3.0 DETAILS OF EQUIPMENT

3.1 Mechanical Description

3.1.1 Truck Guard c/w Loop Detector (ADCL dwg. MI00-C4-33467)

The truck guard is a robust, all-welded steel fabrication of 1" plates and suitably reinforced structures. The guard is designed to protect the stack storage conveyors from accidental damage from the lift truck during loading and unloading.

A loop detector is embedded in the concrete floor directly in front of the loading and unloading zones. Presence of a lift truck is detected and a signal is relayed to the control system to lock out the operating equipment.

3.1.2 Infeed Stack Storage Conveyor (ADCL dwg. DA06-D3-33468)

The infeed stack storage conveyor is designed to receive bale stacks from the loading station. The conveyor is designed in one section measuring 6'-8" in length. It is an all-welded construction of hollow structural steel (HSS) tubing, suitably reinforced with plate gussets. Three strands of 2080 extended roller pitch chains transport the stacks along the conveyor. The chains are supported and guided by UHMW slider tracks. The chain return occurs inside the longitudinal tube members supported on rollers. Each chain is equipped with a separate take-up. The sprockets are double-pitch and hardened for extended longevity. The conveyor is driven by a 2 HP "Eurodrive" shaft-mounted gearmotor. The conveyor running speed is 30 fpm.

3.1.3 Safety Fences (ADCL dwg. GM00-D3-33469)

The safety fence surrounds the infeed stack storage conveyor to contain potential bale stack instability. The approximate height is 13' by 10' long. It is fabricated from 6-5/8" diameter pipe construction, with interior bolts for anchoring to floor and top cross-bridging to assure rigidity. The fence is equipped with swing-out side panels to provide access to tipped and misaligned bales and for maintenance.

3.1.4 Manual Dewiring Conveyor (ADCL dwg. DA06-D3-33470)

The manual dewiring conveyor is downstream of the stack storage conveyor, and is straddled by the destacker station. It measures 18' long. This conveyor is an all welded construction of HSS tubing suitably reinforced with plate gussets. Two strands of 2080 extended roller pitch chain at 21" center-to-center transport the bales across the conveyor. The chains are supported and guided by UHMW slider tracks. Chain return is inside the longitudinal tube members supported on rollers. Each chain has a separate take-up. The drive unit is a 2 HP shaft-mounted "Eurodrive" gearmotor, complete with a brake. The conveyor running speed is 30 ft/min. The manual dewiring station consists of a pivoting table actuated by a pneumatic cylinder with 4" bore diameter and 6" stroke. In the extended position, the table raises the bale off the chain conveyor for easy dewiring access.

3.1.5 Manual Wire Cutter/Tool Balancer (ADCL dwg. MV00-D3-33471)

The manual wire cutter is a "Nile" air-powered wire cutter mounted to a tool balancer. The cutter assembly is mounted on a swing boom above the dewiring conveyor for easy access.

3.1.6 Destacker (ADCL dwg. GB00-D3-33472)

The destacker is designed to receive bale stacks from the stack storage conveyor, and deliver unit bales to the downstream conveyor. The destacker operates by clamping and raising a stack of bales, leaving the bottom-most bale on the chain conveyor, in order to convey the bale from underneath the bale stack. The stack is then lowered back onto the conveyor, released, and then clamped one bale up from the bottom. This sequence is repeated until all the bales have been "de-stacked".

The destacker arch structure straddles the manual dewiring conveyor. It is a robust steel structure anchored to the concrete through base plates. Bales must arrive into the destacking station with the bale edge at +/- 2 ½" from the pass line. Those bales arriving into the destacking station without their edge being on the pass line will be displaced by the destacker clamps once the bale is raised. The clamps will reposition the bale edge onto the pass line prior to sending it to the downstream station.

The clamps are mounted in a carriage and are hydraulically actuated. The stack clamp arms are fabricated from ¾" steel plates. Each arm is equipped with picker points on the inside face to assure a firm grip on the bales. The carriage runs inside the destacker frame on two tracks and is raised and lowered by a hydraulic cylinder with a 33" stroke and 3-1/4" bore diameter. maximum capacity of 3,000 lbs, accommodating a maximum bale width of 36" and a minimum of 28" between clamp arms.

3.1.7 Stacker (ADCL dwg. DS00-D3-33473)

The bale stacker is designed to receive unit bale stacks from the manual dewiring conveyor, and stack them up to 3 high.

