Maryland Parkway
High Capacity Transit Project

Air Quality
Technical Memorandum

Prepared by:

PARSONS

April 2018

Prepared for:

Federal Transit Administration
U.S. Department of Transportation

and

Regional Transportation Commission of
Southern Nevada

This page left intentionally blank.

Table of Contents

List of Figures

List of Tables

Acronyms

BRT	Bus Rapid Transit
CAA	Clean Air Act
CFR	Code of Federal Regulations
CNG	compressed natural gas
CO	carbon monoxide
EA	Environmental Assessment
FTA	Federal Transit Administration
LRT	light rail transit
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Protection Act
NOx	oxides of nitorgen (mostly NO and NO^2)
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
PM_{10}	particulate matter 10 microns or less in diameter
ppb	parts per billion
ppm	parts per million
RTC	Regional Transportation Commission of Southern Nevada
TCP	Transportation Conformity Plan
TSP	Transit Signal Priority
UNLV	University of Nevada Las Vegas
USC	United States Code
USEPA	United States Environmental Protection Agency
VOC	volatile organic compounds

1.0 INTRODUCTION

The Clean Air Act (CAA) requires that, in areas experiencing air quality problems, transportation planning must be consistent with air quality goals. This is determined through the transportation conformity process. These laws, and related regulations by the USEPA, the State of Nevada, and the Clark County Department of Air Quality and Environmental Management, set standards for the concentration of pollutants in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS). NAAQS and state ambient air quality standards have been established for six transportation-related criteria pollutants that have been linked to potential health concerns: carbon monoxide (CO); nitrogen dioxide (NOx); ozone; particulate matter, which is broken down into particles of 10 micrometers or smaller (PM_{10}) and particles of 2.5 micrometers and smaller ($PM_{2.5}$); sulfur dioxide; and lead.

Areas not meeting ambient air quality standards are designated as non-attainment for the specific pollutant that is a violation of the standard. Non-attainment areas are further classified based on the magnitude of the air quality problem.

