CNMI 20-Year Highway Master Plan

Final Report

Commonwealth of the Northern Mariana Islands (CNMI)
Department of Public Works

April 03, 2023

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1 Introduction

The Commonwealth of the Northern Marianas Islands (CNMI) is a commonwealth in political union with the United States, located in the western Pacific Ocean, within the Mariana Islands archipelago. Figure 1.1 presents the CNMI within context of the Pacific Ocean, Micronesia, and adjacent United States territory of Guam. The three main inhabited islands of CNMI are Saipan, Tinian, and Rota. Each of these three islands are unique, with different levels of development, differentiated economies, and varying levels of demand for transportation infrastructure.

Saipan is the largest and most populated island, with the most developed infrastructure and tourism-driven economy. Tinian, immediately south of Saipan, was formerly dominated by a casino resort industry, but is most associated today with its United States military presence. The furthest island south, Rota, is geographically closer to Guam than the other CNMI islands. Rota is the least populated and developed island, currently seeking to expand its “eco-tourism” industry.

The CNMI’s infrastructure and economy were severely affected by the recent Super Typhoon Yutu, which directly hit Saipan and Tinian. The strength and severity of extreme weather events has increased over recent years, corelating with increasing sea surface temperatures due to global climate change, placing additional stress on the islands’ physical transportation infrastructure. In early 2020, the Global Covid-19 pandemic brought the tourism industry on all three islands to an abrupt and extended halt through 2022, when visitor levels started to recover to pre-pandemic levels. These factors have increased challenges related to funding maintenance and construction of infrastructure, with an increase in capital improvement needs, a decreased supply of local labor, and an increase in costs to import and extract raw materials.

1.1 Purpose

This Comprehensive Highway Master Plan (or Highway Master Plan) is an update to the 2008 Comprehensive Highway Master Plan. The main purpose of the Highway Master Plan is to document CNMI’s current and anticipated future performance of the transportation systems and identify the improvements needed to accommodate mobility needs over the next twenty years. As such, this Highway Master Plan identifies transportation issues related to mobility, safety, and congestion while identifying improvement projects that aim to address issues supporting the broader development objectives for CNMI.

A comprehensive Highway Master Plan for CNMI should accommodate the needs of each island, while also integrating their common needs into a unified transportation plan. This Master Plan will provide a unifying framework for future transportation planning in the CNMI through the following actions:

– It identifies a roadway classification scheme that will assist the Department of Public Works in prioritizing transportation improvements.
– It identifies deficiencies and constraints in both the existing and expected future transportation network and provides short-range and long-range recommendations for improvements to alleviate such deficiencies. These recommendations are detailed for each of the three main islands.

1.2 Objectives

This Highway Master Plan update provides an opportunity to identify ways in which the recommended transportation projects can serve broader CNMI development objectives. Over the past five years, CNMI has worked towards achieving more efficient and sustainable resource management planning. Through this process, the *2021-2030 Comprehensive Sustainable Development Plan* (CSDP) was developed to provide a guide for sustainable development focused on planning for environmental sustainability, economic sustainability, and social equity.

Figure 1-1 CSDP Sustainable Development Objectives

The CSDP provides the ten-year growth visions, objectives, and goals that prioritize sustainable systems on the CNMI, focusing on the sectors: socio-economic, natural resources, and the built environment. The Highway Master Plan provides specific planning recommendations for transportation infrastructure projects and the objectives within this plan aim to support those identified for the built environment sector of the CSDP.

1.2.1 CSDP – Built Environment Vision

The Highway Master Plan identifies improvements for transportation infrastructure projects as part of the built environment. The CSDP identifies a vision for planning and development of the build environment that realizes:

> positive results for existing and new structures and infrastructure that consider current needs and future changes to involve all stakeholder and supportive community that ensures sustainable outcomes, continuity of culture and transitions, and quality of life.

CSDP – Goal #9: Industry, Innovation, and Infrastructure

The CSDP identifies sustainable development goals (SDG) that support this vision for the built environment. Included within the built environment SDGs is Goal #9, which relates to industry, innovation, and infrastructure:

> Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.

The CSDP also highlights opportunities for cross-cutting benefits within Goal #9 (i.e., those that support multiple objectives and often involve coordination between multiple planning agencies). To encourage resilient infrastructure, Goal #9 states that road development and maintenance should be planned in coordination with stormwater management planning efforts. The CSDP details that:

> stormwater management and flood risk-reduction planning efforts are ongoing. They will require coordination across jurisdictions and sectors to support road development and maintenance objectives.

Such coordination has been ongoing through interagency and community focused meetings facilitated by the Office of Planning and Development with the Planning and Development Advisory Council's (PDAC) Built Environmental

Taskforce (BE-Taskforce). As part of these coordinated interagency planning efforts, the "Complete Streets Working Group", comprised of members from the PDAC's BE Taskforce, have been holding regular meetings to discuss built infrastructure planning and project implementation that focuses on transportation connectivity and walkability. This working group and the BE Taskforce supported the development of "complete streets" guidance that is further incorporated into CNMI's 2021-2030 CSDP, detailed further here.

CSDP – "Complete Streets" Goal

The CSDP highlights "Complete Streets" planning and design objectives as a critical piece towards ensuring that existing and new infrastructure meet the built environment vision and the SDG #9 described above. "Complete Streets" is an approach to planning and implementing infrastructure improvements that aims to design the built environment with all transportation modalities in mind with the goal to improve the ways in which we can travel safely and conveniently. The CSDP identifies the following "Complete Streets" goal:

> Invest in "Complete Streets" concepts that plan for and achieve safe, multi-modal transportation to community centers, encourage health and well-being by creating walkable and inviting spaces that accommodate the necessary infrastructure to support sustainable growth.

As it relates to transportation plans, the CSDP states the following:

> [The Highway Master Plan update] will include "complete streets" concepts that emphasize designing the built environment with all transportation modalities and multiple benefits in mind into long-term transportation planning efforts.

CSDP – Transportation, Community Design, and Design Regulations Vision

The CSDP also provides visions for various planning elements that encourage interagency and inter-sectoral adaptive management planning efforts. The vision for the "Transportation, Community Design, and Design Regulations" planning element is that:

> Transportation infrastructure in the CNMI is built and maintained to provide inviting, accessible, safe, convenient, and comfortable routes for walking, bicycling, and public transportation […].

This vision is supported by transportation infrastructure that:

- Encourages increased use of these modes of transportation,
- Enables convenient travel as part of daily activities,
- Improves the public welfare by addressing a wide array of health and environmental problems; and
- Meets the needs of all users of the streets, including children, older adults, and people with disabilities.

Smart, Safe Growth

In November 2018, the US Environmental Protection Agency (EPA) and US Federal Emergency Management Agency (FEMA) worked with CNMI resource management and planning agencies to co-developed a Guidance Manual for Smart, Safe Growth for OPD to help CNMI recover from the Typhoons Soudelor in 2015 and Yutu in 2018. The manual identifies development strategies to ensure that communities and their infrastructure are resilient to future natural disasters in changing climate conditions. The Smart, Safe Growth (SSG) strategies identified in the manual are guiding standards that have been incorporated into the CSDP, especially as it relates to planning for land use and the built environment as well as the maintenance and construction of existing transportation infrastructure. The SSG Guidance is supported by an assessment tool that supports planning and scoping decision-making that includes consideration of existing environmental conditions such as flood hazard areas and regulated sensitive ecosystems. This guidance emphasizes planning policies that draw on smart growth, climate adaptation, and hazard mitigation planning to support the implementation of more sustainable and resilient projects within the built environment.

1.2.2 Highway Master Plan Objectives

The Highway Master Plan aims to support the broader sustainable development objectives for the CNMI by recommending projects that support all modes of travel while improving the resilience and reliability of the transportation system. As such, the recommendations presented in this plan are intended to improve circulation and safety for all modes of travel, reduce congestion resulting in less resource consumption and pollution, and consider opportunities for cross-cutting benefits, such as those related to stormwater management and flood risk-reduction.

1.3 Approach

Improvements are provided for each of the three islands within the CNMI based on a review of existing infrastructure (Chapter 3), assessment of public input (Chapter 5), and identification of capacity and operational demands to accommodate future growth. Additional recommendations for projects were provided by members of the CNMI Department of Public Works (DPW) staff. In addition, incomplete improvements previously included in the 2008 Highway Master Plan were evaluated for inclusion in the update. In addition, existing conditions inventory data was supplemented by a field visit by the project team involving collection of photos displayed on the following pages.

The recommended improvements within the Highway Master Plan are categorized as near-term and long-term. The designated timeframe for near-term improvements is from one to ten years whereas the designated timeframe for long-term improvements is from 11 to 20 years. Near-term recommendations include new projects, modifications, or upgrades to be implemented due to their critical nature or smaller scale to be implemented in a shorter timeframe. Long-term recommendations are improvements or upgrades that may be on a larger scale and require more time to implement or modifications that are not immediately necessary but should be implemented to maintain the mobility on the islands.

To ensure that the recommended transportation infrastructure projects serve broader goals related to sustainable development, this Highway Master Plan Update includes a comprehensive list of “General Improvements Categories” to be considered when any individual project is identified for further study and/or implementation. These General Improvement Categories highlight the priorities for the future of mobility within CNMI and are applicable to all three islands.

1.3.1 Technical Approach

This Highway Master Plan updates the technical analysis of the previous master plan and provides updated collision data, traffic volumes, and forecasts for future year conditions of each of the three main islands. The Highway Master Plan update and corresponding traffic volume data collection efforts were initiated in Spring 2021 when the COVID-19 pandemic global travel restrictions were in place. Traffic volume data collected in 2021 was thoroughly evaluated to determine the degree to which a reduction in tourism to the CNMI resulted in lower-than-normal traffic volumes on the roadways and intersections evaluated within this plan. As described in subsequent sections of this report, adjustments were made to adequately reflect travel demand based on an anticipated return to pre-pandemic visitor levels to estimate traffic capacity levels of services for both existing and future year conditions and determine necessary transportation improvements to be included in the plan. Improvement costs and funding sources were updated to reflect changes in construction and material costs and current funding programs available to CNMI.

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Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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Commonwealth of the Northern Mariana Islands
20-Year Highway Master Plan

CNMI Regional Context Map

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 1-2

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Print date: 29 Jun 2022 - 11:41

Data source: Charted Territory: Esri, Garmin, FAO, NOAA, USGS
Charted Territory: Esri, HERE, Garmin, FAO, NOAA, USGSCNMI Shorelines, Boundaries: U.S. Census, 2020. Created by: pthornton

2 Socio-Economic Information

2.1 Population and Workforce

The United States Census Bureau recently published the *2020 Island Areas Censuses* which reported a population of 47,322 in 2020 compared to a 2010 population of 53,883. This 12-percent decrease in population over the latest decade is a continuation of the demographic trend since 2000. Since 2000, population has decreased 30-percent. By contrast, the CNMI population grew by 60-percent between 1990 and 2000. This context has significance for transportation infrastructure needs, as the last two Comprehensive Highway Master Plans were prepared before this sharp shift in population and demographics, and therefore assumed significant increases in traffic volume to continue. Table 2.1 below shows the CNMI population changes over the past four decades, from 1980 to 2020, in Saipan, Tinian, Rota, and the Northern Islands.

Table 2-1 Population by Island (1980 – 2020)

Year	Year over Year Change	Total	Number of Persons			
			Saipan	Tinian	Rota	Northern Islands
2020	**- 12%**	**47,322**	43,385	2,044	1,893	7
2010	**- 22%**	**53,883**	48,220	3,136	2,527	0
2000	**+ 60%**	**69,221**	62,392	3,540	3,283	6
1990	**+ 158%**	**43,345**	38,896	2,118	2,295	36
1980	**-**	**16,780**	14,549	866	1,261	104

Sources: U.S. Census Bureau.

Population Concentrations

Table 2-2 presents the breakdown of population on the islands by district for 2010 and 2020. Consistent with the data presented in Table 2-1, the population in each district on the islands decreased between 2010 and 2020.

Table 2-2 Island Population by District (2010 – 2020)

		Population		
Area	District	2010	2020	Change
Rota				
	7	2,527	1,893	-634
Saipan				
	1	15,160	13,633	-1,527
	2	6,382	5,489	-893
	3	15,624	14,115	-1,509
	4	3,847	3,416	-431
	5	7,207	6,732	-475
Tinian				
	6	3,136	2,044	-1,092

Source: 2010 & 2020 Census Population of the Commonwealth of the Northern Mariana Islands: Municipality and Village. October 28, 2021.

Saipan Population Concentrations in Villages

Saipan's population is spread across its many villages, with populations exceeding 1,000 residents in 14 villages and populations of less than 100 residents in 26 villages. The top 10 villages by 2020 population are presented below in Table 2-3. As reflected in the updated 2020 Census, Saipan's population was primarily concentrated in the villages

along the coastlines of the island, including Garapan, Dandan, Koblerville, Kagman III, San Vicente, Susupe, Chalan Piao, and Afetnas. Of the top 10 villages by populations, both Finasisu and Gualo Rai are not located on the island's coastline. Figure 2-3 presents a map showing population concentrations as of 2020 as provided by the US Census Bureau with the top ten villages by 2020 population identified. (Note: Saipan villages were consolidated in 2022. However, the population concentrations based on 2020 village boundaries is useful to determine the spatial distribution of population on the island.)

Table 2-3 Saipan Top 10 Villages by Population (2020)

Saipan Villages (Top 10 with Highest Population)	2020 Population	Percent of Total
Garapan village	3,096	7%
Dandan village	2,922	7%
Finasisu village	2,566	6%
Koblerville village	2,470	6%
Kagman III village	2,144	5%
San Vicente village	1,862	4%
Gualo Rai village	1,841	4%
Susupe village	1,840	4%
Chalan Piao village	1,338	3%
Afetnas village	1,130	3%

Source: 2020 Census.

Figure 2-1 Saipan Population Distribution and Villages With (2020)

Source: Understanding the Population of the Commonwealth of the Northern Mariana Islands, U.S. Census Bureau, 2020 Census of the Commonwealth of the Northern Mariana Islands.

Tinian Population Concentrations in Villages

Table 2-4 presents the population per village on Tinian according to the 2020 Census. As shown, the bulk majority (61-percent) of the population of Tinian is located in the village of San Jose which is the island's commercial center. The remainder of the island's population is concentrated in Marpo Heights (21-percent) and Carolina Heights (11-percent) as smaller outlying residential areas. Figure 2-3 presents a map showing population concentrations as of 2020 with the top three villages by population identified. As shown, the populated areas are concentrated in the southern portion of the island and little to no population is in the middle and northern portions of the island. This is due primarily to US Military control of approximately two-thirds of the island reserved for military training via a 40-year lease agreement signed in 2019 between CNMI governments and the US Department of Defense.

Table 2-4 Tinian Village Populations (2020)

Tinian Villages	2020 Population	Percent of Total
San Jose (Tinian Municipality) village	1,250	61%
Marpo Heights village	428	21%
Carolinas Heights village	223	11%
Eastern Tinian (Marpo Valley) village	121	6%
Carolinas village	22	1%
Aguijan village	0	-
Northern Tinian village	0	-
Western Tinian village	0	-

Source: 2020 Census.

Figure 2-2 Tinian Population Concentration (2020)

Source: Understanding the Population of the Commonwealth of the Northern Mariana Islands, U.S. Census Bureau, 2020 Census of the Commonwealth of the Northern Mariana Islands.

Rota Population Concentrations in Villages

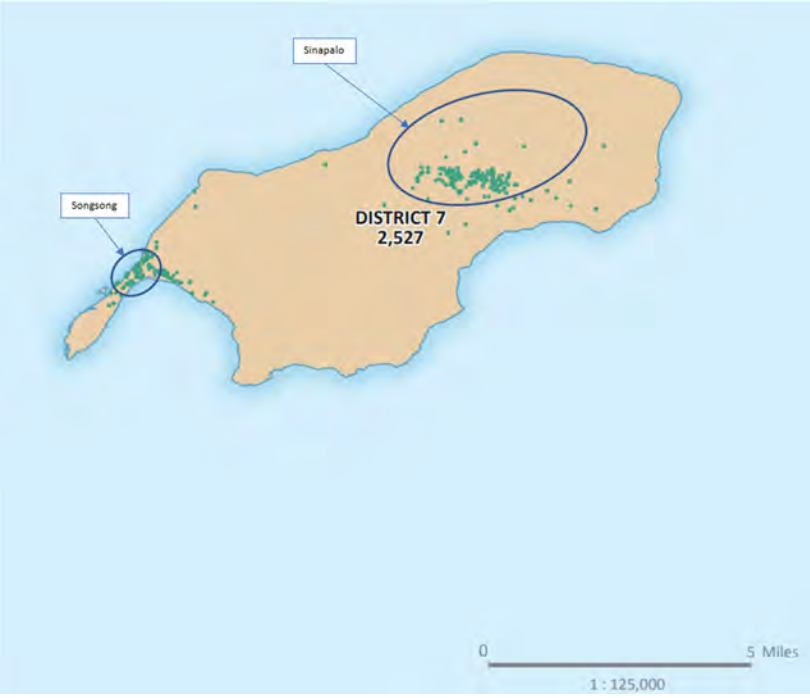
Urbanized areas on Rota consist of Songsong and Sinapalo villages. Songsong is the center of commerce and government for the island and is located adjacent to the island's airport. 58-percent of the island's population resides in Sinapalo and 19-percent resides in Songsong. The villages with reported populations greater than zero (0) are presented below in Table 2-5. Figure 2-3 presents a map showing population concentrations as of 2020 with the villages of Songsong and Sinapalo identified.

Table 2-5 Rota Top 10 Villages by Population (2020)

Rota Villages (Villages with Reported Populations > 0)	2020 Population	Percent of Total
Sinapalo village	1,107	58%
Songsong village	353	19%
Tenetu village	111	6%
Annex F village	101	5%
I Chenchon village	80	4%
Ginalangan (Chudan) village	44	2%
Liyu village	38	2%
Taimama village	19	1%
Gampapa village	12	1%
Matpo village	9	< 1%
Tatgua village	9	< 1%
As Niebes (Nieves) village	7	< 1%
Agatasi (Payapai) village	2	< 1%
Gagani village	1	< 1%

Source: 2020 Census.

Figure 2-3 Rota Population Concentration (2020)

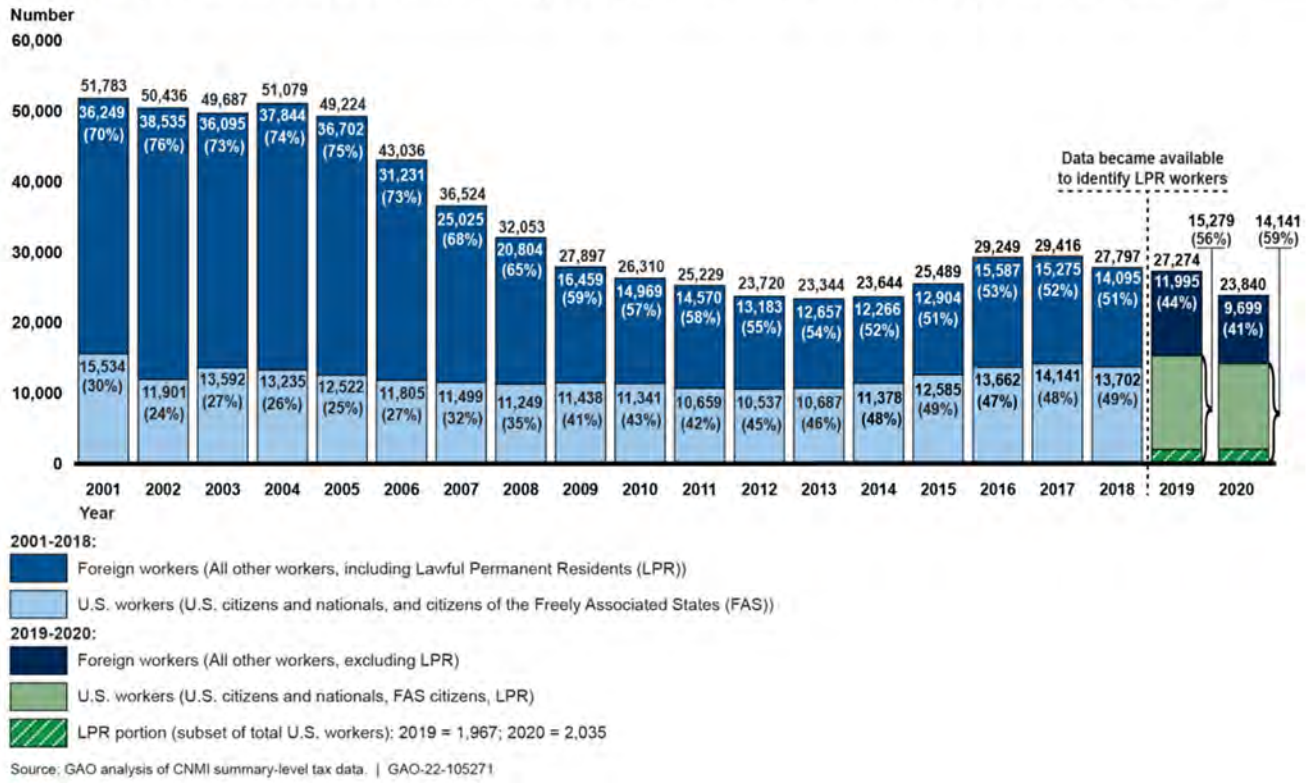


Source: Understanding the Population of the Commonwealth of the Northern Mariana Islands, U.S. Census Bureau, 2020 Census of the Commonwealth of the Northern Mariana Islands.

CNMI Workforce

The population trends mirror labor force trends, as shown in the United States Government Accountability Office's (GAO) *CNMI Recent Economic and Workforce Trends (February 2022)*. Since 2001, the total amount of workers in the CNMI have decreased from about 50,000 to fewer than 24,000 in 2020.

Figure 5: Employed Workers in the Commonwealth of the Northern Mariana Islands (CNMI), Calendar Years 2001–2020

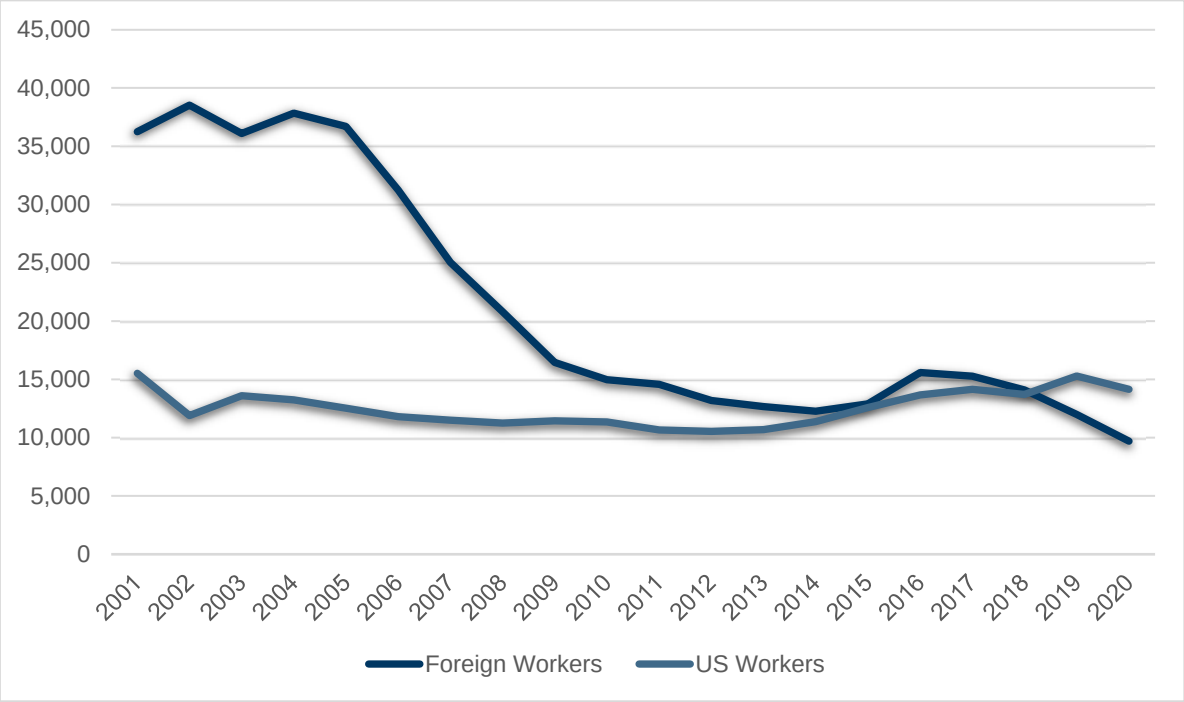


Source: GAO analysis of CNMI summary-level tax data. | GAO-22-105271

As shown in the inset graph, a significant decline in workforce followed 2005 as the garment industry rapidly left the island. Since 2013, however, a gradual increase in workforce reflected growth in hospitality and gaming industries. This growth was reversed in 2018 because of the destructive Super Typhoon Yutu, which followed on the heels of the devastating 2015 Super Typhoon Soudelor.

According to the United States GAO 2022 update to the same study, CNMI workforce has decreased again from 29,249 in 2016 to 23,840 in 2020. The long-term economic consequences of the Global Covid-19 pandemic are not immediately clear, although the hospitality and gaming industries continue to struggle to grow following the travel restrictions administered in 2020. A graph showing the workforce trends for both foreign and US workers between 2001 and 2020 is shown below.

Figure 2-4 CNMI Workforce Trends, 2001-2020



Although previous studies show elevated traffic volume estimates beyond what will likely be realized in the next 15 years based on current trends, it is important to invest in a transportation infrastructure that can accommodate increased capacity as it is an essential element of the economic recovery of the CNMI.

2.2 Household Size & Income

Based on data gathered for the 2016 Household Income and Expenditure Survey, the island with highest median household income was Tinian, having surpassed Rota since the previous Household Income and Expenditure Survey in 2005. Table 2-6 summarizes household and per capita income recorded for 2015.

Table 2-6 Household and Per Capita Income

2015	Household Income (2015 Dollars)			
	CNMI	Saipan	Rota	Tinian
Median Household Income	$ 19,201	$ 19,009	$ 18,911	$ 22,500
Mean Household Income	$ 25,740	$ 25,911	$ 22,666	$ 26,085
Per Capita Income	$ 8,644	$ 8,685	$ 8,375	$ 8,243
Source: 2016 Household Income and Expenditure Survey, data for the year prior (2015)				

The total-percentage of persons in poverty across the CNMI was 55.7-percent in 2015, continuing the increasing trend from 51.8-percent in 2010 and 30.6-percent in 2000. The average household size across the CNMI decreased from 3.65 people per house in 2000 to 3.26 in 2010. On Saipan the largest households were observed in 2010, however data shows that Tinian and Rota had larger families.

2.3 Land Use Patterns

The CNMI consists of a chain of 14 volcanic islands stretching over 375 miles from north to south, with a total land area of 181 square miles. Of all the islands, there are three predominantly inhabited islands: Saipan, Tinian, and Rota.

Saipan

Saipan is the largest island of the CNMI with a total area of 115.39 km^2 (44.55 sq mi). It is divided into five Census Districts and 34 villages. (Note: This map includes the 73 villages, however in 2022, the villages were consolidated to 34.)

Census District 1 on Saipan's southern coast contains the airport area and San Antonio. It includes sixteen mixed residential area villages. Koblerville and San Antonio have populations of 3,543 and 4,741, respectively, and are home to the Coral Ocean Golf Course and Resort community. Route 37 (Chalan Monsignor Martinez), Route 301 (Chalan Monsignor Martinez), Route 32 (As Perdido Road), and Route 31 (Isa Drive) are the primary highway connections in this district.

Census District 2 is located at the southern fringe of Chalan Kanoa and extends through northern Susupe. It is served primarily by Route 33 (Beach Road) for north- south mobility. In addition, Route 32 (As Perdido Road) and Route 31 (Chalan Monsignor Guerrero) serve the traffic in this area in the east to the west direction.

Along the mid-western coast of Saipan lies the most urbanized area of District 3 featuring the villages of Garapan, San Jose, Navy Hill, Gualo Rai, among others. Garapan is the hospitality district with a higher density of commercial and retail businesses and hotels that serve the tourist population. Several major hotels including Crown Plaza Hotel, Hyatt Regency and the Hafa Adai Hotel are located within this dstrict. The village of San Jose contains a mixture of residential and commercial business, with commercial dominating both sides of Route 33 (Beach Road). Route 31 (Chalan Monsignor Guerrero) defines the northern edge of San Jose and provides area residents with access to Route 30 (Middle Road) and the airport further inland.

District 4 makes up the northern portion of the island and consists of primarily open space and undeveloped mountainous region. It includes the village of Tanapag and runs from the island's northwestern coast across the Talofofo ridge line to the As Teo-Chacha area. This area includes much of Capitol Hill, the center of government operations. Route 30 (Middle Road) is the primary roadway in this district. Route 31 (Isa Drive) ties into Route 30 (Middle Road) at the base of Capitol Hill, providing access to residential communities and government offices.

District 5 occupies the central and eastern mountainous region and coastal community of Kagman and the Lao Lao Bay Golf Course.

Figure 2-5 Saipan Census Districts

Tinian

Tinian is the third largest island of the Mariana Islands. It is located approximately 4.5 km southeast, across the Saipan Channel, from Saipan. It has a land area of 101.01 km2 (39 sq. mi.). Tinian is primarily an agricultural community with most of its population residing in San Jose followed by Marpo Valley. Many of the areas in Tinian have been leased to the U.S. Federal Government for military contingency purposes. The “Military Retention Zone” (MRZ) boundary divides the island into northern and southern segments and approximately divides the island’s single census district. The entire municipality of Tinian is considered District 6. The Tinian International Airport is positioned atop a plateau in the central west corner of the island inside the MRZ. Along the island’s northwestern coast is the home to a Voice of America (VOA) radio relay station. The VOA currently broadcasts more than 900 hours of programming weekly in 47 languages.

The southern portion of the island contains the main village of San Jose and the low-density residential area of Marpo Heights. The village of San Jose holds most of the island’s residences and all the commercial and institutional areas, as well as the power generation plant. The Tinian Harbor lies along the coast of San Jose village and features berthing, transshipment, and cold storage facilities. This 100-acre harbor has a 1000-foot-long commercial dock. presents the census districts of the island of Tinian.

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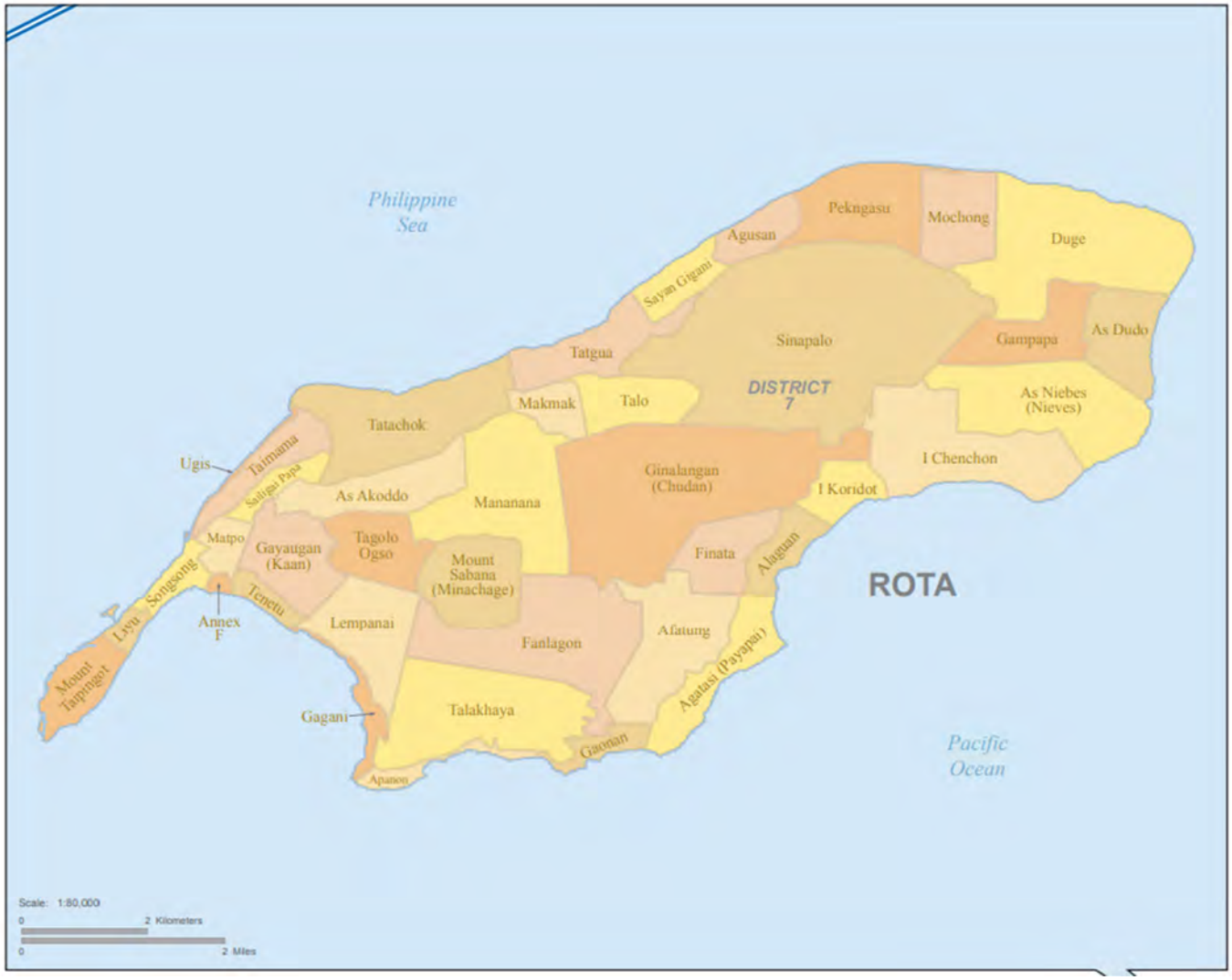
Figure 2-6 *Tinian Census Districts*

Rota

Rota is the southernmost island in the CNMI with a land area of 85.38 km^2 (32.97. sq. mi.). Most of the island remains agricultural or natural habitat with a few, scattered agricultural, mixed-use residential, commercial, and industrial uses located in the rural interior. Urbanized areas on Rota consist of Songsong and Sinapalo villages. Songsong is the center of commerce and government for the island. These two communities are linked by Rota's primary highway, Route 10, which services the airport in Sinapalo and the seaport in Songsong. The entirety of Rota is represented by a Census District 7 and is comprised of 40 villages .

Figure 2-7 Rota Census Districts



Rota's International Airport is located in the central east area of the island, near the village of Sinapalo. Rota's first major hotel and golf course facility, the Rota Resort and Country Club, is located north of the airport and occupies over 560 acres of land.

The southwest portion of the island includes the peninsula of Rota, where the village of Songsong resides. The WWII Japanese Burial Site, Peace Memorial and Rota Zoo is located in this district.

2.3.1 Future Land Use Trends

The Department of Public Lands (DPL) published the *CNMI Comprehensive Public Land Use Plan Update* in March 2019, which provides an overview of current and planned future public land use for the three major islands. The following is a summary of future land use trends for the CNMI's primary islands as identified in the DPL report.

Future Land Use Trends for Saipan:

– The nature of tourism is changing in Saipan, including a shift to apartment-based vacation rentals.
– Much of Saipan's coastline includes designated conservation areas. These lands contribute to the quality of life on Saipan and attract visitors and should be maintained.
– Future land uses on public land through approximately 2029 include identifying:
  - The future Kagman Reservoir.
  - A potential village homestead sites in coordination with DPL .
  - Potential sites for future wastewater facility, and
  - Relocation of public schools from the Tsunami Inundation Zone.

Future Land Use Trends for Tinian:

– Most of the CNMI's future planned labor demand is for development on the island of Tinian, where two casino resorts have been proposed. However, the likelihood of these projects materializing is uncertain.
– Many of Tinian's conservation areas are located along the southern portion of the island. These lands contribute to the quality of life on Tinian and attract visitors and should be maintained.
– The northern 2/3s of Tinian are leased by the U.S. Department of Defense and are the subject of ongoing "build up" proposals.
– Future land use of public lands proposed include:
  - A location in San Jose for civic purposes.
  - Roadway development (Route 205).
  - Village and agricultural homesteads in Kastiyu and Carolina areas.
  - Future use of agricultural land on the eastern side of the island, and
  - Public land identified for economic development in the southern portion of the island.

