ComTech
Combined Technologies Group, Inc.
Dayton, Ohio • 937-274-4866 • www.ComTechGrp.com

To: Shiloh Die Casting
Clarksville TN Plant

Date: January 2, 2018

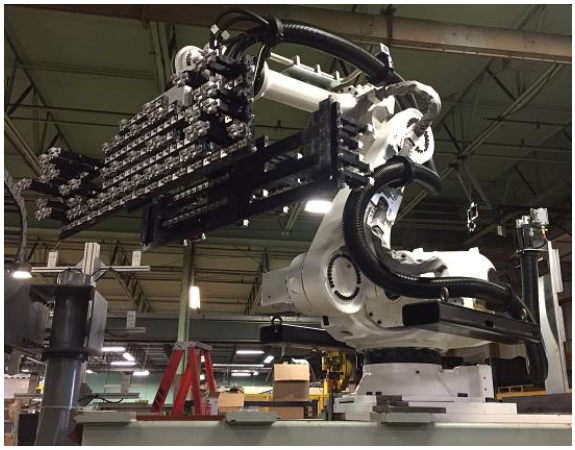
For: **Scott Harden**
Group Maintenance Manager – Shiloh Cast Light, N.A.
8200 100th Street
Pleasant Prairie, WI 53158

O **(+1) 262.947.2146**
C **(+1) 262.960.1463**
F **(+1) 262.947.7610**
E **scott.harden@shiloh.com**

SUBJECT: **Proposal #Q218147 Complete "Turn Key" System for the 4th Buhler Carat DCM**
Adders from Previous systems noted in yellow

The concept for the system is to integrate a FANUC FP R2000iC/210L Extract and a FANUC FP R2000iC/210R Spray robot to perform the Extraction and Spraying applications to the customer's DCM. A customer supplied spray head w/multiple atomizers will be mounted to the robot.

The system quoted in this proposal is for a turn-key system that includes all engineering, construction, programming, and installation identical to the first cell Automation.



Thank-you for giving Combined Technologies the opportunity to submit this proposal. New Fanuc Foundry Pro R2000iC/210L and Foundry Pro R2000iC/210R with the same options will be ordered with this project and painted Shiloh White.

*** Note: Shiloh White Foundry Pro options for these Robot Models is usually a 26 week lead time from Fanuc Japan. ComTech will need 6 weeks after receipt of the robots to Integrate the system on our floor ready for Runoff, hence the 32 week lead time.

1) **FANUC Foundry Pro R2000iC/210L Extract Robot w/ R30iB Haptic A Plus Controller**
   A. 210Kg Payload or 462lbs @ face plate
   B. Any distance off the face plate decreases the payload and inertia values.
   C. Reach 3100mm
   D. There is no door on the automation side of these machines and all utilities to the dies will have to stay inside the platen area, and the 210L can sit in close enough to the machine to work.
   E. The trim press cat walk must be moved to the outside area and the trim press must be close enough to the DCM for adequate reach for the 210L robot.
   F. Rotating the trim press 90deg with the dump towards the DCM helps on the reach of the robot.

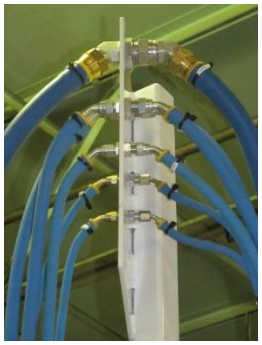
2) **FANUC Foundry Pro R2000iC/210R Robot w/ R30iB A Plus Controller**
   A. Payload 210 Kg / 462 lbs
   B. Reach 3095 mm / 120 inches

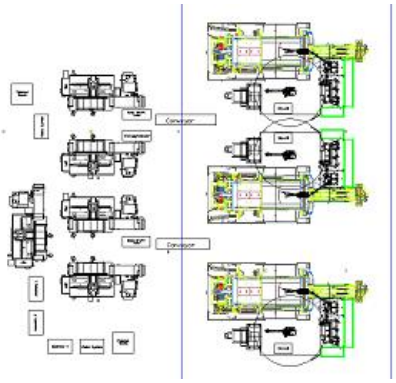
3) **Commonality**
   A. 6 Axis Vertically Articulated Arm
   B. Repeatability 0.2mm/.008 in
   C. R30iB Controller
   D. Teach Pendant Programming
   E. Brakes on all 6 axes
   F. Programming Pendant
   G. Main power disconnect
   H. Fence and E-Stop Circuits
   I. Automatic restart function
   J. Air and signals to upper arm
   K. Complies with RIA/ANSI 15.06-1999 Safety Standards