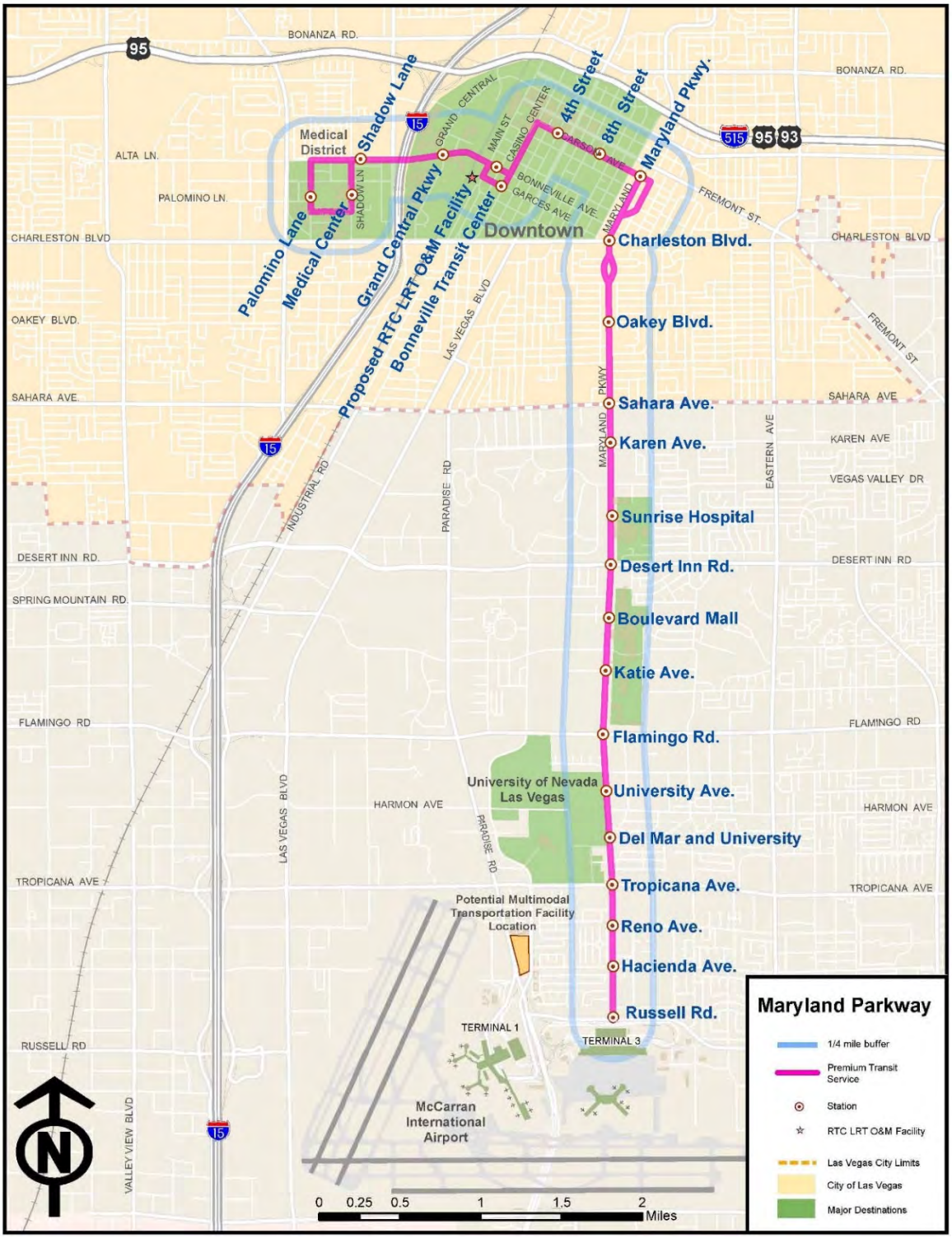
1.1 Project Description

The project corridor is wholly located within Clark County and partially located within the City of Las Vegas, as shown in the project vicinity map in Figure 1-1. The corridor extends on various local streets from the Las Vegas Medical District through the Downtown area to Maryland Parkway, where it would serve major activity centers including the Sunrise Hospital/Medical Center, The Boulevard Mall regional shopping center, the University of Nevada Las Vegas (UNLV) campus, and Russell Road, near McCarran International Airport. The project is located in an urban setting with a wide mix of residential, office, education, medical, and commercial development. Land uses in the project vicinity include residential, commercial, airport, educational institutions, recreation, utility, civic/government, public service facilities (*e.g.*, fire stations, hospitals, and churches), transportation, and vacant land.

The corridor is currently served by local bus Route 109 with 24 hours per day, seven days per week service, with 15-minute headways during the majority of the service span. Stations are currently spaced an average of 0.25-mile apart. The Route 109 buses operate in mixed flow traffic along the 2-lane to 6-lane streets and are subject to the peak hour congestion that occurs at several of the major intersections where average daily traffic reaches levels of 35,000-40,000 vehicles.

The alternative analysis conducted as part of this Environmental Assessment (EA) narrowed the final alternatives for further evaluation to the Light Rail Transit (LRT) Build Alternative, Bus Rapid Transit (BRT) Build Alternative, Enhanced Bus Alternative, and No Build Alternative. A summary of the alternatives evaluated in the EA document is provided below.

Figure 1-1. Project Vicinity Map with Maryland Parkway Corridor



Note: Maryland Parkway Transit Corridor is represented by the purple line; City of Las Vegas municipal boundaries are shown in beige outline.

LRT Build Alternative

The LRT Build Alternative extends from the Las Vegas Medical District through the Downtown Area and connects with Maryland Parkway to serve the Sunrise Hospital/Medical Center, The Boulevard Mall, UNLV, and terminates at Russell Road, near McCarran International Airport.

The project proposes speed and quality improvements to the public transit system within the corridor. LRT service will operate in dedicated lanes through the corridor, primarily curbside-running lanes, with the exception of the segment along Casino Center Boulevard between Carson Avenue and Garces Avenue in downtown Las Vegas, where the LRT vehicles will operate in the existing dedicated center-running lanes currently used by the SDX. Those existing dedicated lanes will be reconstructed to install embedded track for joint LRT/bus operation. All of the curbside-running lanes will be reconstructed to install embedded track for LRT operation. Automobiles and other vehicles will be allowed to use the curbside-running lanes for right-turn movements at major/minor intersections and driveways. New, separate right-turn lanes will be provided at major intersections so that the LRT vehicles are not blocked by queued right-turning vehicles as they wait for pedestrians crossing the side streets. The design features of the LRT Build Alternative include:

- LRT service on 12-minute to 15-minute headways with service for 24 hours per day, seven days per week;
- Single, electrically-powered LRT vehicles are expected to provide sufficient capacity, but will have the option to be coupled into 2-car trains if necessary to serve ridership demand in the future;
- A total of 24 stations spaced approximately 0.35-mile apart on average, with split platforms typically placed on the far side of intersections to minimize travel delay; and
- Transit Signal Priority (TSP) with signal coordination to reduce transit delay through intersections where possible, with minimal effect on traffic operations.

