SUPPORTING NARRATIVES

105 N. Tioga Street, Suite 200 | Ithaca, NY 14850 | p 607.319.4136 | f 607.319.4153 | www.labellapc.com

Options 1 and 2 - New Site Location:

Site Considerations:

For the purposes of this report we selected a hypothetical site on the southwest side of town that is above the 500 year flood plain. The elevation of the building will have to be set above 500 year flood elevation, to meet FEMA requirements. It should be noted that in addition to the property being within the area of silt deposits and naturally unsuitable soils, that there would be some site remediation required.

Stormwater will require storage and water quality practices to meet NYSDEC and NPDES requirements. Some underground storm piping will be required to facilitate drainage from the building and the parking areas. It may be possible to grade parking lots to sheet drain to areas at the edge of the project parcel, enabling the use of shallow swales to address the water quality and quantity. The project would need to meet the requirements of the general permit for stormwater management for construction sites.

Utility needs will include extension of sanitary sewers, most likely requiring a lift station. Water main extension would be required.

Building Considerations:

The building structure is assumed to be steel frame with bar joists and metal decking, long span framing system for the bus storage bays with long-span steel joist. The roof system will be R-32 mechanically fastened rigid polyisocyanurate insulation and an EPDM or PVC fully adhered membrane roof. It is assumed that the exterior walls of the Administration area will consist of metal stud framing, interior gypsum board with a vapor barrier, minimum R-20 combination of batt insulation with a continuous rigid insulation/air barrier on the exterior to meet the energy code and metal panel siding. The exterior walls of the service and storage bays could be horizontal insulated metal panels

Interior finishes in the Administration areas and break room(s) will consist of painted gypsum board on metal stud walls, VCT and carpet flooring, lay-in acoustic ceiling system with suspended metal T's. There

will be ceramic tile in restrooms, locker rooms and wet areas, and plastic laminate cabinets and countertops. Service bays, repair bays and bus storage bays will be concrete with a slip-resistant, abuse resistant traffic coating.

Structural Systems:

The building structure could be a structural steel frame with steel joists and steel beams and columns with metal deck, or it could be a pre-engineered metal building with steel bent moment frames and light gage roof purlins.

The foundation system would likely be a deep foundation system due to the soft, deep soils at the site. This system would likely be driven steel "H" piles, cast-in-place pile caps, grade beams, and structural slab (10" thick.) to support the bus loading and potential soil movements.

Mechanical Systems:

This report assumes that there are no alternative fuel buses in TCAT's future procurement (electric, CNG etc.) although those can be included during the time of design if needed. The bus storage, repair bays, shops, and equipment storage areas will require exhaust air rates and make-up air similar to the existing facility. Energy recovery sections in the make-up air units should be considered as a significant energy saving measure.

The administration area could be served by several zoned air handling units, preferably located indoors. Alternatively, a ground exchange heat pump system could be installed with individual air-to-water heat pumps located indoors above ceilings or ducted from a central equipment room. For a heat pump system, a small hot water boiler may be required for back-up heating and for perimeter radiation heating. The following is a summary for a preliminary schematic:

<u>Administration</u> (18,000 Sq. Ft):

- Two 9,000 CFM natural gas heating and DX cooling air handlers with approximately 450 MBH heating and 20 to 25 Ton cooling capacity each.
- Alternately, the area could be served by a ground exchange heat pump system of about 36 tons, 120 gpm pumped loop water and air-to-water heat exchangers located above the ceilings or ducted from a mechanical equipment room; e.g., six units about 6-tons.
- A back-up auxiliary heating hot water boiler with about 600 MBH capacity and hot water perimeter heating is recommended.
- Power roof ventilators with about a total capacity

<u>Locker/Break Room</u> (5,000 Sq. Ft.):

- One 5,000 cfm, 250 MBH natural gas air handler unit, no cooling located either on the roof or in a mechanical equipment room.
- One 700 CFM rooftop exhaust air fan.