Future Land Use Trends for Rota:

– There are no current prospects for casino development on Rota.
– Rota has recognized wildlife and shoreline conservation areas that are proposed to remain protected.
– Future public land uses include:
  - Identification of agricultural and village homesteads.
  - A potential visitor and cultural center near Wedding Cake;
  - A location near the mayor's office to consolidate civic uses;
  - A potential solar energy production site, and
  - Potential sites for power plant relocation towards a central location on the island.

2.4 Visitor Trends

Island tourism data were gathered from the United States Government Accountability Office's (GAO) *CNMI Recent Economic and Workforce Trends* (both February 2020 and 2022 reports). The reports show periods of growth and decline between 2000 and 2017, with lowest values reported in 2011. The data shows an overall increase in visitor arrivals from fiscal years 2007 (395,000 visitors) to a peak in 2017 (653,000 visitors), which represents an average yearly increase in visitors of 5.7-percent growth per year. However, following Typhoon Yutu in October 2018, total visitor arrivals in 2019 fell to 425,000, a 30-percent reduction from the previous year. Visitor arrivals continued to decline in 2020 and 2021 due to travel restrictions related to the COVID-19 pandemic, reaching as low as 215,000 in 2020 (33-percent of peak 2017 arrivals) and 5,000 in 2021 (less than 1-percent of peak 2017 arrivals).

Figure 2-8 CNMI Workforce (Fiscal Years 2000 to 2017)

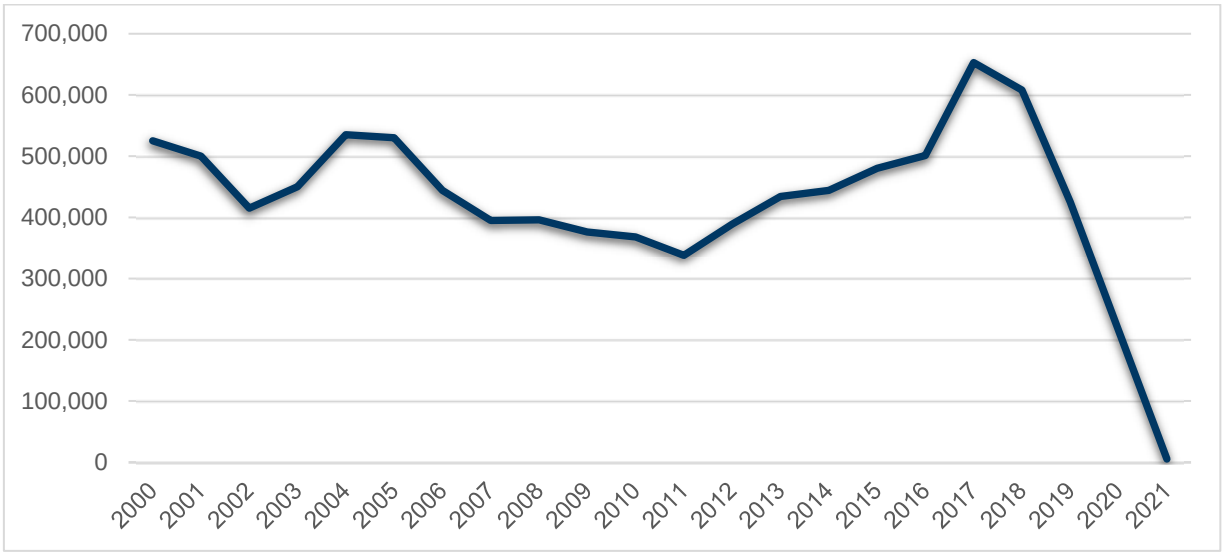
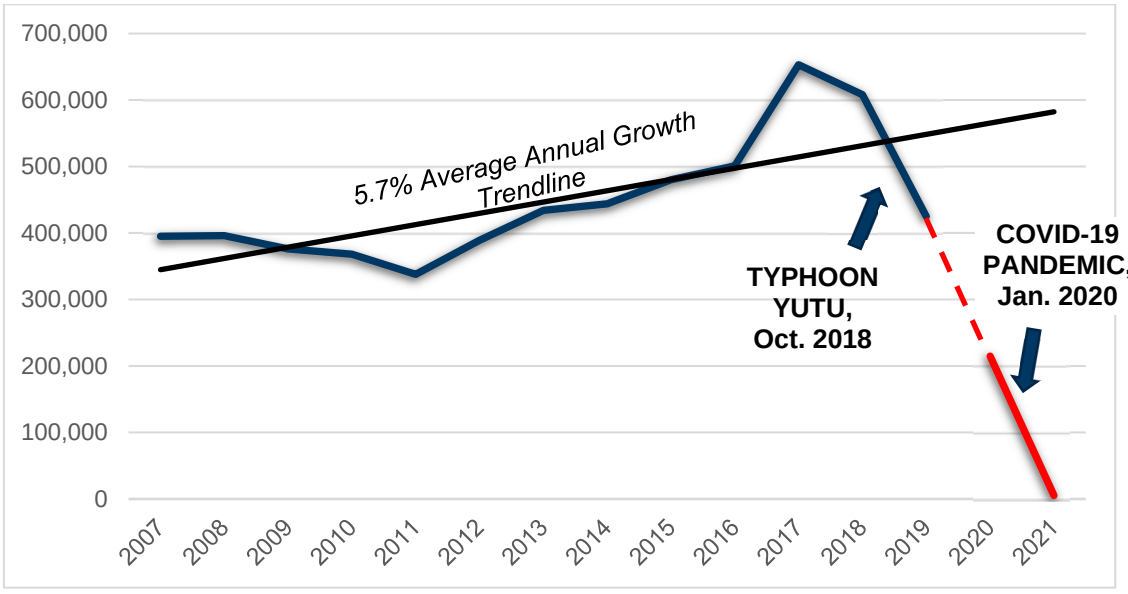


Figure 2-9 presents the annual visitor levels to CNMI between 2007 and 2021. A trendline of the average annual percentage increase between 2007 and peak 2017 levels is provided to emphasize the impact that the typhoon and pandemic had on tourism to the CNMI.

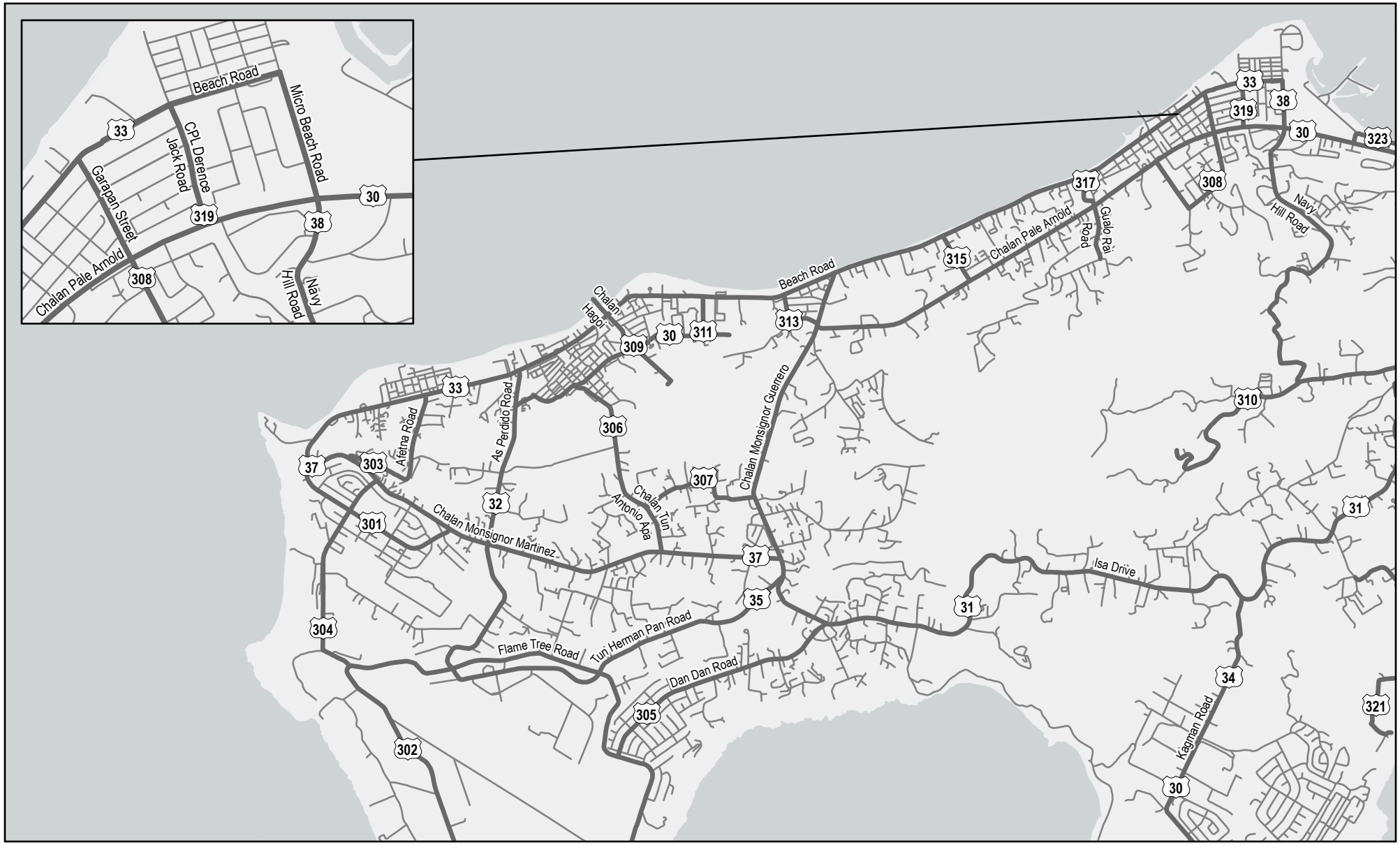
Figure 2-9 Marianas Annual Visitor Levels (Fiscal Years 2007-2021), with Hypothetical Tourism Projection



3 Transportation Systems & Volumes

3.1 Existing Roadway Network

This section discusses the existing transportation facilities on the islands of Saipan, Tinian, and Rota, including the highway network on each island that comprise the scope of this study. The figures on the following pages present the highway network on Saipan, Tinian, and Rota, respectively.



Legend

- Highways
- Other Roads

Paper Size ANSI A

0 2,250 4,500

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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20 - Year Highway Master Plan

SAIPAN
HIGHWAYS

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FIGURE 3-1

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_3-1_Island Highways_Saipan_1
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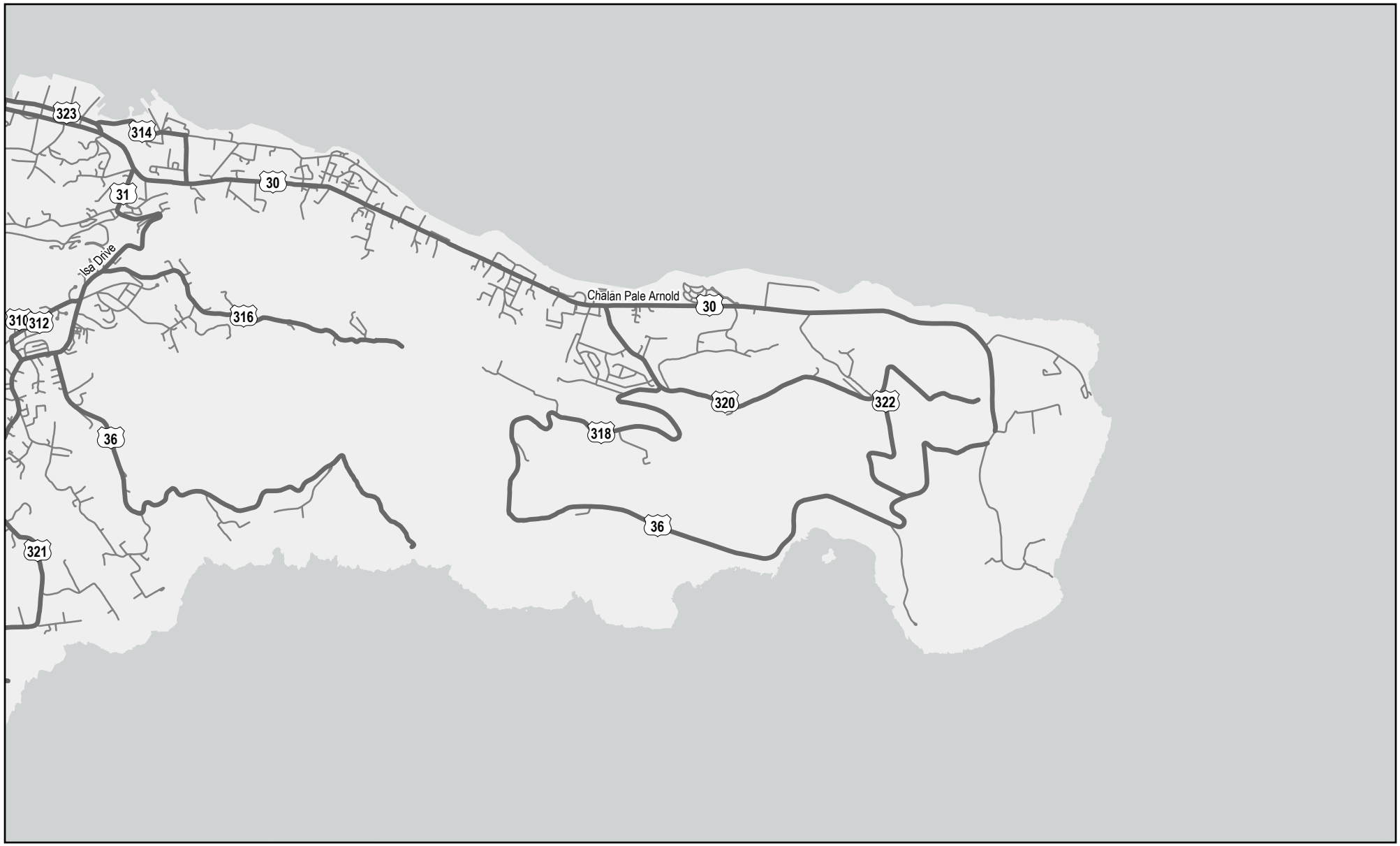
Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; Highways, Roads: TIGER, 2020. Created by: pthornton



Legend

- Highways
- Other Roads

Paper Size ANSI A

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Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

GHD

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

SAIPAN (NORTH)
HIGHWAYS

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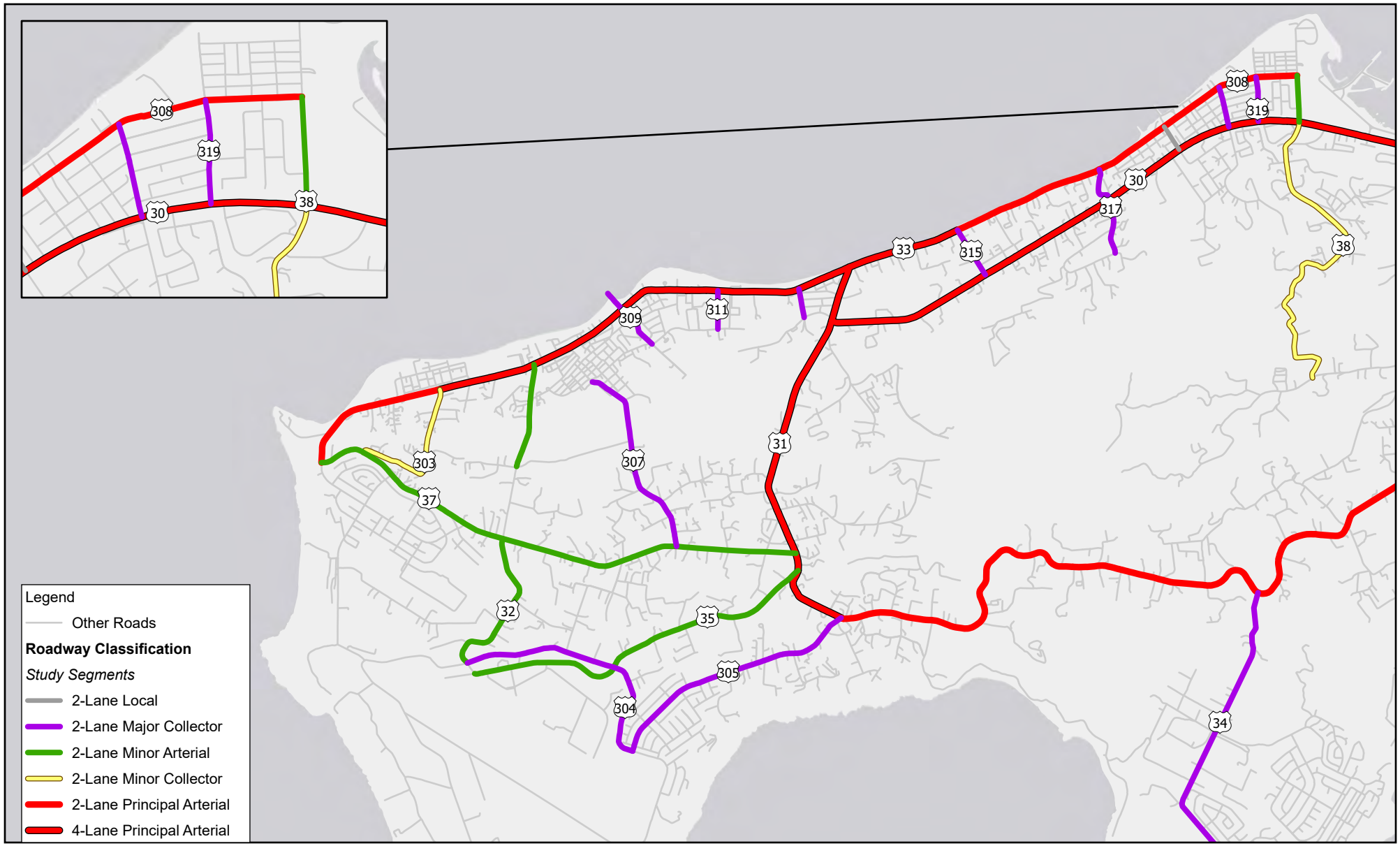
Date **Jun 2022**

FIGURE 3-2

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_3-2_Island Highways_Saipan_2_North
Print date: 29 Jun 2022 - 11:58

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS
Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; Highways, Roads: TIGER, 2020. Created by: pthornton



Paper Size ANSI A

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Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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SAIPAN ROADWAY CLASSIFICATIONS

Project No. **11224010**
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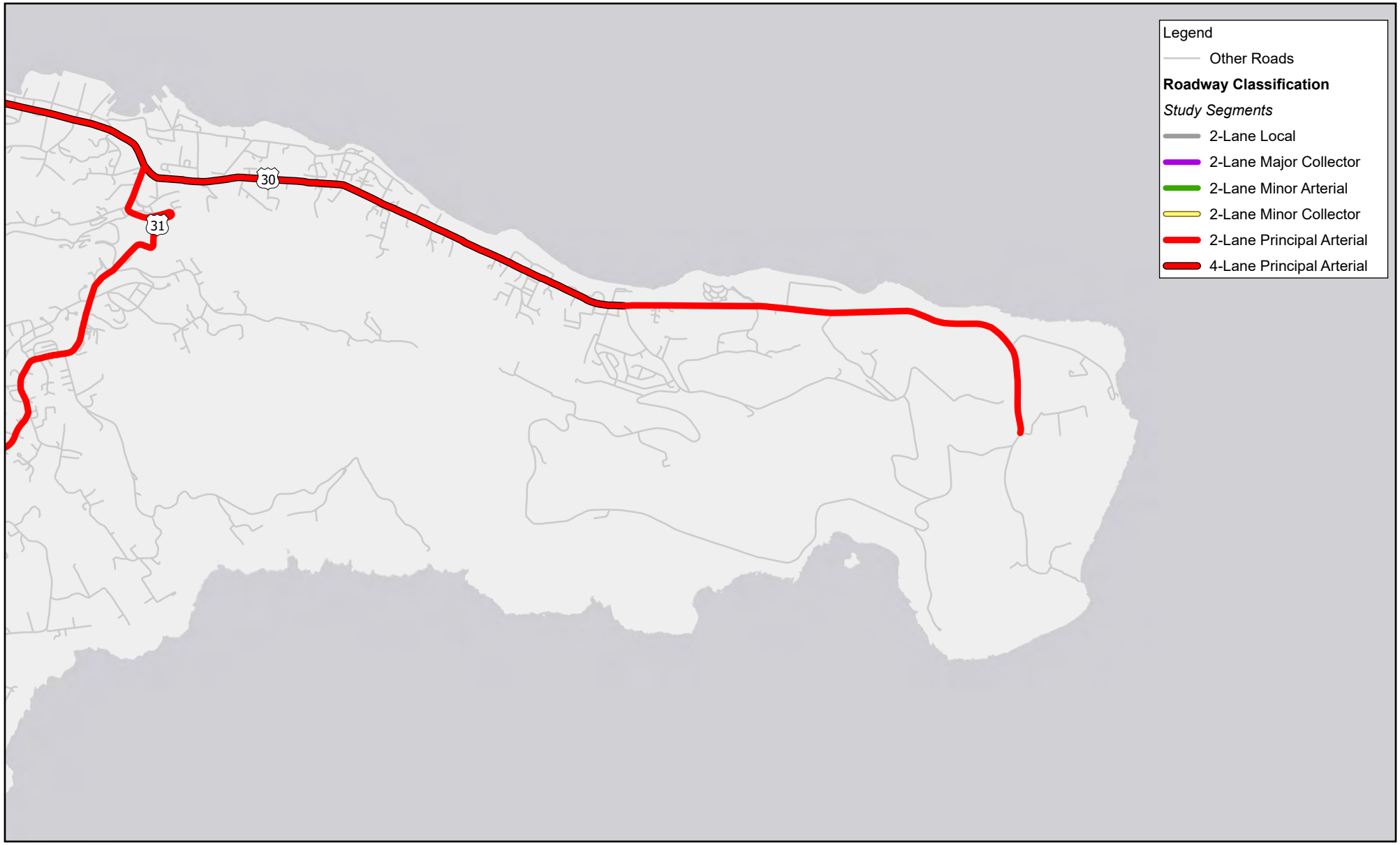
Date **Jun 2022**

FIGURE 3-3

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_3-3 Roadway Classification_Saipan1
Print date: 29 Jun 2022 - 12:06

Data source: World Light Gray Canvas Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, USGSRoadway Classifications: Caltrans, 2021; Roads: TIGER, 2020. Created by: pthornton



Paper Size ANSI A

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Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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SAIPAN (NORTH) ROADWAY CLASSIFICATIONS

Project No. **11224010**
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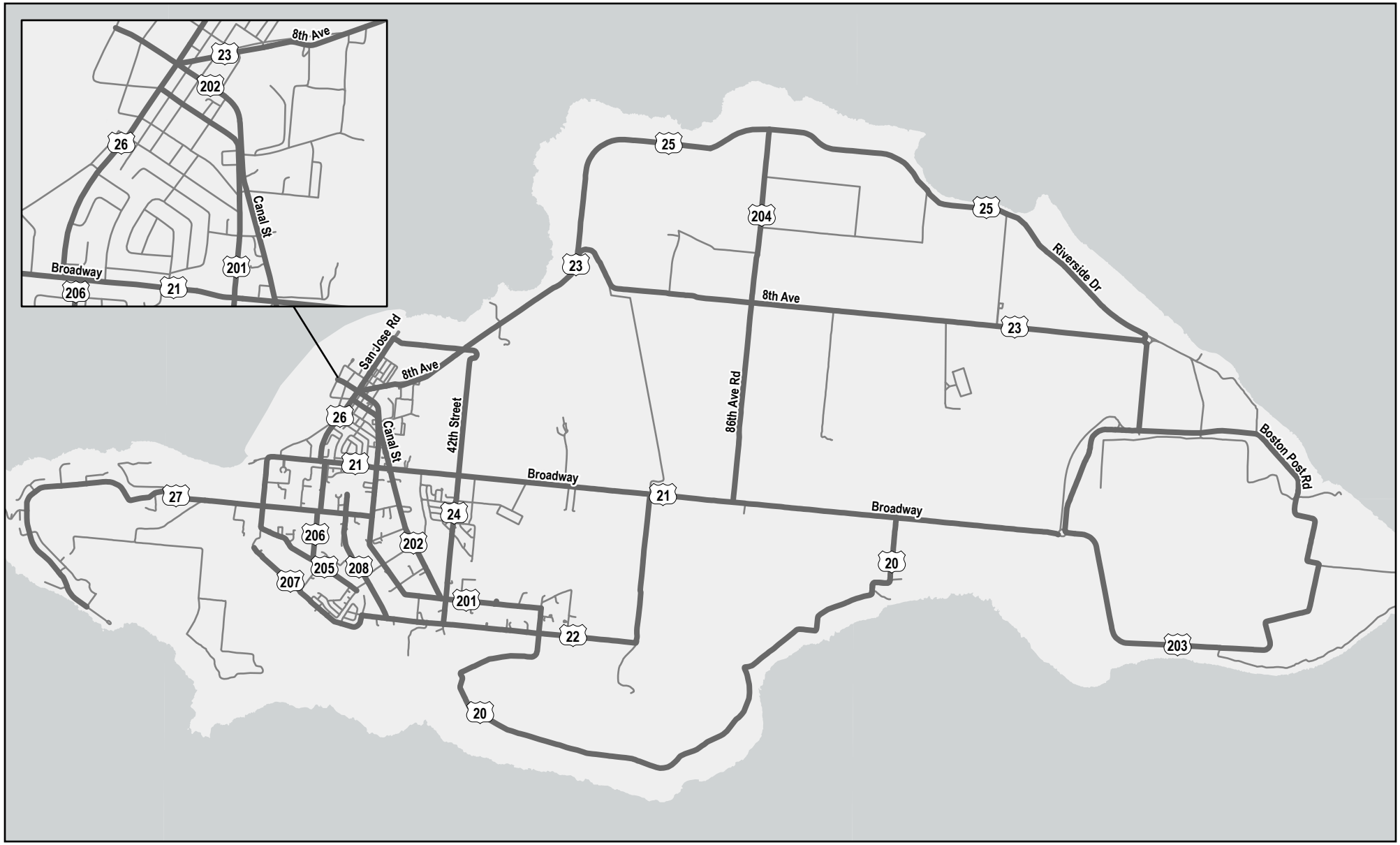
Date **Jun 2022**

FIGURE 3-4

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_3-4_Roadway Classifications_Saipan_2_North
Print date: 29 Jun 2022 - 12:08

Data source: World Light Gray Canvas Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS; Roadway Classifications: Caltrans, 2021; Roads: TIGER, 2020. Created by: pthornton



Legend

- Highways
- Other Roads

Paper Size ANSI A

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Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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TINIAN
HIGHWAYS

Project No. **11224010**
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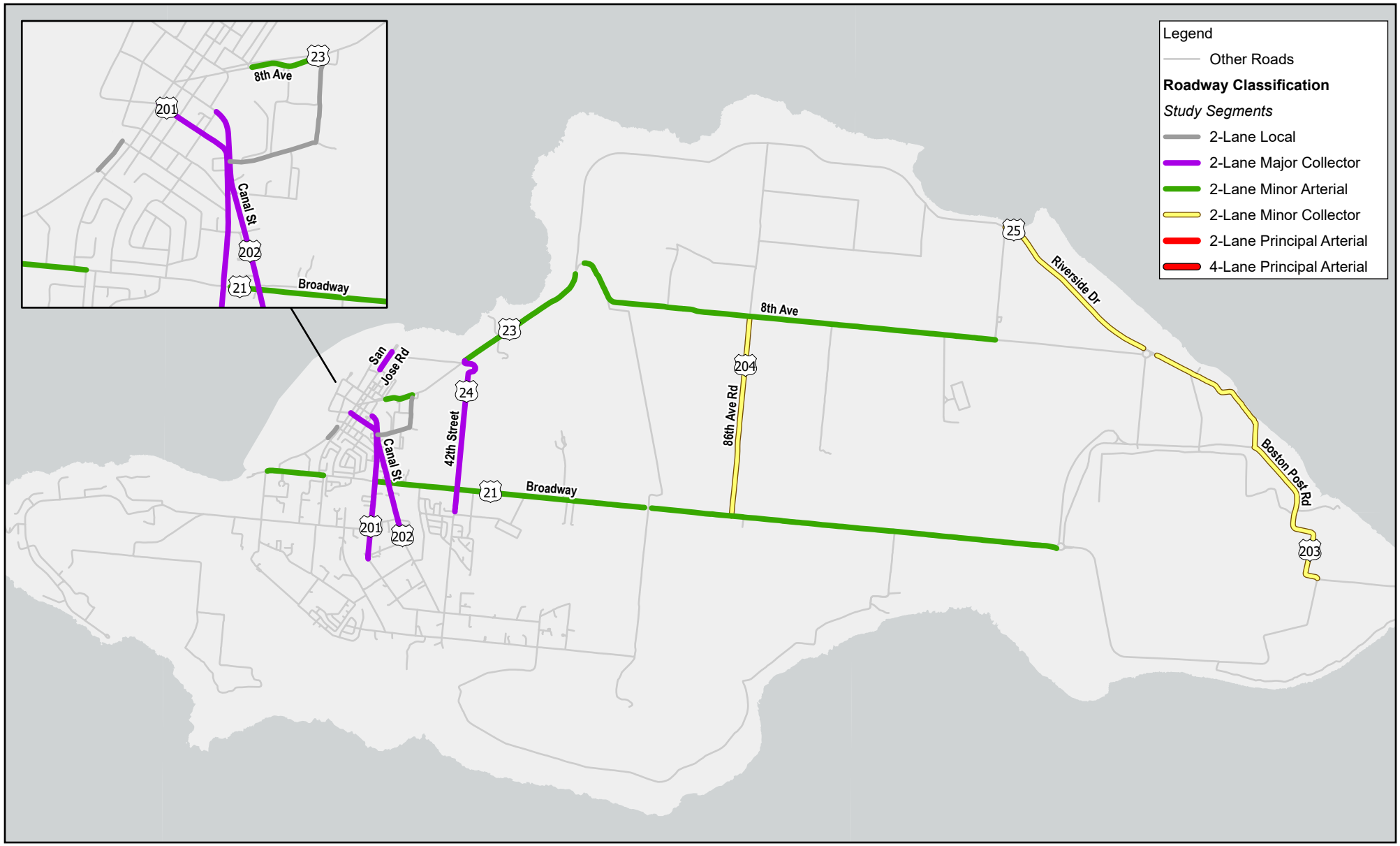
Date **Jun 2022**

FIGURE 3-5

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_3-5_Island Highways_Tinian
Print date: 29 Jun 2022 - 12:03

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; Highways, Roads: TIGER, 2020. Created by: pthornton



Paper Size ANSI A

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US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

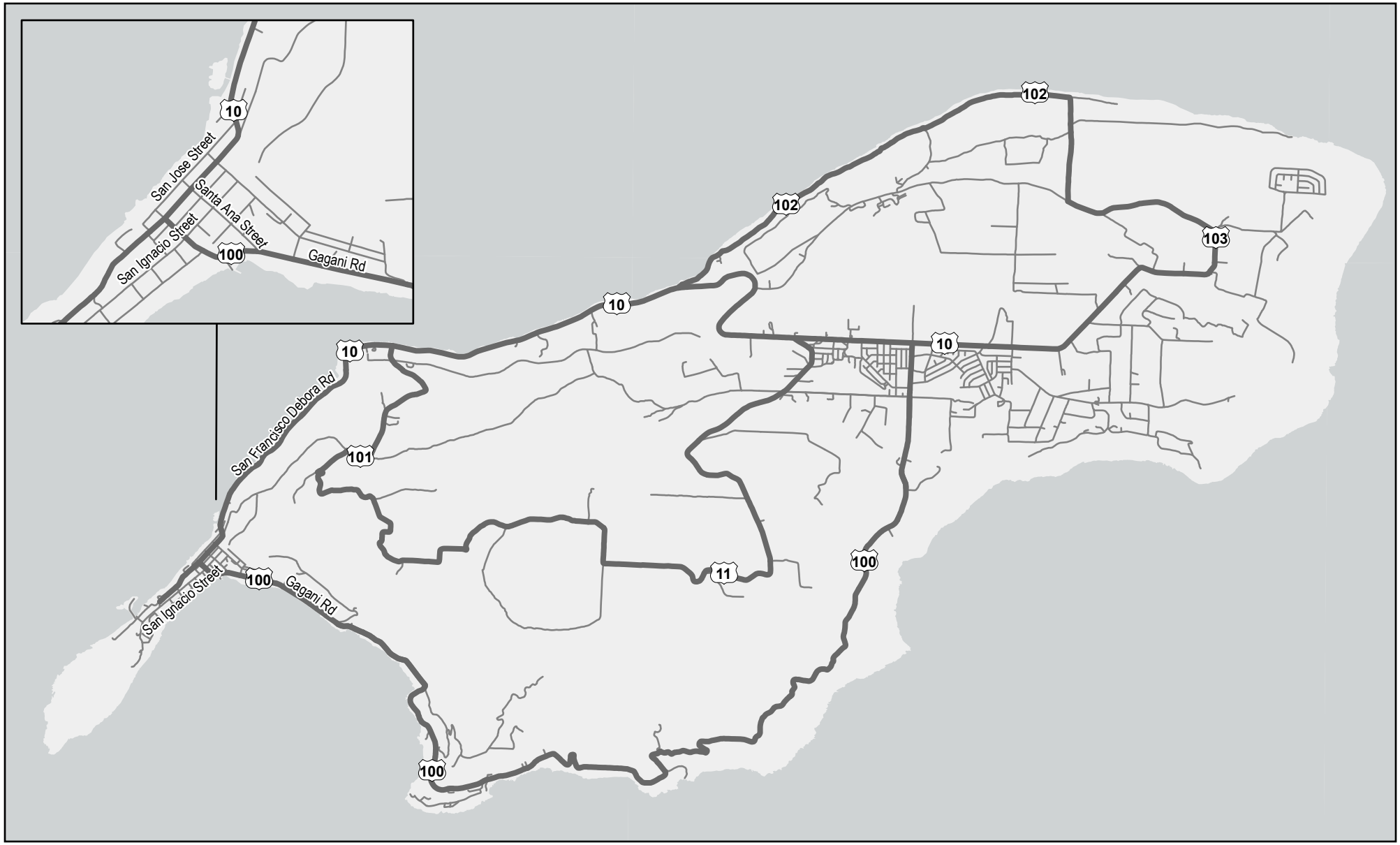
TINIAN ROADWAY CLASSIFICATIONS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-6

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_3-6_Roadway Classifications_Tinian
Print date: 29 Jun 2022 - 12:21

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; Roadway Classifications: Caltrans, 2021; Roads: TIGER, 2020. Created by: pthornton.



