SOUTHWEST LIGHT RAIL TRANSIT OPERATIONS AND MAINTENANCE FACILITY

BASIS OF DESIGN REPORT– FINAL

July 2013

Executive Summary

As part of its planned light rail transit (LRT) system expansion, Metro Transit will need to construct a new Operations and Maintenance Facility (OMF) to store, service and maintain the light rail vehicles (LRVs) which will provide revenue service on the new Southwest LRT (SWLRT) line. The new SWLRT OMF will be designed to accommodate both the current Bombardier (Type I) vehicles and new Siemens (Type II) vehicles to provide Metro Transit with the flexibility to run any LRV on any operating line segment. The OMF will be designed and configured to handle an ultimate capacity of 36 LRVs which, according to current planning estimates, will be sufficient to support SWLRT operations through 2030.

The SWLRT OMF will be designed to perform the following vehicle maintenance activities:

- Daily servicing (interior cleaning, sanding, and daily inspections)
- Exterior washing
- Scheduled vehicle inspections
- Unscheduled running repairs
- Component changeouts including truck removals
- Minor glass and panel replacements
- Fleet modifications and campaigns
- Some minor component repairs as described herein

The LRV storage tracks and the daily LRV servicing (sanding) track at SWLRT OMF will be designed to accommodate three-car consists. Based on current fleet projections, the car storage barn will be constructed with an initial capacity of 30 LRVs and the capability to expand to an ultimate capacity of 36 LRVs. This capacity is to be confirmed during the final design phase of the project. Major vehicle repairs, scheduled vehicle overhauls and all major component repairs and overhauls will be performed at the Hiawatha OMF. On-car wheel truing will be performed at either the Hiawatha or Central Corridor OMFs, but not at SWLRT OMF.

In addition to the vehicle maintenance activities programmed for the SWLRT OMF, facilities will be provided for the following departments, but not limited to:

- Rail Operations (Transportation)
- Materials Management
- Rail Systems Maintenance (Track, Traction Power, Signals, and Communications)
- Facilities Maintenance

A needs analysis was performed for each of the above departments in order to develop a program of requirements for the new OMF. Based on these analyses, it was determined that the SWLRT OMF should include the following major functional elements:

- One storage barn capable of holding 30 LRVs (and being expanded to hold 36 LRVs)
- One servicing (sanding) track capable of handling a three-car consist
- One drive-through automatic exterior car washer
- Four inspection/repair pit positions with car rooftop access platforms
- Two in-ground car hoists
- One vehicle position designed to facilitate the removal and replacement of car roof level components
- Spare truck and component storage
- Some minor component repair capability
- Office and welfare areas for the Vehicle Maintenance, Operations (Transportation) and Rail Systems Maintenance departments
- Materials Management main parts storeroom for vehicle and corridor components
- A Facilities Maintenance shop and office
- Nine indoor parking/storage bays for specialized non-revenue vehicles (i.e., salt truck, crane trucks, boom trucks, and platform truck)
- Outdoor storage for Systems Maintenance materials
- Yard and shop substation(s)

The conceptual space allocation program presented in Chapter 4 indicates that the OMF will need to be approximately 161,000 square feet to efficiently accommodate all programmed spaces and a 30-car storage barn. Floor space requirements increase to approximately 171,000 square feet if a 36-car storage barn is constructed initially. Estimated sizes for the major functional areas are as follows:

- operations and maintenance facility: 101,000 square feet
- LRV storage barn: 55,000 square feet for 30-car barn (65,000 square feet for 36-car barn)
- non-revenue vehicle storage: 5,000 square feet

These preliminary allocations may need to be adjusted to suit specific site conditions once a preferred site is selected for the OMF.

OMF Site Selection

The program of requirements presented herein is being used to test the ability of multiple sites along the SWLRT corridor to accommodate the new OMF. Once a preferred site is selected, this program will be used to develop conceptual site specific yard and shop layouts which will serve as the basis for all subsequent design activities.

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1. Background, Goals and Approach

1.1 Project Description

In 2012 the Metropolitan Council approved the onset of preliminary engineering activities for the Southwest Light Rail Transit (SWLRT) line. The line is an approximately 15.8-mile line that will serve the Twin Cities metropolitan region operating from downtown Minneapolis through the southwestern suburban cities of St. Louis Park, Hopkins, Minnetonka, and Eden Prairie. The line will connect major activity centers in the region including downtown Minneapolis, the Opus/Golden Triangle employment area, Methodist Hospital, the Eden Prairie Town Center, and the Minneapolis Chain of Lakes.

The line will operate primarily at-grade, with structures providing grade separation of LRT crossings and roadways at specified locations. It will be constructed with dual tracks, providing service to and from downtown Minneapolis and the southwestern suburbs. A total of 17 new at-grade stations will be constructed. The terminal station in downtown Minneapolis will be the Target Field station, which is currently the terminus for the Hiawatha and Central Corridor LRT. The SWLRT line will interline with the Central Corridor Green Line.

A total of 35 light rail vehicles (LRVs) are planned to be procured for the SWLRT line. A new operations and maintenance facility (OMF) also is planned to store, service and maintain the LRVs which will be operating on the SWLRT line. The primary purpose of this report is to define the functional and fixed facility requirements for the proposed SWLRT OMF.

1.2 Goals and Objectives

The primary purpose of this programming effort is to define the operating and fixed facility requirements for the proposed SWLRT OMF. Specific objectives of the task are to:

- Determine the general level of servicing and maintenance operations to be supported at the SWLRT OMF and detail the activities to be performed
- Establish the general functional requirements for the facilities on site
- Develop workload projections and preliminary staffing requirements based on the planned maintenance operations
- Define all required functional work areas and support spaces
- Develop vehicle repair bay, floor space and major equipment requirements
- Discuss the flow of work through the various work areas and identify material handling methods

1.3 Approach

The methodology used in defining the functional and operating requirements was developed jointly by the Preliminary Engineering Consultant (PEC) West/East teams to establish the functional yard and building requirement. The approach used is briefly discussed below:

- Reviewed any existing reports and planning documents which pertain to the work effort
- Investigated conditions at the Hiawatha OMF with respect to functional work areas, activities performed, workforce, workload, shop equipment, floor space and layouts, parts storage/ distribution practices and material handling methods. This effort established a baseline against which future requirements are evaluated
- From a series of site visits and interviews with Metro Transit user groups, identified all maintenance and support activities to be located at the SWLRT OMF. Preferred maintenance practices to be applied to the new shop also were identified
- Documented the size of the design fleet
- Identified/confirmed all functional work areas needed to perform required maintenance operations including support areas
- Calculated the number of vehicle repair positions required in the shop
- Defined specific maintenance operations to be performed in each work area
- Established maintenance equipment, staffing and floor space requirements for each work area
- Compared identified/confirmed functional and operating requirements with other facilities similar to SWLRT OMF nationally

The functional and operating requirements presented herein were determined through a series of interviews with Metro Transit user groups from the Rail Operations, Vehicle Maintenance, Systems Maintenance, Materials Management and Facilities Maintenance departments. Existing maintenance workload data was obtained through discussions with the senior vehicle maintenance managers and an analysis of historical work order records.

2. Planning Criteria and Guidelines

Upon completion of the Central Corridor and SWLRT lines, Metro Transit will have three OMFs available to store, service and maintain its LRV fleets. In general, all three OMFs will be capable of performing the following vehicle maintenance activities:

- Daily inspections
- Interior cleaning
- Sanding
- Exterior washing
- Scheduled inspections
- Unscheduled running repairs
- Component changeouts, including detrucking (scheduled and unscheduled)
- Minor glass and panel replacements
- Fleet modifications and campaigns

Both the Hiawatha and Central Corridor Shops will have the capability to perform consist wheel truing. Major vehicle repairs and scheduled overhauls will be performed exclusively at Hiawatha for all of Metro Transit's LRVs. All major component repairs and overhauls also will be performed at Hiawatha.

The new SWLRT OMF will be designed primarily to store, service and maintain LRVs which provide revenue service on the SWLRT line. The OMF will be designed and configured to handle an ultimate capacity of 36 vehicles.

2.1 General Planning Criteria and Guidelines

The guidelines and general planning criteria below were used to develop the functional requirements for the proposed SWLRT OMF. Additional criteria related strictly to the yard and shop facilities are presented in Chapter 3.