Repair Bays/Shop/Storage (40,000 Sq. Ft.):

- Two natural gas rooftop air handler units; each approximately 30,000 cfm with a heating output of 1,400 MBH.
- Total roof mounted exhaust fan capacity of 60,000 CFM (four fans at 15,000 cfm each).
- Energy recovery sections in each rooftop air handling unit is recommended.

Bus Storage (60,000 Sq. Ft.):

- Four natural gas rooftop air handler units, each approximately 25,500 cfm with a heating output of 1,400 MBH.
- Four roof mounted exhaust fans, 25,500 cfm each.
- Energy recovery sections in each rooftop air handling unit is recommended.

Bus Storage (80,000 Sq. Ft.):

- Six natural gas rooftop air handler units, each approximately 22,600 cfm with a heating output of 1,200 MBH.
- Four roof mounted exhaust fans, 22,600 cfm each.
- Energy recovery sections in each rooftop air handling unit is recommended.

Electrical Systems:

The building service size is estimated at 480V, 800 amperes. Distribution will be accomplished by various sub panels throughout the facility. A standby/emergency generator will service emergency lighting, and any other equipment to be powered during outages. Lighting throughout the facility will be LED, with occupancy/vacancy sensing and daylighting controls. The building will be protected by a complete addressable fire alarm system. An option to consider is photo voltaic arrays.

Option 3 - Existing Site:

Site Considerations:

The existing site is very restricted and requires additional space needs that are in competition with the City of Ithaca DPW which owns the property adjacent to the TCAT facility. This includes the area used for outside storage of service vehicles. Expansion of the existing facility will impact other needs and uses of the site.

Auto Parking: The proposed schematic for the automobile parking seems very tight and eliminates much of the green space between the parking lot and Pier Rd. The layout also requires removal of a portion of the existing office area. Additional parking could be accommodated by extending the existing layout to the west by eliminating the turnaround and adding a drive onto Willow Avenue. This would provide for approximately 70 cars without disturbing the green space along Pier Road.

The existing fuel tank is assumed to be relocated by virtue of the new addition. There will need to be an area for fuel tanks and dispensing stations if fueling is relocated outside the facility. At one point the DPW was proposing to install a new fueling island that would be used for both the City vehicles and TCAT but that was not constructed due to the excessive costs due to the foundation for the island. Fuel storage needs to be upgraded to meet NFPA and DEC requirements for bulk storage.

The existing site does not account for a stormwater management area. There is no space for any stormwater retention. With the extent of the work, the addition of new space and the expanded hard surface parking area, the stormwater management requirements will certainly be activated. Overall, the project will need to upgrade this site to include additional pavement for bus and auto parking. Stormwater management improvements will include new storm sewers and stormwater pollution prevention components.

This site may be “grandfathered” with regard to the 500 year flood plain elevation requirement although it should be noted that it is within the 500 year flood plain.

Building Considerations:

The new two story addition bridges over the west entry/exit overhead door. This is a very active passage in the current operation with access to the bus cleaning and bus wash bay, and the 3 maintenance bays. If the passage is to remain open, the floor-floor height of the addition would be relatively high to allow for passage of buses under the 2nd floor.

The foundations for both the two story addition and the bus storage building will most likely require driven piles due to the nature of the existing soils in the area. A geotechnical investigation will be required, and a foundation recommendation would need to be made based on the geotechnical report.

It is assumed that the two story addition will be steel frame with a metal second floor deck and concrete floor. Roof framing is assumed to be low slope steel frame with metal decking, R-32 mechanically fastened polyisocyanurate rigid insulation and an EPDM or PVC fully adhered membrane roof. Exterior walls will consist of metal stud framing, interior gypsum board with a vapor barrier, minimum R-20 combination of batt insulation with a continuous rigid insulation/air barrier on the exterior to meet the energy code and metal panel siding.

Interior finishes will consist of painted gypsum board on metal stud walls, VCT and carpet flooring, lay-in acoustic ceiling system with suspended metal T's, ceramic tile in restrooms and wet areas, plastic laminate cabinets and countertops.