Legend

- Highways
- Other Roads

Paper Size ANSI A

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US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

N

GHD

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

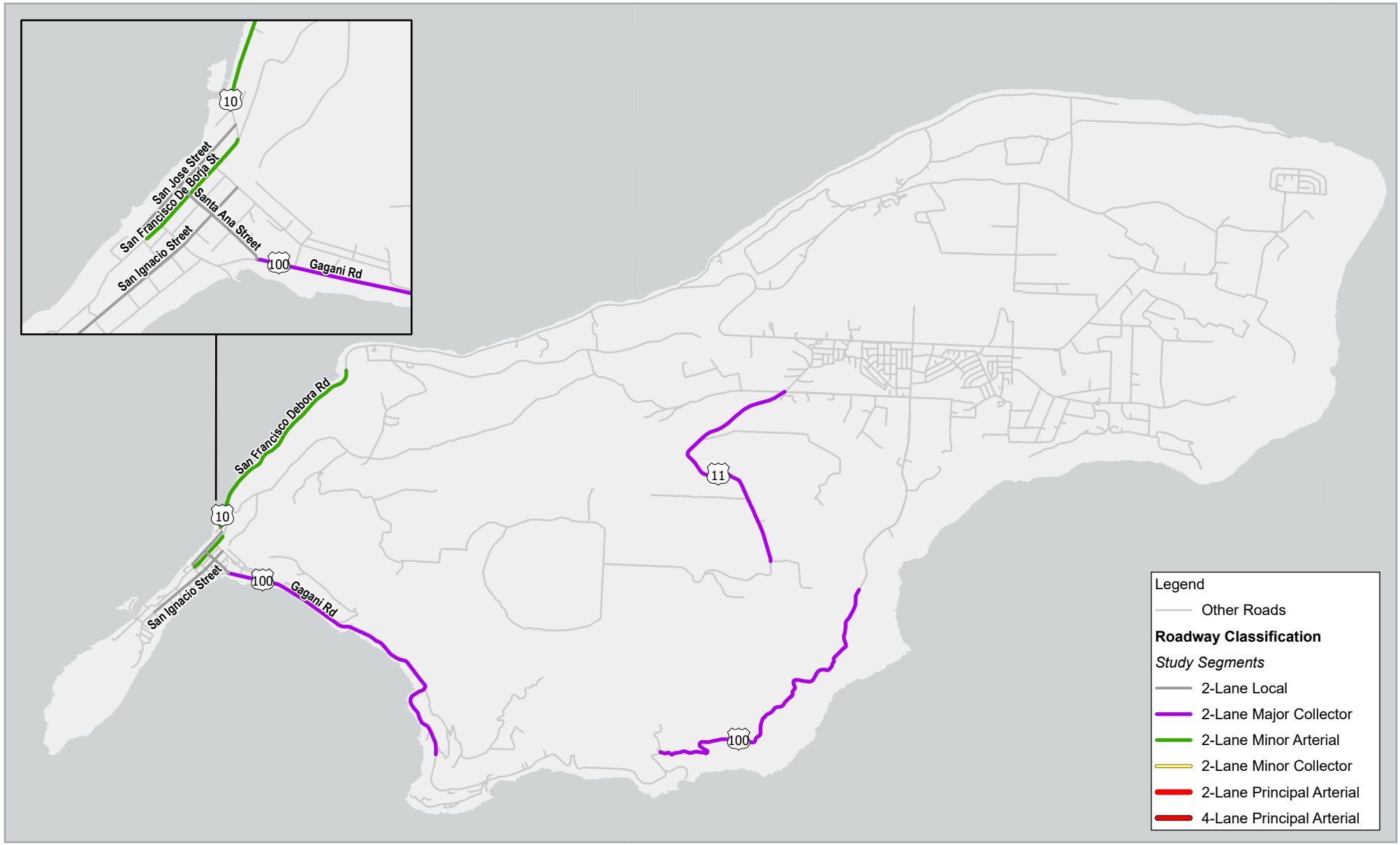
ROTA
HIGHWAYS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-7

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_3-7_Island Highways_Rota
Print date: 29 Jun 2022 - 13:06

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, SafeGraph, METI/NASA, USGS; Highways, Roads: TIGER, 2020. Created by: pthornton



Paper Size ANSI A

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US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

N

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

ROTA ROADWAY CLASSIFICATIONS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-8

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_3-8_Roadway Classifications_Rota
Print date: 29 Jun 2022 - 13:15

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, SafeGraph, METI/NASA, USGS; Roadway Classifications: Caltrans, 2021; Roads: TIGER, 2020. Created by: pthornton

3.1.1 Saipan's Existing Roadway Network

Saipan has the largest amount of existing roadway infrastructure among the three islands. There is a network of paved roadways, including multi-lane arterial roadways. The key roadways of the network included in the analysis are Route 33 (Beach Road), Route 30 (Middle Road/Chalan Pale Arnold), Route 31 (Chalan Monsignor Guerrero), Route 35 (Tun Herman Pan Road), Route 31 (Isa Drive), Route 37 (Chalan Monsignor Martinez), and Route 32 (As Perdido Road).

Route 33 (Beach Road)

Route 33 (Beach Road) functionally begins at the intersection of Micro Beach Road in Garapan and continues south to its terminus where it becomes Koblerville Road in the southern part of the island (Koblerville). This segment is defined as a primary roadway serving as a north-south connection along the western coastline of the island and is approximately seven miles long

Beach Road is a two-lane roadway between Micro Beach Road and Quartermaster Road, where it widens to a four-lane roadway south to Alu Drive. It then narrows to two lanes and a has two-way left turn lanes south of Alu Drive. The segment between Micro Beach Road and Garapan Street features a raised median to restrict some left-turn movements on and off of Beach Road. A signalized pedestrian crosswalk is provided adjacent to the Joeten Hafa Adai Shopping Center located south of Route 319. Additionally, some pedestrian crosswalks along the corridor are accompanied by pedestrian-actuated flashing beacons. These facilities help improve the safety for both pedestrian and vehicle access along Beach Road. Sidewalks are provided on both sides of Beach Road between Micro Beach Road and Garapan Street (Route 308). Few sidewalks are provided on Beach Road south of the Garapan Village. An elevated pedestrian pathway runs parallel to Beach Road along the majority of the island's southwestern coast. However, the much of the pedestrian pathway is in disrepair (see photos).

Photo 3-1 Existing View of Beach Road Parkway (A)

Photo 3-2 Existing View of Beach Road Parkway (B)

Photo 3-3 Existing View of Beach Road Parkway (C)

The 2022 *Beach Road Pathway Masterplan* recommends improvements to the southwestern shoreline to enhance coastal resilience while enhancing the experience for users of the existing pathway and improving accessibility to public spaces on the coast. The photo below shows the study area for the Beach Road pathway improvements.

Photo 3-4 Beach Road Pathway Masterplan Study Area

Table 3-1 summarizes the roadway segments on Beach Road and major characteristics for each roadway segment. While side streets and driveways are generally stop-sign controlled along Beach Road, there are six signalized intersections along the corridor. They are located at Garapan Street, Route 31 (Chalan Monsignor Guerrero) (Route 31), Sarawi Boulevard, Insatto Street, Route 309, and As Perdido (Route 32).

Completed Roadway Improvements

– Traffic signal installation completed at the intersection of Beach Road & Tun Segundo Street

Table 3-1 Route 33 (Beach Road) Segments

Segment	Segment Location	Lanes	Characteristics
S-1	Micro Beach Road (Route 38) to Garapan Street (Route 308)	2	- Raised-median with left-turn pocket at major intersections and driveways - On-street parking on both sides of street - Sidewalk on both sides of road - Pedestrian signal near the DFS Store - High pedestrian activities - Mainly Commercial and Retail business
S-2	Garapan Street (Route 308) to Route 317 (Gualo Rai Road)	2	- Undivided with two-way left-turn (TWLT) lane - Mainly commercial and retail business
S-3	Route 317 (Gualo Rai Road) to Route 315 (Quartermaster Road)	2	- No raised- or striped median - SB left-turn pocket provided at Quartermaster Road - Low-density commercial business
S-4	Route 315 (Quartermaster Road) to Chalan Monsignor Guerrero (Route 31)	4	- No raised median or striped median - No turn lanes for unsignalized intersections - Residential and commercial retails on eastside of road
S-5	Chalan Monsignor Guerrero (Route 31) to Chalan Hagoi (Route 309)	4	- No raised- or striped-median - Exclusive left-turn lanes provided at major intersections
S-6	Chalan Hagoi (Route 309) to Route 32 (As Perdido Road)	4	- No raised median or striped median - No turn lanes for unsignalized intersections - Residential and commercials retails fronting the roadway - High pedestrian activities in the vicinity of the Grand and Diamond Hotel
S-7	Route 32 (As Perdido Road) to Afetna Road (Route 303)	2	- Undivided with two-way left-turn (TWLT) lane - Mixed development on sides of road - Faded pavement delineations
S-8	Afetna Road (Route 303) to As Gonno Road (Route 304)	2	- Undivided with two-way left-turn (TWLT) lane - Mixed development on sides of road

Route 30 (Middle Road/Chalan Pale Arnold)

Route 30 (Middle Road/Chalan Pale Arnold), also known as Middle Road and Chalan Pale Arnold, extends from its northern terminus of As Matius Road (Route 320), loops around the northern tip of the island (partially unpaved up to Bird Island Observatory), and continues south along the western coast to its southern terminus at Route 31 (Chalan Monsignor Guerrero) in San Jose. The entire roadway is approximately 18 miles long and serves as a major north/south route across Saipan. Middle Road/Chalan Pale Arnold is classified as major arterial road south of As Matius Road. North of As Matius Road, Middle Road/Chalan Pale Arnold is classified as a collector road.

Middle Road/Chalan Pale Arnold is a four-lane roadway with portions of both undivided and divided segments. Divided segments include center medians separating bidirectional traffic.

There are eight signalized intersections along Middle Road/Chalan Pale Arnold. They are located at Lower Base Road (Route 314), Isa Drive (Route 31), Smiling Cove Road, Micro Beach Road (Route 38), Garapan Street/Sugar King Road (Route 308), Route 317 (Gualo Rai Road), Quartermaster Road (Route 315), and Route 31 (Chalan Monsignor Guerrero) (Route 31).

High-visibility pedestrian crosswalks are provided at multiple locations (signalized and unsignalized) along Middle Road/Chalan Pale Arnold. These crosswalk facilities provide safer pedestrian access in the hotel,resort,and urbanized commercial areas.

Table 3-2 Route 30 (Middle Road/Chalan Pale Arnold) Segments

Segment	Segment Location	Lanes	Characteristics
S-9	North of As Matius Road (Route 320)	2	- Undivided - Rural, with a few fronting hotel resort areas
S-10	As Matius Road (Route 320) to Route 31 (Isa Drive)	4	- Mostly undivided - Left-turn pockets and unsignalized crosswalks provided at major access locations - Fronted by low-density residential, industrial, and hotel resorts
S-11	Route 31 (Isa Drive) to Smiling Cove Road	4	- Mostly undivided, striped median on some major intersection approaches - Left turn pockets provided at Isa Drive and Smiling Cove Road - Fronted by industrial land uses on the west side of the road
S-12	Smiling Cove Road to Route 317 (Gualo Rai Road)	4	- Undivided - Exclusive turn lanes and crosswalks provided at signalized intersections - Fronted mainly by commercial and retail land uses - Characterized by high pedestrian activity
S-13	Route 317 (Gualo Rai Road) to Quartermaster Road (Route 315)	4	- Undivided - Exclusive turn lanes and crosswalks provided at signalized intersections - Fronted mainly by commercial and retail land uses
S-14	Route 315 (Quartermaster Road) to Chalan Monsignor Guerrero (Route 31)	4	- Undivided - Exclusive turn lanes and crosswalks provided at signalized intersections - Fronted by commercial land uses, with driveways connecting to low-density residential areas

Route 31 (Chalan Monsignor Guerrero)

Chalan Monsignor Guerrero is an east-west street providing a connection between Beach Road in the west and Isa Drive in the east. The entire roadway is approximately 2.5 miles long. According to the existing roadway classification, Chalan Monsignor Guerrero is a 4-lane principal arterial. Table 3-3 summarizes the characteristics of the study roadway segments on Chalan Monsignor Guerrero.

The intersections at Beach Road, Middle Road/Chalan Pale Arnold, Chalan Tun Antonio, Chalan Monsignor Martinez, Tun Herman Pan Road, and Isa Drive / Route 305 (DanDan Road) are signalized. At each of these intersections, exclusive turn lanes are provided for most turning movements.

Table 3-3 Route 31 (Chalan Monsignor Guerrero) Segments

Segment	Segment Location	Lanes	Characteristics
S-15	Route 33 (Beach Road) to Route 30 (Middle Road/Chalan Pale Arnold)	4	- Undivided, with striped median - Turn lanes provided at intersections of Beach Road and Middle Road/Chalan Pale Arnold - Fronted by commercial and retail land uses
S-16	Route 30 (Middle Road/Chalan Pale Arnold) to Route 35 (Tun Herman Pan Road)	4	- Undivided - No turn lanes provided at unsignalized intersections - Fronted by low-density residential and mixed-use developments
S-17	Route 35 (Tun Herman Pan Road) to Route 31 (Isa Drive) / Route 305 (DanDan Road)	4	- Undivided, with medians on some intersection approaches - No turn lanes provided at unsignalized intersections - Fronted by residential land uses

Route 35 (Run Herman Pan Road)

Route 35 (Tun Herman Pan Road) is a north-south road extends from Saipan International Airport to Chalan Monsignor Guerrero. The entire roadway is approximately 2.5 miles long and is classified as a 2-lane minor arterial roadway. Roadway characteristics for the study segments on Tun Herman Pan Road are summarized in Table 3-4.

Table 3-4 Route 35 (Tun Herman Pan Road) Segments

Segment	Segment Location	Lanes	Characteristics
S-18	Route 31 (Chalan Monsignor Guerrero) to Route 304 (Flame Tree Road)	2	- Undivided - Fronted by low density residential land uses
S-19	Route 304 (Flame Tree Road) to As Gonno Road	2	- Undivided - Airport access

Route 31 (Isa Drive)

Route 31 (Isa Drive) extends from Tun Herman Pan Road to Middle Road/Chalan Pale Arnold, providing access to several villages in the eastern portion of Saipan. The roadway is approximately 7.6 miles long and is classified as 2-lane principal arterial roadway. Roadway characteristics for study segments on Isa Drive are summarized in Table 3-5.

Isa Drive is an undivided two-lane road traversing mountainous terrain. In certain areas, the roadway alignment is especially winding with sharp curves. Traffic signals are present at the intersections of Tun Herman Pan Road, Dandan Road, and Middle Road/Chalan Pale Arnold. Exclusive turn lanes are provided at these locations for all turning movements.

Table 3-5 Route 31 (Isa Drive) Segments

Segment	Segment Location	Lanes	Characteristics
S-20	Route 30 (Middle Road/Chalan Pale Arnold) to Capitol Hill Road (Route 312)	2	- Undivided
S-21	Capitol Hill Road (Route 312) to Route 305 (Dandan Road)	2	- Undivided

Completed Roadway Improvements

– Vehicle turnout installed at Isa Drive & Capitol Hill Road
– Improved signage implemented along Isa Drive near Kagman Road

Route 305 (Dandan Road)

Route 305 (Dandan Road) extends from Route 304 (Flame Tree Road) north through Dandan Village to Route 31 (Isa Drive) spanning approximately 1.7 miles. Dandan Road is an undivided two-lane road. A traffic signal is located at its northern terminus where it intersects Isa Drive as the minor road. At the southern terminus, Dandan Road intersects at Flame tree Road at an uncontrolled intersection.

Along its length, Dandan Road is accessed by local roads and driveways of fronting residential properties. Roadway characteristics for the study segment on Dandan Road are summarized in Table 3-6.

Table 3-6 Route 305 (Dandan Road) Segments

Segment	Segment Location	Lanes	Characteristics
S-22	Route 31 (Chalan Monsignor Guerrero) to Route 304 (Flame Tree Road)	2	- Undivided, unstriped

Route 304 (Flame Tree Road)

Route 304 (Flame Tree Road) extends northwest from its eastern terminus at Naftan Road (Route 302), makes up the southern limit of Dandan Village, and continues southwest past Saipan International Airport. At its western terminus, Flame Tree Road forms a three-way intersection with Naftan Road and As Gonno Road. Flame Tree Road continues west beyond this intersection by way of As Gonno Road.

The majority of Flame Tree Road has a centerline stripe dividing the two directions of travel, including the study segments summarized in Table 3-7. The intersection of Flame Tree Road and As Perdidio Road (Route 35) is all-way stop-controlled (AWSC). Access to other minor roads along Flame Tree Road is either uncontrolled or side-street stop-controlled (SSSC) also known as two-way stop-controlled (TWSC).

Table 3-7 Route 304 (Flame Tree Road) Segments

Segment	Segment Location	Lanes	Characteristics
S-23	Route 305 (Dandan Road) to Tun Herman Pan Rd (Route 35)	2	- Undivided - Centerline stripe on a portion of the segment
S-24	Tun Herman Pan Road (Route 35) to Route 32 (As Perdido Road)	2	- Undivided

Route 37 (Chalan Monsignor Martinez)

Route 37 (Chalan Monsignor Martinez) extends from its southern terminus at Beach Road to Chalan Monsignor Guerrero (Route 31), spanning approximately 3.3 miles. Chalan Monsignor Martinez is a two-lane road with centerline markings along its entire length. Chalan Tun Joaquin Doi connects to Chalan Monsignor Martinez at an uncontrolled intersection. Roadway characteristics for the study segments on Isa Drive are summarized in Table 3-8.

Table 3-8 Route 37 (Chalan Monsignor Martinez) Segments

Segment	Segment Location	Lanes	Characteristics
S-25	Route 31 (Chalan Monsignor Guerrero) to Chalan Tun Joaquin Doi	2	- Undivided
S-26	Chalan Tun Joaquin Doi to Beach Road	2	- Undivided

Route 32 (As Perdido Road)

Route 32 (As Perdido Road) is a two-lane undivided roadway which provides east-west mobility between Beach Road and the Saipan International Airport. It is classified as a minor arterial roadway. The entire roadway is approximately 2.2 miles long. There are two signalized intersections along As Perdido Road, located at Beach Road and Chalan Monsignor Martinez. Roadway characteristics for the study segments on As Perdido Road are summarized in Table 3-9.

Table 3-9 Route 32 (As Perdido Road) Segments

Segment	Segment Location	Lanes	Characteristics
S-27	Route 33 (Beach Road) to Route 37 (Chalan Monsignor Martinez)	2	- Undivided - Fronted by low density residential and light industrial
S-28	Route 37 (Chalan Monsignor Martinez) to Tun Herman Pan Road	2	- Undivided - Fronted by scattered residential and other developments

Completed Roadway Improvements

– Improved signage implemented along Route 32 (As Perdido Road)

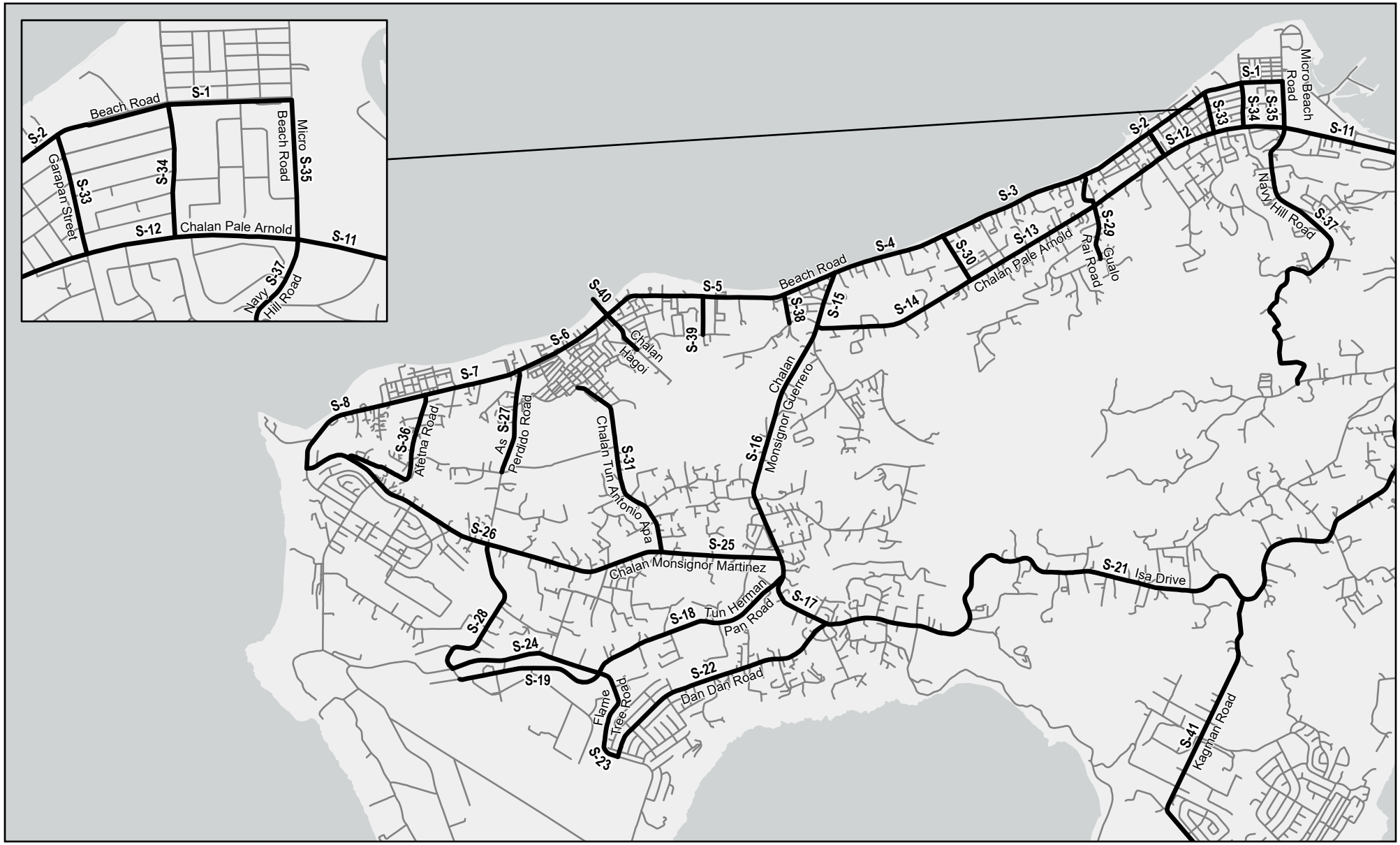
Other Roadway Segments

In addition to the roadway segments presented above, the remaining study segments are listed in Table 3-10.

Table 3-10 Other Study Roadway Segments

Segment	Segment Location	Lanes	Characteristics
S-30	Route 315 (Quartermaster Road)	2	- Undivided
S-31	Chalan Tun Joaquin Doi	2	- Undivided
S-32	Ropa Di Oru Street	2	- Undivided
S-33	Garapan St	2	- Undivided
S-34	CPL Deference Jack Road	2	- Undivided
S-35	Route 38 (Micro Beach Road)	2	- Undivided
S-36	Afetna Road	2	- Undivided
S-37	Navy Hill	2	- Undivided
S-38	Oleai Street	2	- Undivided
S-39	Tekken Street	2	- Undivided
S-40	Chalan Hagoi	2	- Undivided
S-41	Kagman Road	2	- Undivided

The figure on the following pages provides a map of study roadway segments on the island of Saipan.



Legend

- Roadway Study Segments
- Other Roads

Paper Size ANSI A

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Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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ROADWAY STUDY SEGMENTS - SAIPAN

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FIGURE 3-9

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Print date: 29 Jun 2022 - 13:32

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS
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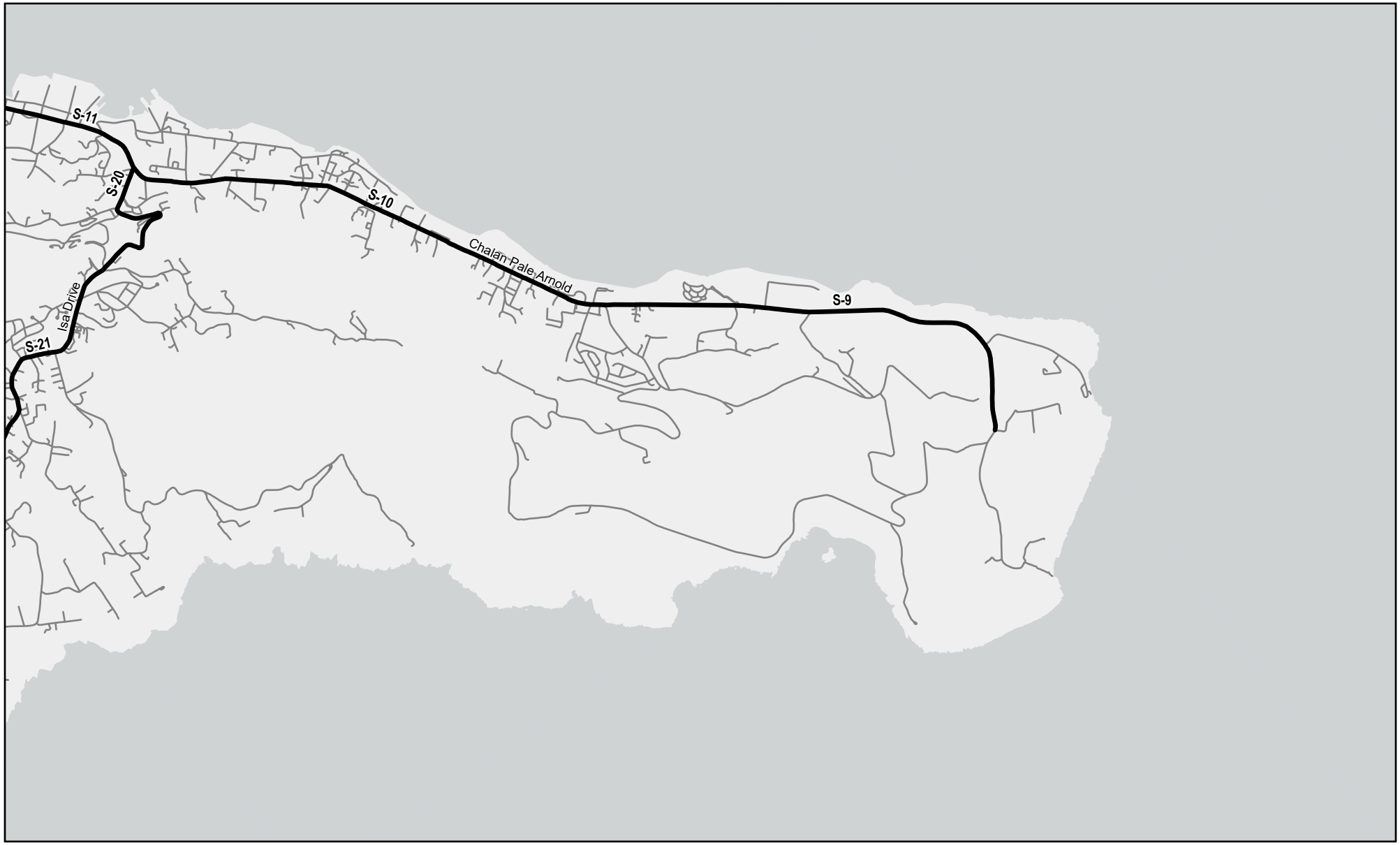

Legend

- Other Roads
- Roadway Study Segments

Paper Size ANSI A

0 2,250 4,500

Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

ROADWAY STUDY SEGMENTS - SAIPAN (NORTH)

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-10

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_3-10_Study_Segments_Saipan_2_North
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3.1.2 Tinian's Existing Roadway Network

Study roadway segments on the island of Tinian are listed in Table 3-11 and mapped in the figure on the following page.

Table 3-11 Tinian Study Roadway Segments

Segment ID	Segment Location	# of Lanes	Characteristics
T-1	Riverside Drive, east of 8th Street	2	- Undivided
T-2	Riverside Drive, west of 8th Street	2	- Undivided
T-4	8th Street, north of 86th Street	2	- Undivided
T-5	8th Street, south of 86th Street	2	- Undivided
T-6	86th Ave, 8th Street to Broadway	2	- Undivided
T-7	Broadway, north of 86th Street	2	- Undivided
T-8	Broadway, north of 42nd Street	2	- Divided
T-9	Broadway, 42nd Street to Route 201	2	- Divided
T-10	42nd Street, west of Broadway	2	- Undivided
T-11	8th Street, north of 42nd Street to Riverside Dr	2	- Undivided
T-12	No Name (School Road), Route 202 to 8th Street	2	- Undivided
T-13	8th Street, north of Canal Street	2	- Undivided
T-14	Canal Street, East/west of Broadway	2	- Undivided
T-15	Route 201, east/west of Broadway	2	- Undivided
T-16	Broadway, south end / north of Wall Street	2	- Undivided
T-17	No name, at Bus Stop / south of Kammer Beach	2	- Undivided
T-18	No Name, road north of Breakwater Park	2	- Undivided

Legend

- Other Roads
- Roadway Study Segments

Paper Size ANSI A

0 1,500 3,000 4,500 6,000

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

N

GHD

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

ROADWAY STUDY SEGMENTS - TINIAN

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-11

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Print date: 29 Jun 2022 - 13:40

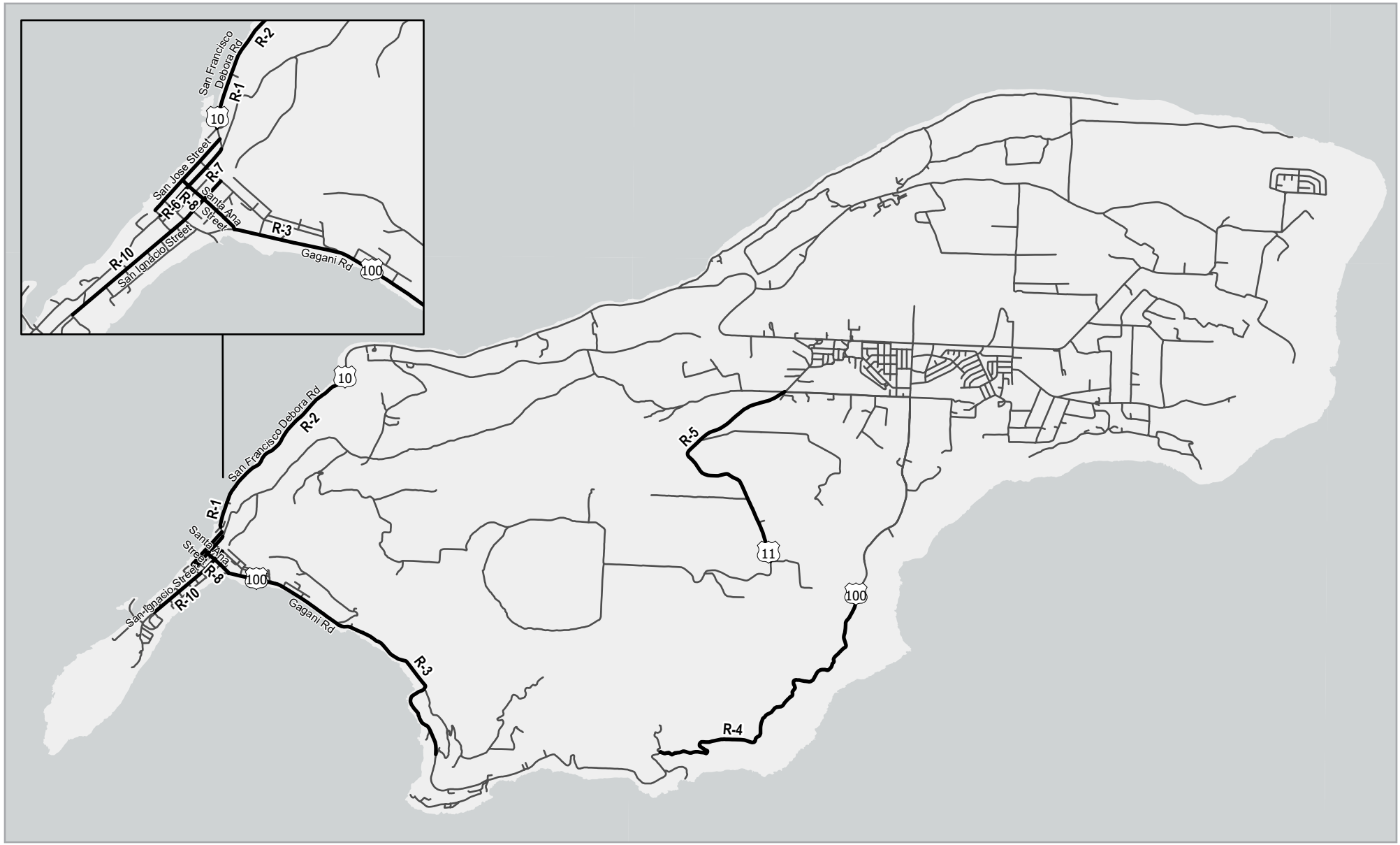
Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; Roads: TIGER, 2020. Created by: pthornton

3.1.3 Rota's Existing Roadway Network

Study roadway segments on the island of Rota are listed in Table 3-12 and mapped in the figure on the following page.

Table 3-12 Rota Study Roadway Segments

Segment ID	Segment Location	# of Lanes	Characteristics
R-1	Route 10, south of Route 101	2	- Undivided
R-2	Route 10, north of Route 101	2	- Undivided
R-3	Route 100, south of Songsong Village	2	- Undivided
R-4	Route 100, along southeastern coast	2	- Undivided
R-5	Route 11	2	- Undivided
R-6	San Jose Street, south of Route 10	2	- Undivided
R-7	San Francisco De Borja St, south of Route 10	2	- Undivided
R-8	Santa Ana Street, San Jose St to Route 100	2	- Undivided
R-9	San Ignacio Street, north of Santa Ana Street	2	- Undivided
R-10	San Ignacio Street, south of Santa Ana Street	2	- Undivided



Legend

- Other Roads
- Roadway Study Segments

Paper Size ANSI A

0 1,500 3,000 4,500 6,000

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

ROADWAY STUDY SEGMENTS - ROTA

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-12

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_3-12_Study_Segments_Rota Print date: 29 Jun 2022 - 13:47

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, SafeGraph, METI/NASA, USGS; Highways, Roads: TIGER, 2020. Created by: pthornton

3.2 Existing Pavement Conditions

In 2018, Typhoon Yutu struck Tinian and Saipan, causing damage and sediment buildup on the transportation infrastructure. Issues with roadway surfaces, such as potholes, frequent flooding, and lack of paved shoulders have been identified as potential hazards. The Department of Public Works Technical Services Division's Four-Year Transportation Improvement Plan listed several resurfacing treatments to be installed between fiscal years 2017-2020. Photographs documenting the existing pavement conditions on Saipan are provided on the following page andinclude examples of roadways without pavement or with poor pavement conditions.

Photo 3-5 Intersection at Route 38 (Micro Beach Road) & Route 30 (Middle Road/Chalan Pale Arnold)

Photo 3-6 Unpaved Roadway near Peace Park

Photo 3-7 Unpaved Surface in Industrial Port Area (Route 323)

3.3 Multimodal Facilities

3.3.1 Complete Street Design Standards

The CNMI Department of Public Works (DPW) uses both AASHTO and NACTO for multimodal facility design standards. AASHTO – the American Association of State Highway and Transportation Officials – is a non-governmental association that provides guidance for the design of highway systems as it relates to all transportation modes, including air, highways, public transportation, active transportation, rail, and water. AASHTO addresses the areas of planning, designing, constructing, and maintaining transportation systems and services.

NACTO – the National Association of City Transportation Officials – is an association of cities and transit agencies across North America that provides guidance for street design that prioritizes people walking, biking, and taking transit. Specifically, NACTO's *Street Design Guide* provides examples of best practices and critical features of street design elements, including intersections, that enhance community mobility on streets.

The CNMI *Comprehensive Sustainable Development Plan* (CSDP) identifies the following "Complete Streets" goal:

> Invest in "Complete Streets" concepts that plan for and achieve safe, multi-modal transportation to community centers, encourage health and well-being by creating walkable and inviting spaces that accommodate the necessary infrastructure to support sustainable growth.

However, most of the roadways on the CNMI were built decades ago and do not include multimodal facilities or the type of facilities that are currently recommended by AASHTO and NACTO. For example, the following list summarizes the existing multimodal conditions on most roads on the CNMI:

- Minimal, sub-standard, or non-existent sidewalk.
- Minimal, sub-standard, or non-existent bicycle lanes.
- Wide pedestrian crossings across roadways.
- Minimal or non-existent separation of non-motorized and motorized traffic.
- Minimal or sub-standard transit stops.

The Highway Master Plan makes recommendations to improve multimodal facilities across the islands, as presented in Chapter 6.

3.3.2 CNMI Existing Multimodal Facility Conditions

Saipan

Sidewalk facilities are mainly located within the developed commercial center of Garapan and fronting Route 30 at the location of Marianas High School. Automobile travel remains the primary mode of transportation supported by the infrastucture between developed areas. Photographs documenting existing conditions of multimodal infrastrucutre on Saipan are provided on the following page.