- The SWLRT OMF will be designed to accommodate both Type I (Bombardier) and Type II (Siemens) LRVs, even though most of the Type I vehicle maintenance work will be performed at Hiawatha. The in-ground car hoists at the SWLRT OMF shall be designed to accommodate both the Bombardier and Siemens cars. The parts storeroom at SWLRT OMF will accommodate Type II components only
- With the exception of daily servicing (sanding, interior cleaning and daily inspections) and exterior washing, all LRV maintenance activities at the SWLRT OMF shall be performed on individual cars, and not coupled consists
- Vehicle maintenance personnel and LRV operators shall have separate reporting, locker room, restroom, and break facilities. If OMF configuration allows, Vehicle Maintenance and Systems Maintenance could share these facilities

- Vehicles shall be moved into the shop as three-car coupled consists for sanding and exterior cleaning. Consists may be separated to run through the automatic exterior wash system independently
- All low floor LRV servicing and maintenance activities programmed for the SWLRT OMF, including car washing, shall be performed indoors
- Shop tracks shall be run-through whenever possible. Stub end tracks should be avoided, if possible
- Minimum spacing between adjacent shop tracks shall be 26 feet
- Indoor storage shall be provided for all LRVs assigned to the SWLRT OMF. Car storage barn shall be designed with sufficient lighting and heating to accommodate car interior cleaning and daily vehicle (barn) inspections. Interior cleaning facilities shall include provisions for filling and emptying mop buckets with soap and water and shall be immediately adjacent to the car storage area
- Ideally, car shop maintenance tracks shall be designed to hold a maximum of two LRVs to preclude entrapment of an LRV between other cars when maintenance and repair activities are being performed. This criterion maximizes the number of car repair positions with direct access to the LRV storage tracks. The exception to this rule is the servicing/sanding track, which must be designed to handle a three-car consist
- Car positions inside the OMF shall be electrified using an overhead contact system (OCS) except for any positions provided with an overhead bridge crane for roof level component removal and replacement
- The OCS in the shop shall be sectionalized by car repair position. Maintainers shall be able to individually control overhead power to each car position in the shop
- The main cross aisles located along both ends of the shop shall be a minimum of 15 feet wide. The main center aisle through the shop shall be a minimum of 20 feet wide
- Main shop aisles shall be wide enough to allow facilities maintenance scissor lifts or sky lifts to drive down the aisles
- Elevated work platforms shall be provided along both sides of the car in the inspection, repair and roof level component changeout work bays for access to LRV rooftops and provide fall protection
- Access to all roof level work platforms shall be interlocked with the OCS to ensure that the catenary wire is de-energized before employees gain access to the platforms
- Interlock major shop equipment items with the OCS as required for safe operation of the equipment. Examples of necessary interlocks are in-ground car hoists and overhead monorails, bridge cranes and jib cranes which operate over electrified tracks
- Foreperson offices shall be located near the work areas they supervise
- An enclosed, heated area shall be provided for a salt truck and Systems Maintenance specialty service vehicles at the SWLRT OMF
- The new SWLRT OMF shall store maintenance-of-way (MOW) parts for the Systems Maintenance department

2.1.1 SWLRT Design Criteria

The design of the SWLRT OMF shall comply with all relevant provisions of the SWLRT Design Criteria —in particular, Section 9.0 (Operations and Maintenance Facility) and Section 3.0 (Track Geometry and Trackwork). Requirements specified herein supplement those presented in the Design Criteria.

2.2 Fleet Size and Composition

Metro Transit currently uses 27 Bombardier Flexity Swift LRVs to provide revenue service on its Hiawatha line (also called the Blue Line), which runs between downtown Minneapolis and the Mall of America. The Bombardier LRVs (designated as Type I cars) are low floor, six-axle, articulated cars with approximately 70 percent of the inside floor within 14 inches of the top of rail. These vehicles are bi-directional and capable of multi-unit operation (up to three cars) with 750 V DC current collection via a roof-mounted pantograph.

Metro Transit's Central Corridor line (also called the Green Line) and SWLRT line (Green Line extension) will be serviced by a new fleet of Siemens S70 low-floor LRVs (designated as Type II cars). The new cars will be similar in size and configuration to the Bombardier Type I cars (six-axle, low floor, articulated), except that they will not be electronically compatible enough to run in-consist with the original Type I cars. Both the Bombardier and Siemens LRVs are, however, outfitted with many of the major car components such as HVAC units, traction and auxiliary inverters, brake resistor grids and batteries located on the roof of the vehicle due to the low floor design of the car.

Metro Transit recently purchased 59 Siemens Type II LRVs which are expected to be used as follows:

- 47 for Central Corridor service
- 12 for expanded Hiawatha service to allow for three-car consist operation

An additional 35 Siemens Type II cars will be procured to provide service on the SWLRT line. Thus the number of Type II cars required to support future Blue and Green Lines (and extension) operations is 94. Metro Transit also has an option available with Siemens to purchase an additional five Type II vehicles, for the Hiawatha line. Refer to **Table 2-1** for a summary of expected fleet assignments and an estimate of peak period vehicle requirements.

Table 2-1: Fleet Projections and Revenue Requirements

Vehicle	Hiawatha	Central Corridor	Southwest
Type I Bombardier	27	0	0
Type II Siemens (Initial)	10	31	0
Type II Siemens (2011 Option)	2	16	0
Type II Siemens (Southwest Option)	5	0	35
Total	**44**	**47**	**35**
Peak Consists (2030) per 2010 Fleet Management Plan (FMP)	10 at 3-car, 3 at 2-car	13 at 2-cars	11 at 2-cars
Peak Vehicles (FMP)	36	26	22
Spares (FMP)	8	5	4
Peak Consists (Revised)	13 at 3-car	13 at 3-car	11 at 3-car
Peak Vehicles (Revised)	39	39	33
Spares (Revised)	5	8	2
Spare Ratio (Revised)	**11.36%**	**17.02%**	**5.71%**

2.2.1 Basing Assignments

The table below shows the maximum projected LRV storage capacity for each of the three Metro Transit OMFs. The proposed SWLRT OMF will be designed initially with covered storage for 30 LRVs, but will include the capability to expand the storage barn capacity to 36 cars; this capacity is to be confirmed during final design of the OMF.

Table 2-2: OMF LRV Storage Capacity

			Southwest	
Storage Location	**Hiawatha**	**Central Corridor**	**Initial**	**Future**
Covered Storage	48	30	30	36
Shop	7	3	4	4
Total	**55**	**33**	**34**	**40**

Based on the above capacity figures, it is likely that some vehicles which support Green Line operations (Central Corridor LRT and SWLRT) will be stored overnight at Hiawatha.

3. Maintenance Activities and Facility Requirements

This chapter defines the functional requirements for the vehicle maintenance activity at the proposed SWLRT OMF. Included herein are requirements for the yard and shop facilities. Requirements for the other Metro Transit departments to be located at the OMF, such as Operations (Transportation), Systems Maintenance, Materials Management and Facilities Maintenance are presented in Chapter 4.

3.1 LRV Servicing and Maintenance Activities

The proposed SWLRT OMF shall be designed to efficiently perform the following servicing and maintenance activities associated with the new Type II Siemens vehicles as well as the existing Type I Bombardier vehicles:

- Daily servicing for the revenue vehicles assigned to the SWLRT OMF. Servicing includes daily (barn) inspection, interior cleaning and sanding
- Exterior washing
- Preventive maintenance (scheduled inspections at pre-determined intervals)
- Life-cycle based maintenance including scheduled component changeouts (trucks, HVAC units, etc.)
- Corrective maintenance or running repair of defects reported during revenue service or identified during scheduled inspections
- Unscheduled component changeouts
- Fleet modifications/campaigns, as necessary
- Minor body repairs (panel and glass replacements)
- Minor component troubleshooting and repairs
- Scheduled vehicle overhauls (SWLRT OMF will be the back-up overhaul facility and will be used for this activity sparingly)
- Scheduled detailed car interior cleaning programs (monthly)
- Component cleaning
- Parts storage and materials management. This activity includes managing, controlling, and proper disposal of hazardous materials and waste products

The following paragraphs provide a brief description of the various servicing and maintenance activities listed above.

Daily Inspection – Each LRV will receive a daily inspection to ensure that the vehicle is fit for the day's revenue service. These visual and functional checks of the LRV's interior and exterior focus on high-wear and safety critical items such as wheels, brakes, doors, operator controls, and communication systems. The ability to completely walk around the car is required for this inspection. This inspection will be performed in the car storage barn.

Interior Cleaning – Vehicle interiors are cleaned every day by what Metro Transit refers to as "helpers" in accordance with Metro Transit's maintenance procedures. This activity involves removing all newspapers and loose debris, sweeping car floors, and dusting operator consoles and other specified surfaces. This activity will be performed in the car barn using push carts and other supplies.

Detail Cleaning – LRV floors will be washed inside the storage barn on an as-needed basis. Floor washing is performed using mops, buckets and approved cleansers. Metro Transit plans to perform a more thorough interior cleaning than the daily cleaning on each LRV every month. These cleaning activities will involve a thorough cleaning of floors, headliners, sideliners, ceilings, seats, and windows.

Sand Replenishment – The sandboxes on the cars will be accessible via ports located outside the car. A fully pneumatic sanding system is envisioned for the OMF which consists of a bulk storage tower with multiple dispensers provided at each LRV servicing position along the length of the car or service track. This operation can take between three and ten minutes to complete per car depending on the number of boxes to be refilled.

Exterior Washing – An automatic drive-through type train washer with a water reclaim system should be provided to maximize washing capabilities. Metro Transit currently washes its LRVs every two to three days in accordance with its established maintenance procedures. Metro Transit expects the new LRVs to be washed with the same frequency (i.e., every two to three days).

Scheduled Inspections – Preventive maintenance inspections and scheduled component replacements will be performed on the LRVs to ensure the operational reliability of the cars and to minimize in-service failures and unscheduled repair work. The new Type II cars will initially be inspected at the same intervals as the existing Bombardier fleet until experiential data suggests that other intervals are more appropriate (see Table 3-1).