4) **Robot Options**
   A. Material Handling Software Bundle with Collision Detect
   B. DCS Dual Check Safety Monitoring
   C. Profibus Network Communication module
   D. Teach Pendant Disconnect for both Robots
   E. Soft Float (Extraction)
   F. 14m Cables on Spray Robot
   G. Foundry Pro Industrial seals
   H. Custom Painting of FANUC Robots Shiloh White RAL 1016

5) Spray Robot Mounting Plate

A. ComTech will design and supply the mounting plate that will bolt to the top of the DCM.
B. The robot will then bolt on to the riser at installation.



6) Spray Head and valve system *(customer supplied)* & Robot Dress out

A. The spray head will be mounted to the faceplate of the robot by an aluminum weldment.
B. The weldment will include a manifold that is plumbed to the spray system.
C. All hosing will mount to a common manifold at the rear of the robot.
D. Each hose and manifold location will be labeled for maintenance.
E. It is understood that a Wohlin Spray Head and Valve package will be supplied by customer.
F. Quick Coupling added to release the spray head in order to change out the head.

7) Extract Robot Riser

A. Comtech will make a new riser with the Fanuc Robot hole pattern in it.
B. There will also be a cable guard that attaches to the back of the robot or to this riser which will protect the robot cables from any damage.

8) End-Of-Arm-Tooling for Extraction Robot

A. The part removal gripper will grip on the biscuit to remove it from the DCM.
B. The biscuit gripper assembly will consist of a Schunk gripper, Steel gripper arms, serrated gripper pads, Steel adapter weldment and proximity switches verifying the biscuit is present.
C. A second biscuit gripper will remove the biscuit from the trim press and drop it to the furnace.
D. Sensors will be wired into the junction box mounted on top of the arm along with the solenoid valve operating the grippers.
E. The Filter/Regulator unit will be mounted on the robot base.
F. Wiring, valves, sensors, plumbing, junction box and cables all included.

9) Add Profibus Network I/O to both Robots

A. Since the PLC is switching to Siemens, Profibus I/O will be required for both robots
B. Profibus will be used to communicate from the robots to the PLC.
C. This will allow the robots to be started from the HMI.
D. All I/O signals from the robot will be incorporated into the HMI along with “Auto” Homing and Program select / start.

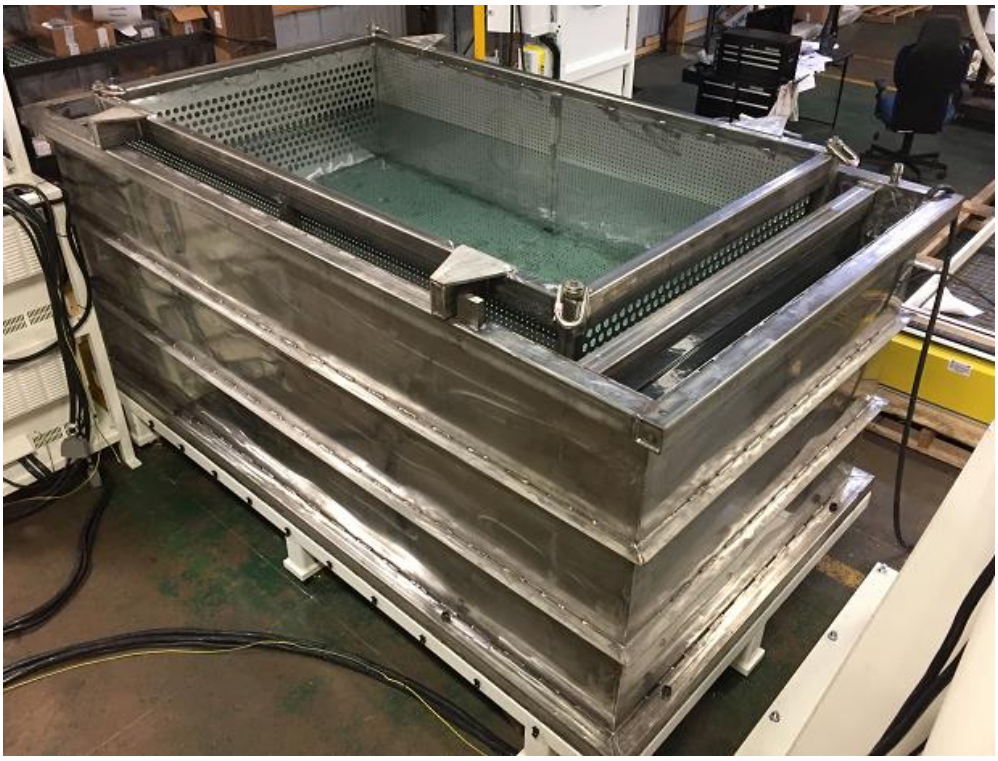
10) Part / runner Verification for Extraction Robot