The stacker arch structure straddles the manual dewiring conveyor. It is a robust steel structure anchored to the concrete through base plates, measuring 9'-8" high and 4'-2" wide. A hydraulically-actuated bale lifter table raises a single bale to the elevation of the stacker paddles. The bale lifter table runs on a set of linear motion bearings. The paddles then close beneath the bale, and the lifter table retracts to the receiving position. This sequence is repeated until a stack of 3 high is ready for the outfeed storage conveyor. Each paddle is actuated by a hydraulic cylinder with a 2" bore and 6" stroke.

3.1.8 Safety Enclosure (ADCL dwg. MI00-D3-33474)

The safety enclosure surrounds the stacker and outfeed stack storage conveyor to contain potential bale stack instability. It consists of expanded metal panels and security handrails to provide a safe perimeter around the equipment. The enclosure measures 7'-2" high, and is equipped with two swing-out access panels to provide access for cleaning and maintenance.

3.1.9 Outfeed Stack Storage Conveyor (ADCL dwg. DA06-D3-33475)

The outfeed stack storage conveyor is designed to receive bale stacks from the manual dewiring conveyor and deliver to the unloading zone. The conveyor is designed in one section measuring 13'-10" in length. It is an all-welded construction of hollow structural steel (HSS) tubing, suitably reinforced with plate gussets. Three strands of 2080 extended roller pitch chains transport the stacks along the conveyor. The chains are supported and guided by UHMW slider tracks. The chain return occurs inside the longitudinal tube members supported on rollers. Each chain is equipped with a separate 4" take-up. Elevation at top of chain is 30". The sprockets are double-pitch and hardened for extended longevity. The conveyor is driven by a 2 HP "Eurodrive" shaft-mounted gearmotor. The conveyor running speed is 30 fpm. Maximum loading capacity is 6,600 lbs, or four stacks of bales 3 high.

3.2 Maintenance

Service and maintenance are absolutely essential in order to obtain the desired performance from ADCL equipment as sold. Follow the scheduled maintenance as shown in the tables below.

3.2.1 Stack Storage Conveyors

Machine Element	Weekly	Monthly	3 Mos.	6 Mos.	Yearly
"SEW Eurodrive" Gearmotor		I/A brake (1)		I/C * or 3,000 hrs	
"SKF" Flange bearings		I/C		G (2)	
Electric Photoeyes & limit switches	I/C/A (1)				

Remarks:

(*) See manufacturer's literature, "SEW Eurodrive" for more information; for scheduled oil change (min. 3 yrs or 10,000 hrs), use Shell Omala 220
(1) As required
(2) SKF LGMT 2 or equivalent lithium based grease

Schedule:	A: Adjust L: Lubricate I : Inspect	O: Change oil C: Clean F : Fill oil	T : Tension G : Grease R : Replace

Table 2. Stack Storage Conveyor Maintenance Schedule

3.2.2 Manual Dewiring Conveyor

Machine Element	Weekly	Monthly	3 Mos.	6 Mos.	Yearly
"SEW Eurodrive" Gearmotor		I/A brake (1)		I/C * or 3,000 hrs	
"SKF" Mounted bearings		I/C	G (2)		
Cylinders & pivots	I **				
"Simonds" Wire cutters	***				
Electrical photoeyes & switches	I/C/A (1)				

Remarks:

(*) See manufacturer's literature, "SEW Eurodrive" for more information; for scheduled oil change (min. 3 yrs or 10,000 hrs), use Shell Omala 220
(**) See Section 3.3.3: Fluid power components maintenance
(***) See Section 8.0 Manufacturer's literature: "Simonds"
(1) As required
(2) SKF LGMT 2 or equivalent lithium based grease

Schedule:	A: Adjust L: Lubricate I : Inspect	O: Change oil C: Clean F : Fill oil	T : Tension G : Grease R : Replace

Table 3. Manual Dewiring Conveyor Maintenance Schedule

3.2.3 Destacker

Machine Element	Weekly	Monthly	3 Mos.	6 Mos.	Yearly
"Rexroth" Linear motion rails	I/C	L (2)			
Cylinders & pivots	**				
Electrical Photoeyes & limit switches	I/C/A (1)				

Remarks:

(**) See Section 3.3.2 Fluid power components maintenance schedule, or Section 8.0 manufacturer's literature, for more information
(1) As required
(2) Shell Alvania G2 or equivalent grease