The existing roof structure over the maintenance and storage building will need to be reviewed to assess the potential need to add reinforcements. This may be necessary to support the additional snow drift loads imposed by the addition of the two story office structure.

As currently configured, the bus storage areas do not account for 24 hour access to bus cleaning and wash bays, the parts room, access to the storage mezzanine or the 3 maintenance bays. All of the bays are actively used and would have to be operationally coordinated to accommodate the bus parking and storage. Bus parking along the south side of the building blocks the overhead door access to all of the service and bus storage bays at some times of day.

Mechanical Considerations:

Removing a portion of the existing one story administrative area also removes the air handlers serving that area. New mechanical space within the addition will be required for air handling equipment or rooftop units could be utilized either on the existing structure (with possible structural reinforcement) or on the new addition. Rooftop units are the lease costly although they are not the best from the standpoint of maintenance and longevity. Gas availability in the area may be a consideration however the addition of new equipment will be somewhat offset by the removal of older, less efficient equipment.

The new administrative addition does impact the water service entrance and sanitary line exiting the building to Willow Avenue to the west. This is not really an obstacle but will need to be accounted for in the design.

Geothermal heating and cooling would be an option. A geothermal system would require approximately 25 wells at 200 feet of depth (spaced at 20ft on center) and would add perhaps $250,000 to the budget. The wells would be placed under the parking area and thus be unseen. The area does have a high water table thus heat transfer would be optimal for both heating and cooling.

Electrical Consideration:

The addition to the west of the facility will run over the underground electric service. This is acceptable, but the service must be well protected when excavating and when placing footings/foundations.

The existing 480/277V service is rated 600 amperes. The demand charge from a NYSEG bill indicates the demand load is about 150 amperes. It appears the new addition(s) can be fed from the existing distribution system.

Certainly any building modifications should include changing out older lighting technologies with new LED fixtures to cut energy costs and add longevity to the fixtures. Also, new lighting control technologies shall be incorporated into any additions or alterations.

The addition of photovoltaic panels on the roof is an option that would save energy. The roof structure and the roof membrane would need to be reviewed to assure that the structure would support ballasted panels and that the roof membrane would be viable for the life of the panels.

Equipment and Process Systems

Compressed Air

Design would include removing the existing compressor and replacing with one rotary screw compressor and a vertical receiving tank. The system will provide approximately 130 psi to the entire shop. The compressor will be specified as "full featured" which includes internal filters, dryers, digital controls, and gauges. Rotary screw compressors offer much quieter and more efficient operation through the use of variable speed control. These compressors tend to run more continuously and would help eliminate the large spikes in electrical usage created by older style reciprocating compressors that constantly cycle on and off. Compressed air will be delivered to each overhead reel and additional wall mounted outlets will be strategically located on columns and walls. The piping will be schedule 40, threaded, black iron pipe and will be designed as a loop system to provide even air distribution to the entire shop. This will reduce the potential for a user upstream to affect the air delivered to the downstream user.

The compressor within the existing maintenance shop will be relocated to provide back up to the compressors identified above.

Process Fluids

Process fluid storage and dispensing will be designed to comply with local codes and NFPA 30 and 30A requirements. Refer to the master equipment list for quantities of fluids to be stored. Air actuated pumps will distribute the fluids throughout the building. Each fluid will be piped to the associated hose reel and nozzle combination specified for that specific fluid type. Reel banks will be suspended from the structure or supported from structural columns. All reel banks will include compressed air. The service lane will have fluids stored within 55 gallon drums and distributed to overhead reels. The fluids dispensed within the service area include diesel exhaust fluid, engine oil, automatic transmission fluid, windshield washer fluid, and engine coolant.

Portable drainage carts will be specified to collect waste oil and waste coolant drained from the vehicles. A pump-out station will be located within the maintenance shop to evacuate the carts into the storage tanks. Waste oil and waste coolant tanks are located within the lube room. Level monitoring within the waste oil and coolant tanks will alarm the user and disable the pump to keep the tanks from overfilling.