A. A parts sensor tree will be located in the cell to verify that all the parts and their runners etc were removed from the Die Cast Machine.
B. Since there may be many (28) overflows that must be verified on the part a **Vision Checker** will be used to identify any and all objects of concern.
C. Once part is verified and Spray is complete the clear to close die signal is given to the DCM.
D. Adding a Pre-test limit switch as close to the die as possible to trigger "OK" to spray may be added to decrease overall cycle time.
E. Added Part Sensors for Trim Press / Trim Die on previous system.

11) Telesis Marking System

Includes:

1) Telesis Marking System
   a) TMP1700 Marking Head
   b) Telesis TMC470 Marking Controller
   c) Telesis ProfiNET Adaptor
   d) Telesis Air Prep Assembly
2) Hoffman window enclosure to protect Telesis controller
2) Steel monting stand
3) Electrical wiring
4) Telesis setup & programming
5) Siemens PLC & HMI programming & integration for full shot # & data string
6) Automatic model selection & changeover



12) Quench Tank

A. The Quench Tank will be **Stainless Steel**.
B. The tank will have an **overflow, drain**, circulating water inlet/outlet, fill, level sensor and spare stainless steel welded in (bungs) or threaded pipe connections.
C. The tank will sit in a steel frame, keeping it up off the floor.
D. The tank will have a **level sensor** in it to indicate when the water level is low, a valve will turn on allowing water to refill the tank, once it reaches the upper limit it will be turned back off.
E. There will be a **Heat Exchanger** mounted behind the tank, when the system is in "Auto" there will be a pump unit that will turn on and circulate the water from the tank through a filter unit, through this pump into the heat exchanger and back into the tank.

F. The other side of the heat exchanger would be connected to your facility cooling tower that would be plumbed to enter the opposite side of the heat exchanger and return the same water back out.
G. The tank will have a **temperature switch** to monitor the water temperature of the tank, when the temperature reaches 95 degrees the valve will actuate letting the cooling tower water to circulate through the heat exchanger to cool the water down, we will turn this valve on and off trying to keep the water temperature close to 95 degrees. There is no heating capability, Shiloh has dictated that the water will be heated with the warm up shots.
H. The top picture shows a tank with two lowering fixtures and the bottom picture shows one with a lowering basket, the quench tank quoted in this proposal is just an open tank and the robot will hold the part in the water.
I. A **stainless steel basket** will be fabricated to sit inside the tank to catch all the loose debris that falls off the parts The basket will have eyelets on the four corners for lifting out by the overhead crane.
J. A local junction box will be mounted to the quench tank frame where all the electrical is terminated and one main line will return back to the MCP.
K. The quench tank will have its own screen in the HMI for manual operations and I/O status.

13) Scrap Conveyor

A. Add a Scrap Conveyor to stretch the width of the Trim Press and incline up and over to discard the scrap into a Scrap Hopper.
B. All electrical will be tied into the MCP and will automatically start with the cell automation.
C. Stainless Steel Chutes and Sidewalls added on previous system.

14) Cell Guarding

A. Standard safety yellow eight-foot fencing will surround the entire extraction cell
B. Two entry gates will be included into the layout, one in front by the furnace, the other in the back between the trim press and DCM.
C. All gates will have gate switch interlocks wired into the safety circuit.
D. Shiloh standard gate switch as pictured.
E. Remote door entry request box for door at the scrap conveyor
F. Forth door added along back of trim press.
G. Added Keyence Laser Scanner
H. Additional hardware & wiring for a Keyence laser scanner to safeguard the

furnace and robot reach zone.