Interval	Shop Time
5,000 mile (safety)	1-2 shifts
25,000 mile (A)	2-3 shifts
50,000 mile (B)	4-6 shifts
100,000 mile (C)	9-12 shifts
150,000 mile (D)	15 shifts

Corrective Maintenance/Running Repairs – Running repairs are defined as minor unscheduled maintenance operations which generally can be completed in one eight-hour work shift with the average repair taking approximately four hours. Running repairs are a result of defects found during the scheduled inspections or problems developed while in revenue service. The repair work is typically performed directly on the vehicle and can involve any of the major car components or systems. For shop planning purposes, it is assumed that the new vehicles will experience the same level of unscheduled repair work as the existing LRVs: 72 unscheduled events per car per year. This figure was derived from

an analysis of existing vehicle maintenance work orders for unscheduled repairs during a three-month period from November 2012 through January 2013. Most of these repairs are expected to be performed inside the shop; however, certain minor activities such as light bulb replacement can be performed on the vehicles in the storage barn, depending upon resource availability and carhouse occupancy.

Component Changeouts – To maximize the service availability of each LRV, the OMF will be designed to perform major component exchanges. Defective components, or those scheduled for replacement, will be removed from the vehicle and replaced with new or remanufactured components. The removed/defective components, including LRV trucks, will then be sent to Hiawatha or another Metro Transit-designated location for required repair work or overhaul.

Minor Body Repairs – Body repairs expected to be performed at the OMF will be limited to panel replacements, door and window replacements, operator seat replacements and brake frame changeouts. Each vehicle is expected to visit the shop once a year for minor body repairs based on current repair rates. Panel replacements, seat replacements and other minor body repair activities can usually be completed in one shift.

Programs/Campaigns – Metro Transit occasionally authorizes programmed modifications for a specific fleet of vehicles to address engineering, safety or performance issues. Metro Transit estimates that each new LRV will experience between two to four such upgrades or retrofits each year, and that each upgrade requiring shop space can be completed in two to three days.

Graffiti Removal – This activity can be performed in the storage barn or inside the shop depending on the extent of damage and the availability of shop space. Any new (corrective) paint will be performed at the Hiawatha OMF.

3.2 Support Activities

In addition to the vehicle servicing and maintenance functions described in the previous sections, the following departments, support activities and spaces will be accommodated at the proposed SWLRT OMF:

- Vehicle Maintenance –administration and support
- Rail Operations (Transportation) – administration and support
- Employee facilities (lockers, lunch rooms)
- Materials Management and storage
- Spare component storage
- Maintenance training
- Operations training
- Rail Systems Maintenance – Track, Traction Power, Signals and Communication
- Facilities Maintenance

- Building mechanical and electrical rooms
- Communications/IT rooms

The functional requirements for these areas are defined in Chapter 4.

3.3 Yard Requirements and Criteria

The yard layout for the OMF should be designed to efficiently accommodate the following transportation and maintenance activities on site:

- Indoor storage of revenue vehicles
- Operator predeparture tests
- Graffiti removal in the storage barn
- Running repairs in the storage barn
- Employee parking
- Non-revenue vehicle parking
- Visitor parking
- Possible delivery of new light rail vehicles
- Designated walkways for ease of access and egress

The major design objectives for the yard are to:

- Provide direct vehicle access to all servicing and maintenance facilities on site
- Minimize any reverse or conflicting train movements. Ideally, a storage yard with both front end and back end loops should be provided
- Effectively separate the movements of steel wheel and rubber tire vehicles on site
- Minimize travel distances for train operators and maintenance personnel around the yard

The following paragraphs describe the functional requirements and criteria which should be used in the planning and design of the new SWLRT OMF storage yard.

General Yard Requirements

- The OMF site shall be designed to provide a safe and secure work area which is capable of efficiently and effectively supporting revenue service for the life of the facility
- The yard site shall be secured by perimeter fencing with access gates at the main entrance and secondary access locations, as appropriate
- Adequate illumination for roadways, employee parking areas, outdoor storage and work areas, the main shops, and other designated areas shall be provided
- A network of site roadways and access aisles shall be provided to promote the safe and efficient movement of employee, visitor, delivery, and non-revenue vehicles on site. Roadway crossings of

yard tracks shall be minimized. Adequate warning devices shall be provided at all necessary road/track crossings

- Parking for employees and visitors shall be provided. Parking for maintenance and for operations personnel need not be separated
- The yard site shall include the necessary environmental protection systems such as wastewater treatment (oil/water separation), hazardous material storage, air pollution control equipment, and noise mitigation
- A fire protection system that meets the requirements and regulations of Metro Transit and municipal, state and federal authorities shall be provided
- Yard site design shall minimize impacts to ongoing operations and maintenance during future expansion projects
- Space is required for a dedicated yard substation. This substation will provide AC power and DC traction power for the yard and storage barn. The maintenance facility will require separate AC and DC power supply rooms for standard electric service and LRV OCS and auxiliary power systems
- The yard site shall include the necessary storm water management system per state and municipal requirements

Yard Planning and Design Criteria

- Yards shall be designed so that vehicle movement is kept within the yard property, if possible
- The yard shall be designed to promote a single-direction flow of car circulation movements
- Yard trackage shall be of double-ended loop configuration with the ability to turn a vehicle if possible
- Two separate yard entrance/exit points shall be provided whenever possible
- The yard trackwork shall be configured to minimize the potential for single point failures to cripple yard operations, LRV pull-ins, or LRV pull-outs. Redundant routes shall be provided whenever possible
- The yard trackwork shall be configured to maximize the curve radii throughout the yards (minimum 100 feet required per SWLRT Design Criteria)
- Storage tracks and other yard trackage shall be designed to accommodate train consists of one, two or three cars.
- LRV storage tracks shall be spaced to allow maintainers to comfortably walk along both sides of the car and perform required inspection duties (i.e., inspect trucks and wheels)
- Powered switches shall be used throughout the yard
- Switch heaters shall be provided in accordance with the SWLRT Design Criteria
- Grade changes throughout the yard, particularly on the approach tracks into the shop repair bays shall be minimized. Ideally, the shop approach tracks shall have 0 percent gradient

- Yard trackage shall include storage barn and shop bypass trackage; multiple leads to logical groups of storage tracks; and direct track routes for all common LRV servicing, maintenance, and yard movements
- A dedicated test track is not required in the yard
- Walking distances between train operator facilities and the LRV storage tracks shall be minimized
- Yard operations and train movements shall be controlled and monitored from the Rail Control Center (RCC) at Hiawatha. The RCC shall be capable of viewing, via CCTV monitors or otherwise, the yard arrival, departure and storage tracks. A yard control office is not required at the SWLRT OMF
- Yard operating speeds shall be limited in accordance with Metro Transit Rail Operations and Maintenance and Metro Transit Rail Operations Rule Book
- Track design shall be in accordance with the SWLRT Design Criteria Manual

3.4 Vehicle Storage and Maintenance Facility

This section sets forth the functional requirements for the vehicle maintenance activity at the SWLRT OMF.

3.4.1 General Requirements

Per discussions with Metro Transit's Vehicle Maintenance managers, the following operating decisions and assumptions were developed for the SWLRT OMF:

- Scheduled LRV overhauls for all fleet (Bombardier and Siemens) will be programmed for Hiawatha. The SWLRT OMF may perform some scheduled overhauls during periods of peak activity
- Major LRV repairs (i.e., unscheduled corrective events requiring more than two days and significant resources) shall be performed at Hiawatha and not at SWLRT OMF
- All major LRV body repair and paint work shall be performed at Hiawatha and not at SWLRT OMF; however, some minor body repairs (panel and window replacement) may be performed at SWLRT OMF
- With wheel truing capabilities at the Hiawatha and Central Corridor OMFs, a wheel truing machine is not required for the SWLRT OMF
- Major component repairs and rebuilds for all fleets shall be performed at Hiawatha. The capability to perform minor troubleshooting and repairs on selected car components (i.e., trucks, HVAC units, inverters, and pantographs) shall be provided at the SWLRT OMF
- An electronics shop is not required at the SWLRT OMF. Electronic components and modules shall be sent to the Hiawatha OMF for troubleshooting and repairs
- A general purpose machine/fabrication shop shall be provided at the SWLRT OMF. This area can be shared with the Rail Systems Maintenance and Facilities Maintenance Departments
- A welding shop shall be provided at the SWLRT OMF. This area can be shared with the Rail Systems Maintenance and Facilities Maintenance Departments

- Metro Transit plans to continue outsourcing all battery repair work. No off-vehicle charging shall be performed in-house. Consequently, a battery shop is not required at the SWLRT OMF
- A central lube and fluid distribution system is not required at the SWLRT OMF. Required lubricants and fluids will be dispensed from 55 gallon drums or smaller containers
- The SWLRT OMF shall have the capability to remove and replace all major LRV components including truck assemblies, HVAC units, pantographs and large inverter boxes
- A truck wash facility shall be provided at the SWLRT OMF. This area also will be used to clean other components removed from the cars, using hand-operated spray wands. A separate room for spray wash cabinets is not required at the OMF

3.4.2 Vehicle Repair Bay Calculations

The number of vehicle repair bays required for the proposed OMF is based on the following parameters:

- Projected number of vehicles to be maintained at the facility (36 maximum)
- Accumulated annual miles per car per year
- Inspection and repair activities to be assigned to the SWLRT OMF
- Amount of time required to complete each activity (shop durations)
- Facility work days and work shifts

Table 3-1 identifies all of the vehicle maintenance activities expected to be performed in the vehicle maintenance bays at the SWLRT OMF. This table includes scheduled inspection intervals, expected repair frequencies and estimated shop times. This information is based on the maintenance philosophy currently in place at the Hiawatha OMF and on discussions with Metro Transit maintenance managers. These parameters were used as inputs to a workload model which calculates repair bay requirements based on fleet size and shop operating hours.