Roadway audits were performed as part of a data collection study for the *2021 Availability of Street-Level Supports for Walking in Saipan*. During these audits, the following observations were recorded:

> *When safety factors were assessed, it was found that 17.5-percent of segments had no streetlights, 24.3-percent had stray dogs present, and 72.3-percent had no sidewalks. Of the segments with sidewalks, 78.3-percent had no buffer between the sidewalk and the road. Of the segments without a sidewalk, 30.7-percent had no other roadside space to walk. Commercial segments had a lack of streetlights compared to residential segments (19.2-percent vs 12.0-percent, $p<0.05$). In addition, residential segments had a significantly higher prevalence of stray dogs present compared to commercial segments (42.0-percent vs 18.6-percent, $p<0.05$).*
>
> *When physical disorder was assessed, it was found that 41.8-percent of sidewalks had major trip hazards, such as misalignment, overgrowth, cracks, or incomplete sidewalks. 46.8-percent of segments had*

abandoned buildings or overgrown vacant lots and 18.9-percent were considered to have some or high amounts of litter.

When functional design was assessed, it was found that 12.6-percent of segments had access to a park, 24.3-percent had public transportation access, 18.0-percent had places to sit, 1.5-percent had adequate sun coverage, and 1.0-percent had a designated bike lane.

When crossings were assessed, it was found that 60.0-percent had no walk signal present, 54.0-percent had no pedestrian signs present, and 80.0-percent had no marked crosswalk on the road. Of the crosswalks that were marked, 67.4-percent were worn or faded to the point they are difficult to be seen.

The overall walkability score of all street segments evaluated on Saipan was 6.57 (95-percent CI: 6.25, 6.88) out of 20 possible points. Commercial areas had a higher walkability score (7.10; 95-percent CI: 6.76, 7.45) than residential areas (4.90; 95-percent CI: 4.39, 5.41).

According to this report, the primary infrastructure-related challenges for safe pedestrian travel on Saipan are:

– Lack of adequate and connected pedestrian pathways and sidewalks
– Lack of or incomplete or faded cross-walks at intersections
– Limited or inadequate lighting in pedestrian areas
– Presence of major trip hazards, such as misalignment, overgrowth, cracks, or incomplete sidewalks.
– Limited connections to places of interest, such as parking spaces, public transportation, etc.
– Lack of pedestrian signalsat signalized intersections
– Lack of pedestrian signage

Tinian

Pedestrian infrastructure on Tinian is composed of sidewalks adjacent to Canal Street and Route 201 in the developed area of the San Jose community. Walking access to the sites of interest along the northern coast of Tinian is limited.

Rota

The developed communities on the island of Rota, Songsong Village and Sinpalu Village, lack dedicated pedestrian infrastructure. The highway routes along the north and south coastlines also lack pedestrian and bicycle infrastructure, which limits non-motorized accessibility across the island.

Photo 3-8 Lack of Pedestrian Facilities near a School (Intersection of Route 304 & Route 301)

Photo 3-9 Lack of Pedestrian Pathway or Sidewalk along Route 38 (Micro Beach Road)

Photo 3-10 Missing crosswalk – Intersection of Route 38 & Route 30

3.4 Public Transit

The Commonwealth Office of Transit Authority (COTA) provides the following bus transit service routes on Saipan:

– Route 1A – Flame Tree Line: Travels between Northern Marianas College and Garapan, serving stops along Chalan Monsignor Guerrero and Middle Road/Chalan Pale Arnold.
– Route 1B – Flame Tree Line: Spans Route 37 (Chalan Monsignor Martinez), serving several stops at the southern portion of the island, and continues Beach Road up to Garapan.
– Route 2: Travels between Garapan and San Roque, serving stops along Middle Road/Chalan Pale Arnold.
– Route 3: Travels between Garapan and Kagman, stopping along Middle Road/Chalan Pale Arnold and Isa Drive.
– Route 4: Travels between Northern Marianas College and Kagman, serving several stops near Saipan International Airport, within the community of Dandan, and along Isa Drive.

The current headway (the duration between vehicles in a transit system) for all routes is 120 minutes.

3.5 Truck Routes, Airports, & Goods Movement

Truck Routes

In Saipan, Route 33 (Beach Road) and Route 30 (Middle Road/Chalan Pale Arnold) form the major commercial vehicle routes for the movement of goods between the developed areas along the west coast of the island. Route 31, Chalan Monsignor Guerrero and Isa Drive, provide commercial vehicle access to the developed areas on the eastern portions of the island, such as the villages of Dandan and Kagman. However, the sharp curves and pavement conditions on the northern portion of Route 31 just south of Route 30 can limit the traversability of the road for high-gross weight commercial vehicles. Route 304, As Gonno Road and Flame Tree Road, provide commercial vehicle access between Saipan International Airport and the communities of San Antonio and Dandan in the southern portion of the island.

On Tinian, Broadway and 8th Avenue provide routes for commercial vehicles between the port facilities of San Jose and Tinian International Airport.

Air Travel

Francisco C. Ada/Saipan International Airport (SPN) is the only airport on the island of Saipan. It serves as a destination for several airlines with international connecting flights to multiple cities in China, Korea, and most frequently, Guam. Short-distance local flights also provide service to the airports on Tinian and Rota.

Tinian International Airport serves passenger traffic from inter-island travel from Saipan, Rota, and Guam, accommodating single engine aircraft with capacity of up to nine passengers. The Tinian International Airport is positioned atop a plateau in the central west corner of the island inside the Military Retention Zone (MRZ). Car rental services are available at the airport to accommodate tourists.

Benjamin Taisacan Manglona International Airport of Rota serves passenger traffic from inter-island travel from Saipan and Guam. Rota's International Airport is located in the central east area of the island, near the village of Sinapalo. Current aircraft include an ATR 42 aircraft with capacity of up to 30 passengers as well as eight passenger Navaho aircraft. Car rental services are available at the airport to accommodate tourists.

Ports

The Port of Saipan is centrally located on the island proximal to Route 30 (Middle Road) along the western coast just north of the village of Garapan. The port services freighters, tourist cruises, and the US Coast Guard vessels.

Tinian Harbor is located along the southwestern coast of Tinian in the village of San Jose. The harbor supplies a bulk fuel plant operated by Mobil Oil and provides service to a small boat ramp for local use.

Rota West Harbor is located in the Village of Liyu just south of Songsong. The harbor provides services for storage companies, U.S. Customs and Immigration Services, and docks for personal watercrafts.

3.6 Current Traffic Data

Daily roadway traffic counts were gathered by the Department of Public Works (DPW) at locations across Saipan, Tinian, and Rota to ensure a varied data set for average daily traffic (ADT) volumes to assess the current vehicle usage of roadways. Roadway traffic counts were collected at a variety of locations consistent with previous Highway Master Plan updates in 1997 and 2008. The combination of 26 new roadway traffic counts collected in 2021 and traffic counts from 2016 and 2017 were provided for four additional roadway locations. This collection of traffic data from years 2016 to 2021 represents current travel conditions that inform roadway and intersection operational analysis and assessment are summarized in Table 3-13.

The new 2021 counts are markedly lower and were collected during the COVID-19 pandemic, while tourism to the islands was restricted. Due the potential effect of the COVID-19 pandemic on vehicular travel volumes, the 2021 ADT data were compared to the data from 2008 ADT to estimate the degree of this impact. As suspected, the new 2021 ADT volumes were approximately 20.3-percent lower, on average, compared to 2008 ADT volumes. Thus, it is likely that the COVID-19 pandemic had a significant impact on the traffic volumes observed by the 2021 counts.

The figures on the following pages present maps depicting current traffic data (from 2016 to 2021) and current conditions (collection years are shown in red numbers). 2021 volume estimates for locations in which recent traffic counts were not collected were prepared for study locations not shown in the table above. These estimates (shown in black text) were achieved by reducing the available 2008 volumes by the average-percent change of 20.3-percent.

Note on 2008 Traffic Volumes:

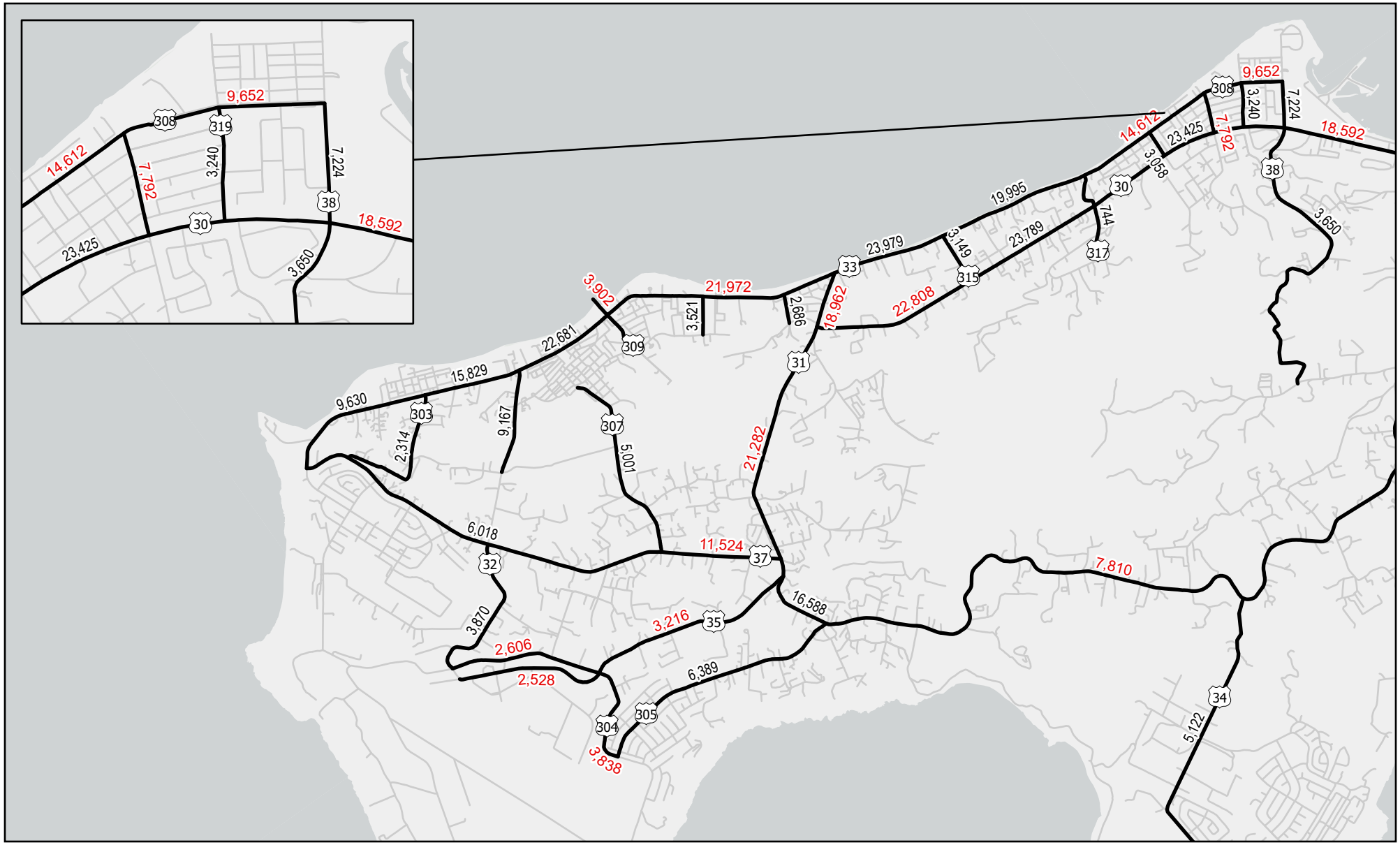
It should be noted that 2008 traffic volume data from the prior Highway Master Plan did not collect new traffic count information at all study locations. Most of the 2008 traffic volumes were estimated based on 1997 data and based on historical traffic trends in the decades prior to 1997. As documented in population, tourism, and employment trends, a potential overestimation of 2008 counts in several locations may be observed.

While the 20.3-percent average reduction in travel between 2008 and 2021 appears reasonable relative to recent demographic, tourism, and economic trends, some of the larger percent changes shown below may reflect an overestimation of 2008 traffic volumes. As described in subsequent sections of this document, adjustments were made to adequately reflect travel demand based on an anticipated return to pre-pandemic visitor levels to estimate traffic capacity levels of services for both existing and future year conditions and determine necessary transportation improvements to be included in the plan. It is recommended that new traffic counts be collected in the near-term to validate the volume assumptions and corresponding improvements within this plan.

Table 3-13 Current Count Locations, Comparison to 2008 Study Volumes

ID	Count Roadway & Location	2008 Study Volume	Current Volume (Year 2016 – 2021 Counts)	Current Count Year	2008 to Current Difference	Percent Change
S-1*	Route 33 North of Route 308	27,080	9,652	2021	-17,428	-64%
S-2*	Route 33 South of Route 308	27,080	14,612	2021	-12,468	-46%
S-5	Route 33 South of Tekken Street	39,890	21,972	2021	-17,918	-45%
S-11	Route 30 CPA North of Route 38 Micro Beach	23,180	18,592	2021	-4,588	-20%
S-12	CPA Route 30 South of Route 38 Micro Beach	30,870	4,308	2017		
S-14	CPA Route 30 North of Route 31 Isa Dr.	27,820	22,808	2021	-5,012	-18%
S-15	Route 31 Isa Dr. West Bound of CPA Route 30	22,330	18,962	2021	-3,368	-15%
S-16	Route 31 East of Route 30	29,040	21,282	2021	-7,758	-27%
S-16**	Route 31 North of Route 37	29,040	7,094	2021		
S-17	Route 31 South of Route 37	N/A	16,588	2016		
S-18	Route 35 North of Route 304	5,280	3,216	2021	-2,064	-39%
S-19	Route 35 South of Route 304	6,950	2,528	2021	-4,422	-64%
S-20	Route 31 North of Route 316	8,490	8,362	2021	-128	-2%
S-21	Route 31 South of Route 216	8,490	7,810	2021	-680	-8%
S-23	Route 304 East of Route 35	4,760	3,838	2021	-922	-19%
S-24	Route 304 West of Route 35	2,930	2,606	2021	-324	-11%
S-25	Route 37 West of Route 31	13,180	11,524	2021	-1,656	-13%
S-33	Route 308 East of Route 33	8,300	7,792	2021	-508	-6%
S-35	Route 38 Micro Beach West of Route 30 CPA	9,520	4,510	2017	-5,010	
S-37	Route 38 East of Route 30 CPA	4,270	3,650	2017		
S-40	Route 30 North of Route 33	7,560	3,902	2021	-3,658	-48%
N/A	Route 316 East of Route 31	N/A	892	2021		
R-1	Route10 North of Esong (Pinatang Park)	1,730	1,508	2021	-222	-13%
R-2	Route 10 South of Route101	1,710	1,512	2021	-198	-12%
R-4	Route 100 South of Sinapalo II	970	616	2021	-354	-36%
R-9	San Ignacio Street North of Santa Ana Street	1,970	636	2021	-1,334	-68%
R-10	San Ignacio Street South of Songsong Look out.	1,290	512	2021	-778	-60%
T-9	Route 21 South of Route24 Joeten side	1,470	1,562	2021	92	6%
T-15	Route 201 West of Route 21	2,240	2,130	2021	-110	-5%
T-17	Route26 West-North of Route21	300	1,126	2021	826	275%
Average-percent Change from 2008 Study Volumes to 2021 Count Volumes						**-20.3%**

*These count locations show duplicate values in the 2008 report and likely represent the most heavily travelled section of segment S-2. As noted, many of the 2008 counts were based on escalated 1997 conditions, and likely overestimate actual traffic volumes in 2008 as they did not consider the decrease in travel between these respective years.
**Two counts were collected within the limits of study roadway segment S-16. Based on the greater similarity of the count collected east of Route 30 to the 2008 study volume, that count was used to represent the updated current volume on S-16 rather than the count collected north of Route 37.



Legend

- Roadway Study Segments
- XX,XXX Estimated Daily Volumes
- XX,XXX 2021 Daily Count

Paper Size ANSI A

0 2,250 4,500

Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

UPDATED BASE YEAR VOLUMES - SAIPAN

Project No. **11224010**
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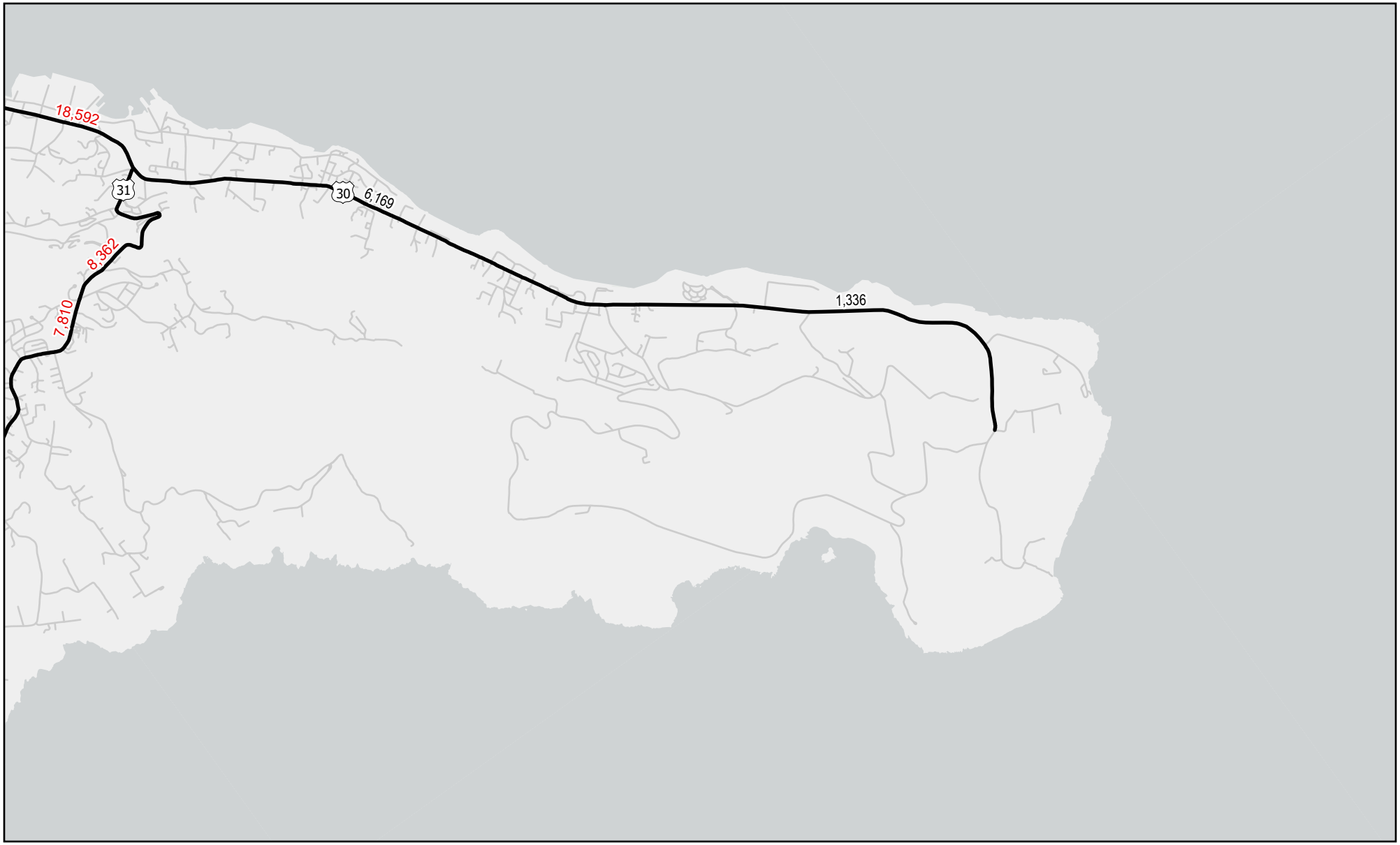
Date **Jun 2022**

FIGURE 3-13

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_3-13_Updated Base Year Volumes_Saipan1
Print date: 29 Jun 2022 - 14:38

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; 2021 Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021. Created by: pthornton



Legend

Roadway Study Segments

XX,XXX Estimated Daily Volumes

XX,XXX 2021 Daily Count

Paper Size ANSI A

0 2,250 4,500

Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

UPDATED BASE YEAR VOLUMES - SAIPAN (NORTH)

Project No. **11224010**
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Date **Jun 2022**

FIGURE 3-14

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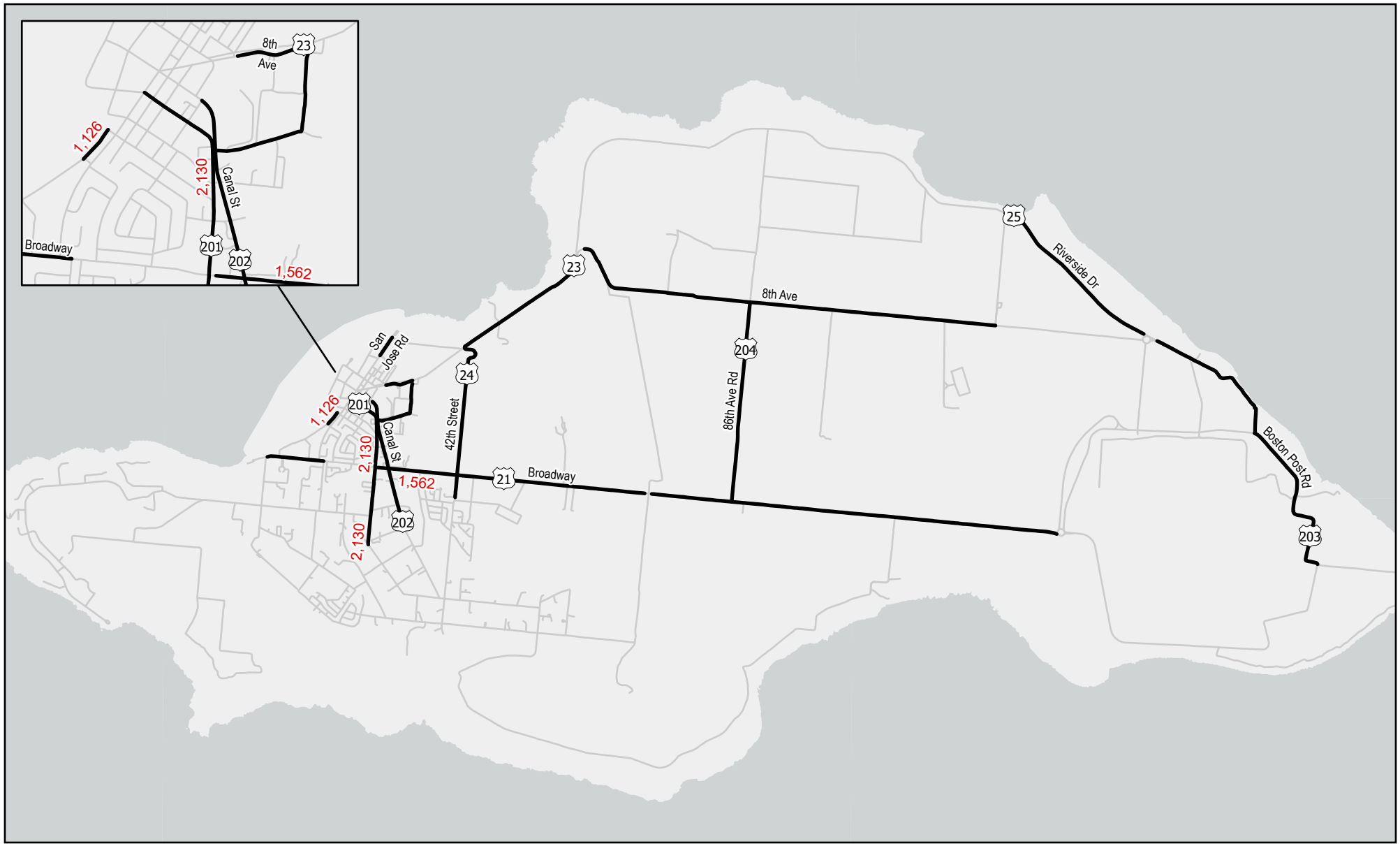
Print date: 29 Jun 2022 - 14:39

Data source: World_Light_Gray_Reference: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS
World_Light_Gray_Base: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community; 2021 Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021. Created by: pthornton



Legend

Roadway Study Segments

XX,XXX Estimated Daily Volumes

XX,XXX 2021 Daily Count

Paper Size ANSI A

0 1,500 3,000 4,500 6,000

Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

UPDATED BASE YEAR VOLUMES - TINIAN

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-15

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 315_Updated Base Year Volumes_Tinian
Print date: 29 Jun 2022 - 16:28

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; 2021
Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021.
Created by: pthornton

Legend

Roadway Study Segments

XX,XXX Estimated Daily Volumes

XX,XXX 2021 Daily Count

Paper Size ANSI A

0 1,500 3,000 4,500 6,000

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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GHD

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Date **Jun 2022**

UPDATED BASE YEAR VOLUMES - ROTA

FIGURE 3-16

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 316_Updated Base Year Volumes_Rota
Print date: 29 Jun 2022 - 16:28

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, SafeGraph, METI/NASA, USGS
Light Gray Base: Esri Community Maps Contributors, Esri, © OpenStreetMap contributors, HERE, Garmin, SafeGraph, METI/NASA, USGS; 2021 Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021.
Created by: pthornton

3.7 Near-Term Recovery Traffic Conditions

As described in the previous section, current traffic volumes data collected in 2021 is on average approximately 20-percent lower than traffic volumes reported in the 2008 Highway Master Plan. Most of the traffic volumes used within the 2008 Highway Master Plan were estimated based on 1997 data and using historical traffic trends from the decades prior to 1997 that estimated growth, rather than a decrease, in volumes. Several factors have been identified as potentially affecting the observed decline in traffic volumes over the past two decades from 2000 to 2020/2021:

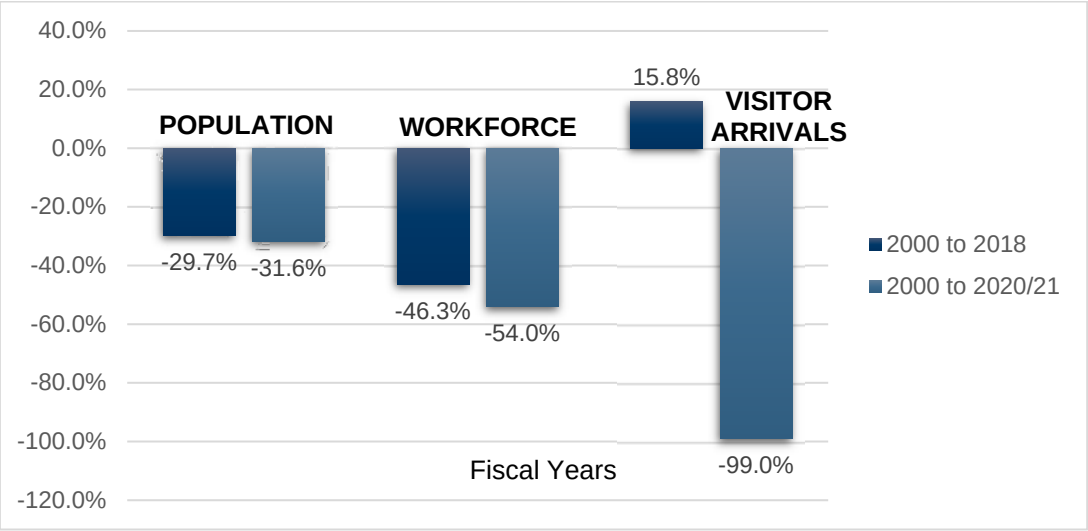
1. Reduction in population numbers (2020 values show a 31.6-percent reduction from 2000 values)
2. Reduction in workforce numbers (2020 values show a 54-percent reduction from 2000 values)
3. Significant reduction in visitor arrivals (2021 values show a 99-percent reduction from 2000 values)

According to the United States Government Accountability Office's (GAO) *CNMI Recent Economic and Workforce Trends* (reports from February 2020 and 2022), both population and workforce numbers decreased steadily over the past two decades. Population values dropped from approximately 69,200 in fiscal year (FY) 2000 to 47,300 in FY 2020, a 32-percent decrease. Employment values dropped from 51,800 in FY 2001 to 23,800 in FY 2020, a 54-percent decrease.

However, while population and employment levels declined over the past two decades, the GAO reported that visitor arrivals increased by approximately 16-percent from FY 2000 to FY 2018, prior to Typhoon Yutu and the COVID-19 pandemic. The highest increase in visitor arrivals occurred between FY 2007 and FY 2017, resulting in a 65-percent increase from FY 2007 (395,000 visitors) to 2017 (653,000 visitors). Subsequently, following Typhoon Yutu in October 2018, total visitor arrivals in FY 2019 fell to 425,000, a 30-percent reduction from the previous year. Visitor arrivals continued to decline in FY 2020 and FY 2021 due to travel restrictions related to the COVID-19 pandemic, reaching as low as 215,000 in FY 2020 and 5,000 in FY 2021 (less than 1-percent of 2020 levels).

The following figure shows the percentage change in population, employment, and visitor arrivals before and after Typhoon Yutu and the COVID-19 pandemic, between the years of FY 2000 to FY 2018 and FY 2018 to FY 2020/ FY 2021, respectively. As shown, population and workforce values were minimally affected by the Typhoon Yutu and the COVID-19 pandemic and the additional decrease in numbers following the typhoon and pandemic (post-2018) was consistent with the downward trend of the preceding 18-years. However, following the typhoon and pandemic (post-2018), the upward trend in visitor arrivals over the preceding 18-years was entirely reversed.

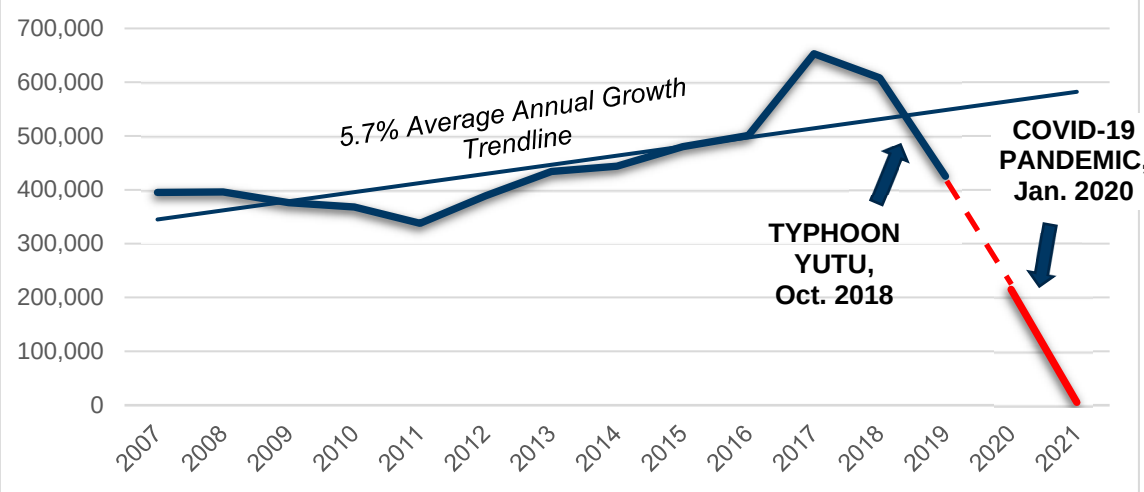
Graph 3.7a Reduction in Population, Employment, and Visitor Arrivals (Fiscal Years 2000 to 2018 & 2018 to 2020/21)



Although a reduction in vehicle volumes (from those presented in the 2008 Highway Master Plan to those collected in 2021) is consistent with declining population and workforce trends, the ultimate decline in visitor arrivals in FY 2021 to less than 1-percent of FY 2000 values suggests that total vehicle volumes were significantly impacted by the

temporary lack of tourism to the islands. Figure 2-9 presents the annual visitor levels to CNMI between 2007 and 2021. A trendline of the average annual percentage increase between 2007 and peak 2017 levels is provided to emphasize the impact that the typhoon and pandemic had on tourism to the CNMI. Given the potential for economic recovery as COVID-19 travel restrictions are lifted, it is reasonable to expect a recovery in visitor arrivals that is more consistent with observed trends prior to 2018.

Graph 3.7b Marianas Annual Visitor Levels (Fiscal Years 2007-2021)



Methodology to Estimate Near-Term Recovery Conditions Traffic Volumes and Operations

As discussed in the preceding section, visitor arrivals increased from 2000 to 2018, prior to Typhoon Yutu and the COVID-19 pandemic, but declined significantly between 2018 and 2021 to less than 1-percent of peak values. The 2021 traffic volumes were collected during a time when tourism was restricted to the CNMI and therefore may not accurately represent travel conditions that could occur in the next five to ten years, without travel restrictions. Given the decline to almost zero visitor arrivals in 2021, it was assumed that the traffic volumes collected in 2021 did not include tourism-related traffic, which is typically a significant portion of total traffic volumes on CNMI highways.

Potential for Economic Recovery

The Commonwealth of the Northern Mariana Islands 2022 Recovery Plan Performance Report[1] identifies funds to support a path to recovery for the islands following the COVID-19 pandemic, specifically as it affected tourism. The report states the following to highlight the role that tourism plays in the CNMI economy:

> The Commonwealth of the Northern Mariana Islands (CNMI) is a remote US territory in the Western Pacific whose economy is solely dependent on East Asian countries for tourism. The tourism industry is the major contributing factor of the CNMI's economic base. The U.S. Department of Housing and Urban Development has designated and classified all municipalities of the CNMI as Nonmetropolitan Difficult Development Areas, "an area which has high construction, land, and utility costs relative to area median gross income." With the arrival of the COVID-19 pandemic, the CNMI was negatively impacted socially and economically. East Asian countries have adopted COVID-19 rules and regulations that have made tourism travel difficult in small numbers.

According to the Recovery Plan, the CNMI was allocated a total of $481,876,521 and are provided broad flexibility to decide how best to use this funding to meet the needs of their communities. As efforts are undertaken to assist in the economic recovery of the CNMI, tourism levels are also anticipated to recover.

[1] SLFRF-Recovery-Plan-Performance-Report v. 1 TN (gov.mp), 2022

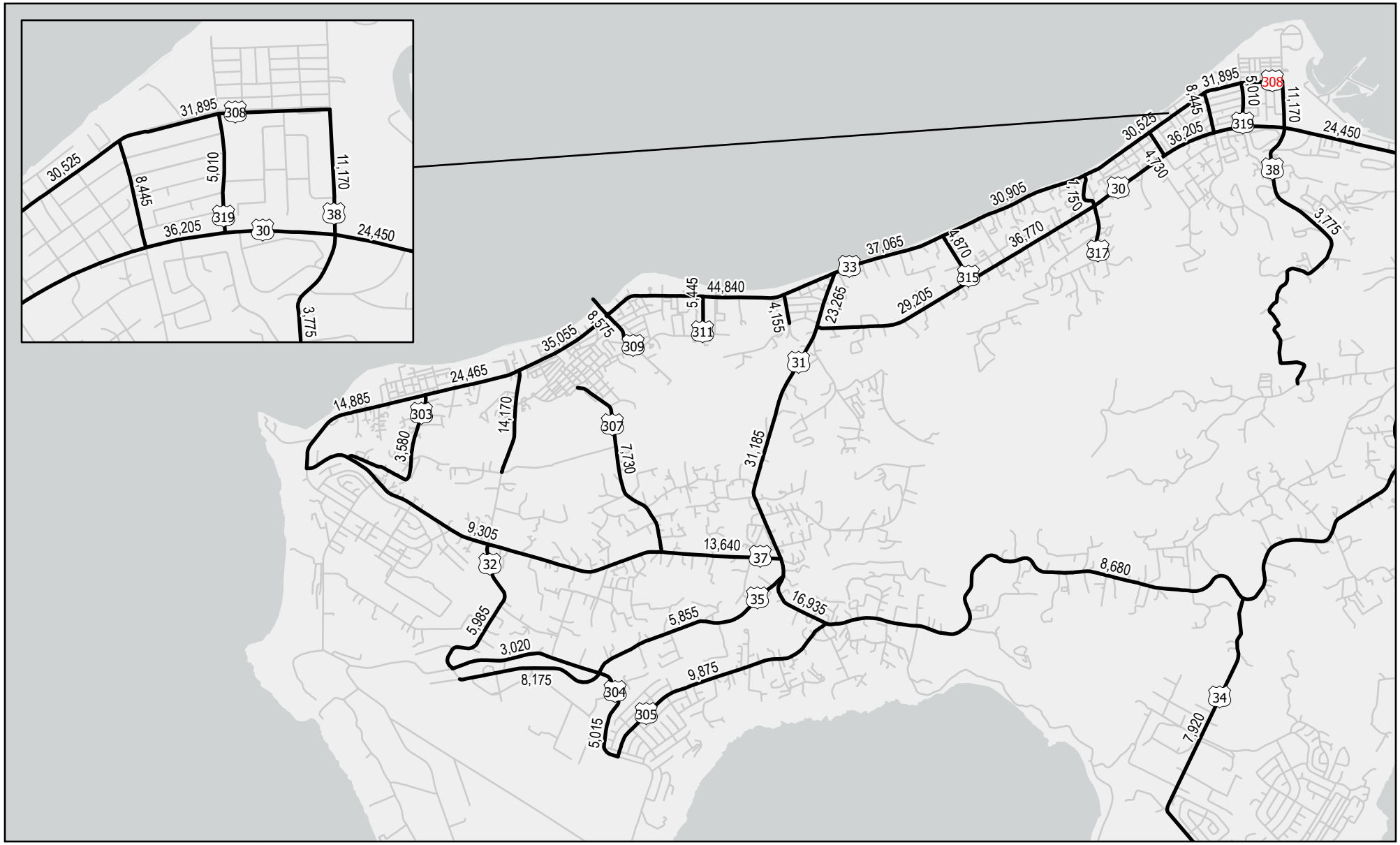
Therefore, to inform the Highway Master Plan update and to identify highway improvements that correspond to anticipated travel demand in the near term, 2021 traffic volumes were manually adjusted to include “tourism-related volume” that could have been realized had the COVID-19 pandemic never occurred, consistent with previous growth trends. These anticipated conditions are referred to as the Near-Term Recovery Conditions scenario, based on a recovery in tourism within the next five to ten years. For roadway locations with counts collected in 2016 and 2017, prior to COVID-19 travel restrictions, traffic volumes were estimated using an observed average growth rate based on previous trends to reflect anticipated volumes under the Near-Term Recovery Conditions scenario.