I. A ComTech designed & supplied guard will protect the laser scanner. Includes programming & integration of the robot with DCS, PLC, & HMI for automatic biscuit bypass to prevent short stops.

15) System Main Control Panel (MCP)

A. A New Control Panel like Pierceton and Pleasant Prairie (right in picture).
B. Will use a **Siemens** PLC.
C. New HMI remote control panel (left in picture).
D. 10" **Siemens Touchscreen** HMI mounted in remote cabinet.
E. Profibus will be used to communicate with the DCM, Robots, trim Press and HMI.
F. Main disconnect Switch, LOTO point, mounted on the side of the 480 panel, Arcflash compliant.
G. Cabinet will be separated with 480/120 in top cabinet and 24v in the lower cabinet.
H. E-Stop and Fence Safety Relays
I. External 120v transformer
J. Internal 24v transformer
K. Box mounted to the side of the MCP with a separate disconnect switch for each 480 volt supply to each piece of the cell equipment.
L. Servo Disconnect for Extract and Spray Robot
M. External Ethernet programming port and computer 120v outlet
N. Spare space to add spray, ladle and other equipment in future
O. Cabinet will be painted Shiloh White
P. HMI display screens will be the same as the other plants. Part counts, time out errors, some DCM faults, sequence of operations I/O status screen, can all be added to the HMI
Q. Change PLC and HMI to Siemens, includes changes to Electrical Drawings, changing out all the I/O structure, PLC Programming, all programs must be rewritten in Siemens logic and all tags must be readdressed, HMI screens, all screens have to be recreated from scratch and all tags readdressed to new PLC logic.
R. Additional Wireway added to previous system.

16) Add a "Cell Controller" HMI to the operators side of the DCM

1) The HMI will have all the same functionality as the one on the Automation side
2) The HMI will be mounted in a double panel (Large enough to combined the furnace HMI) with all the wiring and termination required for operating this unit including the stand.
3) Installation for setup, programming and commissioning with system.

17) Programming and Integration for the Extraction and Spray Robots.

A. Programming and Setup of the Extraction Robot to unload the Die Cast Machine.
B. Verify the part present and place the part on the trim press.
C. Programming and Setup of the Spray Robot to spray the die as desired. Integration of Signals will be controlled through the FANUC Controllers to the MCP.
D. Installation and on site Programming and setup are included in this breakdown.
E. Documentation of Setup Parameters, Programs and System Backup disks will be provided.

18) Engineering Package

Our engineering package will include:

A. Mechanical engineering – will develop drawings of the Cell Layout, EOAT and design any extra features to the system that may be required.
B. Electrical Engineering – will develop ACAD drawings of all electrical components in the system including interfacing between the robots, die cast machine and the E-Stop / Fence Safety Circuits.
C. Controls Engineering - will develop the PLC and HMI programs as outlined in this quote.
D. Robotics Engineering – will integrate the robots into the system setting up all parameters and safety devices, will program the Robots for the sequence of operations in the system.

19) Documentation Package

A. Documentation package will include all electrical and mechanical AY drawings on CD.
B. The package will also contain a backup of all robot setup parameters and programs
C. All vendor manuals will also be in this package
D. A detailed startup/shutdown procedures and operations procedures will be furnished in the documentation
E. Recommended PM schedules and spare parts lists will also be furnished

20) Service and Engineering

A. Project Management
B. Cell layout development and comprehensive reach study
C. Mechanical engineering and tooling/cell design
D. Controls engineering and integration of all ComTech supplied deliverables
E. All designs, schematics and information to be formally documented and provided to Shiloh Industries
F. Documentation to include standard robot manuals on CD, system-specific operation manuals and program documentation, etc.
G. System set-up and run-off prior to shipment at the ComTech's facility.
H. Robot path programming for one (1) part
I. Installation supervision and start-up assistance estimated at 2 weeks at Clarksville.