Schedule:			
	A: Adjust	**O**: Change oil	**T** : Tension
	L: Lubricate	**C**: Clean	**G** : Grease
	I : Inspect	**F** : Fill oil	**R** : Replace

Table 4. Destacker Maintenance Schedule

3.2.4 Stacker

Machine Element	Weekly	Monthly	3 Mos.	6 Mos.	Yearly
"Rexroth" Linear motion rails	I/C	L (2)			
"SKF" Pillow blocks		I/C	G (3)		
Cylinders & pivots	**				
Electrical Photoeyes & limit switches	I/C/A (1)				

Remarks:

(**) See Section 3.3.2 Fluid power components maintenance schedule, or Section 8.0 manufacturer's literature, for more information
(1) As required
(2) Shell Alvania G2 or equivalent grease
(3) SKF LGMT 2 or equivalent lithium based grease

Schedule:			
	A: Adjust **L**: Lubricate **I** : Inspect	**O**: Change oil **C**: Clean **F** : Fill oil	**T** : Tension **G** : Grease **R** : Replace

Table 5. Stacker Maintenance Schedule

3.3 Fluid Power Controls Description

The following sub-sections describe the hydraulic and pneumatic controls supplied with the project including their maintenance schedules.

For additional information concerning:

- The Functional Description — see section 4 of this manual;
- The Installation Instructions — see section 5 of this manual;
- The Bill of Materials — see section 7 of this manual;
- The Drawings — see section 7 of this manual;
- The Manufacturer's Literature — see section 8 of this manual.

3.3.1 HYDRAULIC CONTROLS

The Bale Handling System hydraulics are supplied in 4 sections consisting of :

60HPU1 – Hydraulic Power unit
15HM1 – Destacker
16HM1 – Bale Stacker

For general information, all hydraulic assemblies are done using the following typical guidelines when possible :

- All ADCL power units and manifolds are supplied with a drip pan c/w drain;
- Hydraulic pressure is applied on the cap end of cylinders when a directional control valve's port 'A' is pressurized (note however that this is not possible in all cases).

With respect to drawings, all hydraulic drawings are schematics only and do not reflect the component physical layout nor line lengths. As standard supply, all ADCL hydraulic drawings include :

- A client connection point(s) description table, where applicable;
- Client supply requirements, where applicable;
- Line size, material and bend radius table for all lines used on manifolds;
- An actuator reference information box for all functions;
- Line, item and general reference notes.

3.3.1.1 60HPU1 - Hydraulic Power Unit

The hydraulic power unit is supplied completely assembled. It consists of the following main items:

- 80 gallon JIC top mount style reservoir;
- 20 HP, 3 phase, 60 Hz and 1750 RPM high efficiency main electrical motor;
- 20 GPM, 1450 PSI variable displacement main pump for supply of all equipment;
- 6 GPM fixed displacement recirculation pump for kidney loop type cooling and filtration of oil;
- Air / oil heat exchanger with by-pass check valve installed in the kidney loop;
- Recirculation loop filter with a $\beta 7\mu(c)=1000$ element;
- Magnetic pump inlet strainer;
- Pressure relief valve preset to 1800 PSI;
- Desiccant type air breather;
- 3/4" size quick-coupler for filling and toping-up of reservoir;
- SAE-16 'Return Flush' port for the return of the flushing fluid;
- Reservoir drain and access cover for cleaning and inspection;
- Visual level, temperature and pressure indicators.

Electrical control devices on the HPU include :

- 60LSLL1 Switch for low low oil level detection & main pump shutdown;
- 60PDSH1 Switch for kidney loop filter clogged detection & maintenance warning;
- 60TSH1 Switch for high temperature detection & heat exchanger (cooler) start-up;
- 60TSHH1 Switch for high high temperature detection & HPU shutdown;
- 60PSH1 Switch for high pressure detection & HPU shutdown in case of major pressure loss.

Please refer to the manufacturer's litterature in section 8 of this manual for all information pertaining to the hydraulic power unit.

3.3.1.2 15HM1 – Destacker Hydraulics

The section 15HM1 hydraulic manifold is mounted on the East side of the Destacker frame. Interconnection from the hydraulic power unit to the manifold are to be done by others. This manifold serves the following actions :

- Destacker clamps shift towards pass line / opposite pass line;
- Destacker clamps open / close;
- Destacker clamps lower / raise.