Service piping schedule provided below:

Fluid/Service	Type
Engine Oil (EO)	Steel Tubing
Windshield Washer Fluid (WWF)	Copper Pipe
Automatic Transmission Fluid (ATF)	Steel Tubing
Engine Coolant (EC)	Copper Pipe
Gear Oil (GO)	Sch 40 Steel Pipe, Grade B, ERW
Chassis Grease (CG)	Sch 160 Steel Pipe, Grade B, seamless
Diesel Exhaust Fluid (DEF)	Sch 40 Stainless Steel Pipe, type 304
Used Oil	Steel Tubing

Used Coolant	Copper Pipe

Exhaust extraction system

A tail pipe exhaust system will be provided to allow the direct exhaust of vehicle exhaust. Each bay will be provided with its own exhaust reel. The reels will be electric driven controlled by a suspended pendent controller. Each reel will be provided with its own exhaust fan that will automatically activate when the reel is energized. Ductwork risers from each fan will be extended through the roof and terminate with weather caps. High temperature exhaust hoses reinforced with steel helix will be specified for each reel to accommodate high temperature exhaust systems and system durability.

Lifts

There are many different styles of lifts, each serves a different purpose to accommodate maintenance operations. The design will include a combination of 2-post scissor lifts, a platform lift, and portable lifts. Of the 10 bays, six bays will have 2 post scissor lifts, one bay will have a platform lift, and the remaining 3 bays will be flat bays. Two sets of 4 portable lifts will be provided for the flat bays. Additionally, within the chassis wash bay, the design will include a platform scissor lift rated for wet environments.

Within the existing garage there are two existing in ground 2 post lifts that are older style units with controls in the floor. These lifts will be removed and the pits backfilled. The existing platform parallelogram lift will be relocated. The existing 4 post lift will be removed and discarded.

Parts

A variety of means for storing parts will be provided. Proper spacing of the storage racks will be designed to provide proper access. Vented hazardous material cabinets will be provided within the shop storage areas. Refer to the equipment list for estimated quantity.

Fueling

New facility design:

Diesel storage and dispensing will be designed to comply with local codes and NFPA 30 and 30A requirements Diesel fuel will be dispensed on site. Two 15,000 gallon aboveground double wall protected diesel fuel tanks will be provided. Double wall PE piping will be installed underground from the tank to the fueling area. Fuel usage will be metered through a fleet fuel dispenser and connected to the Veeder Root system. The user will be required to input their user ID or swipe their card to activate the fueling system. Conventional style nozzles and a high flow Emco Wheaton posi lock nozzle will be specified. An overhead tramway system will provide flexibility to accommodate different fueling locations for various bus models and vintages. Similarly, a conventional style nozzle will be located on each side of the service lane to accommodate fueling on both sides of the bus. A Veeder Root system will be utilized to provide leak detection and inventory tracking for fuel. Leak detection is provided within the interstitial space of each double wall tank and the fuel dispensing underground sumps. Fueling will not be activated until proper identification has been provided.

Diesel exhaust fluid (DEF) will be stored within an above ground double wall stainless steel tank. The tank will be located indoors within a heated space to prevent freezing. DEF piping will be installed underground to an island mounted dispenser. The dispenser will be specified with a heated cabinet to prevent freezing of the DEF fluid. The type and style of nozzle will be coordinated with the owner.

Existing facility design:

Initial assessment of the diesel dispenser is that it is original to the building and will be upgraded to a digital pedestal style dispenser with a high flow posi lock nozzle that is interlocked with the existing Fuel Master chip key reader. This will help decrease fueling and service time. An overhead tramway system will provide flexibility to accommodate different fueling locations for various bus models and vintages. Similarly, a conventional style nozzle will be located on each side of the service lane to accommodate fueling on both sides of the bus. A Veeder Root system will be utilized to provide leak detection and inventory tracking for fuel.

The existing fuel tank and vault will be removed. Two 15,000 gallon aboveground double wall protected diesel fuel tanks will be provided. The tanks will be installed next to the new maintenance area on the east side of the building. Double wall PE piping will be installed underground from the tank to the building exterior. A transition sump will transition the underground to aboveground overhead piping and will be extended to the existing fueling area. Belowground piping will be double wall PE piping. Aboveground piping will be schedule 40 welded steel pipe.