21) Installation

A. The system will be run off at Combined Technologies.
B. This will include demonstrating functionality and programming.
C. Quality and craftsmanship of the system will be approved.
D. After runoff acceptance, the system will be shipped to SHILOH INDUSTRIES.
E. ComTech will abide by OSHA, State of Indiana and Shiloh Industry safety rules, environmental regulations and procedures. ComTech will document their understanding of Shiloh Industry safety and PPE requirements and shop rules prior to entering the work place.
F. Onsite labor- ComTech will supply 2 men onsite to perform the following labor support:
    1. Mechanical Technician
    2. Electrical Technician
    3. Robot Technician
    4. Controls Engineer
G. Installation is based on weekly hours Monday through Friday 7am to 7pm.
H. ComTech will supply all Electrical and Mechanical equipment necessary for the installation.
J. Upon shipment to SHILOH INDUSTRIES ComTech personnel will help place the system in place and complete all plumbing and wiring interconnections to the cell.
K. Once the equipment is in place ComTech will wire in the equipment, power it up and debug it.
L. After system is mechanically and electrically installed the ComTech supplied robots will be taught to run one production model of casting.
M. After system installation and acceptance is complete, training on system operations and maintenance will be done.
N. ComTech request that a proven tool with a qualified program be installed and running in the cell DCM prior to ComTech's arrival.
O. SHILOH INDUSTRIES will be responsible for off-loading the truck, setting the robots and risers in the cell (we assume the overhead crane will reach this area), connecting 480VAC and air supplies to the connection points of the system.
P. ComTech has included 35 man days to install this System.
Q. Any significant wait time due to dies, furnace, DCM, etc that results in extraneous installation hours that is not the cause of ComTech supplied equipment will be billed at standard field service hours with Shiloh's pre-approval.
R. Travel and Living Costs will be billed at the end of the Project on the actual costs incurred in conjunction with the attached Field Service Rates.

S. ***Shiloh Responsibilities***
    1. *Shiloh Industries will be responsible for supplying 480V and compressed air to the main disconnects.*
    2. *Shiloh Industries will be responsible for the unloading of the equipment and setting it in place.*
    3. *No rigging costs are included in this proposal.*
    4. *Shiloh Industries will be responsible for the decking surrounding the DCM.*

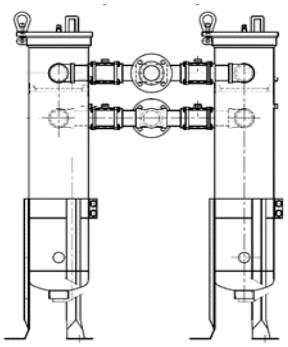
22) Total Investment for the Above Described "Turn Key" System $ 566,310

Cost Breakout for Major Components:

Extraction Robot, EOAT, Riser, Parts Tree, Programming	**$ 145,412**
Spray Robot, Mounting Plate, Hose Package, Programming	**$ 143,530**
Scrap Conveyor system	**$ 26,700**
Vision Checker for overflow verification	**$ 14,996**
Telesis Marking System	**$ 19,758**
Quench Tank with removable basket and Heat Exchanger	**$ 42,428**
Perimeter Guarding, Fortress Gate locks (4 Doors), Laser Scanner	**$ 36,924**
MCP, HMI, Controls, 2nd HMI	**$ 49,538**
Mechanical/Electrical/Controls/Robotic/Project Engineering, Runoff	**$ 45,695**
Installation	**$ 41,329**

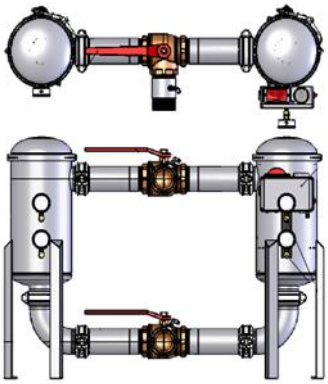
23) Option #1: 304 Stainless Duplex Size #2 Bag Filter System $ 19,506

All 2" stainless piping & components.
The system will have a common drip base and include ball valves to quickly switch to a standby filter to minimize downtime.
Duplex filter assembly with 25 micron size 2 bags.
Pressure differential gauge with sensor for PLC monitoring.



24) Option #2: 304 Stainless Duplex Automatic Flush Strainer System $ 27,257

All 2" stainless piping & components.
The system will have a common drip base and includes an automatic flush & cleaning system to backflush & remove debris without shutting down the DCM.
Duplex filter assembly with mesh screening strainers.
Pressure differential gauge with sensor for PLC monitoring
Automatic cleaning timer backflush option.



25) Shipment

A. Shipment is estimated at **32 weeks** ARO, based on current delivery of Foundry Pro Robots.
B. Receipt of machine drawings and any other pertinent information to the design process must be received 2 weeks ARO to guarantee delivery.
C. Shipment to be made FOB to Customer.
D. Customer pays shipping costs.