With respect to the Destacker hydraulic controls :

- A pressure reducing valve (SPRP) limits the shifting force of the clamps;
- Clamp shifting speeds are manually adjustable via flow controls (SFCA, SFCB);
- A pressure reducing valve (CPRB) limits the closing force of the clamps;
- Clamp opening and closing speeds are manually adjustable via flow controls (CFCA, CFCB);
- A counterbalance valve locks the clamp closed;
- A counterbalance valve lock the clamp in any vertical position;
- Clamp raising and lowering speeds are manually adjustable via flow controls.

3.3.1.3 16HM1 – Bale Lifter Hydraulics

The section 16HM1 hydraulic manifold is mounted on the East side of the Bale Stacker frame. Interconnection from the hydraulic power unit to the manifold are to be done by others. This manifold serves the following actions :

- Bale lifter raise / lower;
- Pass line paddle open / close;
- Opposite pass line paddle open / close.

With respect to the Bale Stacker hydraulic controls :

- Raise / lower speeds are manually adjustable via flow controls;
- Vertical positions are maintained via load holding valves;
- Paddle open / close speeds are manually adjustable via flow controls.

3.3.2 PNEUMATIC CONTROLS

The Bale Handling System pneumatics are supplied in 1 section consisting of :

13PM1 – Manual Dewiring Conveyor Pneumatics

For general information, all pneumatic assemblies are done using the following typical guidelines when possible :

- Section pneumatics are supplied with an inlet ball valve which exhausts downstream pressure when closed;
- Pneumatic pressure is applied on the cap end of cylinders when a directional valve's port 'A' (or '4') is pressurized (note however that this is not possible in all cases).

With respect to drawings, all pneumatic drawings are schematics only and do not reflect the component physical layout nor line lengths. As standard supply, all ADCL pneumatic drawings include :

- A client connection point(s) description table, where applicable;
- Client supply requirements, where applicable;
- Line size, material and bend radius table for all lines used on valve assemblies;
- An actuator reference information box for all functions;
- Line, item and general reference notes.

3.3.2.1 13PM1 –Manual Dewiring Conveyor Pneumatics

The section 13 pneumatic valve assembly is mounted on a plate installed on the West side of the manual dewiring conveyor frame. This valve assembly serves the following actions :

- Manual dewiring conveyor raise / lower;
- Air supply to the manual wire cutter.

3.3.3 Fluid Power Maintenance Schedule

3.3.3.1 Hydraulic Power Unit

	Weekly	Monthly	Quarterly	Bi-Yearly	Yearly
Electric Motor (of pump & fan cooler)					L (3)
Hydraulic Oil Level	I, A (4)				
Hydraulic Oil Temperature	I				
Hydraulic Oil					N (5)
Gauges			C, I (1)		
Filter	I (1)				R (6)
Heat Exchanger (air / oil)	I		C		
HPU General Assembly			C, I (2)		

Remarks:

(1) Inspect for leaks and external damage, adjust or replace as necessary;
(2) Inspect for leaks, adjust as necessary;
(3) Shell Dolium R or equivalent;
(4) Fill with Shell Tellus 32, or equivalent, if necessary;
(5) Clean reservoir and replace oil with Shell Tellus 32, or equivalent, if necessary;
(6) Change element with proper replacement as per section bill of material.

Legend :	A: Adjust C: Clean I: Inspect L: Lubricate N: Analyse R: Replace

Table 6. HPU Maintenance Schedule

3.3.3.2 Fluid Power Components

	Weekly	Monthly	Quarterly	Bi-Yearly	Yearly
Filters (of pneumatic circuits only)	I (3)				R (6)
Lubricators (of pneumatic circuits only)		I (4)		C	
Manifolds & Valve Assemblies		C, I (2)			
Gauges		C, I (1)			
Exhaust Mufflers (of pneumatic circuits only)				C	
Hoses		I (1)			
Cylinders		C, I (1)			
Cylinder Pivots and Accessories		C, L (5)			
Rotary Actuators		C, I (1)			
Motors		C, I (1)			
Air Bags		C, I (1)			

Remarks:

(1) Inspect for leaks and external damage, adjust or replace as necessary;
(2) Inspect for leaks, adjust as necessary;
(3) Drain bowl;
(4) Fill with Mobil Die Light NFO 10 W/NR, or equivalent, if necessary;
(5) Use Shell Alvania RA3 or equivalent;
(6) Change element with proper replacement as per section bill of material.

Legend :	A: Adjust C: Clean I: Inspect L: Lubricate N: Analyse R: Replace

Table 7. Fluid Power Components