Scheduled inspections and preventative maintenance is broken down into Inspections A though D and those intervals and shop times match what the Hiawatha OMF is currently experiencing. For unscheduled repairs, actual unscheduled repair data for the Hiawatha OMF was analyzed over a three month period. The work order data suggests that approximately 72 work orders are generated for each LRV each year. It is assumed that these work orders were spread evenly between a pit bay, a car hoist bay, and a bridge crane bay in the workload model. Unscheduled truck repair data for Hiawatha was also obtained and analyzed. During the same three month time period, each LRV experienced an unscheduled truck repair approximately 17 times per year and each repair took an average of 5.71 hours. All other workload model inputs were based on conversations with Metro Transit management.

Table 3-1: Shop Time and Occurrence Information by Maintenance Activity

ACTIVITY	MILES BETWEEN OCCUR	LABOR HOURS		SHOP TIME (SHIFTS / OCCUR)	BAY TYPE	FLEET SIZE
SCHEDULED INSPECTIONS		INSPECTIO	WORK-OFFS			
SAFETY INSPECTION	5,000	12	12	2.00	PIT + OH CATWALK	36
A INSPECTION	25,000	20	20	3.00	PIT + OH CATWALK	36
B INSPECTION	50,000	30	20	6.00	PIT + OH CATWALK	36
C INSPECTION	100,000	72	50	12.00	PIT + OH CATWALK	36
PREVENTATIVE MAINTENANCE						
D INSPECTION - DETRUCKING	150,000	8	0	3.00	CAR HOIST	36
D INSPECTION - COMPONENT CHANGEOUTS	150,000	112	0	12.00	BRIDGE CRANE	36
SCHEDULED TRUCK CHANGEOUTS	500,000				CAR HOIST	36
REPAIRS / PROGRAMS						
UNSCHEDULED REPAIRS				1.00	PIT + OH CATWALK	36
UNSCHEDULED REPAIRS				1.00	CAR HOIST	36
UNSCHEDULED REPAIRS				1.00	BRIDGE CRANE	36
UNSCHEDULED TRUCK CHANGEOUTS				1.00	CAR HOIST	36
PROGRAMS/CAMPAIGNS				9.00	FLAT TRACK	36
OVERHAULS	400,000			12.00	BRIDGE CRANE	36
OVERHAULS	400,000			3.00	CAR HOIST	36
BODY REPAIRS - PANELS/WINDOWS				2.00	FLAT TRACK	36

Because Metro Transit's scheduled maintenance program is mileage based, the number of repair positions required for scheduled inspections depends upon the annual mileage accumulated by each car. The existing Type I cars currently accumulate approximately 70,000 miles per car per year. Mileage projections for the SWLRT line vary from 60,000 miles/car/year to 100,000 miles/car/year. Because of this uncertainty, car spot requirements were calculated for the following operating conditions:

- Seven day, two shift operation at 60,000 miles per car per year
- Seven day, three shift operation at 60,000 miles per car per year
- Seven day, two shift operation at 100,000 miles per car per year
- Seven day, three shift operation at 100,000 miles per car per year

The car spot requirements for each of the above conditions are presented in **Table 3.2**.

Table 3-2: Car Spot Requirements by Operating Condition

	7/2/60,000		7/3/60,000		7/2/100,000		7/3/100,000	
Bay Type	**Calc**	**Provided**	**Calc**	**Provided**	**Calc**	**Provided**	**Calc**	**Provided**
Pit Position	2.84	3	1.89	2	3.95	4	2.63	3
Pit or Flat Track	0.99	1	0.66	1	0.99	1	0.66	1
Car Hoist	2.10	2	1.40	2	2.16	2	1.44	2
Bridge Crane	1.51	2	1.01	1	1.73	2	1.15	1
	7.44	8	4.96	6	8.83	9	5.88	7

Refer to Tables A-1 thru A-4 in Appendix A for the detailed calculation worksheets.

Based on the above calculations, the following vehicle repair bays will be programmed for the OMF:

- Four pit positions
- Two car hoists
- One roof-level changeout position with bridge crane

The workload model also confirmed that one to two truck repair positions would be adequate to support the minor truck repair activities envisioned for the SWLRT OMF.

To test the validity of the work bay derivation model described above, a benchmarking analysis was performed. This analysis compares the number of repair bays proposed for the new OMF with the actual number of work bays constructed at other LRT facilities in North America, as well as the number of repair positions available at Metro Transit's existing OMF. Results of this analysis indicate that the proposed number of work bays for the new OMF is slightly above the average number of bays provided per LRV at six other LRT shops using the metric of "Average LRVs per inspection and repair bay." The calculated number of bays required (seven total bays) is five LRVs per bay for the SWLRT fleet and the average for the other LRT facilities in North America is just over six LRVs per bay. This confirms that the number of bays proposed for the new OMF is consistent with LRT industry averages.

3.4.3 Shop Equipment

To support the vehicle maintenance and servicing activities planned for the SWLRT OMF, both general purpose and specialized shop equipment and material handling systems are required. Some of the major equipment items and systems required are:

- Automatic car washer with a water reclaim system
- Sand tower and dispensing system
- In-ground car hoists with integrated body support stands
- Truck turntables

- Overhead bridge cranes
- Monorails
- Truck repair stands
- Vertical lift machines (VLMs) for high density small parts storage
- Bulk and pallet storage racks for medium and large components and supplies
- General fabrication shop equipment

Space also has been set aside in the SWLRT OMF space program for the storage of portable equipment. Equipment such as forklifts, sweepers, scrubbers, and jacks will be stored in this space.

3.4.4 Staffing Estimates

Projected staffing levels for the new operations and maintenance facility by department are presented in **Table 3-3**. Staffing projections for the SWLRT OMF were derived through interviews conducted with Metro Transit senior management. These numbers are based on the existing staffing levels and include provisions for work methods that may be implemented in the future.

Table 3-3: Metro Transit Staffing by Department

Metro Transit Department	Staffing
Operations	61
Vehicle Maintenance	42
Materials Management	4
Facilities Maintenance	2
Systems Maintenance - Office/Welfare	10
Systems Maintenance - Shop/Support	44
Total	**163**

4. Space Needs Program

The Space Needs Program that follows was developed based on design team analysis and interviews with Metro Transit user groups regarding the functional requirements and operating characteristics of the proposed SWLRT OMF. This program serves as the basis of design and provides an estimation of space required. Actual building square footages may vary due to site design constraints, circulation efficiency and value added design features. The program includes the following information for each space:

- **Description**: A description of the space
- **Space Standard:** The standard for each space is based on the function, equipment, and furnishings to be accommodated. The standards are given in square feet. Where the configuration of the space is critical, dimensions are given for the space
- **Quantity**: Identifies the number of spaces to be accommodated
- **Area:** Area in square feet for the proposed space. Note that where a space standard is given, the area equals the space standard times the quantity
- **Staff:** Identifies the number of staff to be accommodated
- **Remarks:** Lists pertinent design information.
    - Ops: Operations
    - Maint: Vehicle Maintenance
    - Sys: Systems Maintenance
    - FM: Facilities Maintenance
    - Stores: Material Management

The space requirements shown for each function are net useable area. A circulation factor is applied to the total net usable area to arrive at a gross square footage requirement. In addition to circulation, the factor provides for spaces such as mechanical and electrical chases, structure and width of walls.

Following the Space Needs Program is some expanded descriptions of individual facility areas.

Space Needs Program

Space Name		Space Standard	Qty	Area	Staff	Remarks
Common Areas						
Lobby	[E]	500	1	500		Secure, system & historical displays, no receptionist required by Ops or Maint, Sys's secretary could act as site receptionist if building configuration allows it
Conference Rooms	[E]	480	2	960		24 people, 16 @ table, 70" display, white boards, video conferencing
Training Room	[E]	600	1	600		24 people @ tables, 70" display, white boards
Operations						
Training Office	[E]	200	1	200		Adj to Training Room, 2 workstations, training files
Training Storage	[E]	80	1	80		Adj to Training Office
Vehicle Maintenance						
Training Office	[E]	100	1	100		Adj to Training Room
Training Storage	[E]	80	1	80		Adj to Training Office
Systems Maintenance						
Training Office	[E]	100	1	100		Adj to Training Room
Training Storage	[E]	80	1	80		Adj to Training Office
Computer Lab	[E]	400	1	400		12 people @ PC's plus trainer station w/ room display
Vending Area	[A]	160	1	160		Centrally located and shared vending machines
Fitness Center	[E]	600	1	600		Convenient to all user groups
Special Needs Room	[E]	100	1	100		Convenient to all user groups
Drug Testing Room	[E]	140	1	140		Incl unisex restroom
Subtotal				4,100		
Circulation		40%		1,640		
Subtotal Including Circulation	(sf)			**5,740**		