BRT Build Alternative

The BRT Build Alternative extends the same distance as the LRT Build Alternative and uses the same station locations. The BRT vehicles will run on 100 percent compressed natural gas (CNG) fuel and will be serviced and maintained at the two existing RTC maintenance facilities located 3.75 miles to the northwest and 4.5 miles southwest of the project study area. Features of the BRT Build Alternative include:

- Curbside-running dedicated lanes that allow vehicular right-turns at minor cross street intersections and at driveways to maintain traffic operational flexibility and capacity. The project also includes separate right-turn lanes at major cross street intersections along northbound and southbound Maryland Parkway to ensure that transit vehicles are not delayed by the volume of right-turning vehicles or those queued as they wait for crossing pedestrians and to otherwise maintain intersection capacity and improve traffic operations.

- There are 24 station locations spaced 0.35-mile apart on average, with split platforms typically placed on the far side of intersections to minimize travel delay.

- TSP with traffic signal coordination to reduce transit delay through minor intersections where possible, with minimal effect on traffic operations.

Enhanced Bus Alternative

The Enhanced Bus Alternative would attempt to maximize service without any major capital improvements. The Enhanced Bus alternative would be a limited stop service with the same 24 stations as those included in the Build alternative with average spacing of 0.35-mile and the same span of service. However, the CNG-fueled buses would operate in the existing mixed flow traffic curb lanes, like the existing Route 109 buses.

The Enhanced Bus Alternative operating plan would be similar to that of the BRT and LRT Build Alternatives, with headways that would be reduced during the weekday peak periods to every 12 minutes. This would increase the level of bus service by 25 percent over the existing condition, from 4 buses to 5 buses per hour in each direction during peak periods. In addition, the 24 bus stops in the corridor would be enhanced with shelters, benches and information displays, as appropriate, but with minimal capital expenditure.

No Build Alternative

The No Build Alternative proposes no improvements to the existing local bus services. Under the No Build Alternative, the existing Route 109 local bus service would maintain current service with 15-minute headways (total of 4 buses per hour in each direction), operating in side/curb lanes with mixed traffic flow, and with stops spaced every 0.25-mile on average. The buses would be a mix of diesel and CNG-fueled vehicles, which eventually will be converted to 100 percent CNG in the future.

2.0 REGULATORY CONTEXT

The NAAQS and state standards are set at levels that protect public health with a margin of safety and are subject to periodic review and revision (refer to Table 2-1 for current standard levels). The CAA Clean Air Act identifies two types of NAAQS. ***Primary standards*** provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. ***Secondary standards*** provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Table 2-1. National and Nevada Ambient Air Quality Standards

Pollutant	Averaging Time	Nevada and National Ambient Air Quality Standards[1]	
		Primary[2]	Secondary[2]
Ozone	8-hour[3]	0.070 ppm	0.070 ppm
Carbon monoxide	8-hour[4] 1-hour[4]	9 ppm 35 ppm	-- --
Nitrogen dioxide	Annual mean 1-hour[6]	53 ppb 100 ppb	53 ppb --
Sulfur dioxide	1-hour[6] 3-hour[4]	75 ppb --	-- 0.5 ppm
Lead	Rolling 3-month average[7]	0.15 $\mu g/m^3$	0.15 $\mu g/m^3$
PM_{10}	24-hour[8]	150 $\mu g/m^3$	150 $\mu g/m^3$
$PM_{2.5}$	Annual mean[5] 24-hour[6]	12 $\mu g/m^3$ 35 $\mu g/m^3$	15 $\mu g/m^3$ 35 $\mu g/m^3$

Sources: USEPA, 2016.

[1] Nevada adopted the NAAQS as the state ambient air quality standards.

[2] ppm = parts per million; ppb = parts per billion; $\mu g/m^3$ = micrograms per cubic meter; -- = not applicable

[3] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor over each year must not exceed 0.070 ppm (effective October 26, 2015).

[4] Not to be exceeded more than once per calendar year.

[5] Annual arithmetic mean, averaged over 3 years.

[6] 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years.

[7] Not to be exceeded.

[8] Not to be exceeded more than once per year on average over 3 years.

Clark County Department of Air Quality and Environmental Management is required to develop long-term planning documents such as a State Implementation Plan to demonstrate how the NAAQS will be attained, maintained, and enforced. After an area reaches attainment, a Redesignation/Maintenance Plan is developed to demonstrate maintenance for at least the next 10-year period. These Maintenance Plans also become part of the State Implementation Plan. Clark County Department of Air Quality and Environmental Management also develops Transportation Conformity Plans (TCPs), in collaboration with RTC, the Metropolitan Planning

Organization for Clark County, to address transportation conformity issues in Southern Nevada. If an area's proposed projects will lead to travel demand that exceeds the NAAQS, then the projects cannot be federally-funded.