The Near-Term Recovery Condition volumes presented in Table 3-14 are used for operational analysis of travel demand that may be reached within the next five to ten years and are a basis for estimating Long-Term (2040) Conditions volume forecasts. Figures 3-17 through 3-20 present the Near-Term Recovery Conditions volumes for the study roadway facilities. The figures are labeled as “Year 2021 with Tourism” and represent Near-Term Recovery Conditions.

Table 3-15 Near-Term Recovery Conditions Estimated Roadway Volumes

ID	Route Name	Road Name	Location	2008 Study Volume (Per the 2008 Highway Master Plan)	2021 Traffic Count (For locations where counts were collected)	Estimated Near-Term Recovery Conditions (All locations)	Percent Change from 2008 Study Volume
S-1	Rte 33	Beach Road	Micro Beach to Garapan Street	27,080	9,652	31,895	17.80%
S-2	Rte 33	Beach Road	Garapan Street to Route 317 (Gualo Rai Road)	27,080	14,612	30,525	12.70%
S-3	Rte 33	Beach Road	Gualo Rai Road to Quartermaster Road	26,350		30,905	17.30%
S-4	Rte 33	Beach Road	Quartermaster Road to Route 31 (Chalan Monsignor Guerrero)	31,600		37,065	17.30%
S-5	Rte 33	Beach Road	Route 31 (Chalan Monsignor Guerrero) to Chalan Hagoi	39,890	21,972	44,840	12.40%
S-6	Rte 33	Beach Road	Chalan Hagoi to As Perdido Road	29,890		35,055	17.30%
S-7	Rte 33	Beach Road	As Perdido Road to Afetna Road	20,860		24,465	17.30%
S-8	Rte 33	Beach Road	Afetna Road to Koblerville Road	12,690		14,885	17.30%
S-9	Rte 30	Middle Road/Chalan Pale	North end to As Matius Road	1,760		2,065	17.30%
S-10	Rte 30	Middle Road/Chalan Pale	As Matius Road to Route 31 (Isa Drive)	8,130		9,535	17.30%
S-11	Rte 30	Middle Road/Chalan Pale	Route 31 (Isa Drive) to Route 38 (Micro Beach Road)	23,180	18,592	24,450	5.50%
S-12	Rte 30	Middle Road/Chalan Pale	Route 38 (Micro Beach Road) to Route 317 (Gualo Rai Road)	30,870		36,205	17.30%
S-13	Rte 30	Middle Road/Chalan Pale	Route 317 (Gualo Rai Road) to Route 315 (Quartermaster Road)	31,350		36,770	17.30%
S-14	Rte 30	Middle Road/Chalan Pale Arnold	Route 315 (Quartermaster Road) to Route 31 (Chalan Monsignor Guerrero)	27,820	22,808	29,205	5.00%
S-15	Rte 31	Chalan Monsignor Guerrero	Route 33 (Beach Road) to Route 30 (Middle Road/Chalan Pale	22,330	18,962	23,265	4.20%
S-16	Rte 31	Chalan Monsignor Guerrero	Route 30 (Middle Road/Chalan Pale Arnold) to Chalan Msgr. Martinez	29,040	21,282	31,185	7.40%
S-17	Rte 31	Chalan Monsignor Guerrero	Tun Herman Pan Road to Route 305 (Dandan Road)	16,590		16,935	2.10%
S-18	Rte 35	Tun Herman Pan Road	Chalan Msgr Guerrero to Route 304 (Flame Tree Road)	5,280	3,216	5,855	10.90%
S-19	Rte 35	Tun Herman Pan Road	Route 304 (Flame Tree Road) to Airport	6,950	2,528	8,175	17.60%
S-20	Rte 31	Isla Drive	Route 30 (Middle Road/Chalan Pale Arnold) to Capitol Hill Road	8,490	8,362	8,530	0.50%
S-21	Rte 31	Isla Drive	Capitol Hill Road to Route 305 (Dandan Road)	7,530	7,810	8,680	15.30%
S-22	Rte 305	Dandan Road	Route 31 (Chalan Monsignor Guerrero) to Route 304 (Flame Tree	8,420		9,875	17.30%
S-23	Rte 304	Flame Tree Road	Route 305 (Dandan Road) to Route 35 (Tun Herman Pan Road)	4,760	3,838	5,015	5.40%
S-24	Rte 304	Flame Tree Road	Route 35 (Tun Herman Pan Road) to Route 32 (As Perdido Road)	2,930	2,606	3,020	3.10%
S-25	Rte 37	Chalan Monsignor Martinez	Route 31 (Chalan Monsignor Guerrero) to Chalan Tun Joaquin Doi	13,180	11,524	13,640	3.50%
S-26	Rte 37	Chalan Monsignor Martinez	Chalan Tun Joaquin Doi to Route 33 (Beach Road)	7,930		9,305	17.30%
S-27	Rte 32	As Perdido Road	Route 33 (Beach Road) to Route 37 (Chalan Monsignor Martinez)	12,080		14,170	17.30%
S-28	Rte 32	As Perdido Road	Route 37 (Chalan Monsignor Martinez) to Route 35 (Tun Herman Pan Road)/Route 304 (Flame Tree Road)	5,100		5,985	17.40%
S-29	Rte 317	Gualo Rai Road	east of Route 33 (Beach Road)	980		1,150	17.30%
S-30	Rte 315	Quartermaster Road	east of Route 33 (Beach Road)	4,150		4,870	17.30%
S-31	Rte 307	Chalan Tun Antonio APA	Route 31 (Chalan Monsignor Guerrero) to Chalan Tun Joaquin Doi	6,590		7,730	17.30%
S-32		Ropa Di Oru Street	east of Route 33 (Beach Road)	4,030		4,730	17.40%
S-33	Rte 308	Garapan Street	east of Route 33 (Beach Road)	8,300	7,792	8,445	1.70%
S-34	Rte 319	CPL Derence Jack Road	east of Route 33 (Beach Road)	4,270		5,010	17.30%
S-35	Rte 38	Micro Beach Road)	east of Route 33 (Beach Road)	9,520		11,170	17.30%
S-36	Rte 303	Afetna Road	east of Route 33 (Beach Road)	3,050		3,580	17.40%

ID	Route Name	Road Name	Location	2008 Study Volume (Per the 2008 Highway Master Plan)	2021 Traffic Count (For locations where counts were collected)	Estimated Near-Term Recovery Conditions (All locations)	Percent Change from 2008 Study Volume
S-37	Rte 38	Navy Hill Road	east of Route 30 (Middle Road/Chalan Pale Arnold)	4,270		3,715	-13.00%
S-38		Oleai Street	east of Beach Road	3,540		4,155	17.40%
S-39	Rte 311	Tekken Street	east of Beach Road	4,640		5,445	17.30%
S-40	Rte 309	Chalan Hagoi	east of Beach Road	7,560	3,902	8,575	13.40%
S-41	Rte 34	Kagman Road		6,750		7,920	17.30%
R-1	Rte 10		north of Esong (Pinatang Park)	1,730	1,508	1,795	3.80%
R-2	Rte 10		south of Rte 101	1,710	1,512	1,765	3.20%
R-3	Rte 100		east of Songsong Village and west of Pona Point	900		1,056	17.30%
R-4	Rte 100		south of Sinapalu	560	616	1,070	91.10%
R-5	Rte 11		south of Sinapalu	970		1,138	17.30%
R-6		San Jose Street	south of Rte 10	350		410	17.30%
R-7		San Francisco De Borja St	south of Rte 10	680		798	17.30%
R-8		Santa Ana Street	San Jose St to Rte 100	400		469	17.30%
R-9		San Ignacio Street	north of Santa Ana Street	1,970	636	2,340	18.80%
R-10		San Ignacio Street	south of Santa Ana Street	1290	512	1,505	16.70%
T-1		Riverside Drive	east of 8th Street	25		29	17.30%
T-2		Riverside Drive	west of 8th Street	25		29	17.30%
T-3		No name (Mt Lasso Shinto	east of 8th Street	50		59	17.30%
T-4		8th Street	north of 86th Street	50		59	17.30%
T-5		8th Street	south of 86th Street	90		106	17.30%
T-6		86th Ave	8th Street to Broadway	100		117	17.30%
T-7	Rte 21	Broadway	north of 86th Street	180		211	17.30%
T-8	Rte 21	Broadway	north of 42nd Street	390		457	17.30%
T-9	Rte 21	Broadway	42nd Street to Rte 201	1,470	1,562	1,595	8.50%
T-10		42nd Street	west of Broadway	150		176	17.30%
T-11		8th Street	north of 42nd Street to Riverside Dr	180		211	17.30%
T-12		No Name (School Road)	Rte 202 to 8th Street	310		364	17.30%
T-13		8th Street	north of Canal Street	300		352	17.30%
T-14	Rte 202	Canal Street	west of Broadway	1,520		1,783	17.30%
T-15	Rte 201		west of Broadway	2,240	2,130	2,275	1.60%
T-16	Rte 21	Broadway	south end / north of Wall Street	300		352	17.30%
T-17	Rte 21	No name	at Bus Stop / south of Kammer Beach	300	1,126	1,150	283.30%
T-18		No Name	road north of Breakwater Park	290		340	17.30%



Legend

Roadway Study Segments

XX,XXX Estimated Daily Volumes

Paper Size ANSI A

0 2,250 4,500

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

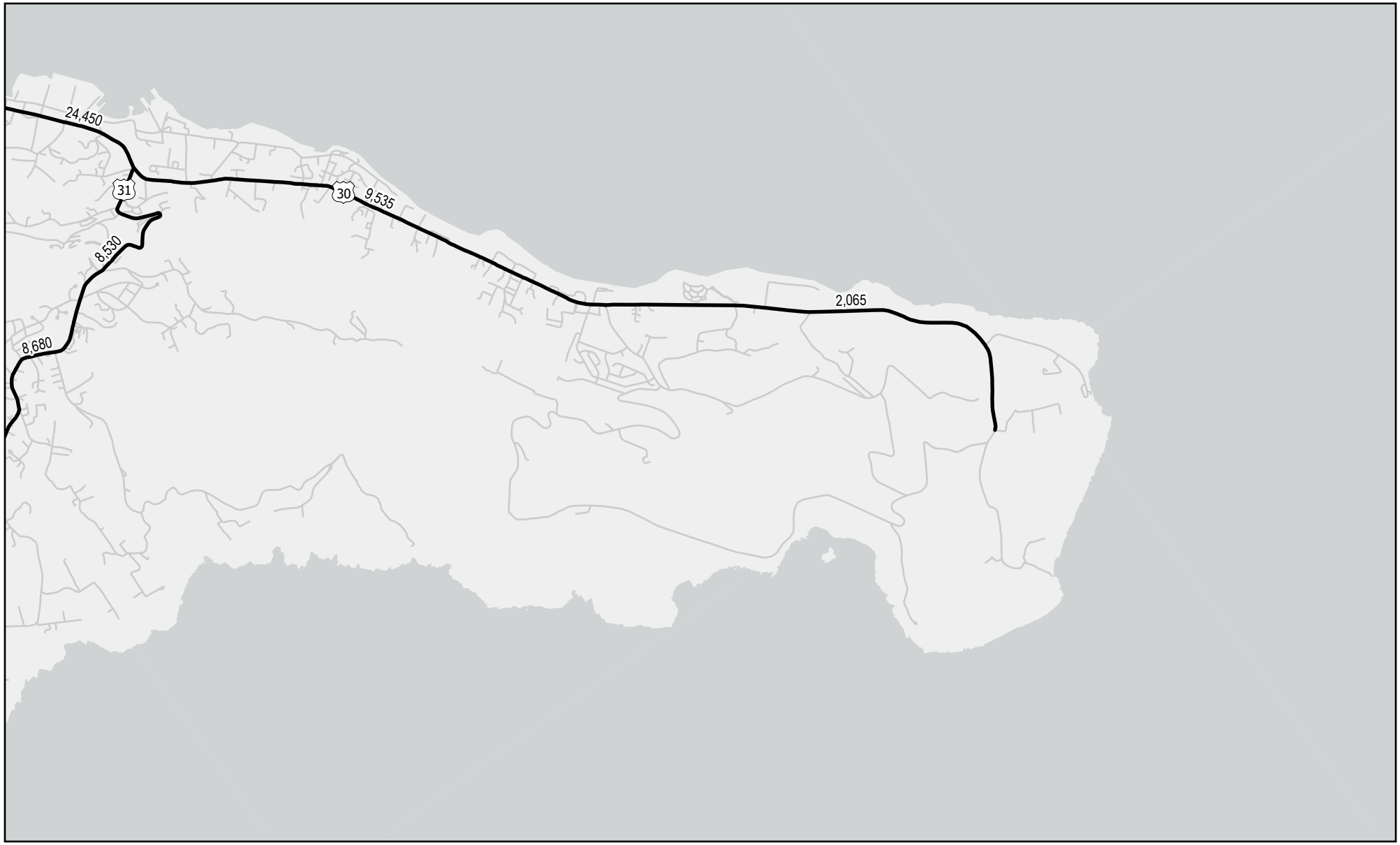
YEAR 2021 WITH TOURISM DAILY TRAFFIC VOLUMES - SAIPAN

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-17

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 317_Year 2021 w Tourism Volumes_Saipan1
Print date: 29 Jun 2022 - 16:57

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; 2021 Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021. Created by: pthornton



Legend

Roadway Study Segments

XX,XXX Estimated Daily Volumes

Paper Size ANSI A

0 2,250 4,500

Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

GHD

Commonwealth of the Northern Mariana Islands

20 - Year Highway Master Plan

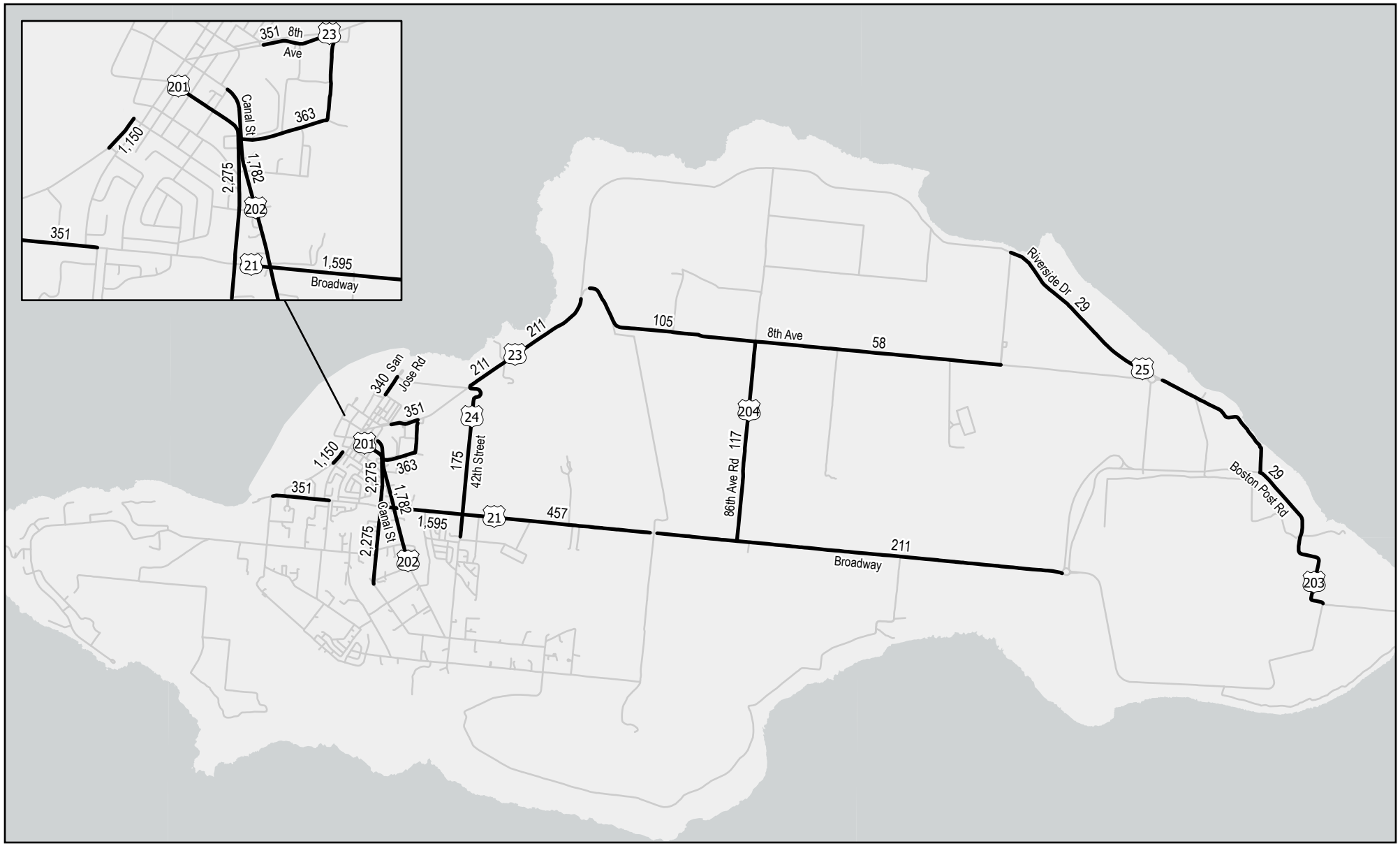
YEAR 2021 WITH TOURISM DAILY TRAFFIC VOLUMES - SAIPAN (NORTH)

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-18

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 318_Year 2021 w Toursim Volumes_Saipan_2_North
Print date: 29 Jun 2022 - 16:59

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS
World_Light_Gray_Base: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community; 2021
Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021. Created by: pthornton



Legend

Roadway Study Segments

XX,XXX Estimated Daily Volumes

Paper Size ANSI A

0 1,500 3,000 4,500 6,000

Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

N

GHD

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

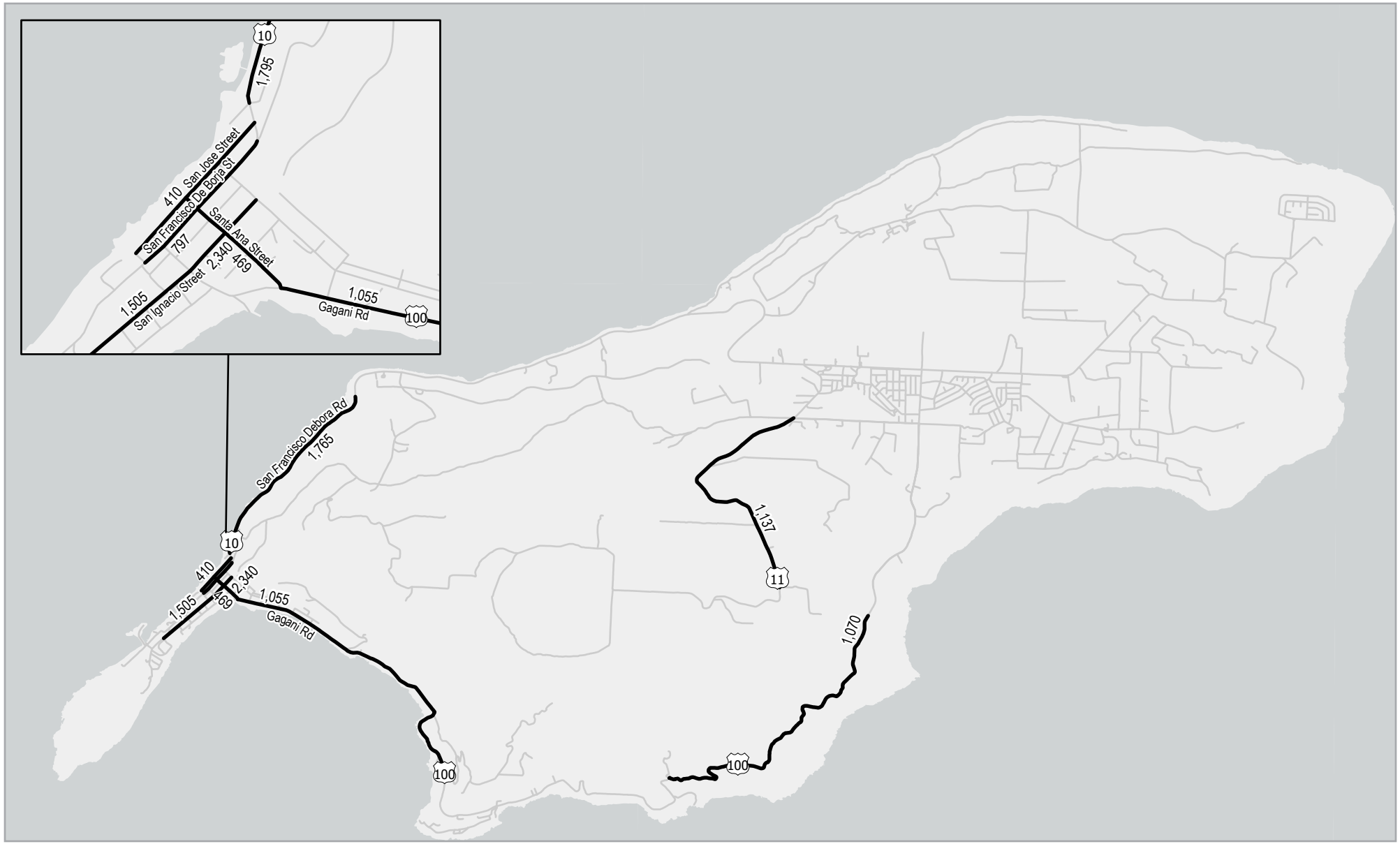
YEAR 2021 BASE YEAR DAILY TRAFFIC VOLUMES - TINIAN

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-19

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 319_Year 2021 w Tourism Volumes_Tinian
Print date: 29 Jun 2022 - 17:07

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; 2021 Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021. Created by: pthornton



Legend

Roadway Study Segments

XX,XXX Estimated Daily Volumes

Paper Size ANSI A

0 1,500 3,000 4,500 6,000

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

N

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

YEAR 2021 WITH TOURISM DAILY TRAFFIC VOLUMES - ROTA

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-20

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 320_Year 2021 w Tourism Volumes_Rota
Print date: 29 Jun 2022 - 17:15

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, SafeGraph, METI/NASA, USGS
Light Gray Base: Esri Community Maps Contributors, Esri, © OpenStreetMap contributors, HERE, Garmin, SafeGraph, METI/NASA, USGS; 2021 Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021. Created by: pthornton

3.7.1 Near-Term Recovery Conditions Roadway Operations

Roadway segment Level of Service (LOS) standards and thresholds provide the basis for the analysis of roadway segment performance. The analysis of roadway segment LOS is based on the roadway functional classification, maximum capacity, geometrics, and peak hour traffic volumes. Level of Service is a qualitative measure of traffic operating conditions, whereby a letter grade "A" through "F" is assigned to a roadway segment representing progressively worsening traffic conditions. LOS "A" represents free-flow operating conditions and LOS "F" represents over-capacity conditions.

The Near-Term Recovery Conditions daily volume estimates were converted to peak hour roadway volume estimates through a set of proportionality factors (k factors), where the peak hour volume represents a proportion of total daily traffic on the same roadway. To establish k factors, 2008 peak hour volumes on study roadway segments were compared to 2008 daily counts from the previous Highway Master Plan. The 2008 k factors were applied to Near-Term Recovery Conditions daily volumes for respective locations. To estimate peak hour roadway volume on the remaining study roadway segments without 2008 peak hour data, a weighted average of 2008 k factors was calculated for ranges of daily traffic volumes, where k factors for higher volume roadways differed from k factors for lower volume roadways, at 5,000 vehicle intervals. According to this data set, the higher-volume roadways tend to have lower k factors (less pronounced peak hours, where the peak hour volume represents a lower-percentage of total daily volume on the roadway facility). Resulting k factors were applied to Near-Term Recovery Conditions daily volume estimates at the remaining roadway locations based on the daily volume used to establish Near-Term Recovery Conditions peak hour volumes.

The LOS thresholds used in this analysis of roadways, presented in Table 3-16, are drawn from the State of Florida Department of Transportation *2020 Quality/Level of Service Handbook*., specifically, the methodology for peak hour two-way volume thresholds for roadways in urbanized areas. The analysis and resulting LOS determinations discussed in this section were based upon the comparison of Near-Term Recovery Conditions peak hour estimates to these roadway thresholds. **Roadways with LOS grades of LOS D or better are considered to operate at acceptable conditions, while roadways at LOS E or F are considered to operate deficiently. In cases where the LOS volume thresholds can only determine that the segment is operating at LOS E or F, the segment is considered to operate deficiently.**

Since the CNMI currently has a different roadway classification system than is listed in Table 3-16, the roadways in Saipan, Tinian, and Rota were assigned to one of the roadway classifications listed in the table that best matches the corresponding roadway characteristics. In general, the existing four-lane primary arterials were considered as four-lane major arterials, and existing secondary arterials as either minor arterials or collectors.

Table 3-16 Roadway Segment Level of Service Thresholds

Roadway Classification	LOS Thresholds (upper bounds)				
	A	B	C	D	E
Class I Signalized Arterial (≥ 40mph), 2-lane	-	-	1,590	1,680	-
Class I Signalized Arterial (≥ 40mph), 4-lane	-	-	3,420	3,580	-
Class I Signalized Arterial (≥ 40mph), 6-lane	-	-	5,250	5,390	-
Class I Signalized Arterial (≥ 40mph), 8-lane	-	-	7,090	7,210	-
Class II Signalized Arterial (< 40mph), 2-lane	-	-	690	1,400	1,480
Class II Signalized Arterial (< 40mph), 4-lane	-	-	1,310	2,920	3,040
Class II Signalized Arterial (< 40mph), 6-lane	-	-	2,090	4,500	4,590
Class II Signalized Arterial (< 40mph), 8-lane	-	-	2,880	6,060	6,130
Uninterrupted Flow Highway, 2-lane	-	810	1,610	2,280	3,150
Uninterrupted Flow Highway, 4-lane	-	3,300	4,660	5,900	6,530
Uninterrupted Flow Highway, 6-lane	-	4,950	6,990	8,840	9,790

The FDOT methodology for determining LOS thresholds also includes several adjustment factors based on the presence of certain roadway features, as presented in Table 3-17. These adjustment factors are applied to the base thresholds in Table 3-16 above.

Table 3-17 Roadway Feature Threshold Adjustment Factors

Roadway Features			Adjustment Factor
Number of Lanes	Median Division	Left Turn Lanes	
2	Yes	Yes	5%
2	Yes	No	0%
2	No	Yes	-5%
2	No	No	-20%
More than 2	Yes	Yes	0%
More than 2	Yes	No	0%
More than 2	No	Yes	-5%
More than 2	No	No	-25%

Table 3-18 presents the Near-Term Recovery Conditions scenario daily volume, estimated peak hour volume, and roadway LOS result for each study location, with segments operating at deficient LOS highlighted. As presented in this table the following study segments operate at deficient LOS (LOS E or F) during the PM peak hours under Near-Term Recovery Conditions:

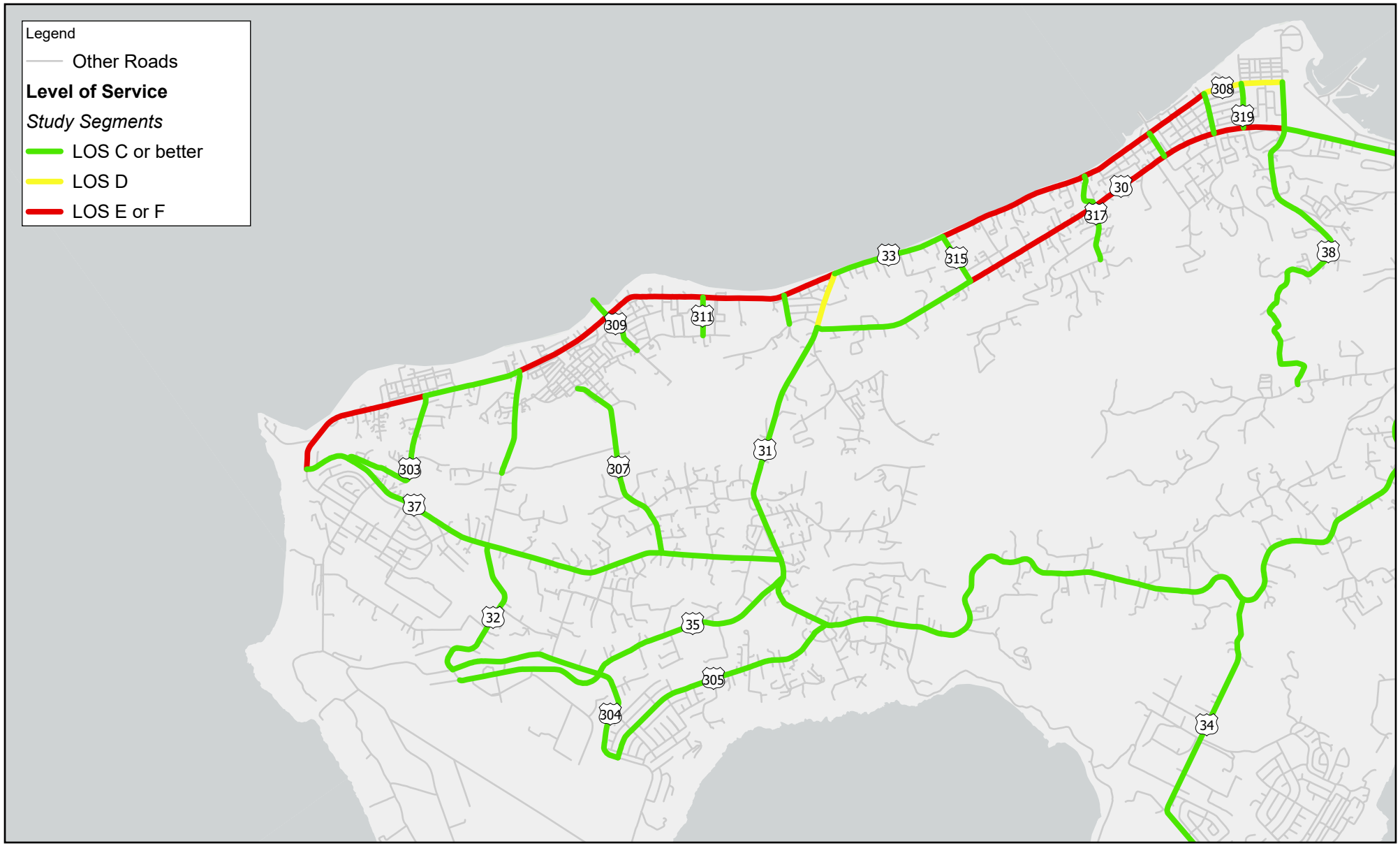
S-2 Route 33 (Beach Road), Garapan Street to Gualo Rai Road
S-3 Route 33 (Beach Road), Gualo Rai Road to Quartermaster Road
S-5 Route 33 (Beach Road), Route 31 (Chalan Monsignor Guerrero) to Chalan Hagoi
S-6 Route 33 (Beach Road), Chalan Hagoi to As Perdido Road
S-8 Route 33 (Beach Road), Afetna Road to Koblerville Road
S-12 Route 30 (Middle Road/Chalan Pale Arnold), Route 38 (Micro Beach Road) to Route 317 (Gualo Rai Road)
S-13 Route 30 (Middle Road/Chalan Pale Arnold), Route 317 (Gualo Rai Road) to Route 315 (Quartermaster Road)

Figures 3-21 through 3-24 present the Near-Term Recovery Conditions LOS results for the study roadway facilities. The figures are labeled as “Year 2021 with Tourism” and represent Near-Term Recovery Conditions.