Space Name		Space Standard		Qty	Area	Staff	Remarks
Operations - Office/Welfare							
Waiting Area	[O]		200	1	200		Chairs
Asst Transportation Manager	[E]		168	1	168	1	Fax machine
Asst Operations Manager	[E]		168	1	168	1	
Safety Officer	[E]		168	1	168	1	Incl gear storage
Swing Offices	[E]		168	2	336		Site visitor work areas
Rail Supervisor Office	[E]		320	1	320	6	3 workstations in shared office
Rail Supv Gear/Storage	[E]		180	1	180		Adj to Rail Supv Office, 8-24"x18" lockers, signs, equip
Conference Room	[E]		200	1	200		8 people, video conferencing
Copy/File Area	[A]		200	1	200		Incl office supplies
Ready Room	[O]		600	1	600		2 HASTUS workstations w/ printer, 70" HASTUS display, mailboxes, union boards, 8 people @ tables, area for possible future dispatch workstation
Quiet Room	[E]		200	1	200		5 recliners
Break Room	[E]		500	1	500		20 people, kitchenette, could share w/ other groups if convenient
Restroom/Shower - Men	[E]		420	1	420		Incl 2 showers
Restroom/Shower - Women	[E]		420	1	420		Incl 2 showers
Locker Area	[A]		520	1	520		Adj to restrooms, 80 full-length lockers
Custodial Closet	[E]		80	1	80		
Operators						52	
Subtotal					4,680		
Circulation			40%		1,872		
Subtotal Including Circulation	(sf)				**6,552**	**61**	

Operations - Veh/Equip Storage							
LRV's	[E]	16.5 x 100	1,650	30	49,500		Alternating 14' & 19' track spacing w/ access aisles, heated to 50F, detail cleaning done monthly
Subtotal					49,500		
Circulation			10%		4,950		
Subtotal Including Circulation	(sf)				**54,450**		

Space Name			Space Standard	Qty	Area	Staff	Remarks
Vehicle Maintenance - Office/Welfare							
Waiting Area	[O]		200	1	200		Chairs
Maintenance Manager	[E]		224	1	224	1	
Maintenance Supervisor	[E]		120	1	120	1	
QA Supervisor	[E]		120	1	120	1	
Maintenance Scheduler	[O]		100	1	100	1	
Maintenance Clerk	[O]		100	1	100	1	
Conference Room	[E]		200	1	200		8 people, video conferencing
Copy/File Area	[A]		200	1	200		Incl office supplies
Maintenance Office	[E]		240	1	240	3	Adj to shop floor, workstation for 2, files, side chairs
Break Room	[E]		600	1	600		24 people, kitchenette, could share w/ other groups if convenient
Restroom/Shower/Locker - Men	[E]		720	1	720		50 full-length & 50 half-length lockers, 2 showers
Restroom/Shower/Locker - Women	[E}		600	1	600		25 full-length & 25 half-length lockers, 2 showers
Laundry Lockers	[A]		100	1	100		Near restrooms, laundry service provided
Custodial Room	[E]		200	1	200	1	Main custodial room
Gear Room	[E]		400	1	400		Adj to shop floor, good ventilation, gear on hooks/bars
Mechanics						21	
Helpers						12	
Subtotal					4,124		
Circulation			40%		1,650		
Subtotal Including Circulation	(sf)				**5,774**	**42**	

Space Name		Space Standard		Qty	Area	Staff	Remarks
Vehicle Maintenance - Track Area							
S&I Tracks	[O]	26 x 124	3,224	4	12,896		Double pit/platform configuration, 2T monorail, OCS
CCO Tracks	[O]	26 x 124	3,224	2	6,448		In-ground lifts, OCS interlocked w/ lifts
Unscheduled Maintenance Track	[O]	26 x 124	3,224	1	3,224		Pit/platform configuration, 7.5T bridge crane, no OCS
Mezzanine Work Platform	[O]	16 x 100	1,600	1	1,600		Adj to Unscheduled Maintenance Track
Component Work Area	[O]		3,200	1	3,200		7.5T bridge crane, incl flatbed truck loading area
Rail Truck Storage	[O]	12 x 100	1,200	1	1,200		7.5T bridge crane, 8 trucks total stacked 2 high
Equipment Storage	[O]		1,200	1	1,200		Forklifts, sweeper, scrubber, jacks, etc.
Sanding Track	[E]	25 x 320	8,000	1	8,000		Sanding & fluid dispensers to service 3-car train in place
Train Wash	[E]	25 x 200	5,000	1	5,000		Brush type drive-thru, heated exterior exit pad, wash approx 3 times weekly
Wash Support	[E]		1,200	1	1,200		Adj to Train Wash; tanks, pumps, detergent, etc.
Subtotal					43,968		
Circulation			10%		4,397		
Subtotal Including Circulation	(sf)				**48,365**		

Vehicle Maintenance - Shop/Support							
Truck Wash	[E]	25 x 25	625	1	625		Ventilated
Machine Shop	[O]		1,000	1	1,000		Adj to shop floor, lathe, mill, horz band saw, 50T press, drill press, blast cabinet, B/G, parts tank
Welding Shop	[E]		500	1	500		Exhaust arm, welding table, welders
Tool Crib	[E]		200	1	200		Foreman controlled
Lube Room	[E]		200	1	200		Drums stored on containment pallets
Detail Cleaning Storage	[E]		400	1	400		Adj to LRV storage
Compactor	[C]	10 x 20	200	1	200		Convenient vendor truck access
Compressor Room	[E]		400	1	400		
DC Power Room	[E]		600	1	600		Auxiliary power for maintenance tracks
Building Systems	[E]		2,000	1	2,000		Mech, elec, plumb & telecomm rooms
Subtotal					6,125		
Circulation			25%		1,531		
Subtotal Including Circulation	(sf)				**7,656**		

Space Name		Space Standard		Qty	Area	Staff	Remarks
Materials Management							
Parts Office	[E]		200	1	200	1	2 shared workstations
Parts Counter	[O]		160	1	160	3	Incl stockkeeper workstation
Restroom - Unisex	[E]		60	1	60		
Parts Storeroom	[E]						22' clearance, 300 pallets, 68 bulk, 147 shelves
Rack Storage	[O]		7,200	1	7,200		Pallet racks, bulk racks, VLM's, FMC's
Floor Storage	[O]		1,600	1	1,600		Spools, A/C units, CPCU's, pantographs, tires, etc.
Shipping/Receiving	[O]		1,600	1	1,600		Below grade dock, stockkeeper workstation
Sally Port	[E]	16 x 36	576	1	576		Adj to Shipping/Receiving, below grade dock w/ leveler
Subtotal					11,396		
Circulation			10%		1,140		
Subtotal Including Circulation	(sf)				**12,536**	**4**	

Facilities Maintenance							
FM Office	[E]		200	1	200	2	Adj to FM Shop, workstation, files, gear lockers
FM Shop	[E]		1,800	1	1,800		Pallet racks, workbenches, attic stock, working stock, platform lift, mowers, snowblowers, attachments, pickup truck (during inclement weather)
FM Vehicle Storage	[E]	16 x 40	640	1	640		Salt dump truck, isolated area
Subtotal					2,640		
Circulation			10%		264		
Subtotal Including Circulation	(sf)				**2,904**	**2**	

Space Name			Space Standard	Qty	Area	Staff	Remarks
Systems Maintenance - Office/Welfare							
Reception	[O]		300	1	300	1	Reception counter for Secretary, waiting area
Asst Managers	[E]		168	4	672	4	Track, power, signals, comm
Supervisors	[E]		120	4	480	4	Track, power, signals, comm
QA/Training Office	[E]		120	1	120	1	
Swing Office	[E]		120	1	120		
Conference Room	[E]		200	1	200		8 people, video conferencing
Copy/File Area	[A]		200	1	200		Incl office supplies
Reference Library	[E]		200	1	200		
Break Room	[E]		600	1	600		24 people, kitchenette, could share w/ Maint
Restroom/Shower/Locker - Men	[E]		680	1	680		60 full-length 2 showers, could share w/ Maint
Restroom/Shower/Locker - Women	[E}		560	1	560		30 full-length 2 showers, could share w/ Maint
Custodial Closet	[E]		80	1	80		
Gear Room	[E]		800	1	800		50-36"x24" lockers, washer/dryer, sink
Subtotal					5,012		
Circulation			40%		2,005		
Subtotal Including Circulation	(sf)				**7,017**	**10**	

Space Name		Space Standard		Qty	Area	Staff	Remarks
Systems Maintenance - Shop/Support							
Track Shop	[E]		600	1	600	10	Foreman workstation, 2 computer decks
Tool Room	[E]		200	1	200		
Power Shop	[E]		600	1	600	10	Foreman workstation, 2 computer decks
Tool Room	[E]		200	1	200		
Signal Shop	[E]		600	1	600	18	Foreman workstation, 2 computer decks
Tool Room	[E]		200	1	200		
Comm Shop	[E]		600	1	600	6	Foreman workstation, 2 computer decks, office type environment, ESD flooring
Tool Room	[E]		200	1	200		
Truck Wash	[E]	16 x 40	640	1	640		1T bridge crane for truck loading, isolated area
Subtotal					3,840		
Circulation			25%		960		
Subtotal Including Circulation	(sf)				**4,800**	**44**	

Systems Maintenance - Veh/Equip Storage							
Specialty Vehicle Storage		12 x 40	480	8	3,840		Crane truck, boom trucks(2), platform truck, dump truck, loader, bobcat w/ trailer, generator trailers(2), compressor trailer, attachments, pallet racks
Subtotal					3,840		
Circulation			10%		384		
Subtotal Including Circulation	(sf)				**4,224**		

Space Name	Space Standard		Qty	Area	Staff	Remarks
Total Building(s) Area (30 Car Storage Barn)			(sf)	**160,018**	**163**	