The Federal Transit Administration (FTA) must find that a transit project located in a nonattainment or maintenance area meets the project-level conformity requirements of a currently conforming Metropolitan Transportation Plan and Transportation Improvement Program (TIP). Each Metropolitan Planning Organization must prepare a Metropolitan Transportation Plan in accordance with 49 USC 5303(i). The plan must identify how the metropolitan area will manage and operate a multi-modal transportation system. Under this requirement, RTC must quantitatively assess the air quality impacts of its plans and programs. In particular, RTC needs to demonstrate that changes in the transportation system will not cause the areas to exceed motor vehicle emissions milestones set by the U.S Environmental Protection Agency (USEPA) and the local air quality agency.

The RTC adopted the Regional Transportation Plan fiscal year 2017-2040 (RTC, 2017), which is the region's Metropolitan Transportation Plan and meets the air quality conformity determination requirement of the federal government. In 2014, RTC adopted the 2015-2019 TIP (RTC, 2016) containing the highway, transit, bike, and pedestrian projects in Southern Nevada, which updated the Air Quality Conformity Analysis of the 2013-2015 Regional Transportation Plan. The projects identified in the 2017-2040 Regional Transportation Plan and the 2015-2019 TIP will not contribute to any violation of the air quality standards.

3.0 METHODOLOGY

As of April 2015, Clark County was classified in attainment for $PM_{2.5}$, sulfur dioxide, lead, nitrogen dioxide, and ozone, so no further analysis is required under the National Environmental Protection Act (NEPA). The Las Vegas Valley is a maintenance area for PM_{10} and carbon monoxide. A Maintenance Plan and Redesignation Request for PM_{10} was submitted to USEPA in August 2012 and USEPA approved Clark County Department of Air Quality and Environmental Management's request and designation for Clark County as a PM_{10} attainment area on October 6, 2014.

Certain transit projects located in PM_{10} maintenance area would require a qualitative PM hot-spot analysis during the NEPA process. However, these projects generally include major new or expanded transit centers or stations where a large number of diesel-powered transit vehicles will congregate. Projects typically not of concern for PM hot-spot analysis are stations and transit centers serviced by non-diesel-powered transit vehicles (LRT, BRT, additional bus service). Therefore, no PM_{10} hot spot analysis was completed for the NEPA analysis, because the LRT cars will be electric powered and replace existing CNG and diesel-fueled buses. The BRT option would replace any remaining diesel-fueled buses with CNG-fueled vehicles.

In 2018, RTC estimated that replacing 100 percent CNG-fueled buses on Maryland Parkway with electric LRT vehicles would result in daily bus VMT on Route 109 and daily idle (transit stops, traffic lights, and driver layover) reductions for carbon monoxide (CO) and oxides of nitrogen (NOx) emissions of 18.61 kg/day and 5.49 kg/day, respectively (6,793 kg/year and 2,004 kg/year, respectively). RTC estimated that current ridership on the weekday 109 bus route was 8,901 riders/day and the projected ridership on the Maryland parkway LRT would be 16,100 riders/day. The reduction in number of vehicles on Maryland Parkway would result in the CO, NOx, and volatile organic compounds (VOC) reductions in emissions of 143.78, 13.35, and 17.96 kg/day, respectively. Therefore, total emission reduction estimates for the LRT option along Maryland Parkway would be:

Reductions	kg/day
CO	**162.38**
NOx	**18.85**
VOC	**17.97**

RTC emission reduction estimates for the project used emissions factors specifically for heavy-duty CNG transit buses that were developed by the USEPA (1998) and California Air Resources Board (2018). Replacing transit vehicles currently operating on Maryland Parkway (100 percent of buses fueled by CNG with fully electric LRT vehicles) will result in an emissions benefit.

Carbon monoxide, PM_{10}, and $PM_{2.5}$ hot-spot analyses are not required to consider construction-related activities, which cause temporary increases in emissions. Each site which is affected by construction-related activities shall be considered separately, using established "Guideline" methods. Temporary increases are defined as those which occur only during the construction phase and last five years or less at any individual site (40 CFR 93.123).

4.0 IMPACTS

4.1 Operational Impacts

Build Alternatives

The Build Alternatives were included in the 2015-2019 TIP (Project #2792 on Table 1, Page T1-46) for premium transit service; therefore, it meets the project-level air quality conformity analysis required by FTA. No PM_{10} hot spot analysis was completed for this NEPA analysis, because the LRT cars will be electric powered and replace existing CNG and diesel-fueled buses. The BRT option would replace any remaining diesel-fueled buses with CNG-fueled vehicles. Therefore, both Build Alternatives would have beneficial effects on air quality in the project area and community.