In addition to diesel fuel dispensing, Diesel Exhaust Fluid (DEF) is dispensed from 55 gallon drums to accommodate newer busses that utilize DEF systems to address current emission requirements. Part of our design will include providing a central bulk storage system. Diesel exhaust fluid (DEF) will be stored within an above ground double wall stainless steel tank. The tank will be located indoors within a heated space adjacent to the existing service lane to prevent freezing. DEF piping will be installed to an overhead fluid reel.

Wash and service

New facility design:

Both bus wash bays will be provided with a bus wash system. One bus wash will be a six brush drive thru system. The other bus wash will be a hybrid brush and high pressure touchless combination wash. Both systems will be provided with high powered drying blowers, high pressure undercarriage chassis and tire wash, and full length stainless steel guide rails. The six brush system will provide a better wash for the fixed transit busses where the hybrid will accommodate a wider range of bus profiles such as the paratransit busses and any non-revenue vehicles due to the use of high pressure touchless wash bars used to wash front the vehicle and brushes on the side. Providing one of each will provide diversity accommodate a wide range of vehicles that will require washing both current and future use. Water from the wash will be drained into a water reclaim pit. A water reclaim system will treat the water and recycle it to be used for subsequent washing. Water recycling can provide up to 85% water reclamation. It is both environmentally and fiscally beneficial particularly in the winter time when

busses are frequently washed. The bus wash system is designed taking into consideration the use of bike racks on the front of the bus.

Overflow from the reclaim pit will discharge to the sanitary system through the oil water separator.

A gas fired hot water high pressure washer and wand will be provided to accommodate manual wash operations within the chassis wash bay.

Portable industrial vacuums will be provided to accommodate bus cleaning. Overhead hose reels connected to the vacuums will help keep excessive hose off the ground.

A stationary fair collection vault will be included along with an overhead electronic probe.

Existing facility design:

The existing bus wash was installed in 2000. It appeared to be in good condition, but is approaching the end of its useful life and recommended be replaced. Additionally, it was noted that the existing system does not utilize any type of water recycling. The design would include removing the existing wash system and replacing with a hybrid brush wash and high pressure touchless wash as identified above. Drying blowers will be added at the end of the bay. Water from the wash will be drained into a water reclaim pit. A water reclaim system will treat the water and recycle it to be used for subsequent washing. Water recycling can provide up to 85% water reclamation. It is both environmentally and fiscally beneficial particularly in the winter time when busses are frequently washed. The water recycling room will be located where the existing fuel tank is located.

Tire shop

The tire shop will be provided with two tier tire storage racks with overhead trolley cranes attached to the rack to accommodate storage of approximately 40 tires total. Additionally, a tire carousel will be specified to accommodate additional storage of used and new tire storage. The carousel can accommodate storage for various tire sizes.

Fluid Management

A Fuel Master fluid management system will be provided (extended within the existing garage) to track fuel, engine oil, and engine coolant usage for each bus. A Veeder Root system will be utilized to provide leak detection and inventory tracking for fuel and process fluids. Leak detection is provided within the interstitial space of each double wall tank and the fuel dispensing underground sumps. The Fuel Master and Veeder Root system will communicate through an internet IP address and Ethernet connection. The user can access the fluid management server at any workstation by means of an internet IP address, username, and pass code. Each maintenance bay will be provided with a control panel to activate the fluid for that bay. The user will input the bus number and mileage prior to activating fluid dispensing for that bay. Similarly, each fueling lane will be provided with a controller. Fueling will not be activated until proper identification has been provided.

Fall Protection

Fall protection will be specified within designated bays. The fall protection system will be a pre-engineered track system to accommodate two users. The track system will be suspended from the structure above, approximately 19’ above finished floor, to accommodate lifting of the bus. A self-retracting lifeline and full body harness will be specified as part of the design.