each*		
Impact testing of welding procedures	ASME VIII UCS-67 rules for construction of pressure vessels division – impact testing of welding procedures	EA	\$40.00/each*		
Fusion Welding of Steel	CSA W47.1 fusion welding of steel	EA	\$80.00/each*		
Steel Products	ASTM A370 steel products	EA	\$104.00/each*		
Optional Vee-notch		EA	\$8.00/each*		

Hardness					
Rockwell Hardness	ASTM E18 – hardness of metallic materials	EA	\$48.00/each*		
Brinell Hardness	ASTM E10 Hardness of metallic materials by portable hardness testers	EA	\$120.00/each*		
Vickers – Hardness	ASTM E384 micro indentation hardness of materials	EA	\$120.00/each*		
Profile Harness	ASTM E384 micro indentation hardness of materials	EA	\$160.00/each*		
Case Depth	ASTM E384 – up to 10 hits per component	EA	\$160.00/each*		
Dynamic Wind Uplift					
12’x24’ wind uplift test	Sequence A through E (19-hour average test)	EA	\$25,000/each*		
1-day specimen assembly required	Hourly rates (charged under Staff Compensation)				
1-day specimen disassembly required	Hourly rates (charged under Staff Compensation)				
1-day test	Hourly rates (charged under Staff Compensation) + daily operating expenses				
Monotonic Wind Uplift					
8’x8’ monotonic wind uplift	Static pressure (defined during project scope) held for “x” hours (defined during project scope) during scope	EA	\$5,000/each*		
½ day specimen assembly	Hourly rates (charged under Staff Compensation)				
½ day specimen disassembly	Hourly rates (charged under Staff Compensation)				
1-day test	Hourly rates (charged under Staff Compensation) + daily operating expenses				
Blower Tests					
ASTM E779	Determining air leakage rate by fan pressurization (includes final report)	EA	\$1,000/each		
Facility Operating Expenses (Daily)					
Facility Operating Expenses	Daily Rate	1	\$112.71/day		
Equipment Costs					

Equipment Costs (10-year depreciation)	Daily Rate	1	\$232.53/day		
TOTAL					

Above tests entail producing a data set and graphs, no analysis. Tests requiring machining, sample preparation, fixturing, or significant setup time will be charged by the hour at applicable rates plus materials costs. An estimate will be given upon receipt of samples

*specimen preparation and fixturing is additional via Staff Compensation + Facility Operating Expenses