Table 3-18 Near-Term Recovery Conditions Roadway LOS

ID	Route Name	Road Name	Location	Roadway Classification	PM Peak Volume	PM Peak LOS
S-1	Rte 33	Beach Road	Micro Beach to Garapan Street	2-Lane Principal Arterial	1,020	D
S-2	**Rte 33**	Beach Road	**Garapan Street to Gualo Rai Road**	**2-Lane Principal Arterial**	**1,490**	**F**
S-3	**Rte 33**	Beach Road	**Gualo Rai Road to Quartermaster Road**	**2-Lane Principal Arterial**	**1,700**	**F**
S-4	Rte 33	Beach Road	Quartermaster Road to Route 31 (Chalan Monsignor Guerrero)	4-Lane Principal Arterial	2,290	C or better
S-5	**Rte 33**	Beach Road	**Route 31 (Chalan Monsignor Guerrero) to Chalan Hagoi**	**4-Lane Principal Arterial**	**2,800**	**E or F**
S-6	**Rte 33**	Beach Road	**Chalan Hagoi to As Perdido Road**	**4-Lane Principal Arterial**	**2,800**	**E or F**
S-7	Rte 33	Beach Road	As Perdido Road to Afetna Road	4-Lane Principal Arterial	1,790	C or better
S-8	**Rte 33**	Beach Road	**Afetna Road to Koblerville Road**	**2-Lane Principal Arterial**	**1,390**	**E**
S-9	Rte 30	Middle Road/Chalan Pale Arnold	North end to As Matius Road	2-Lane Principal Arterial	230	B or better
S-10	Rte 30	Middle Road/Chalan Pale Arnold	As Matius Road to Route 31 (Isa Drive)	4-Lane Principal Arterial	980	C or better
S-11	Rte 30	Middle Road/Chalan Pale Arnold	Route 31 (Isa Drive) to Route 38 (Micro Beach Road)	4-Lane Principal Arterial	2,780	C or better
S-12	**Rte 30**	Middle Road/Chalan Pale Arnold	**Route 38 (Micro Beach Road) to Route 317 (Gualo Rai Road)**	**4-Lane Principal Arterial**	**3,280**	**E or F**
S-13	**Rte 30**	Middle Road/Chalan Pale Arnold	**Route 317 (Gualo Rai Road) to Route 315 (Quartermaster Road)**	**4-Lane Principal Arterial**	**2,940**	**E or F**
S-14	Rte 30	Middle Road/Chalan Pale Arnold	Route 315 (Quartermaster Road) to Route 31 (Chalan Monsignor Guerrero)	4-Lane Principal Arterial	1,290	C or better
S-15	Rte 31	Chalan Monsignor Guerrero	Route 33 (Beach Road) to Route 30 (Middle Road/Chalan Pale Arnold)	4-Lane Principal Arterial	1,940	D
S-16	Rte 31	Chalan Monsignor Guerrero	Route 30 (Middle Road/Chalan Pale Arnold) to Chalan Msgr. Martinez	4-Lane Principal Arterial	1,910	C or better
S-17	Rte 31	Chalan Monsignor Guerrero	Tun Herman Pan Road to Route 305 (Dandan Road)	4-Lane Principal Arterial	1,410	C or better
S-18	Rte 35	Tun Herman Pan Road	Chalan Msgr Guerrero to Route 304 (Flame Tree Road)	2-Lane Minor Arterial	600	B or better
S-19	Rte 35	Tun Herman Pan Road	Route 304 (Flame Tree Road) to Airport	2-Lane Minor Arterial	840	B or better
S-20	Rte 31	Isa Drive	Route 30 (Middle Road/Chalan Pale Arnold) to Capitol Hill Road	2-Lane Principal Arterial	880	B or better
S-21	Rte 31	Isa Drive	Capitol Hill Road to Route 305 (Dandan Road)	2-Lane Principal Arterial	900	B or better
S-22	Rte 305	Dandan Road	Route 31 (Chalan Monsignor Guerrero) to Route 304 (Flame Tree Road)	2-Lane Major Collector	1,020	B or better
S-23	Rte 304	Flame Tree Road	Route 305 (Dandan Road) to Tun Herman Pan Road	2-Lane Major Collector	520	B or better
S-24	Rte 304	Flame Tree Road	Tun Herman Pan Road to Route 32 (As Perdido Road)	2-Lane Major Collector	340	B or better
S-25	Rte 37	Chalan Monsignor Martinez	Route 31 (Chalan Monsignor Guerrero) to Chalan Tun Joaquin Doi	2-Lane Minor Arterial	1,270	B or better
S-26	Rte 37	Chalan Monsignor Martinez	Chalan Tun Joaquin Doi to Route 33 (Beach Road)	2-Lane Minor Arterial	960	B or better
S-27	Rte 32	As Perdido Road	Route 33 (Beach Road) to Route 37 (Chalan Monsignor Martinez)	2-Lane Minor Arterial	1,320	B or better
S-28	Rte 32	As Perdido Road	Route 37 (Chalan Monsignor Martinez) to Tun Herman Pan Rd/Flame Tree Rd	2-Lane Minor Arterial	620	B or better
S-29	Rte 317	Gualo Rai Road	east of Route 33 (Beach Road)	2-Lane Major Collector	130	B or better
S-30	Rte 315	Quartermaster Road	east of Route 33 (Beach Road)	2-Lane Major Collector	550	B or better
S-31	Rte 307	Chalan Tun Antonio Apa	Route 31 (Chalan Monsignor Guerrero) to Chalan Tun Joaquin Doi	2-Lane Major Collector	800	B or better
S-32		Kopa Di Oru Street	east of Route 33 (Beach Road)	2-Lane Local	540	B or better
S-33	Rte 308	Garapan Street	east of Route 33 (Beach Road)	2-Lane Major Collector	870	B or better
S-34	Rte 319	CPL Derence Jack Road	east of Route 33 (Beach Road)	2-Lane Major Collector	520	B or better
S-35	Rte 38	Micro Beach Road	east of Route 33 (Beach Road)	2-Lane Minor Arterial	620	B or better
S-36	Rte 303	Afetna Road	east of Route 33 (Beach Road)	2-Lane Minor Collector	410	B or better
S-37	Rte 38	Navy Hill Road	east of Route 30 (Middle Road/Chalan Pale Arnold)	2-Lane Minor Collector	630	B or better
S-38		Oleai Street	east of Route 33 (Beach Road)	2-Lane Major Collector	470	B or better

ID	Route Name	Road Name	Location	Roadway Classification	PM Peak Volume	PM Peak LOS
S-39	Rte 311	Tekken Street	east of Route 33 (Beach Road)	2-Lane Major Collector	560	B or better
S-40	Rte 309	Chalan Hagoi	east of Route 33 (Beach Road)	2-Lane Major Collector	880	B or better
S-41	Rte 34	Kagman Road		2-Lane Major Collector	820	B or better
R-1	Rte 10	Airport Road	north of Esong (Pinatang Park)	2-Lane Minor Arterial	200	C or better
R-2	Rte 10	Airport Road	south of Rte 101	2-Lane Minor Arterial	200	C or better
R-3	Rte 100	Talakhaya Road	east of Sonsong Village and west of Pona Point	2-Lane Major Collector	120	C or better
R-4	Rte 100	Eastern Loop Road	south of Sinapalo	2-Lane Major Collector	120	C or better
R-5	Rte 11	Coral Road	south of Sinapalo	2-Lane Major Collector	130	C or better
R-6		San Jose Street	south of Rte 10	2-Lane Local	50	C or better
R-7		San Francisco De Borja St	south of Rte 10	2-Lane Minor Arterial	90	C or better
R-8		Santa Ana Street	San Jose St to Rte 100	2-Lane Local	50	C or better
R-9		San Ignacio Street	north of Santa Ana Street	2-Lane Local	260	C or better
R-10		San Ignacio Street	south of Santa Ana Street	2-Lane Local	170	C or better
T-1		Riverside Drive	east of 8th Street	2-Lane Minor Collector	10	C or better
T-2		Riverside Drive	west of 8th Street	2-Lane Minor Collector	10	C or better
T-4		8th Street	north of 86th Street	2-Lane Minor Arterial	10	C or better
T-5		8th Street	south of 86th Street	2-Lane Minor Arterial	10	C or better
T-6		86th Ave	8th Street to Broadway	2-Lane Minor Collector	10	C or better
T-7	Rte 21	Broadway	north of 86th Street	2-Lane Minor Arterial	20	C or better
T-8	Rte 21	Broadway	north of 42nd Street	2-Lane Minor Arterial	50	C or better
T-9	Rte 21	Broadway	42nd Street to Rte 201	2-Lane Minor Arterial	180	C or better
T-10		42nd Street	west of Broadway	2-Lane Major Collector	20	C or better
T-11		8th Street	north of 42nd Street to Riverside Dr	2-Lane Minor Arterial	20	C or better
T-12		No Name (School Road)	Rte 202 to 8th Street	2-Lane Local	40	C or better
T-13		8th Street	north of Canal Street	2-Lane Minor Arterial	40	C or better
T-14	Rte 202	Canal Street	west of Broadway	2-Lane Major Collector	200	C or better
T-15	Rte 201	Grand Street	west of Broadway	2-Lane Major Collector	260	C or better
T-16	Rte 21	Broadway	south end / north of Wall Street	2-Lane Minor Arterial	40	C or better
T-17	Rte 21	No name	at Bus Stop / south of Kammer Beach	2-Lane Local	130	C or better
T-18		No Name	road north of Breakwater Park	2-Lane Major Collector	40	C or better



Paper Size ANSI A

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Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

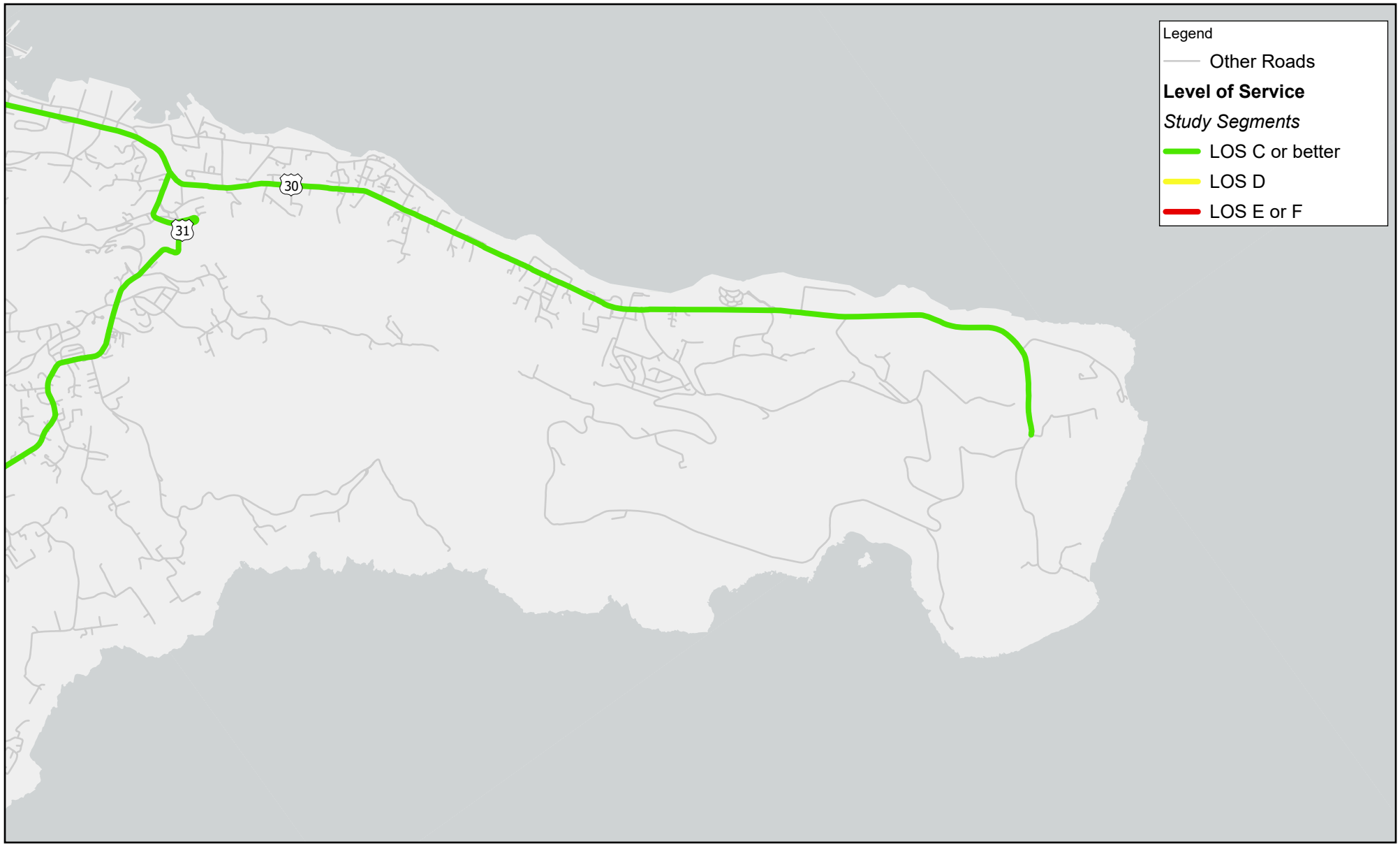
YEAR 2021 WITH TOURISM LEVEL OF SERVICE - SAIPAN

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-21

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 321_Year 2021 w Tourism Roadway LOS_Saipan1
Print date: 29 Jun 2022 - 17:25

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS. Created by: pthornton



Paper Size ANSI A

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Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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YEAR 2021 WITH TOURISM LEVEL OF SERVICE - SAIPAN (NORTH)

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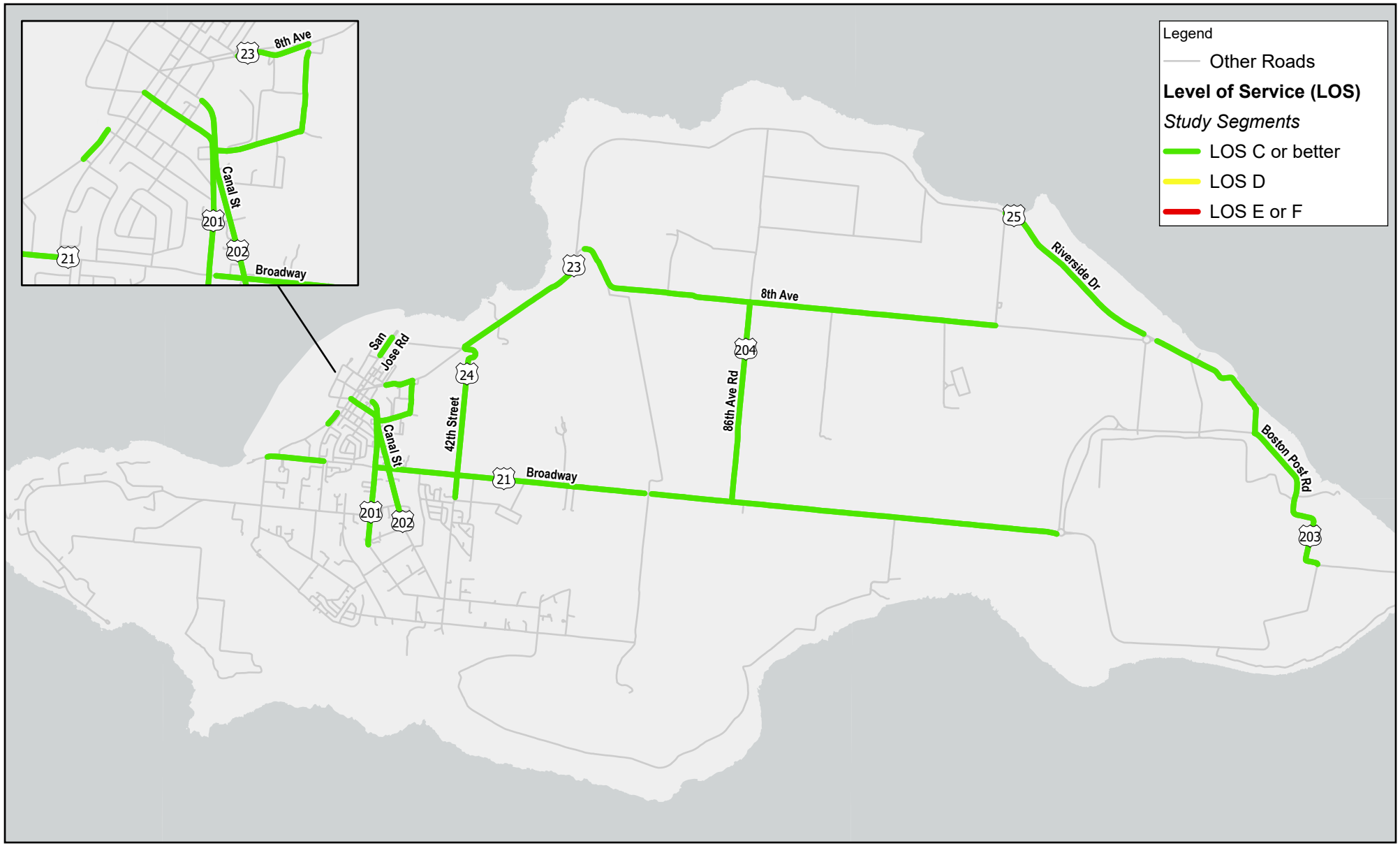
Revision No. **-**
Date **Jun 2022**

FIGURE 3-22

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 322_Year 2021 w Tourism Roadway LOS_Saipan2_North
Print date: 29 Jun 2022 - 17:25

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS. Created by: pthornton



Paper Size ANSI A

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US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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YEAR 2021 WITH TOURISM LEVEL OF SERVICE - TINIAN

Project No. **11224010**
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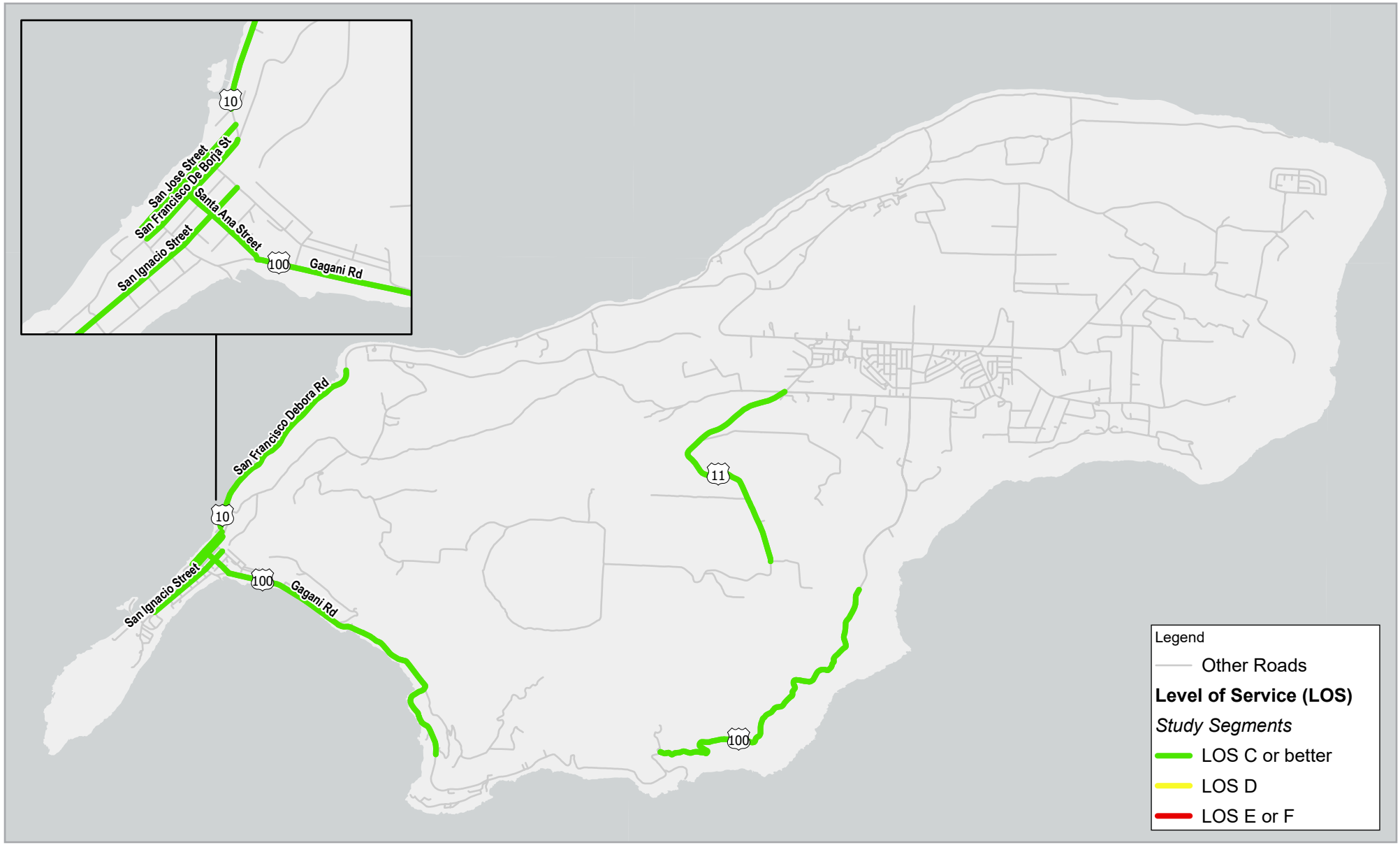
Date **Jun 2022**

FIGURE 3-23

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 323_Year 2021 w Tourism Roadway LOS_Tinian
Print date: 29 Jun 2022 - 17:39

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS.
Created by: pthornton



Paper Size ANSI A

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US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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GHD

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

YEAR 2021 WITH TOURISM LEVEL OF SERVICE - ROTA

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-24

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx
- 11224010_FIG 324_ Year 2021 w Tourism Roadway LOS_Rota
Print date: 29 Jun 2022 - 17:42

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, SafeGraph, METI/NASA, USGS. Created by: pthornton

3.7.2 Near-Term Recovery Conditions Intersection Operations

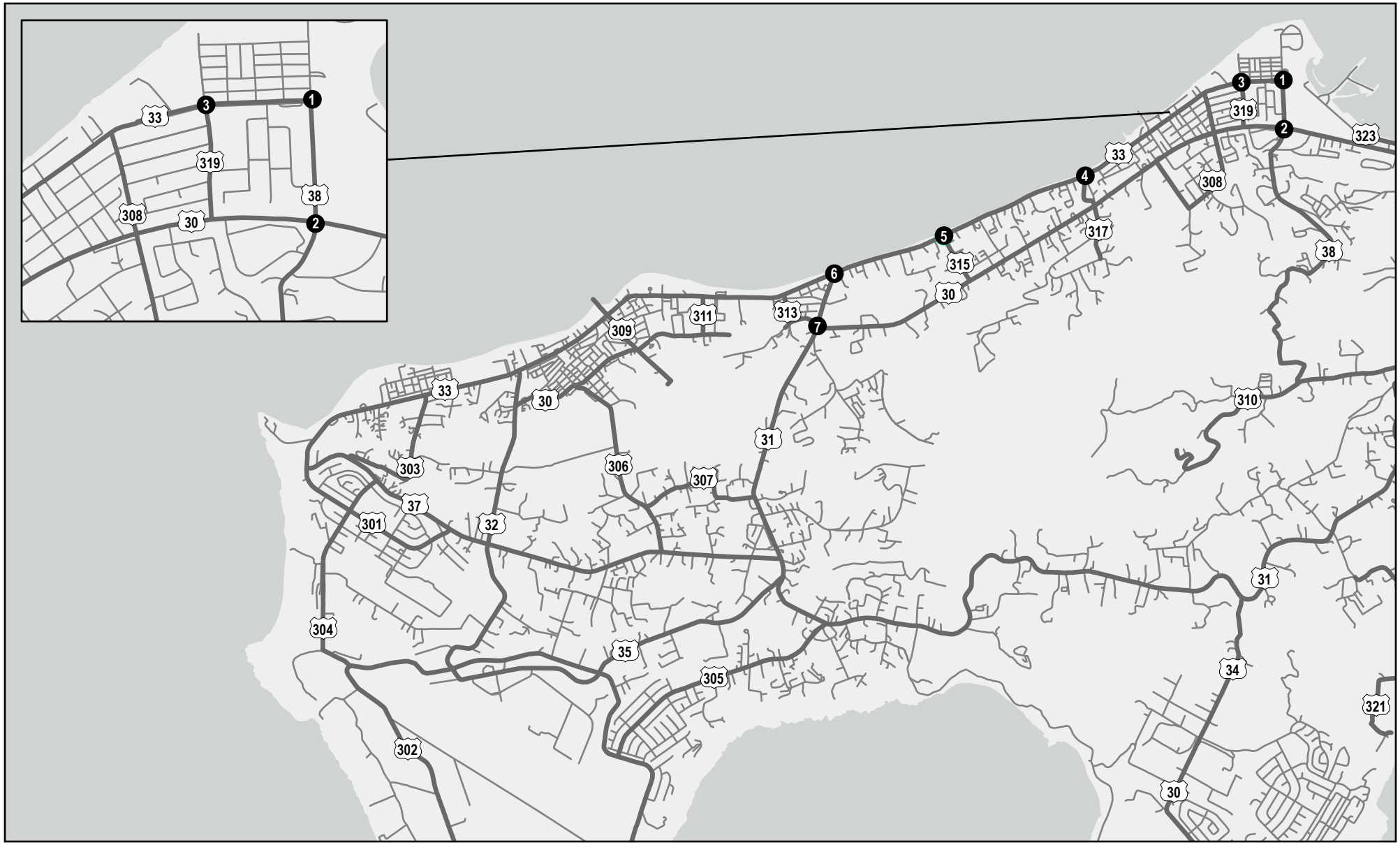
The Synchro 10 (Trafficware) software program was used to implement the HCM 6 analysis methodologies for signalized and stop-controlled intersections. Intersection Level of Service (LOS) was calculated for all control types using the methods documented in HCM 6. Level of Service is a qualitative measure of traffic operating conditions, whereby a letter grade "A" through "F" is assigned to an intersection representing progressively worsening traffic conditions. LOS "A" represents free-flow operating conditions and LOS "F" represents over-capacity conditions. For signalized or all-way stop-controlled (AWSC) intersections, an LOS determination is based on the calculated averaged delay for all approaches and movements. For two-way or side-street stop controlled (TWSC) intersections, an LOS determination is based upon the calculated average delay for all movements of the worst performing approach. The vehicular-based LOS criteria for different types of intersection controls are presented in Table 3-19.

Figure 3-25 presents the locations of the study intersections, all of which are on Saipan. The peak hour counts collected for the 2008 study were escalated to Near-Term Recovery Conditions using a factor of 17.3-percent, the average growth from the 2008 study daily roadway volumes to the Near-Term Recovery Conditions daily roadway volume estimates. Figure 3-26 presents the Near-Term Recovery Conditions peak hour turning movement volume estimates that were utilized for the intersection LOS analysis.

Table 3-19 Level of Service (LOS) Criteria for Intersections

LOS	Type of Flow	Delay	Maneuverability	Stopped Delay per Vehicle	
				Signalized	Un-signalized
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	≤10.0	≤10.0
B	Stable Flow	Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles.	>10.0 and ≤20.0	>10.0 and ≤15.0
C	Stable Flow	Higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted	>20.0 and ≤35.0	>15.0 and ≤25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	>35.0 and ≤55.0	>25.0 and ≤35.0

LOS	Type of Flow	Delay	Maneuverability	Stopped Delay per Vehicle	
				Signalized	Un-signalized
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	>55.0 and ≤80.0	>35.0 and ≤50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures.	Jammed conditions. Back-ups from other locations restrict or prevent movement.	>80.0	>50.0



Legend

- Study Intersections Locations
- Highways
- Other Roads

Paper Size ANSI A

0 2,250 4,500

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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STUDY INTERSECTION LOCATIONS

Project No. **11224010**
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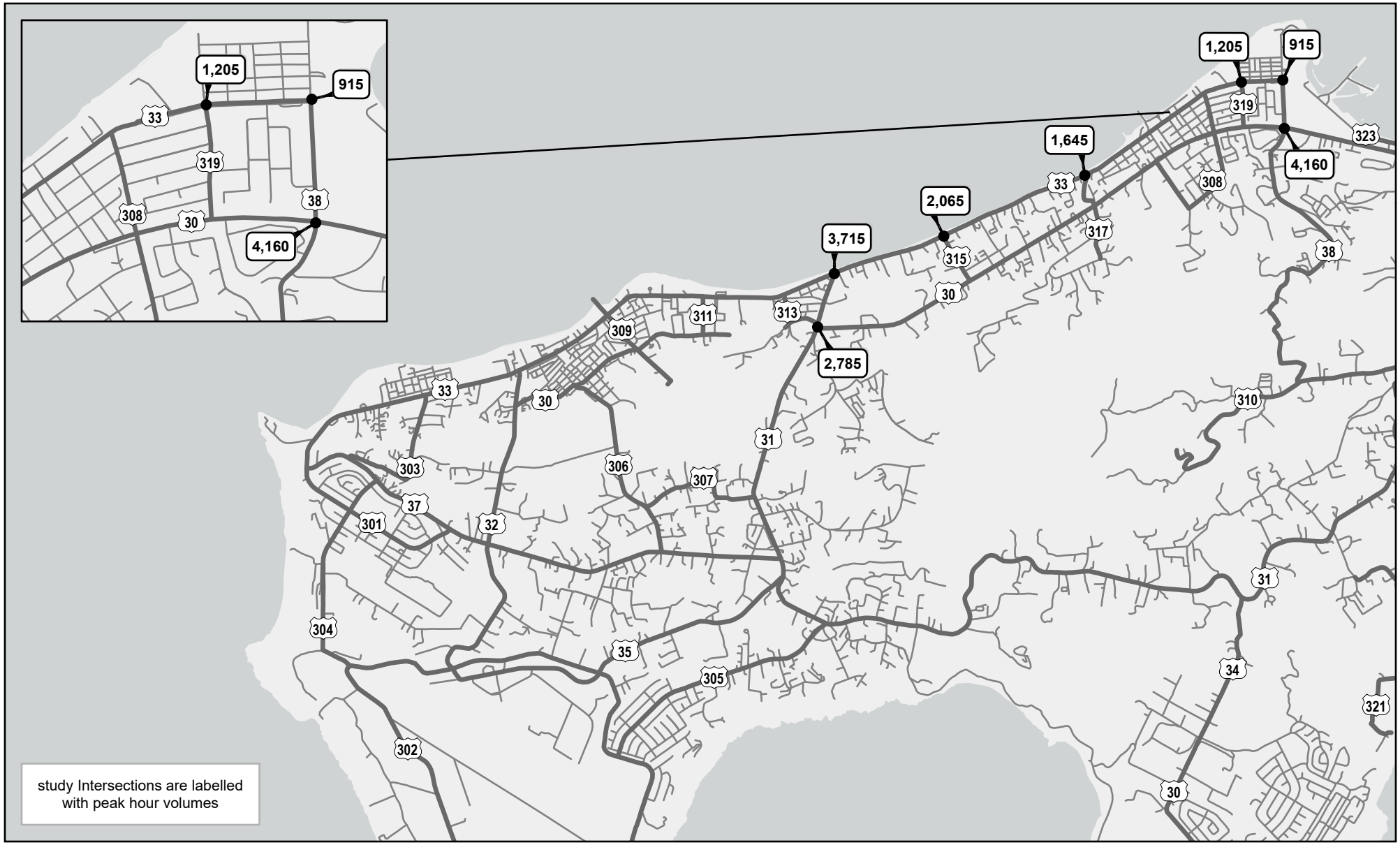
Date **Jun 2022**

FIGURE 3-25

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 325_Study Intersection Locations_Saipan
Print date: 29 Jun 2022 - 17:45

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS. Created by: pthornton



Legend

- Study Intersections Locations
- Highways
- Other Roads

Paper Size ANSI A

0 2,250 4,500

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
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YEAR 2021 WITH TOURISM PEAK HOUR VOLUMES AT STUDY INTERSECTIONS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-26

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 326_2021 Tourism Intersection Peak Hour Vol_Saipan
Print date: 29 Jun 2022 - 17:50

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS. Created by: pthornton

Table 3-20 and Figure 3-27 present the PM peak hour intersection operations at study intersections under Near-Term Recovery Conditions, with deficient intersections highlighted. LOS results from the 2008 study are shown for comparison.

Table 3-20 Intersection Peak Hour LOS – Near-Term Recovery Conditions

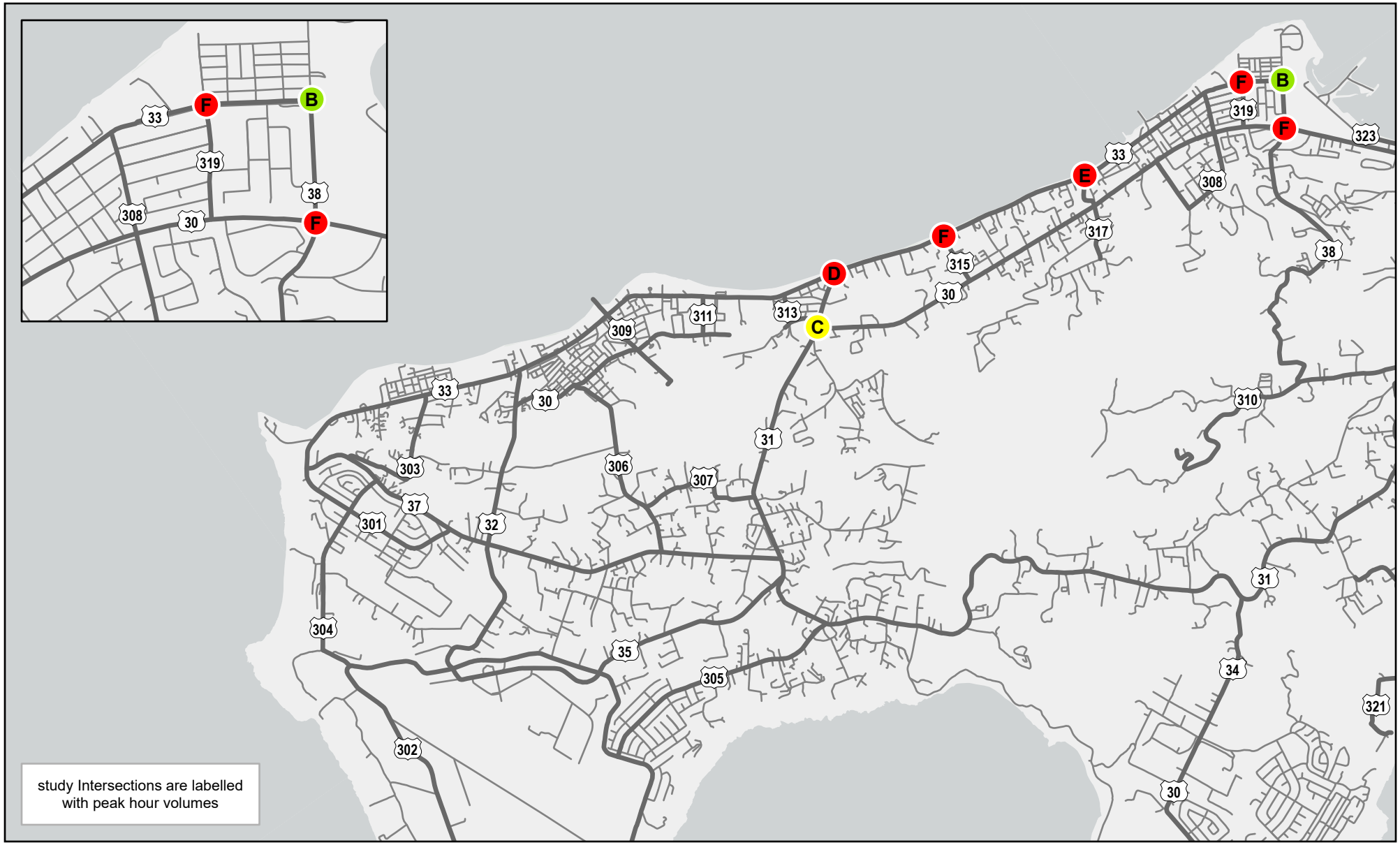
#	Intersection	Control Type[1,2]	Target LOS	Near-Term Recovery Conditions PM Peak Hour		2008 PM Peak Hour
				Delay (sec/veh)	LOS	LOS
1	Route 33 (Beach Road) & Route 38 (Micro Beach Road)	AWSC	D	12.1	B	B
2	**Route 30 (Middle Road/Chalan Pale Arnold) & Route 38 (Micro Beach Road)**	**Signal**	**E**	**OVR**	**F**	D
3	**Route 33 (Beach Road) & Route 319 (CPL Derence Jack Road)**	**TWSC**	**E**	**93.5**	**F**	**F**
4	**Route 33 (Beach Road) & Route 317 (Gualo Rai Road)**	TWSC	E	48.8	E	C
5	**Route 33 (Beach Road) & Route 315 (Quartermaster Road)**	**TWSC**	**E**	**OVR**	**F**	**F**
6	**Route 33 (Beach Road) & Route 31 (Chalan Monsignor Guerrero)**	Signal	D	50.1	D	C
7	Route 30 (Middle Road/Chalan Pale Arnold) & Route 31 (Chalan Monsignor Guerrero)	Signal	D	29.5	C	B

Notes:

1. *AWSC = All Way Stop Control; TWSC = Two Way Stop Control*
2. *LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal*
3. ***Bold** = Unacceptable Conditions*
4. *OVR = Delay over 300 seconds*

As presented in Table 3.18, the following study intersections operate at deficient LOS during the PM peak hour under Near-Term Recovery Conditions:

– Route 30 (Middle Road/Chalan Pale Arnold) & Route 38 (Navy Hill Road)
– Route 33 (Beach Road) & CPL Derence Jack Road
– Route 33 (Beach Road) & Route 317 (Gualo Rai Road)
– Route 33 (Beach Road) & Route 315 (Quartermaster Road)



Legend

Level of Service (LOS)

- LOS C or better
- LOS D
- LOS E or F

Highways

Other Roads

Paper Size ANSI A

0 2,250 4,500

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

YEAR 2021 WITH TOURISM LEVEL OF SERVICE AT STUDY INTERSECTIONS

Project No. **11224010**
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FIGURE 3-27

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 327_Year 2021 w Tourism Study Intersection LOS_Saipan
Print date: 29 Jun 2022 - 17:52

3.8 Collision Analysis

Collision data for the island of Saipan spanning the year 2017 was provided by the Department of Public Safety and analyzed to identify trends. In 2017, there was a total of 1,325 collisions on the Highway Master Plan study facilities, including 163 injury and five (5) fatal collisions, as shown in Table 3-21. Most of these collisions (28-percent) were "rear-end" collisions, where the front of one vehicle collides with the rear end of another vehicle.