Space Name		Space Standard		Qty	Area	Staff	Remarks
Operations - Veh/Equip Storage - Future							
LRV's	[E]	16.5 x 100	1,650	6	9,900		Alternating 14' & 19' track spacing w/ access aisles, heated to 50F, detail cleaning done monthly
Subtotal					9,900		
Circulation			10%		990		
Subtotal Including Circulation	(sf)				**10,890**		

Space Name	Space Standard		Qty	Area	Staff	Remarks
Total Building(s) Area (36 Car Storage Barn)			(sf)	**170,908**	**1**	

Exterior Areas							
Vehicle Parking	[X]						
Visitor	[X]	10 x 20	200	8	1,600		
Employee	[X]	10 x 20	200	100	20,000		
NRV's	[X]	10 x 20	200	16	3,200		Ops(3), Maint(1), Stores(1), FM(1), Sys(8), pool(2)
Trash/Recycling Area	[X]	30 x 10	300	1	300		Convenient vendor truck access
Sand Silo	[X]	12 x 12	144	1	144		Convenient vendor truck access
Yard Storage	[C]		3,500	1	3,500		12' deep canopy storage along building, 2/3 for Stores & 1/3 for Sys, ties, rail, poles, switch points, crossing gates, transformers
Emergency Generator	[X]	16 x 24	384	1	384		Self-enclosed unit
Relief Platform	[X]						To be determined
TPSS	[X]						Stand alone structure, to be determined
TCR	[X]						Stand alone structure, to be determined

4.1 Area Descriptions

4.1.1 Common Areas

Common areas are spaces that will be shared by various user groups as building layouts will allow. The intent is to have one central building lobby to be used by all users and visitors. This lobby will be secured through the use of key cards. If the building layout allows, Systems Maintenance's secretary could serve as the site's receptionist for all facility user groups. The lobby should be suitably outfitted with displays illustrating the rail system and rail oriented historical pictures.

Conference rooms and the training room shall be shared by domicile user groups. These rooms shall be outfitted with large video displays suitable for video conferencing and presentations. Operations, Vehicle Maintenance and Systems Maintenance will require training offices and training storage adjacent to the training room to support ongoing training activities. A computer lab shall also be provided to serve individual and group computer training needs. At the front of the computer lab, a workstation shall be provided for the trainer to control a large video monitor for instructing classes.

A vending area shall be provided for the facilities' staff. This area shall be centrally located within the facility for convenient access to the various break rooms. A fitness center shall be provided to serve all facility staff members. This area shall also be centrally located within the facility for convenient access to all and will be outfitted with cardio and strength conditioning equipment and adequate area for floor activities. A special needs room and drug testing room shall also be provided for facility staff common use.

4.1.2 Operations

The SWLRT OMF shall have office and crew areas to serve LRT operators and office staff. The main activities that will be performed in these areas are LRT operator reporting, operator assignment distribution, operator readiness, operator layover, field supervisor coordination and managerial and office staff administrative duties. Although LRT dispatching activities will be performed from the central RCC at Hiawatha, the ready room shall be adequately sized to accommodate a possible future workstation for a rail dispatcher. The ready room shall also be equipped with two HASTUS workstations with large video display for operator reporting, mailboxes for all operators, union and informational boards and tables and chairs.

In addition to the ready room, a quiet room and break room shall be provided for operator down time and employee breaks. The quiet room shall be outfitted with recliners for operator relaxation between service runs and the break room will be outfitted with a counter/sink area, microwaves, refrigerator and tables and chairs for operators and office staff. The operator locker area will be located outside the restrooms and shall be outfitted with a full-length locker for all operators assigned to the facility.

The storage tracks for the LRVs shall be enclosed and heated to a nominal temperature of 50 degrees. The tracks shall be ballasted with paved personnel and cart egress paths at the end of, and between,

train consists. Daily interior cleaning will be performed on the LRV storage tracks nightly. All storage tracks shall be outfitted with catenary power lines and bi-fold doors at each end of the structure.

4.1.3 Vehicle Maintenance

The SWLRT OMF shall have office, crew and shop areas to support vehicle maintenance activities and support staff. LRV maintenance activities shall include service and inspection, component changeouts, unscheduled repairs, sanding and exterior and interior cleaning as described in Sections 3.1 and 3.4. Almost all overhaul, paint and body and component rebuilding activities will continue to be performed at the Hiawatha OMF. Some simple truck rebuild activities will be performed at the SWLRT OMF with more complex truck servicing being done at the Hiawatha facility. Typical operations will transport trucks needing servicing and trucks ready for service back and forth from Hiawatha via flatbed highway vehicles. Wheel truing activities will be performed at either the Central Corridor or Hiawatha OMF.

The Maintenance Office shall be located adjacent to the maintenance tracks for convenient access of first line supervisors to the shop floor. The break room and restroom/shower/locker rooms can be located off the first floor of the facility, but still need to be conveniently accessible from the shop floor. Each mechanic and service worker requires one full-length and one half-length locker. If the main mechanic restrooms are located off the first floor, convenience restrooms will need to be provided at maintenance track level. A laundry lockers area needs to be provided for maintenance personnel. This area should be near the main mechanic restrooms and readily accessible for the outside laundry service vendor. A gear room shall be provided at track level and will be used for the storage of mechanic and service worker inclement weather gear.

The S&I Tracks will primarily be used for LRV scheduled service and inspection maintenance activities. These tracks will be configured with a pit level for undercar servicing and a LRV roof platform level for top-of-car servicing. The S&I tracks shall be arranged in parallel pairs of LRV service positions. One side of the LRV will be accessed from top-of-rail (TOR) via gangway for interior vehicle work. The other side of the vehicle will be accessed from pit level for undercar work. The roof platforms will flank the top of cars, allowing mechanics to work on the roofs of the vehicles without utilizing fall protection. A material lift shall be provided to allow the movement of materials and toolboxes from the shop floor level to the pit and the platform levels. Each S&I track will be outfitted with catenary power that can be individually controlled.

The component changeout (CCO) tracks will be primarily used for the replacement of undercar components, mainly trucks. Each of the vehicle repair positions shall be outfitted with C-frame hoists and catenary power; these two items will require an electrical interlocking system. No vehicle rooftop access platforms will be provided on the CCO tracks. The unscheduled maintenance track will be primary used for unscheduled vehicle repairs and replacement of vehicle rooftop components. This posted-rail track shall be outfitted with rooftop platforms and an overhead bridge crane capable of lifting a truck. The overhead bridge crane shall be capable of traversing over the component work area and rail truck

storage, allowing for the movement of heavy components and the loading of trucks onto, and off of, highway flatbed vehicles.

LRV sand boxes will be filled by use of a central sanding system on the sanding track. This interior area will immediately precede the train wash in the daily vehicle service cycle. Both the sanding track and the train wash will be equipped with catenary power. The train washer will be a drive-thru brush type system with a water stripper and water reclamation.

To aid in LRV maintenance activities, a few support shops will be provided at the SWLRT OMF. A truck wash, outfitted with a power washer, shall be provided to clean trucks and other vehicle components before servicing. A machine shop shall also be provided to house general fabrication equipment used in vehicle maintenance activities. To prevent the migration of fumes and dust into other shop areas a welding shop shall be provided. This shop shall be equipped with welders, a welding table and an overhead exhaust system. To support interior vehicle cleaning activities, a detail cleaning storage area shall be provided and be equipped with a trash compactor. This storage area will need to be adjacent to the interior vehicle storage tracks.

4.1.4 Materials Management

The majority of Type II car parts will be stored at the SWLRT OMF. The parts storeroom at the Central Corridor OMF is small and will only be capable of storing a limited amount of commonly used vehicle parts. In addition to the vehicle parts, the SWLRT OMF's parts storeroom will be required to store material for Systems Maintenance. The parts storeroom requires high vertical clearance of 22 feet to efficiently utilize pallets racks. The parts storeroom also will include vertical lift modules (VLMs) to store small parts and bulk storage units to store medium sized parts. The shipping/receiving area of the parts storeroom shall have a below grade loading dock equipped with a dock leveler and an at-grade dock for delivery trucks. Adjacent to the shipping/receiving area shall be the sally port. This enclosed vehicle docking area will be used for the continual loading of internal delivery trucks during the day for overnight deliveries to other Metro facilities. This below grade docking area also will be equipped a dock lever.

4.1.5 Facilities Maintenance

For the servicing of SWLRT OMF facilities, Facilities Maintenance (FM) will be provided with shop, storage and office areas on site. The FM Office shall be large enough for an office workstation, filing cabinets and gear lockers. This office shall be adjacent to the FM shop. The FM shop shall be outfitted with an area for bench work and pallet racks for the storage of building supplies and attic stock. This shop area shall also include ample area for the storage of several facilities and ground servicing equipment. FM vehicle storage shall be provided on site for the enclosed heated storage of a salt spreading truck.

4.1.6 Systems Maintenance

To service the new SWLRT line, Systems Maintenance will require office/crew, support shop, service vehicle storage and material storage areas at the SWLRT OMF. All of Systems Maintenance's departments will have a presence at the facility, except Technical Services. Systems Maintenance will have frequent visitors/vendors to the site and require a reception area. If the building layout allows, this reception area could serve all the user groups within the SWLRT OMF. Also, if the layout of the OMF allows, the break room and restroom/shower/locker areas could be shared with Vehicle Maintenance. Each service worker requires one full-length locker.