26) Payment Terms

Special Machine or Equipment Suppliers: The following must appear as individual line items on the requisition.

a) 20% paid at time of purchase order release; due net 45 from date of Supplier invoice
b) 20% paid at Mechanical Drawing Approval; due net 45 from date of Supplier invoice
c) 20% paid at Supplier Receipt of Robots; due net 45 from date of Supplier invoice
d) 20% paid at time of sign-off by Shiloh on the Supplier floor; due net 45 days from date of sign-off or vendor invoice (whichever is later)
c) 20% paid at time of sign-off on Shiloh production floor; due net 45 from date of sign-off or vendor invoice (whichever is later)

Regardless of PO terms, the above stated terms remain in effect unless Project Manager of Combined Technologies has given written acknowledgement of change in terms. Quoted delivery date is dependent upon customer providing all requested information to Combined Technologies at a time set forth by Combined Technologies. Any changes to the above quoted system after Drawing Approval may be subject to extraneous charges unless approved in writing by the Project Manager of Combined Technologies. If final acceptance is delayed due to customer, then payment will be due 45 days from date of shipment. ComTech's performance and support obligations will remain in effect even if final payment has been received Payments outstanding of the above terms will be subject to a 21% annual interest payment billed monthly together with any court costs, attorney fees and cost of collection that Combined Technologies may incur in enforcing the terms of this agreement.

27) Warranty

A. The system is warranted for a period of two year for parts from the time it is shipped from Combined Technologies backed by Combined Technologies and its vendors.
B. Warranty applies only to new Equipment governed by this purchase order and not for previously supplied or reused equipment. Warranty includes defects in design, assembly, programming, or craftsmanship.
C. Fanuc Robots will also have a two year warranty from shipping date. Any service issues with the FANUC Robots can be handled through us or you can contact FANUC directly (Dual Support).

Thank you for the opportunity to quote this system. We look forward to being selected as your automation partner for this new project. If you have any questions, please give me a call at (937) 274-4866.

Sincerely,
Combined Technologies Group, Inc.

ComTech
Combined Technologies Group, Inc.
Dayton, Ohio • 937-274-4866 • www.ComTechGrp.com

FIELD SERVICE CAPABILITIES

Combined Technologies offers Emergency Field Service as well as Scheduled Maintenance Services including but not limited to:

- Support all software versions and manipulator types for ABB, FANUC, MOTOMAN, MITSUBISHI and other robotic makes.
- Extensive background in Robotic Programming, Mechanical and Electrical troubleshooting of Robotic Systems, PLC Programming, Vision Systems and most anything related to Automation.
- Offers wide variety of scheduled services such as: periodic / annual preventive maintenance, program modifications, safety inspections and teaching software or maintenance courses at customer's facility.

FIELD SERVICE RATES

Category	Standard Work Hours	Overtime Work Hours	Sundays & Holidays
Technician	$80	$120	$160
Engineer	$120	$180	$240
Travel Time	$50	$75	$100

DEFINITIONS:

Standard Work Hours	8:00 am-5:00 p.m. Monday through Friday or purchaser's regular first shift hours, exclusive of ComTech's Holidays.
Overtime Work Hours	After 8 hours worked or any hours worked past 7:00 pm Monday through Friday. Or all day Saturday exclusive of ComTech's Holidays.
Sundays & Holidays	12:00 am Sunday (or Holiday) - 8:00 am of next Standard Workday.

Com Tech
Combined Technologies Group, Inc.
Dayton, Ohio • 937-274-4866 • www.ComTechGrp.com

COMTECH'S HOLIDAYS INCLUDE:

New Year's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving (Thursday and Friday)
Christmas Eve through New Year's Eve

Notes:

1) *The minimum charge is four (4) hours for all categories.*
2) *Fractional hours will be prorated at the appropriate hourly rate to the nearest one-quarter (1/4) hour.*

TRAVEL AND LIVING EXPENSES:

Commercial Transportation (plane, train, bus, etc.) Lodging (hotel, motel, etc.) Rental Car (car plus fuel) Meals ($30/day) Miscellaneous (parking, tolls, etc.)	at Actual Cost

Mileage	$0.52 per mile

PAYMENT TERMS:

- **Net 30 payable upon receipt of invoice**