Table 3-21 Total Collisions on Study Facilities

	TOTAL
Total	1,325
Non-Injury	1,157
Injury	163
Fatal	5

The five (5) fatalities occurred at the following locations:

- Chalan Pale Arnold, on the roadway approximately 400-feet west of Puetto Street:
  - Vehicle to vehicle collision (front-to-side)
  - Northbound travel direction of primary vehicle
- Chalan Monsignor Guerrero & Chalan Antonio Apa intersection:
  - Single vehicle collision
  - Eastbound travel direction of primary vehicle
  - Traffic signal intersection
- Chalan Monsignor Guerrero & Kannat Tabla Drive:
  - Vehicle to pedestrian collision
  - Eastbound travel direction
  - Stop-controlled intersection
- Chalan Monsignor Guerrero & Rayao Loop:
  - Vehicle to vehicle collision (rear-end)
  - Eastbound travel direction of primary vehicle
  - Stop-controlled intersection
- Beach Road, on the roadway approximately 225-feet south of Ghili Street
  - Single vehicle collision
  - Northbound travel direction

Collisions at Intersections

Figure 3-28 presents the total collisions at study intersections, as well as 13 additional intersection locations on the highway system. Table 3-22 presents the intersections with the highest number of total collisions that occurred in 2017, three of which are study intersections.

Table 3-23 presents the number of collisions that occurred at each study intersection during the 2017 data period, categorized further into fatal, injury, and non-injury collisions.

Table 3-23, the study intersections with the highest collision frequency in 2017 were Beach Road & Quartermaster Road, Beach Road & Garapan Street, and Beach Road & Chalan Monsignor Guerrero.

Table 3-22 Top Intersection Collision Locations on Highway Network

Intersection	2017 Collisions	
	Total	Study Intersection?
Beach Road & Quartermaster Road	**33**	Yes
Beach Road & Orchid Street	**20**	-
As Perdido Road & Beach Road	**19**	-
Beach Road & Garapan Street	**18**	-
Beach Road & Hibiscus Street	**18**	-
Chalan Monsignor Guerrero & Kannat Tabla Drive	**18**	-
Beach Road & Bwughos Street	**17**	-
Beach Road & Chalan Monsignor Guerrero	**15**	Yes
Chalan Monsignor Guerrero & Chalan Pale Arnold	**16**	Yes
Coral Tree Avenue & Palm Street	**13**	-
Alahai Avenue & Garapan Street	**12**	-
Beach Road & Insatto Street	**12**	-
Chalan Pale Arnold & Garapan Street	**12**	-
Chalan Pale Arnold & Gualo Rai Road	**12**	-
Beach Road & Susupe Street	**11**	-
Chalan Pale Arnold & Espana Street	**11**	-

Table 3-23 Collisions at Study Intersections by Severity

#	Intersection	Control Type[1,2]	2017 Collisions			
			Total	Non-Injury	Injury	Fatal
1	Beach Rd & Micro Beach Rd	AWSC	**4**	4	-	-
2	Chalan Pale Arnold & Navy Hill Rd	Signal	**0**	-	-	-
3	Beach Rd & CPL Derence Jack Rd	TWSC	**0**	-	-	-
4	Beach Rd & Gualo Rai Rd	TWSC	**4**	3	1	-
5	Beach Rd & Quartermaster Rd	TWSC	**33**	24	9	-
6	Beach Rd & Chalan Monsignor Guerrero	Signal	**15**	15	-	-
7	Chalan Pale Arnold & Chalan Monsignor Guerrero	Signal	**16**	15	2	-

Collision Types (Motor Vehicle Involved With)

Table 3-24 summarizes the collision data based on the type of objects or vehicles involved in the collision and compares 2017 data to the collision data presented in the previous 2008 report, spanning 2003 to 2008. As presented in Table 3-24, for the 2017 dataset, collisions between multiple motor vehicles were the most common type of reported collision, followed by collisions with fixed objects, vehicle overturning, and collisions with non-fixed objects.

Table 3-24 Collisions by Motor Vehicle Involved With

Motor Vehicle Involved With	2017 Collisions		2003-2008 Collisions*	
	Total	Percent	Total	Percent
Motor Vehicle	1,630	72.2%	6,431	72.1%
Fixed Object	60	2.7%	623	7.0%
Non-Fixed Object	23	1.0%	-	-
Pedestrian	20	0.9%	141	1.6%
Pedalcycle	2	0.1%	-	-
Animal	8	0.4%	59	0.7%
Overturned	26	1.2%	39	0.4%
Ran Offroad	7	0.3%	667	7.5%
Other/Unknown/Unreported	483	21.4%	-	-
SAIPAN TOTAL	**2,259**	**100%**		

**The collision "Motor Vehicle Involved With" attribute was recorded with different categories for the 2003-2008 data. The nearest matches are shown for comparison to the 2017 collision dataset.*

3.8.1 Collision Frequency and Rates

Table 3-25 presents the number of collisions that occurred along each study roadway segment during the 2017 data period, categorized further into fatal, injury, and non-injury collisions. These totals include collisions that occurred at intersections along the study roadway segments.

Five fatal collisions occurred in 2017 on CNMI highways at the following locations:

- **1 fatal collision:** Route 33 (Beach Road), between Chalan Monsignor Guerrero to Chalan Hagoi
- **1 fatal collision:** Route 30 (Middle Road/Chalan Pale Arnold), between Isa Drive to Micro Beach Road
- **3 fatal collisions:** Route 31 (Chalan Monsignor Guerrero), between Middle Road/Chalan Pale Arnold to Chalan Msgr. Martinez

In addition, collision rates were calculated for each study segment using the Federal Highway Administration (FHWA) collision rate[2] for both total and fatal + injury collisions. The study segments with the highest rate for either total or fatal + injury collisions are highlighted in in the following table. Collision rates are helpful in comparing study segments to each other, as the rates consider both segment length and daily volume to account for variations in study segments.

As presented in Table 3-25, several segments along Route 33 (Beach Road), Route 30 (Middle Road/Chalan Pale Arnold), and Chalan Monsignor Guerrero compose the highest collision frequency locations. However, Garapan Street has the highest collision rate with a length of 1,370-feet with 19 total and three injury collisions.

Collision rates for both total and fatal + injury collisions are presented on Figure 3-29 and Figure 3-30, respectively.

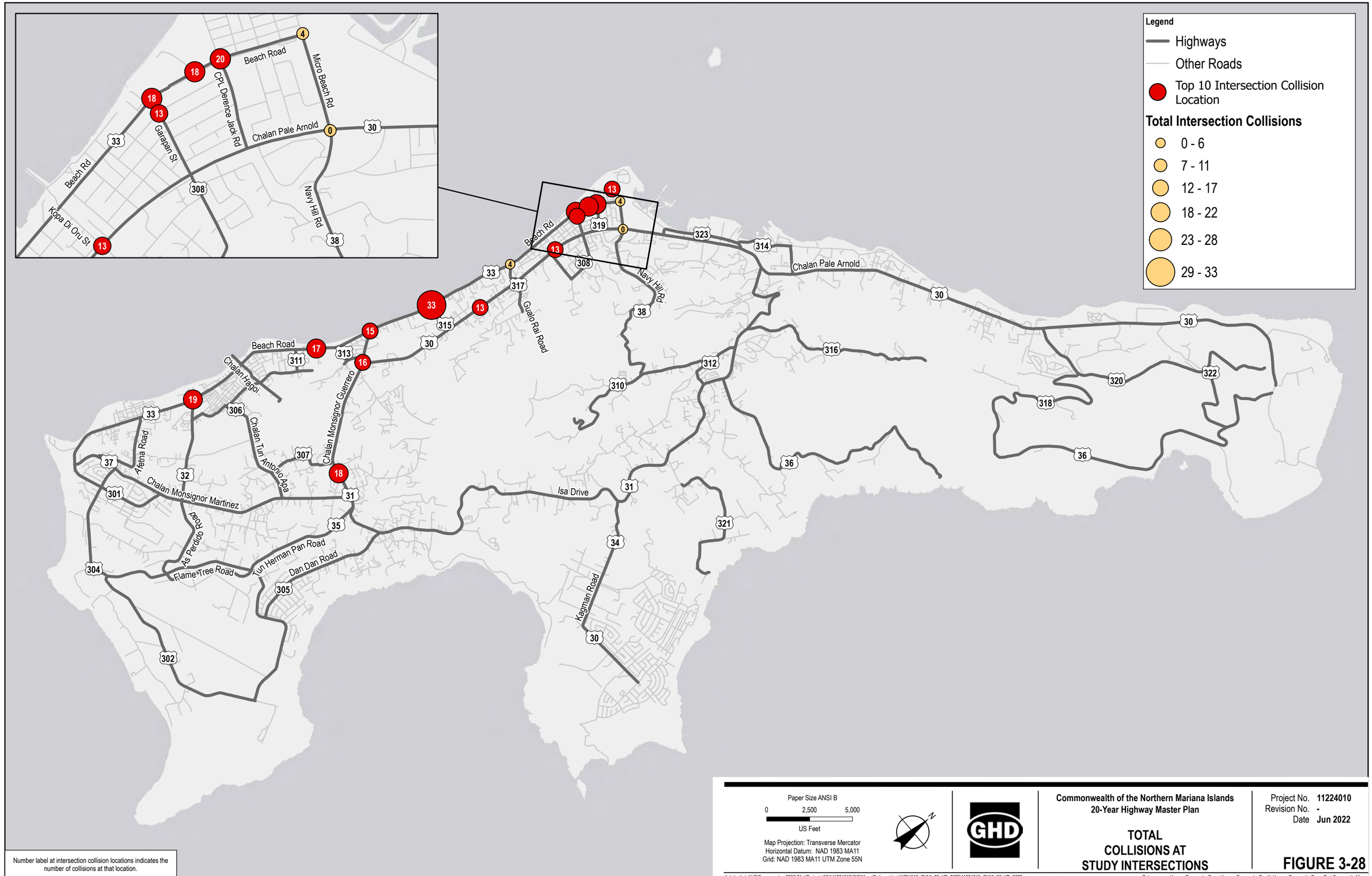
[2] https://safety.fhwa.dot.gov/local_rural/training/fhwasa1109/app_c.cfm

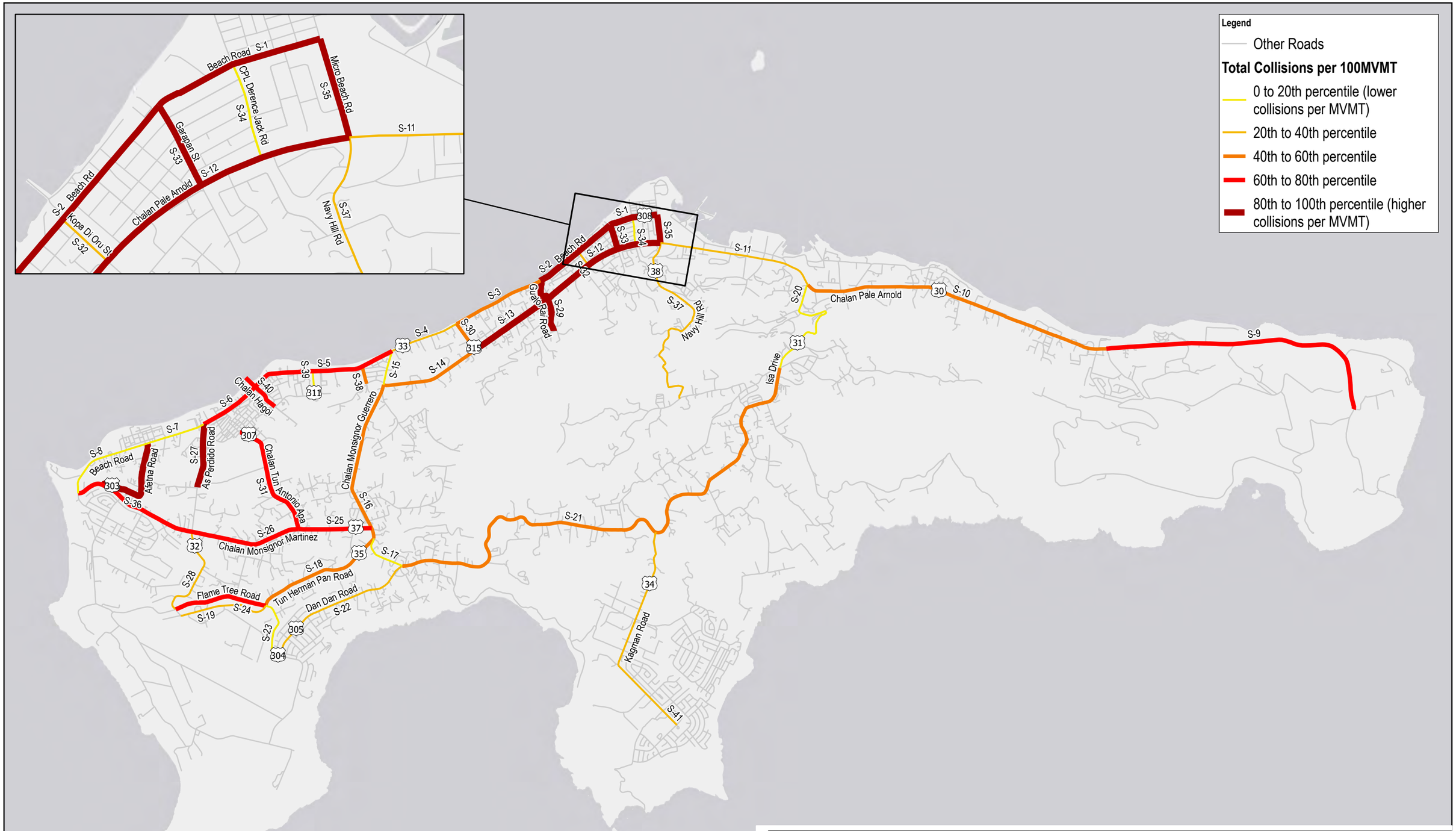
Table 3-25 Collisions on Study Road Segments by Severity

			2017 Collisions				Total Collision Rate	Fatal + Injury Collision Rate
Study Segment	Road Name	Location	Total	Non-Injury	Injury	Fatal	Rank	Rank
S-1	Beach Road	Micro Beach to Garapan St.	**87**	84	3	-	3	17
S-2	Beach Road	Garapan St. to Gualo Rai Rd.	**76**	65	11	-	7	6
S-3	Beach Road	Gualo Rai Rd. to Quartermaster Rd.	**39**	34	5	-	22	20
S-4	Beach Road	Quartermaster Rd. to Chalan Monsignor Guerrero	**26**	24	2	-	31	26
S-5	Beach Road	Chalan Monsignor Guerrero to Chalan Hagoi	**157**	137	19	1	12	11
S-6	Beach Road	Chalan Hagoi to As Perdido Rd.	**59**	54	5	-	10	15
S-7	Beach Road	As Perdido Rd. to Afetna Rd.	**0**	-	-	-	38	27
S-8	Beach Road	Afetna Rd. to Koblerville Rd.	**0**	-	-	-	38	27
S-9	Middle Road/Chalan Pale Arnold	North end to As Matius Road	**14**	14	-	-	13	27
S-10	Middle Road/Chalan Pale Arnold	As Matius Road to Isa Drive	**43**	38	5	-	19	22
S-11	Middle Road/Chalan Pale Arnold	Isa Drive to Micro Beach Road	**38**	31	6	1	32	19
S-12	Middle Road/Chalan Pale Arnold	Micro Beach Road to Gualo Rai Road	**129**	114	15	-	8	8
S-13	Middle Road/Chalan Pale Arnold	Gualo Rai Road to Quartermaster Road	**86**	72	14	-	9	4
S-14	Middle Road/Chalan Pale Arnold	Quartermaster Road to Chalan Monsignor Guerrero	**37**	33	4	-	25	23
S-15	Chalan Monsignor Guerrero	Beach Road to Middle Road/Chalan Pale Arnold	**6**	6	-	-	35	27
S-16	Chalan Monsignor Guerrero	Middle Road/Chalan Pale Arnold to Chalan Msgr. Martinez	**75**	63	9	3	18	14
S-17	Chalan Monsignor Guerrero	Tun Herman Pan Road to Dandan Road	**2**	2	-	-	37	27
S-18	Tun Herman Pan Road	Chalan Msgr Guerrero to Flame Tree Road	**10**	8	2	-	23	13
S-19	Tun Herman Pan Road	Flame Tree Road to Airport	**8**	7	1	-	29	24
S-20	Isa Drive	Middle Road/Chalan Pale Arnold to Capitol Hill Road	**11**	10	1	-	34	25
S-21	Isa Drive	Capitol Hill Road to Dandan Road	**66**	57	9	-	20	18
S-22	DanDan Road	Chalan Monsignor Guerrero to Flame Tree Road	**18**	11	7	-	28	3
S-23	Flame Tree Road	Dandan Road to Tun Herman Pan Rd.	**2**	1	1	-	36	9
S-24	Flame Tree Road	Tun Herman Pan Road to As Perdido Road	**7**	7	-	-	11	27
S-25	Chalan Monsignor Martinez	Chalan Monsignor Guerrero to Chalan Tun Joaquin Doi	**16**	14	2	-	17	16

			2017 Collisions				Total Collision Rate	Fatal + Injury Collision Rate
Study Segment	Road Name	Location	Total	Non-Injury	Injury	Fatal	Rank	Rank
S-26	Chalan Monsignor Martinez	Chalan Tun Joaquin Doi to Beach Road	**50**	43	7	-	14	10
S-27	As Perdido Road	Beach Road to Chalan Monsignor Martinez	**26**	23	3	-	6	7
S-28	As Perdido Road	Chalan Monsignor Martinez to Tun Herman Pan Rd/Flame Tree Rd	**6**	5	1	-	30	21
S-29	Gualo Rai Road	east of Beach Road	**4**	4	-	-	2	27
S-30	Quartermaster Road	east of Beach Road	**2**	2	-	-	24	27
S-31	Chalan Tun Antonio Apa	Chalan Monsignor Guerrero to Chalan Tun Joaquin Doi	**20**	16	4	-	15	5
S-32	Kopa Di Oru Street	east of Beach Road	**1**	1	-	-	26	27
S-33	Garapan Street	east of Beach Road	**19**	16	3	-	1	1
S-34	CPL Derence Jack Road	east of Beach Road	**0**	-	-	-	38	27
S-35	Micro Beach Road	east of Beach Road	**10**	6	4	-	5	2
S-36	Afetna Road	east of Beach Road	**12**	12	-	-	4	27
S-37	Navy Hill Road	east of Middle Road/Chalan Pale Arnold	**8**	8	-	-	33	27
S-38	Oleai Street	east of Beach Road	**1**	1	-	-	21	27
S-39	Tekken Street	east of Beach Road	**0**	-	-	-	38	27
S-40	Chalan Hagoi	east of Beach Road	**7**	7	-	-	16	27
S-41	Kagman Road		**21**	16	5	-	27	12

Note: Values in columns are shaded according to their respective ranking compared to all study roadway segments, where dark red represents worse conditions.


Legend
Highways
Other Roads
Top 10 Intersection Collision Location
Total Intersection Collisions
0 - 6
7 - 11
12 - 17
18 - 22
23 - 28
29 - 33
Beach Road
Micro Beach Rd
CPL Derence Jack Rd
Chalan Pale Arnold
Garapan St
Beach Rd
Kopa Di Oru St
Navy Hill Rd
Gualo Rai Road
Chalan Pale Arnold
Chalan Hagoi
Chalan Monsignor Guerrero
Afetna Road
Chalan Tun Antonio Apa
Chalan Monsignor Martinez
As Perdido Road
Flame Tree Road
Tun Herman Pan Road
Dan Dan Road
Isa Drive
Kagman Road
Number label at intersection collision locations indicates the number of collisions at that location.
Paper Size ANSI B
0 2,500 5,000
US Feet
Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N
GHD
Commonwealth of the Northern Mariana Islands
20-Year Highway Master Plan
TOTAL COLLISIONS AT STUDY INTERSECTIONS
Project No. 11224010
Revision No. -
Date Jun 2022
FIGURE 3-28
\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 328_Total Collisions at Study Intersections_Saipan
Print date: 29 Jun 2022 - 17:57
Data source: Human Geography Base; Human Geography Deatil: Human Geography Base: Esri Community Maps Contributors, BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS.; CNMI coastlines, CNMI, 2021; Roads: TIGER, 2021; Collisions: CNMI, 2017.
Created by: pthornton



Paper Size ANSI B

0 2,500 5,000

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
20-Year Highway Master Plan

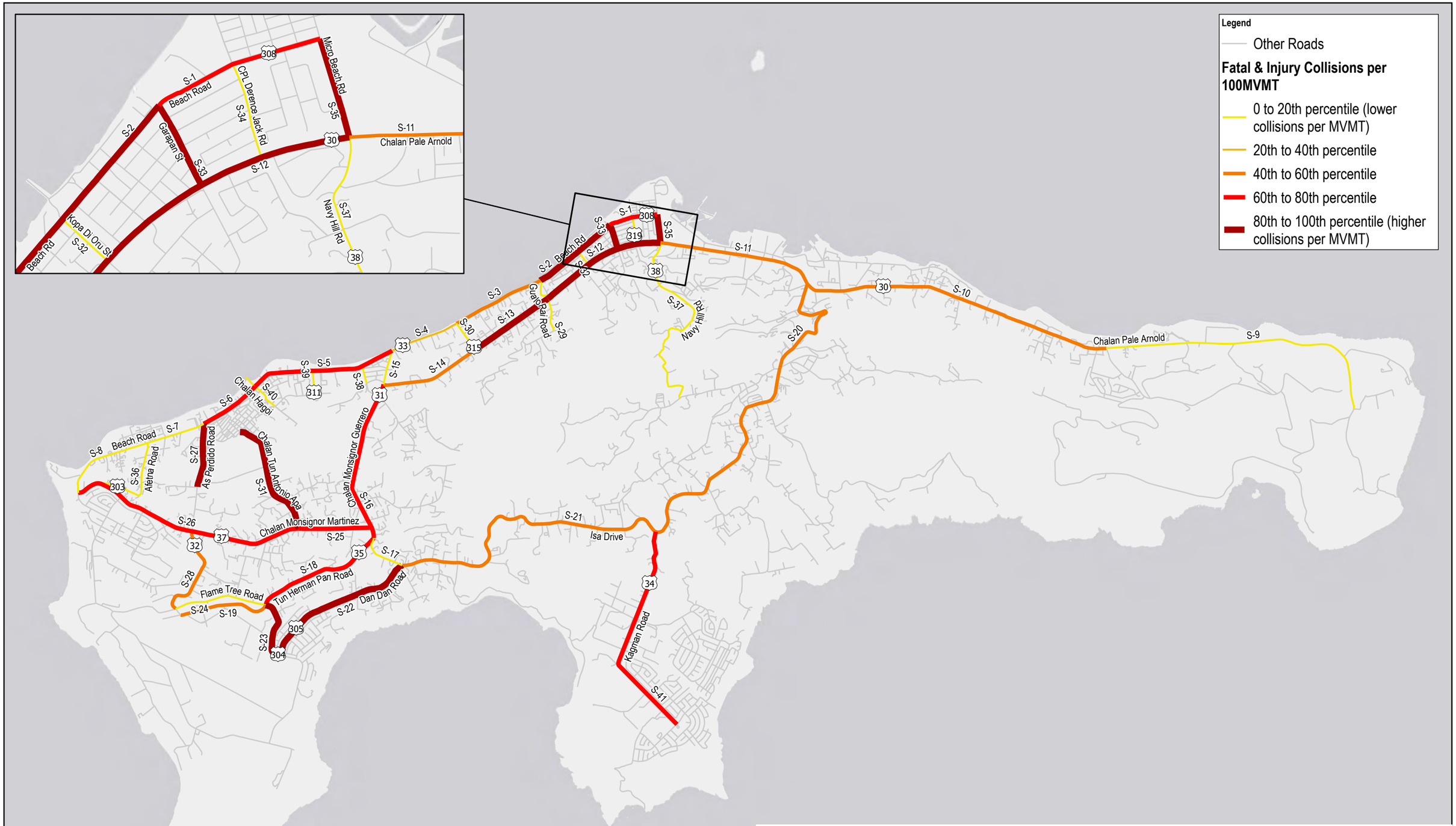
COLLISION RATES

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 3-29

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 329_Collision Rates_Saipan
Print date: 29 Jun 2022 - 17:59

Data source: Human Geography Base; Human Geography Deatil: Human Geography Base: Esri Community Maps Contributors, BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS,; CNMI coastlines, CNMI, 2021; Roads: TIGER, 2021; Collisions:
Created by: pthornton



Paper Size ANSI B

0 2,500 5,000

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
20-Year Highway Master Plan

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FATAL & INJURY COLLISION RATES

FIGURE 3-30

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 330_Fatal + Injury Collision Rates_Saipan
Print date: 29 Jun 2022 - 18:00

Data source: Human Geography Base; Human Geography Deatil: Human Geography Base: Esri Community Maps Contributors, BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS.; CNMI coastlines, CNMI, 2021; Roads: TIGER, 2021; Collisions:
Created by: pthornton

4 Public Input

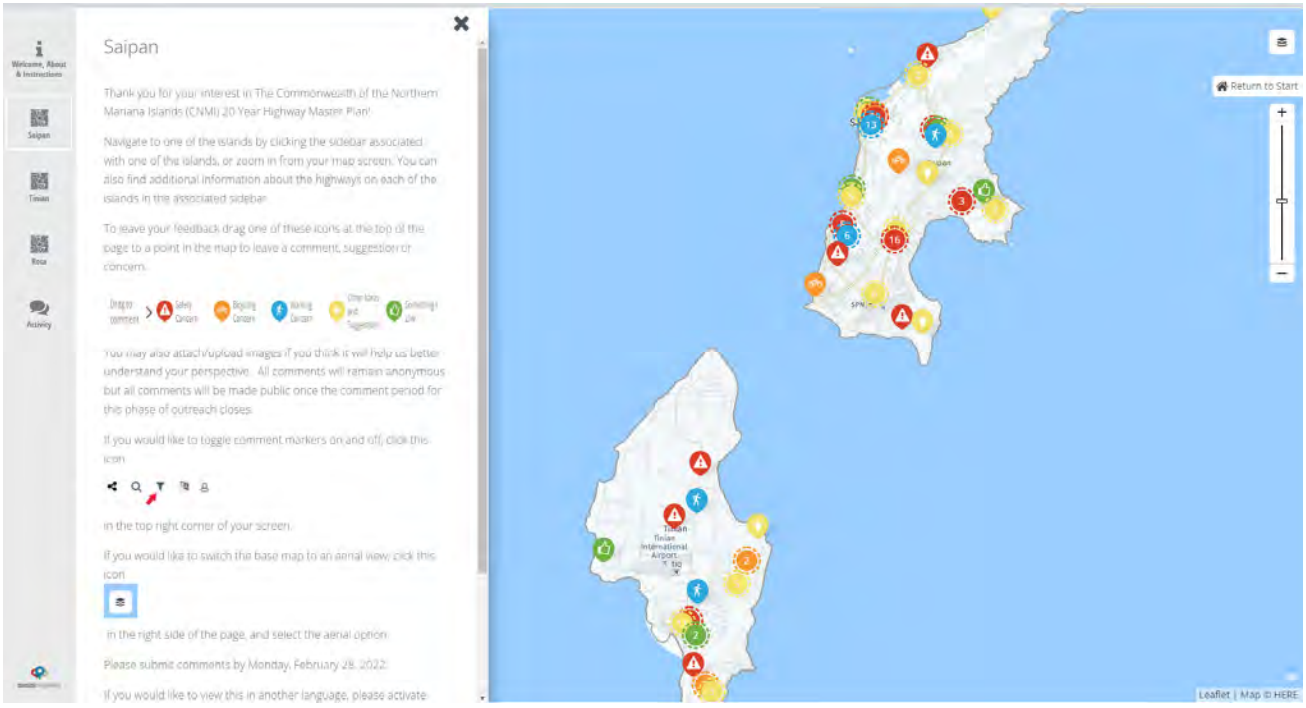
4.1 Public Workshops

Public workshops were held in early 2022 on each of Rota (January 26), Tinian (February 2), and Saipan (February 10). The public workshops were advertised on social media and in the local newspapers of the Marianas Variety and the Saipan Tribune including a QR code that linked to the Project website. Each meeting included an informational presentation covering the purpose of the Highway Master Plan, study components, and review of previous public input received electronically, as well as a forum for comments, questions, and suggestions for highway system improvements. This section summarizes the community feedback received from these meetings, as well as the comments received on the project website.

4.2 Interactive Project Website

A Project website[3] was created, hosted on the Social Pinpoint platform, which provided Project background and goals, an informational video recorded by GHD and DPW staff, listed upcoming workshops with location details for in-person and virtual participation via Zoom. and provided an interactive map that allowed users to pin their comments to a location on Saipan, Tinian, or Rota. The comment submission period lasted from July 31, 2021 to February 28, 2022, during which time a total of 224 comments were recorded on the Project website and included in the Appendix. A view of the online interactive map with pinned comments is shown on Figure 4-1.

Figure 4-1 Online Interactive Comment Map View



These comments were assigned tags (or themes) based on keywords found in the text of the comment (e.g. comments containing the word “walking” or “crosswalk” were assigned the Pedestrian tag). The comment location types based on the spatial location of the comment left on the interactive project map was also considered and were broken down into categories:

[3] https://cnmihighwaymasterplan.mysocialpinpoint.com/

– On the highway (hwy) system
– Adjacent to the highway system
– Off the highway system; and
– Related to non-terrestrial modes of travel.

Comments categorized as “On the Highway System” were those pinned directly on a roadway or sidewalk facility of the highway system. Comments categorized as “System Adjacent” were those pinned on a property fronting a road within the highway system or pinned on a side street near where it crosses the highway route.

Saipan

A total of 161 comments were pinned on the island of Saipan. Of those, 97 comments were pinned on roadways that are part of the highway system. The following figure shows the breakdown of comments by tag and location type. A word-cloud was also generated based on observed comment tags, shown below. The primary tags assigned to the Saipan comments were Roadway (83 comments), Automobile (47), and Pedestrian (44), followed by Safety (36) and Drainage (32).

Figure 4-2 Saipan Comments by Tag & Location Type

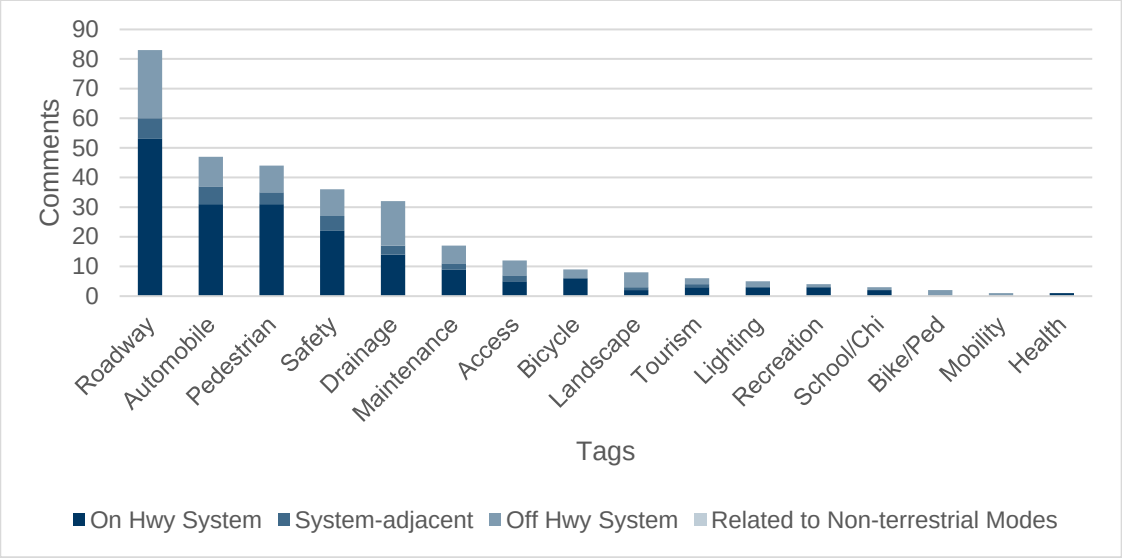


Figure 4-3 Saipan Comment Tags Word Cloud

Among the comments received for Saipan, repeated concerns included:

– Limited walking and biking access on roadways and intersections in Garapan
– Concerns about pedestrian exposure to vehicle traffic along Middle Road/Chalan Pale Arnold
– Traffic congestion experienced at the intersection of Beach Road & Chalan Monsignor Guerrero
– Rain events causing flooding, eroded ruts, and sediment buildup on various roadways on Saipan

Tinian

A total of 46 comments were pinned on the island of Tinian. Of these, 30 were pinned on roadways that are part of the highway system. The following figure shows the breakdown of comments by tag and location type. A word-cloud was also generated based on observed comment tags, shown below. The primary tags assigned to the Tinian comments were related to Roadway concerns (18 comments). The remaining tag categories were fairly evenly distributed amongst Maintenance (6), Automobile (6), Access (4), Safety (4), Drainage (3), and Bicycle (3).

Figure 4-4 Tinian Comments by Tag & Location Type

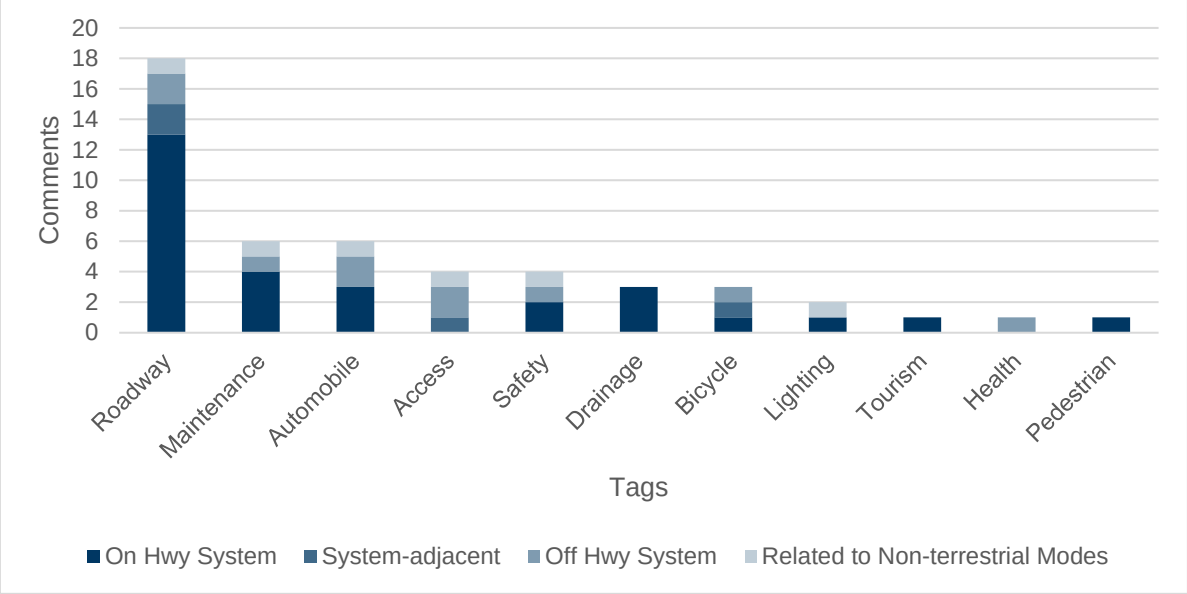


Figure 4-5 Tinian Comment Tags Word Cloud

As presented Figure 4-4, the tags assigned to the Tinian comments were Roadway (18 comments), Location (15), Maintenance (6 comments), and Automobile (6 comments).

Among the comments received for Tinian, repeated concerns included:

– Vegetation overgrowth on Route 27 limiting usable roadway width and creating hazardous driving conditions
– Sight distance concerns at the Broadway and Canal Street roundabout
– Limited walking access in developed areas, including the Marpo Heights expansion
– Potholes and drainage issues along Broadway

Rota

A total of 17 comments were pinned on the island of Rota. Of these, seven were pinned on roadways that are part of the highway system. The following figure shows the breakdown of comments by tag and location type. A word-cloud was also generated based on observed comment tags, shown below. The primary tags assigned to the Rota comments were Pedestrian (11 comments), Roadway (9), Maintenance (6), Bicycle (6), and Safety (5).