Although most work is done in the field by Track, Power and Signal, a dedicated shop area is required by each of these departments. The track shop, power shop and signal shop will be used for the crew coordination and light fabrication activities. Each shop will contain a foreman workstation, two crew work order processing workstations, workbenches and storage units. Each of these shops will have an associated tool room for the secure storage of work gear and equipment. A communications shop is required for the testing and repairing of electrical components. This shop will be an office type environment with ESD flooring and workbenches. In addition, this area requires a foreman workstation and two crew work order processing workstations and an adjacent tool room.

To clean the exteriors of service trucks, a truck wash will be provided on site. This enclosed heated area will be equipped with a power washer and a 1-ton suspended bridge crane for the convenient loading of service trucks. To protect weather sensitive vehicles and equipment an enclosed heated garage area will be provided. This *Specialty Vehicle Storage* area also will be outfitted with pallet racks for the storage of working stock

APPENDIX A

DETAILED CAR SPOT CALCULATION WORKSHEETS

SOUTHWEST
Green Line LRT Extension

Table A-1

7 day 2 shift operation at 60,000 miles per car per year

									FACILITY = >	SOUTHWEST								
									FLEET SIZE = >	36								
ACTIVITY	MILES BETWEEN OCCUR	OCCUR / LRV / YR	WORK DAY / WORK SHIFT	SHIFT PERFORMED	LABOR HOURS		SHOP TIME (SHIFTS / OCCUR)	BAY TYPE	FLEET SIZE	TOTAL OCCUR / YR	SHIFTS / LRV / YR	TOTAL SHIFTS / YR	SHIFTS / BAY / YR	SHOP SPOTS REQUIRED	SHOP SPOTS CALCULATED	SHOP SPOTS PROVIDED	COMMENTS
SCHEDULED INSPECTIONS					INSPECTION	WORK-OFFS											
SAFETY INSPECTION	5,000	9.60	7/2	ALL	12	12	2.00	PIT + OH CATWALK	36	345.6	19.2	691.2	730	0.95	2.84	3	
A INSPECTION	25,000	1.20	7/2	ALL	20	20	3.00	PIT + OH CATWALK	36	43.2	3.6	129.6	730	0.18			2-3 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
B INSPECTION	50,000	0.60	7/2	ALL	30	20	6.00	PIT + OH CATWALK	36	21.6	3.6	129.6	730	0.18			4-6 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
C INSPECTION	100,000	0.60	7/2	ALL	72	50	12.00	PIT + OH CATWALK	36	21.6	7.2	259.2	730	0.36			9-12 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
PREVENTATIVE MAINTENANCE																	
D INSPECTION - DETRUCKING	150,000	0.40	7/2	ALL	8	0	3.00	CAR HOIST	36	14.40	1.20	43.20	730	0.06	2.10	2	1 DAY TO REMOVE & REPLACE TRUCKS
D INSPECTION - COMPONENT CHANGEOUTS	150,000	0.40	7/2	ALL	112	0	12.00	BRIDGE CRANE	36	14.40	4.80	172.80	730	0.24	1.51	2	4 DAYS FOR OTHER CHANGEOUT WORK
SCHEDULED TRUCK CHANGEOUTS	500,000		7/2	ALL				CAR HOIST	36								PERFORMED AS PART OF D INSPECTION
REPAIRS / PROGRAMS																	
UNSCHEDULED REPAIRS		24.00	7/2	ALL			1.00	PIT + OH CATWALK	36	864	24.00	864	730	1.18			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED REPAIRS		24.00	7/2	ALL			1.00	CAR HOIST	36	864	24.00	864	730	1.18			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED REPAIRS		24.00	7/2	ALL			1.00	BRIDGE CRANE	36	864	24.00	864	730	1.18			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED TRUCK CHANGEOUTS		17.00	7/2	ALL			1.00	CAR HOIST	36	612.00	17.00	612.00	730	0.84			FOR TIRE CHANGE, CAMPAIGNS AND OTHER EVENTS
PROGRAMS/CAMPAIGNS		2.00	7/2	ALL			9.00	FLAT TRACK	36	72	18	648	730	0.89	0.99	1	2-4 NON-TRUCK PROGRAM REPAIRS PER YEAR
OVERHAULS	400,000	0.15	7/2	ALL			12.00	BRIDGE CRANE	36	5.4	1.8	64.8	730	0.09			PRIMARILY PERFORMED AT HIAWATHA
OVERHAULS	400,000	0.15	7/2	ALL			3.00	CAR HOIST	36	5.4	0.45	16.2	730	0.02			PRIMARILY PERFORMED AT HIAWATHA
BODY REPAIRS - PANELS/WINDOWS		1.00	7/2	ALL			2.00	FLAT TRACK	36	36	2	72	730	0.10			
														TOTAL BAYS	7.44	8	

ASSUMPTIONS:
1. 60,000 MILES / LRV / YR
2. TIRE LIFE IS 250,000 MILES FOR POWERED TRUCKS AND 100,000 MILES FOR TRAILER
3. SOUTHWEST OMF WILL BE STAFFED SIMILAR TO HIAWATHA OMF
4. SHOP WILL OPERATE 2 SHIFTS PER DAY
5. PROVIDE MINIMUM OF TWO TRUCK REPAIR POSITIONS (ASSUMING 5/1 TRUCK REPAIRS)
6. 1/2 OF ALL CAMPAIGN WORK INVOLVES TRUCK HOIST (2 OF 4 EVENTS)

Table A-2

7 day, 3 shift operation at 60,000 miles per car per year

								FACILITY = >	SOUTHWEST								
								FLEET SIZE = >	36								
ACTIVITY	MILES BETWEEN OCCUR	OCCUR / LRV / YR	WORK DAY / WORK SHIFT	SHIFT PERFORMED	LABOR HOURS		SHOP TIME (SHIFTS / OCCUR)	BAY TYPE	FLEET SIZE	TOTAL OCCUR / YR	SHIFTS / LRV / YR	TOTAL SHIFTS / YR	SHIFTS / BAY / YR	SHOP SPOTS REQUIRED	SHOP SPOTS CALCULATED	SHOP SPOTS PROVIDED	COMMENTS
SCHEDULED INSPECTIONS					INSPECTION	WORK-OFFS											
SAFETY INSPECTION	5,000	9.60	7/3	ALL	12	12	2.00	PIT + OH CATWALK	36	345.6	19.2	691.2	1095	0.63	1.89	2	
A INSPECTION	25,000	1.20	7/3	ALL	20	20	3.00	PIT + OH CATWALK	36	43.2	3.6	129.6	1095	0.12			2-3 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
B INSPECTION	50,000	0.60	7/3	ALL	30	20	6.00	PIT + OH CATWALK	36	21.6	3.6	129.6	1095	0.12			4-6 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
C INSPECTION	100,000	0.60	7/3	ALL	72	50	12.00	PIT + OH CATWALK	36	21.6	7.2	259.2	1095	0.24			9-12 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
PREVENTATIVE MAINTENANCE																	
D INSPECTION - DETRUCKING	150,000	0.40	7/3	ALL	8	0	3.00	CAR HOIST	36	14.40	1.20	43.20	1095	0.04	1.40	2	1 DAY TO REMOVE & REPLACE TRUCKS
D INSPECTION - COMPONENT CHANGEOUTS	150,000	0.40	7/3	ALL	112	0	12.00	BRIDGE CRANE	36	14.40	4.80	172.80	1095	0.16	1.01	1	4 DAYS FOR OTHER CHANGEOUT WORK
SCHEDULED TRUCK CHANGEOUTS	500,000		7/3	ALL				CAR HOIST	36								PERFORMED AS PART OF D INSPECTION
REPAIRS / PROGRAMS																	
UNSCHEDULED REPAIRS		24.00	7/3	ALL			1.00	PIT + OH CATWALK	36	864	24.00	864	1095	0.79			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED REPAIRS		24.00	7/3	ALL			1.00	CAR HOIST	36	864	24.00	864	1095	0.79			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED REPAIRS		24.00	7/3	ALL			1.00	BRIDGE CRANE	36	864	24.00	864	1095	0.79			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED TRUCK CHANGEOUTS		17.00	7/3	ALL			1.00	CAR HOIST	36	612.00	17.00	612.00	1095	0.56			FOR TIRE CHANGE, CAMPAIGNS AND OTHER EVENTS
PROGRAMS/CAMPAIGNS		2.00	7/3	ALL			9.00	FLAT TRACK	36	72	18	648	1095	0.59	0.66	1	2-4 NON-TRUCK PROGRAM REPAIRS PER YEAR
OVERHAULS	400,000	0.15	7/3	ALL			12.00	BRIDGE CRANE	36	5.4	1.8	64.8	1095	0.06			PRIMARILY PERFORMED AT HIAWATHA
OVERHAULS	400,000	0.15	7/3	ALL			3.00	CAR HOIST	36	5.4	0.45	16.2	1095	0.01			PRIMARILY PERFORMED AT HIAWATHA
BODY REPAIRS - PANELS/WINDOWS		1.00	7/3	ALL			2.00	FLAT TRACK	36	36	2	72	1095	0.07			
														TOTAL BAYS	4.96	6	