Enhanced Bus Alternative

The Enhanced Bus Alternative was included in the 2015-2019 TIP (Project #2792 on Table 1, Page T1-46) for enhanced transit service; therefore, it meets the project-level air quality conformity analysis required by FTA. No PM_{10} hot spot analysis was completed for this NEPA analysis because the new buses will be alternative fuel powered and replace any existing diesel-fueled buses. There would be no increase in diesel-fueled buses in the project corridor.

No Build Alternative

Air quality conditions will continue under the No Build Alternative and may worsen as traffic congestion increases in the corridor.

4.2 Construction Impacts

Build Alternative

During construction, short-term degradation of air quality may occur due to the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and other construction-related activities. Site preparation and rail construction typically involves clearing, cut-and-fill activities, grading, installing rails and catenary system, and paving roadway and sidewalk surfaces. Sources of fugitive dust would include disturbed soils at the construction site. Unless properly controlled, vehicles leaving the site could deposit mud on local streets, which could be an added source of airborne dust after it dries. PM_{10} emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions would depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

In addition to dust-related PM_{10} emissions, heavy-duty trucks, and construction equipment powered by gasoline and diesel engines would generate carbon monoxide, sulfur dioxide, nitrogen oxides, volatile

organic compounds, and some soot particulate (PM_{10} and $PM_{2.5}$) in exhaust emissions. Because construction activities will increase traffic congestion in the area, carbon monoxide and other emissions from traffic would increase slightly while those vehicles are delayed. These emissions would be temporary and limited to the immediate area surrounding the construction site. Construction activities are expected to occur over a 2.5-year period, less than the 5-year federal requirement to be considered temporary impacts.

Enhanced Bus Services

Construction impacts would be similar to the Build Alternatives, except soil disturbance will be confined to only the 24 new station locations along the route. Therefore, temporary construction activities would be minimal.

No Build Alternative.

The No Build Alternative would not result in any direct, indirect, or construction-related air quality impact.

5.0 MITIGATION MEASURES

Most of the construction impacts to air quality are short-term in duration and, therefore, will not result in long-term adverse conditions. Implementation of the following measures, some of which may also be required for other purposes such as storm water pollution control, will reduce any air quality impacts resulting from construction activities:

- Minimize land disturbance.
- Water or dust palliative will be applied to the site and equipment as often as necessary to control fugitive dust emissions.
- Construction equipment and vehicles will be properly tuned and maintained.
- A dust control plan will be developed documenting sprinkling, temporary paving, speed limits, and timely revegetation of disturbed slopes, as needed.
- Equipment and materials storage sites will be located as far away from residential and park uses, as practicable.
- Gravel pads will be used at project access points to minimize dust and mud deposits on roads affected by construction traffic. All transported loads of soils and wet materials will be covered before transport.
- Dust and mud that are deposited on paved, public roads due to construction activity and traffic will be promptly and regularly removed to decrease particulate matter.
- To the extent feasible, construction traffic will be scheduled and routed to reduce congestion and related air quality impacts caused by idling vehicles along local roads during peak travel time.

This page left intentionally blank.

6.0 REFERENCES

California Air Resources Board. 2018. *Methods to Find the Cost-Effectiveness of Funding Air Quality Projects: For Evaluating Motor Vehicle Registration Fee Projects and Congestion Mitigation and Air Quality (CMAQ) Improvement Projects*. Emission Factor Tables March 2018. https://www.arb.ca.gov/planning/tsaq/eval/evaltables.pdf

RTC. 2016. *Transportation Improvement Program Fiscal Years 2015-2019, Narrative/Analysis and Project Summaries*. http://www.rtcsnv.com/wp-content/uploads/2014/02/RTCSNV_TIPFY2015-2019_2016-12-22.pdf; http://www.rtcsnv.com/wp-content/uploads/2014/02/Table-1-thru-Amend16-19-1.pdf

RTC. 2017. *Regional Transportation Plan of Southern Nevada 2017-2040*. Adopted February 9, 2017. https://www.rtcsnv.com/planning-engineering/transportation-planning/2017-2040-regional-transportation-plan/

U.S. Environmental Protection Agency. 1998. *Emission Facts: Idling Vehicle Emissions*. Air and Radiation Office of Mobile Sources. EPA420-F-98-014. April. https://nepis.epa.gov/Exe/ZyPDF.cgi/P1009Z19.PDF?Dockey=P1009Z19.PDF

This page left intentionally blank.