ASSUMPTIONS:
1. 60,000 MILES / LRV / YR
2. TIRE LIFE IS 250,000 MILES FOR POWERED TRUCKS AND 100,000 MILES FOR TRAILER
3. SOUTHWEST OMF WILL BE STAFFED SIMILAR TO HIAWATHA OMF
4. SHOP WILL OPERATE 3 SHIFTS PER DAY
5. PROVIDE MINIMUM OF TWO TRUCK REPAIR POSITIONS (ASSUMING 5/1 TRUCK REPAIRS)
6. 1/2 OF ALL CAMPAIGN WORK INVOLVES TRUCK HOIST (2 OF 4 EVENTS)

Table A-3

7 day, 2 shift operation at 100,000 miles per car per year

								FACILITY = >	SOUTHWEST								
								FLEET SIZE = >	36								
ACTIVITY	MILES BETWEEN OCCUR	OCCUR / LRV / YR	WORK DAY / WORK SHIFT	SHIFT PERFORMED	LABOR HOURS		SHOP TIME (SHIFTS / OCCUR)	BAY TYPE	FLEET SIZE	TOTAL OCCUR / YR	SHIFTS / LRV / YR	TOTAL SHIFTS / YR	SHIFTS / BAY / YR	SHOP SPOTS REQUIRED	SHOP SPOTS CALCULATED	SHOP SPOTS PROVIDED	COMMENTS
SCHEDULED INSPECTIONS					INSPECTION	WORK-OFFS											
SAFETY INSPECTION	5,000	16.00	7/2	ALL	12	12	2.00	PIT + OH CATWALK	36	576	32	1152	730	1.58	3.95	4	
A INSPECTION	25,000	2.00	7/2	ALL	20	20	3.00	PIT + OH CATWALK	36	72	6	216	730	0.30			2-3 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
B INSPECTION	50,000	1.00	7/2	ALL	30	20	6.00	PIT + OH CATWALK	36	36	6	216	730	0.30			4-6 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
C INSPECTION	100,000	1.00	7/2	ALL	72	50	12.00	PIT + OH CATWALK	36	36	12	432	730	0.59			9-12 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
PREVENTATIVE MAINTENANCE																	
D INSPECTION - DETRUCKING	150,000	0.67	7/2	ALL	8	0	3.00	CAR HOIST	36	24.00	2.00	72.00	730	0.10	2.16	2	1 DAY TO REMOVE & REPLACE TRUCKS
D INSPECTION - COMPONENT CHANGEOUTS	150,000	0.67	7/2	ALL	112	0	12.00	BRIDGE CRANE	36	24.00	8.00	288.00	730	0.39	1.73	2	4 DAYS FOR OTHER CHANGEOUT WORK
SCHEDULED TRUCK CHANGEOUTS	500,000		7/2	ALL				CAR HOIST	36								PERFORMED AS PART OF D INSPECTION
REPAIRS / PROGRAMS																	
UNSCHEDULED REPAIRS		24.00	7/2	ALL			1.00	PIT + OH CATWALK	36	864	24.00	864	730	1.18			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED REPAIRS		24.00	7/2	ALL			1.00	CAR HOIST	36	864	24.00	864	730	1.18			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED REPAIRS		24.00	7/2	ALL			1.00	BRIDGE CRANE	36	864	24.00	864	730	1.18			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED TRUCK CHANGEOUTS		17.00	7/2	ALL			1.00	CAR HOIST	36	612.00	17.00	612.00	730	0.84			FOR TIRE CHANGE, CAMPAIGNS AND OTHER EVENTS
PROGRAMS/CAMPAIGNS		2.00	7/2	ALL			9.00	FLAT TRACK	36	72	18	648	730	0.89	0.99	1	2-4 NON-TRUCK PROGRAM REPAIRS PER YEAR
OVERHAULS	400,000	0.25	7/2	ALL			12.00	BRIDGE CRANE	36	9	3	108	730	0.15			PRIMARILY PERFORMED AT HIAWATHA
OVERHAULS	400,000	0.25	7/2	ALL			3.00	CAR HOIST	36	9	0.75	27	730	0.04			PRIMARILY PERFORMED AT HIAWATHA
BODY REPAIRS - PANELS/WINDOWS		1.00	7/2	ALL			2.00	FLAT TRACK	36	36	2	72	730	0.10			
														TOTAL BAYS	8.82	9	

ASSUMPTIONS:
1. 100,000 MILES / LRV / YR
2. TIRE LIFE IS 250,000 MILES FOR POWERED TRUCKS AND 100,000 MILES FOR TRAILER
3. SOUTHWEST OMF WILL BE STAFFED SIMILAR TO HIAWATHA OMF
4. SHOP WILL OPERATE 2 SHIFTS PER DAY
5. PROVIDE MINIMUM OF TWO TRUCK REPAIR POSITIONS (ASSUMING 5/1 TRUCK REPAIRS)
6. 1/2 OF ALL CAMPAIGN WORK INVOLVES TRUCK HOIST (2 OF 4 EVENTS)

SOUTHWEST
Green Line LRT Extension

Table A-4

7 day, 3 shift operation at 100,000 miles per car per year

								FACILITY = >	SOUTHWEST								
								FLEET SIZE = >	36								
ACTIVITY	MILES BETWEEN OCCUR	OCCUR / LRV / YR	WORK DAY / WORK SHIFT	SHIFT PERFORMED	LABOR HOURS		SHOP TIME (SHIFTS / OCCUR)	BAY TYPE	FLEET SIZE	TOTAL OCCUR / YR	SHIFTS / LRV / YR	TOTAL SHIFTS / YR	SHIFTS / BAY / YR	SHOP SPOTS REQUIRED	SHOP SPOTS CALCULATED	SHOP SPOTS PROVIDED	COMMENTS
SCHEDULED INSPECTIONS					INSPECTION	WORK-OFFS											
SAFETY INSPECTION	5,000	16.00	7/3	ALL	12	12	2.00	PIT + OH CATWALK	36	576	32	1152	1095	1.05	2.63	3	
A INSPECTION	25,000	2.00	7/3	ALL	20	20	3.00	PIT + OH CATWALK	36	72	6	216	1095	0.20			2-3 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
B INSPECTION	50,000	1.00	7/3	ALL	30	20	6.00	PIT + OH CATWALK	36	36	6	216	1095	0.20			4-6 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
C INSPECTION	100,000	1.00	7/3	ALL	72	50	12.00	PIT + OH CATWALK	36	36	12	432	1095	0.39			9-12 SHIFTS PER EVENT DEPENDING ON WORK-OFFS
PREVENTATIVE MAINTENANCE																	
D INSPECTION - DETRUCKING	150,000	0.67	7/3	ALL	8	0	3.00	CAR HOIST	36	24.00	2.00	72.00	1095	0.07	1.44	2	1 DAY TO REMOVE & REPLACE TRUCKS
D INSPECTION - COMPONENT CHANGEOUTS	150,000	0.67	7/3	ALL	112	0	12.00	BRIDGE CRANE	36	24.00	8.00	288.00	1095	0.26	1.15	1	4 DAYS FOR OTHER CHANGEOUT WORK
SCHEDULED TRUCK CHANGEOUTS	500,000		7/3	ALL				CAR HOIST	36								PERFORMED AS PART OF D INSPECTION
REPAIRS / PROGRAMS																	
UNSCHEDULED REPAIRS		24.00	7/3	ALL			1.00	PIT + OH CATWALK	36	864	24.00	864	1095	0.79			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED REPAIRS		24.00	7/3	ALL			1.00	CAR HOIST	36	864	24.00	864	1095	0.79			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED REPAIRS		24.00	7/3	ALL			1.00	BRIDGE CRANE	36	864	24.00	864	1095	0.79			72 WORK ORDER PER LRV PER YEAR
UNSCHEDULED TRUCK CHANGEOUTS		17.00	7/3	ALL			1.00	CAR HOIST	36	612	17.00	612.00	1095	0.56			FOR TIRE CHANGE, CAMPAIGNS AND OTHER EVENTS
PROGRAMS/CAMPAIGNS		2.00	7/3	ALL			9.00	FLAT TRACK	36	72	18	648	1095	0.59	0.66	1	2-4 NON-TRUCK PROGRAM REPAIRS PER YEAR
OVERHAULS	400,000	0.25	7/3	ALL			12.00	BRIDGE CRANE	36	9	3	108	1095	0.10			PRIMARILY PERFORMED AT HIAWATHA
OVERHAULS	400,000	0.25	7/3	ALL			3.00	CAR HOIST	36	9	0.75	27	1095	0.02			PRIMARILY PERFORMED AT HIAWATHA
BODY REPAIRS - PANELS/WINDOWS		1.00	7/3	ALL			2.00	FLAT TRACK	36	36	2	72	1095	0.07			
														TOTAL BAYS	5.88	7	

ASSUMPTIONS:
1. 100,000 MILES / LRV / YR
2. TIRE LIFE IS 250,000 MILES FOR POWERED TRUCKS AND 100,000 MILES FOR
3. SOUTHWEST OMF WILL BE STAFFED SIMILAR TO HIAWATHA OMF
4. SHOP WILL OPERATE 3 SHIFTS PER DAY
5. PROVIDE MINIMUM OF TWO TRUCK REPAIR POSITIONS (ASSUMING 5/1 TRUCK REPAIRS)
6. 1/2 OF ALL CAMPAIGN WORK INVOLVES TRUCK HOIST (2 OF 4 EVENTS)