Figure 4-6 Rota Comments by Tag & Location Type

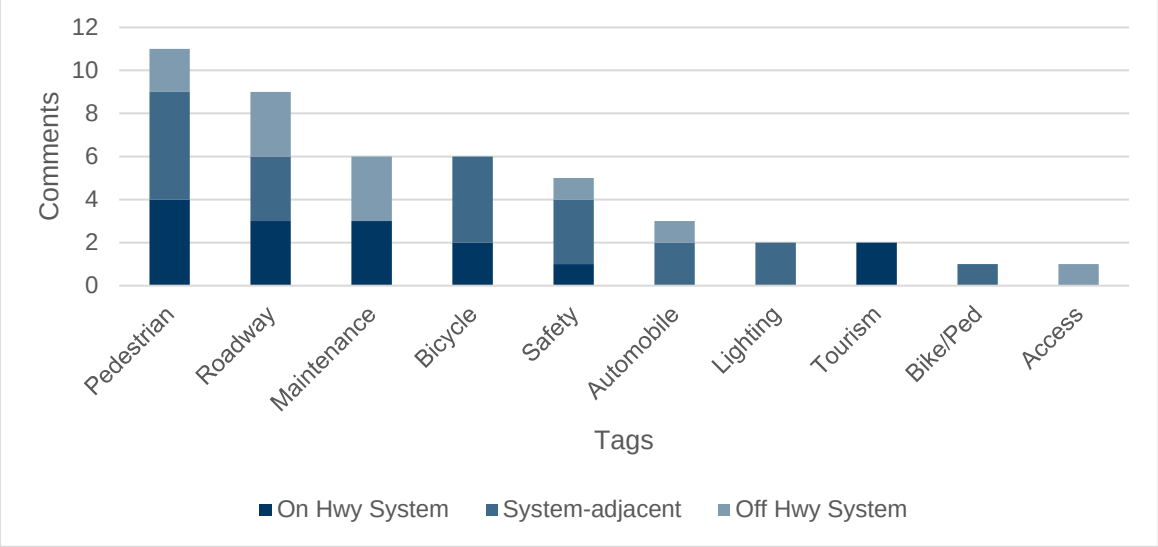


Figure 4-7 Rota Comment Tags Word Cloud

As presented in Figure 4-6, the tags assigned to the Rota comments were Location (15 comments), Pedestrian (11), Roadway (9 comments).

Among the comments received for Rota, repeated concerns included:

– Difficulty travelling along coastal highways for pedestrians and bicyclists
– Sheer slopes close to the edge of Route 100
– Desire for pedestrian and bike facilities to increase access between developed areas of the island
– Potholes and encroaching plant growth along Ginalangan Road creating hazardous driving conditions

4.2.1 Public Input on Multimodal Needs

According to the public outreach effort of this plan, the following highways are ideal candidates for further evaluation for improvement of pedestrian infrastructure, including sidewalks, crosswalks, and lighting(highlighted in orange on the following maps). In addition, the following roadways suggest consideration for improvement of bicycle infrastructure, including bike-specific lanes, and/or widened shoulders (highlighted in blue on the following maps).

Note: The illustrations below reflect the opinion of those members of the public that participated in the online mapping tool as part of this planning process.

Saipan

– Pedestrian (Orange):
  - Route 31 (Chalan Monsignor Guerrero), specifically near Chalan Monsignor Martinez
  - Route 33 (Beach Road), entire extent
  - Route 30 (Middle Road/Chalan Pale Arnold), specifically from Quartermaster Road to the port on Industrial Drive
  - Route 304 (Flame Tree Road), near the airport field
  - Route 31 (Isa Drive), east of Chalan Tun Herman Pan, to connect to the park
  - Route 31 (Isa Drive), entire extent
  - Route 30 (Middle Road/Chalan Pale Arnold/Middle Road/Chalan Pale Arnold), to the north

– Bicycle (Blue):
  - Route 30 (Middle Road/Chalan Pale Arnold/Middle Road/Chalan Pale Arnold), to connect villages in the North and the South of Saipan
  - Route 33 (Beach Road), southern segments
  - Route 30 (Middle Road/Chalan Pale Arnold/Middle Road/Chalan Pale Arnold), to the north

Illustration 4-1 Saipan (South) Pedestrian & Bicycle Public Comment Areas

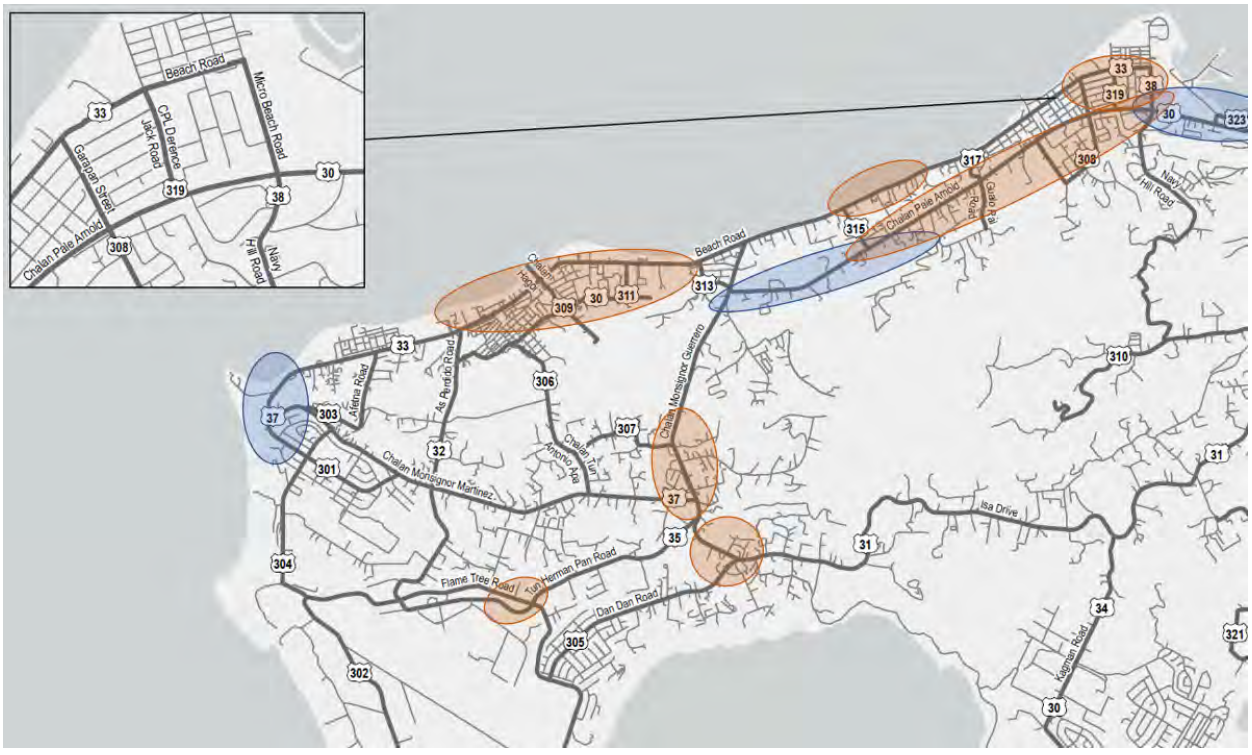
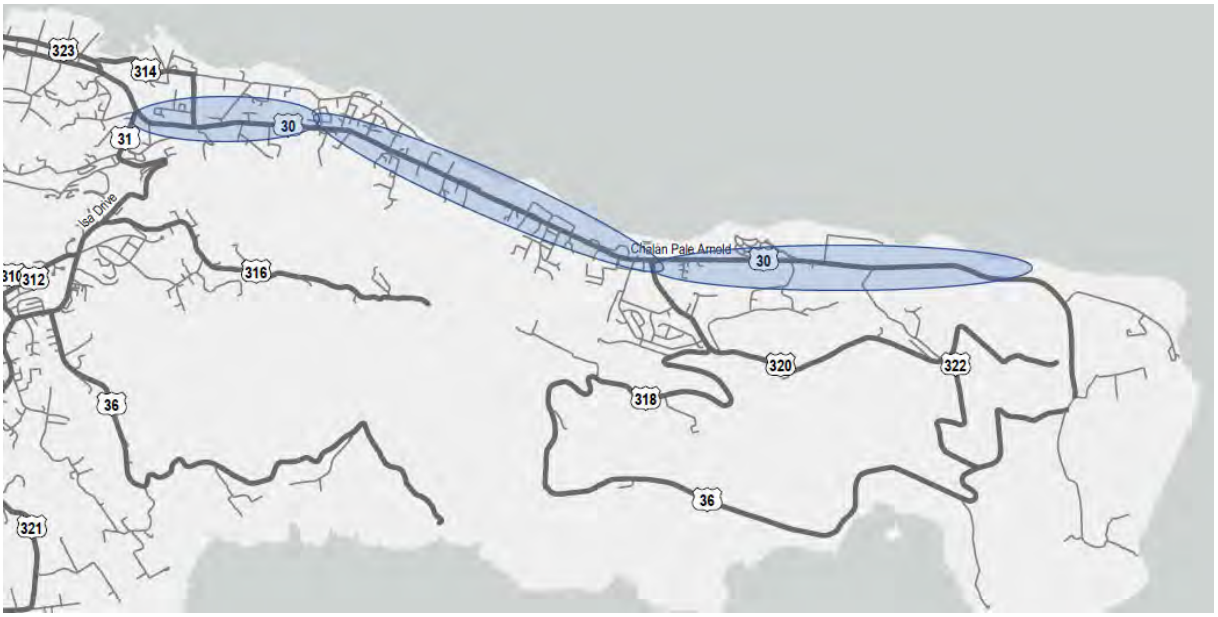


Illustration 4-2 Saipan (North) Bicycle Public Comment Areas



Tinian

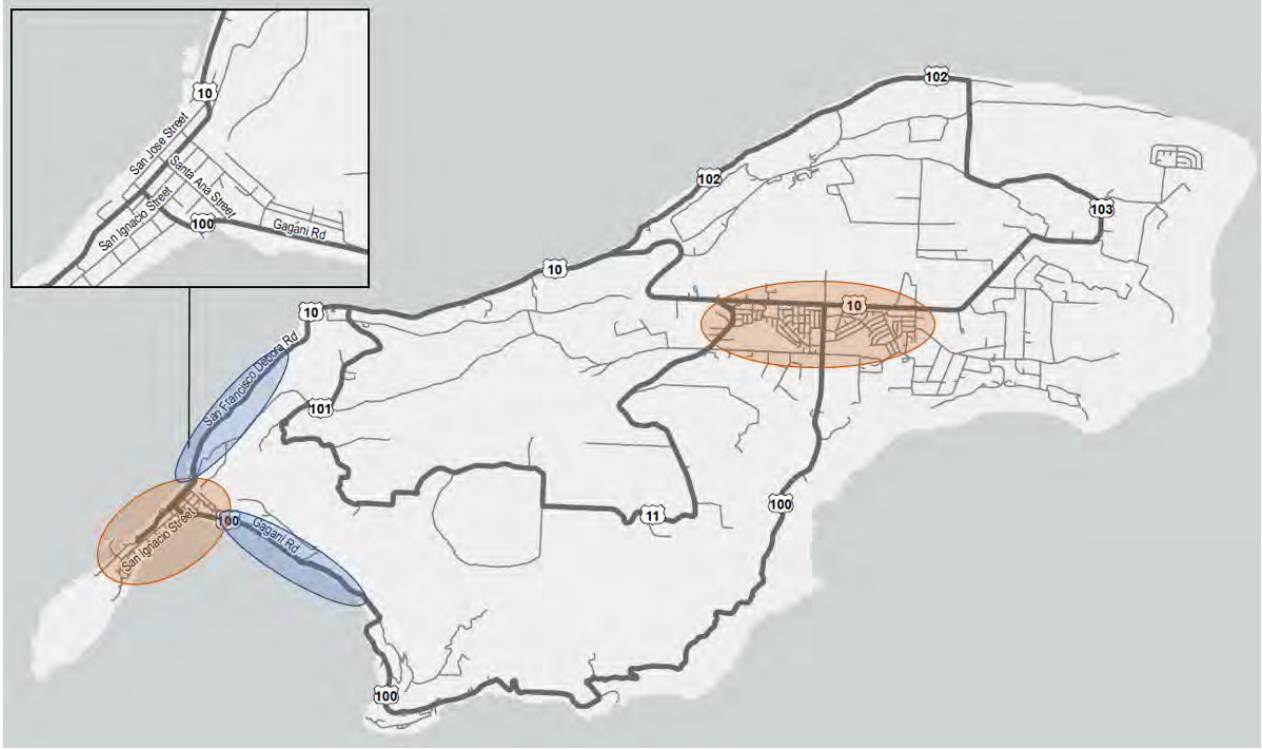
– Pedestrian (Orange):
  - Route 21 (Broadway) near Wall Street
  - Route 21 (Broadway) near 86th Street
– Bicycle (Blue):
  - Route 27, southern segment (comments were made for connections to the highway via non-highway roads)
  - Route 20 (comments were made for connections to the highway via non-highway roads)

Illustration 4-3 Tinian Pedestrian & Bicycle Public Comment Areas

Rota

– Pedestrian (Orange) & Bicycle (Blue):
  - Primarily in Songsong Village and Sinapalo Village
  - General comments for sidewalks and bicycle lanes throughout the island

Illustration 4-4 Rota Pedestrian & Bicycle Public Comment Areas



5 Long-Term Transportation Conditions

5.1 Long-Term (2040) Traffic Volumes

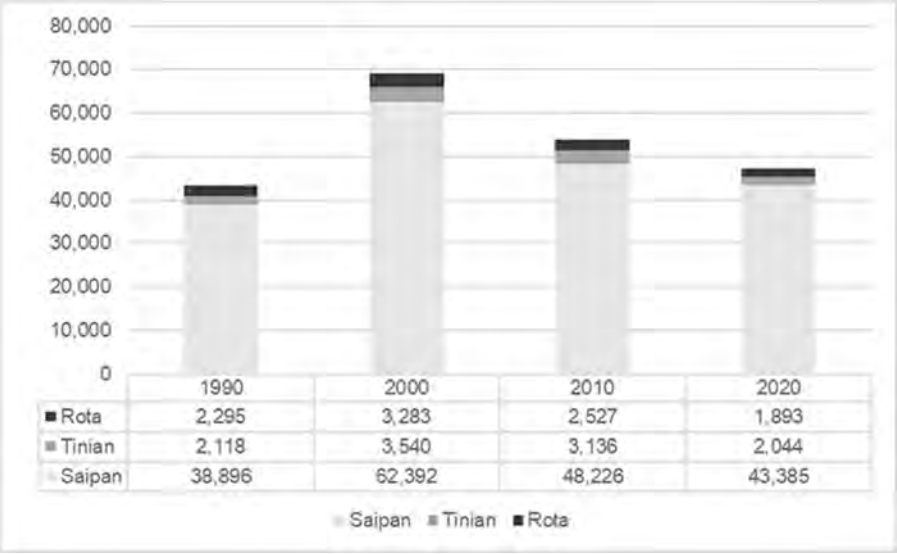
The Highway Master Plan identifies long-term transportation improvements to address deficiencies and constraints anticipated to occur over the next twenty years and beyond. Future transportation conditions assume planned roadway improvements are in place and traffic volumes have been idealized to reflect approximately twenty years of change associated with anticipated fluctuations in population, employment, and tourism. To forecast Long-Term (2040) traffic volumes, the Near-Term Recovery Conditions traffic volume estimates were estimated by an annual growth factor and analyzed using the same operational analysis methodology utilized for Near-Term Recovery Conditions for study roadways and intersections. The following provides a summary of the assumptions and methodology used to forecast Long-Term (2040) traffic volumes.

The previous 2008 Highway Master Plan utilized a growth rate of 2-percent per year to grow traffic volumes for study intersection and roadway locations. This growth rate was derived from both historic average daily traffic volumes from Saipan and population data from all three islands. Lacking enough historical traffic data to confidently identify a trend in growth beyond near-term conditions, population was determined to be the most reliable and available proxy to use as the basis for estimating an annual growth rate to forecast traffic volumes.

Population Trends & Projections

Historical population values reported through the US Census over the past 20-years show a decrease in total population for Saipan, Tinian, and Rota, with a 30-percent decrease in population on Saipan and a 42-percent decrease in population on both Tinian and Rota between 2000 and 2020 (see Figure 5-1). Several world events between 2000 and 2020 have contributed to the declining trend seen in Figure 5-1, including the September 11 tragedy of 2001, the outbreak of SARS in 2003, the withdrawal of Japan Airlines in 2005, the global economic crisis of 2009, several seismic events, typhoons, and the current Global COVID-19 pandemic.

Figure 5-1 Island Population (1990 – 2020)

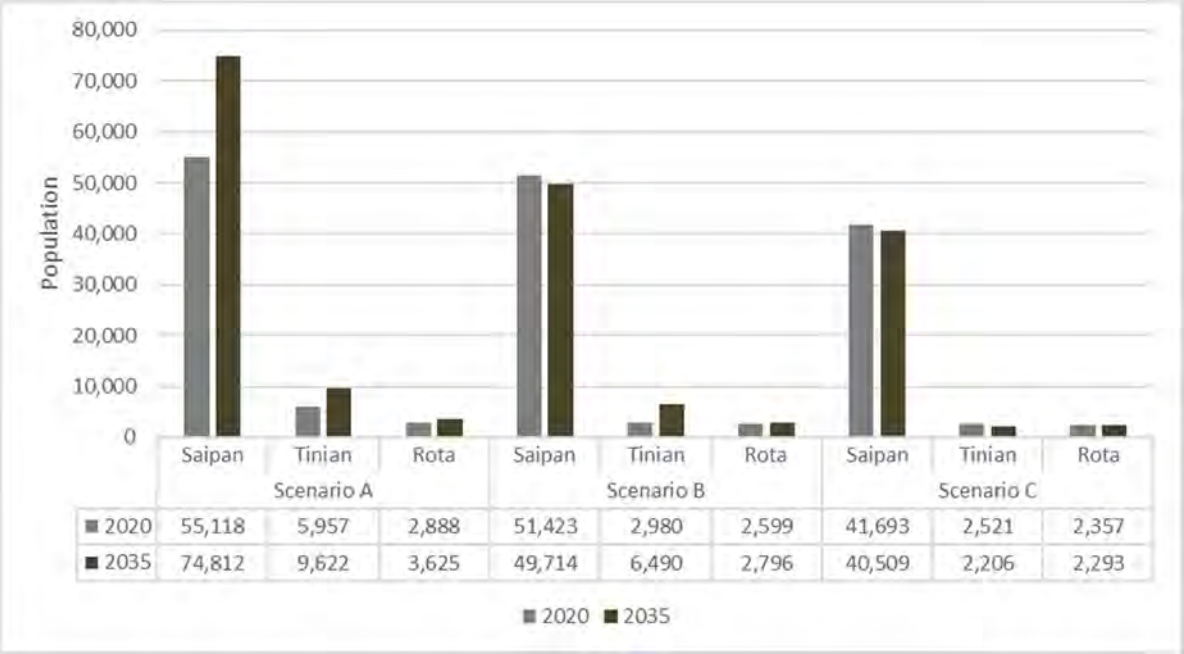


Although historical population trends suggest a continued decline into the future, other factors such as varying degrees of land use development on the islands are anticipated to affect growth trends over the next twenty years. Population growth projections published in the March 2019 CNMI Comprehensive Public Land Use Plan Update (Public Land Use Plan, DPL Report) reflect varying degrees of development with corresponding ranges of anticipated

population growth between years 2020 and 2035 (see Figure 5-2). These projections are represented within the following three scenarios:

- Scenario A is the high estimate derived from the optimistic estimates found in the 2017 publication *Tourism Development in the US Commonwealth of the Northern Mariana Islands: A Feasibility & Sustainability Study* developed by consultants Horwath HTL for the Marianas Visitors Authority (MVA), assuming buildout of several hotels and casinos across the islands.
- Scenario B is medium growth, where Saipan remains with the current level of development so visitor levels plateaus there, Tinian still gets a casino, and Rota adds one new hotel.
- Scenario C is the negative growth scenario, wherein the phase-out of CW-1 workers (a temporary working permit for non-US people to work in the CNMI) disrupts the economy. Visitor arrivals on Saipan are assumed to drop then slightly recover. Rota and Tinian have minimal development.

Figure 5-2 DPL Island Population Projections (2020 – 2035)



Highway Master Plan Growth Rates

The Public Land Use Plan Year 2020 population estimates were forecast based on anticipated growth from Year 2018 and do not reflect actual population values. Actual Census reported Year 2020 population numbers per island were considerably lower than the Year 2020 estimates from the Public Land Use Plan. The lower-than-projected populations are likely attributable to recent economic factors, such as Delta's removal of flights to Saipan International Airport, the impact of multiple typhoons, and the COVID-19 pandemic. In lieu of using actual population projections published within the Public Land Use Plan, the growth rates were annualized and applied to actual Census reported Year 2020 population numbers per island to project Long-Term (2040) population estimates. The resulting growth rates per island per scenario are shown in the following table.

While each scenario has the potential to occur, scenario A land use development projections represent overly optimistic growth, especially when compared against the minimal growth represented in scenario C. To reach a more realistic forecast scenario, the calculated population growth rates between years 2020 and 2040 for scenarios A (the highest) and C (the lowest) were averaged to create the new scenario (Scenario D) to represent a conservatively high estimate in that it results in a positive growth rate despite the decrease between 2000 and 2020 Census population numbers and the aforementioned economic factors. Table 1.2 presents the average projected population estimates (Scenario D) and proposed 20-year annual growth rates by island.

Table 5-1 Island Population Growth Rates

Scenario	DPL Report Estimates			Census Data	20-Year Growth* (Y)	Actual 2020 + 20-Year Growth (X+Y)	20-Year Annual Growth Rate
	2020	2035	15 Year Growth (2020 to 2035)	Actual 2020 (X)			
Scenario A							
Saipan	55,118	74,812	19,694	43,385	26,259	69,644	3.0%
Tinian	5,957	9,622	3,665	2,044	4,887	6,931	12.0%
Rota	2,888	3,625	737	1,893	983	2,876	2.6%
Scenario B							
Saipan	51,423	49,714	-1,709	43,385	-2,279	41,106	-0.3%
Tinian	2,980	6,490	3,510	2,044	4,680	6,724	11.4%
Rota	2,599	2,796	197	1,893	263	2,156	0.7%
Scenario C							
Saipan	41,693	40,509	-1,184	43,385	-1,579	41,806	-0.2%
Tinian	2,521	2,206	-315	2,044	-420	1,624	-1.0%
Rota	2,357	2,293	-64	1,893	-85	1,808	0.0%

The resulting calculated annual growth rate for **Saipan is 1.42-percent** growth per year, for **Tinian is 5.46-percent** growth per year, and for **Rota is 1.19-percent** growth per year. This averaged growth rate is applied to Near-Term Recovery Condition roadway and intersection traffic volumes for Long-Term (2040) operational analysis for each island. To establish Long-Term (2040) roadway and intersection operational analysis, these annual growth rates are applied to the Near-Term Recovery Conditions traffic volume estimates, non-compounding, over twenty years.

Table 5-2 Highway Master Plan 20-Year Growth Rate

Scenario	Averages of Scenarios A & C			Census Data	20-Year Growth* (Y)	Actual 2020 + 20-Year Growth (X+Y)	20-Year Annual Growth Rate
	2020	2035	15 Year Growth (2020 to 2035)	Actual 2020 (X)			
Scenario D							
Saipan	48,406	57,661	9,255	43,385	12,340	55,725	**1.42%**
Tinian	4,239	5,914	1,675	2,044	2,233	4,277	**5.46%**
Rota	2,623	2,959	337	1,893	449	2,342	**1.19%**

5.2 Future Roadway Operations

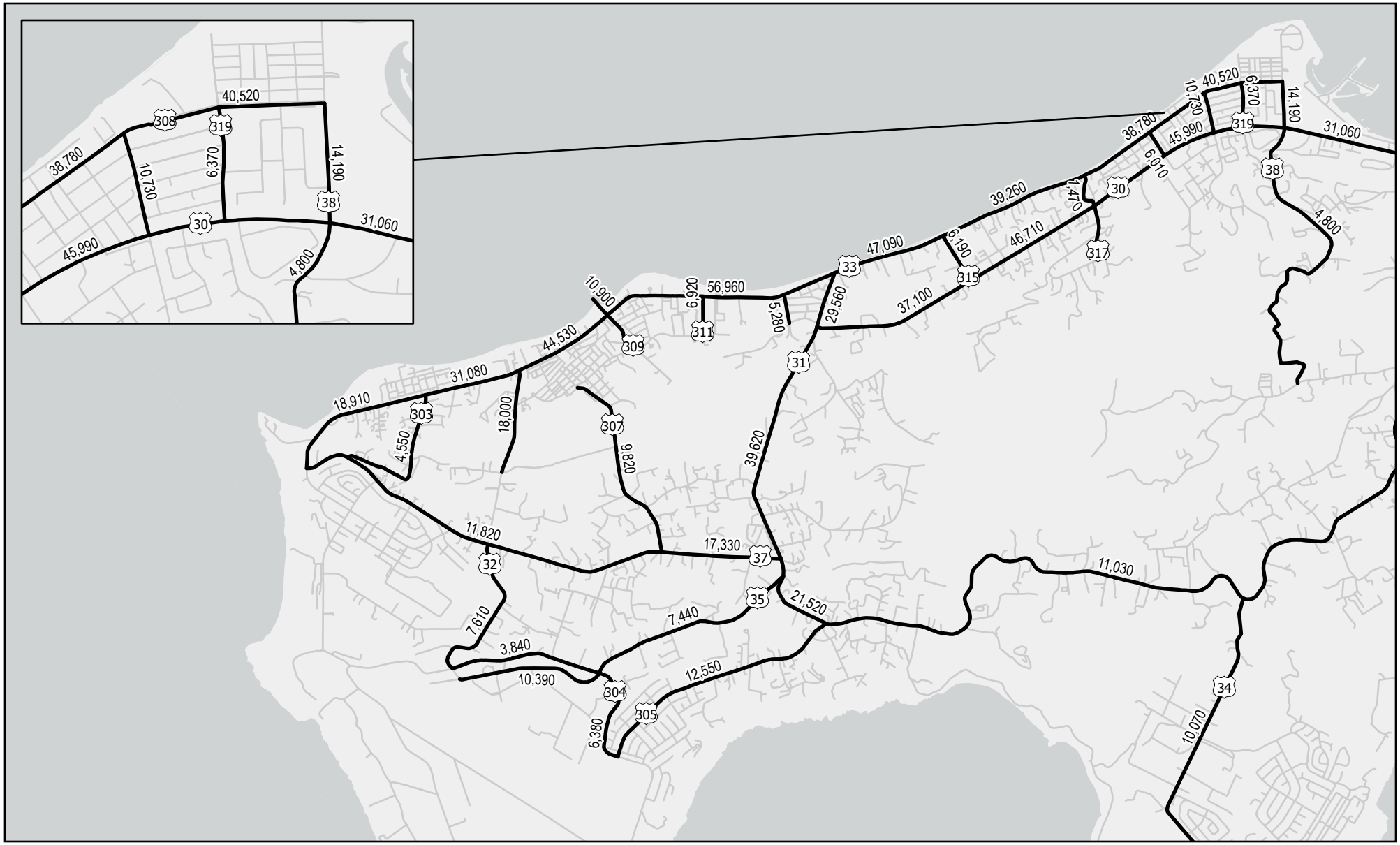
Table 5-3 presents the Long-Term (2040) daily volume (see Figure 5-3 through Figure 5-6), estimated peak hour volume, and roadway LOS results (see Figure 5-7 through 5-10) for each study location, with segments operating at deficient LOS highlighted. As presented in this table the following study segments operate at deficient LOS (LOS E or F) during the PM peak hour under Long-Term (2040) conditions:

- S-2 Route 33 (Beach Road), Garapan Street to Gualo Rai Road
- S-3 Route 33 (Beach Road), Gualo Rai Road to Quartermaster Road
- S-4 Route 33 (Beach Road), Quartermaster Road to Route 31 (Chalan Monsignor Guerrero)
- S-5 Route 33 (Beach Road), Route 31 (Chalan Monsignor Guerrero) to Chalan Hagoi
- S-6 Route 33 (Beach Road), Chalan Hagoi to As Perdido Road
- S-8 Route 33 (Beach Road), Afetna Road to Koblerville Road
- S-12 Route 30 (Middle Road/Chalan Pale Arnold), Route 38 (Micro Beach Road) to Route 317 (Gualo Rai Road)
- S-13 Route 30 (Middle Road/Chalan Pale Arnold), Route 317 (Gualo Rai Road) to Route 315 (Quartermaster Road)

Table 5-3 Long-Term (2040) Roadway Operations

ID	Route Name	Road Name	Location	Roadway Classification	PM Peak Volume	PM Peak LOS
S-1	Rte 33	Route 33 (Beach Road)	Micro Beach to Garapan Street	2-Lane Principal Arterial	1,300	D
S-2	**Rte 33**	**Route 33 (Beach Road)**	**Garapan Street to Gualo Rai Road**	**2-Lane Principal Arterial**	**1,890**	**F**
S-3	**Rte 33**	**Route 33 (Beach Road)**	**Gualo Rai Road to Quartermaster Road**	**2-Lane Principal Arterial**	**2,160**	**F**
S-4	**Rte 33**	**Route 33 (Beach Road)**	**Quartermaster Road to Route 31 (Chalan Monsignor Guerrero)**	**4-Lane Principal Arterial**	**2,910**	**E or F**
S-5	**Rte 33**	**Route 33 (Beach Road)**	**Route 31 (Chalan Monsignor Guerrero) to Chalan Hagoi**	**4-Lane Principal Arterial**	**3,560**	**E or F**
S-6	**Rte 33**	**Route 33 (Beach Road)**	**Chalan Hagoi to As Perdido Road**	**4-Lane Principal Arterial**	**3,560**	**E or F**
S-7	Rte 33	Route 33 (Beach Road)	As Perdido Road to Afetna Road	4-Lane Principal Arterial	2,270	C or better
S-8	**Rte 33**	**Route 33 (Beach Road)**	**Afetna Road to Koblerville Road**	**2-Lane Principal Arterial**	**1,770**	**F**
S-9	Rte 30	Route 30 (Middle Road/Chalan Pale Arnold)	North end to As Matius Road	2-Lane Principal Arterial	290	B or better
S-10	Rte 30	Route 30 (Middle Road/Chalan Pale Arnold)	As Matius Road to Route 31 (Isa Drive)	4-Lane Principal Arterial	1,250	C or better
S-11	Rte 30	Route 30 (Middle Road/Chalan Pale Arnold)	Route 31 (Isa Drive) to Route 38 (Micro Beach Road)	4-Lane Principal Arterial	3,530	C or better
S-12	**Rte 30**	**Route 30 (Middle Road/Chalan Pale Arnold)**	**Route 38 (Micro Beach Road) to Route 317 (Gualo Rai Road)**	**4-Lane Principal Arterial**	**4,170**	**E or F**
S-13	**Rte 30**	**Route 30 (Middle Road/Chalan Pale Arnold)**	**Route 317 (Gualo Rai Road) to Route 315 (Quartermaster Road)**	**4-Lane Principal Arterial**	**3,730**	**E or F**
S-14	Rte 30	Route 30 (Middle Road/Chalan Pale Arnold)	Route 315 (Quartermaster Road) to Route 31 (Chalan Monsignor Guerrero)	4-Lane Principal Arterial	1,640	C or better
S-15	Rte 31	Route 31 (Chalan Monsignor Guerrero)	Route 33 (Beach Road) to Route 30 (Middle Road/Chalan Pale Arnold)	4-Lane Principal Arterial	2,460	D
S-16	Rte 31	Route 31 (Chalan Monsignor Guerrero)	Route 30 (Middle Road/Chalan Pale Arnold) to Chalan Msgr. Martinez	4-Lane Principal Arterial	2,430	C or better
S-17	Rte 31	Route 31 (Chalan Monsignor Guerrero)	Tun Herman Pan Road to Route 305 (Dandan Road)	4-Lane Principal Arterial	1,790	C or better
S-18	Rte 35	Tun Herman Pan Road	Chalan Msgr Guerrero to Route 304 (Flame Tree Road)	2-Lane Minor Arterial	760	B or better
S-19	Rte 35	Tun Herman Pan Road	Route 304 (Flame Tree Road) to Airport	2-Lane Minor Arterial	1,070	B or better
S-20	Rte 31	Isa Drive	Route 30 (Middle Road/Chalan Pale Arnold) to Capitol Hill Road	2-Lane Principal Arterial	1,120	B or better
S-21	Rte 31	Isa Drive	Capitol Hill Road to Route 305 (Dandan Road)	2-Lane Principal Arterial	1,140	B or better
S-22	Rte 305	Route 305 (Dandan Road)	Route 31 (Chalan Monsignor Guerrero) to Route 304 (Flame Tree Road)	2-Lane Major Collector	1,300	B or better
S-23	Rte 304	Route 304 (Flame Tree Road)	Route 305 (Dandan Road) to Tun Herman Pan Road	2-Lane Major Collector	660	B or better
S-24	Rte 304	Route 304 (Flame Tree Road)	Tun Herman Pan Road to Route 32 (As Perdido Road)	2-Lane Major Collector	430	B or better
S-25	Rte 37	Route 37 (Chalan Monsignor Martinez)	Route 31 (Chalan Monsignor Guerrero) to Chalan Tun Joaquin Doi	2-Lane Minor Arterial	1,610	B or better
S-26	Rte 37	Route 37 (Chalan Monsignor Martinez)	Chalan Tun Joaquin Doi to Route 33 (Beach Road)	2-Lane Minor Arterial	1,220	B or better
S-27	Rte 32	Route 32 (As Perdido Road)	Route 33 (Beach Road) to Route 37 (Chalan Monsignor Martinez)	2-Lane Minor Arterial	1,680	B or better
S-28	Rte 32	Route 32 (As Perdido Road)	Route 37 (Chalan Monsignor Martinez) to Tun Herman Pan Rd/Flame Tree Rd	2-Lane Minor Arterial	790	B or better
S-29	Rte 317	Route 317 (Gualo Rai Road)	east of Route 33 (Beach Road)	2-Lane Major Collector	170	B or better
S-30	Rte 315	Quartermaster Road	east of Route 33 (Beach Road)	2-Lane Major Collector	700	B or better
S-31	Rte 307	Chalan Tun Antonio Apa	Route 31 (Chalan Monsignor Guerrero) to Chalan Tun Joaquin Doi	2-Lane Major Collector	1,020	B or better
S-32		Kopa Di Oru Street	east of Route 33 (Beach Road)	2-Lane Local	690	B or better
S-33	Rte 308	Garapan Street	east of Route 33 (Beach Road)	2-Lane Major Collector	1,110	B or better
S-34	Rte 319	CPL Derence Jack Road	east of Route 33 (Beach Road)	2-Lane Major Collector	660	B or better
S-35	Rte 38	Route 38 (Micro Beach Road)	east of Route 33 (Beach Road)	2-Lane Minor Arterial	790	B or better
S-36	Rte 303	Afetna Road	east of Route 33 (Beach Road)	2-Lane Minor Collector	520	B or better
S-37	Rte 38	Route 38 (Navy Hill Road)	east of Route 30 (Middle Road/Chalan Pale Arnold)	2-Lane Minor Collector	800	B or better
S-38		Oleai Street	east of Route 33 (Beach Road)	2-Lane Major Collector	600	B or better
S-39	Rte 311	Tekken Street	east of Route 33 (Beach Road)	2-Lane Major Collector	710	B or better

ID	Route Name	Road Name	Location	Roadway Classification	PM Peak Volume	PM Peak LOS
S-40	Rte 309	Chalan Hagoi	east of Route 33 (Beach Road)	2-Lane Major Collector	1,120	B or better
S-41	Rte 34	Kagman Road		2-Lane Major Collector	1,040	B or better
R-1	Rte 10	Airport Road	north of Esong (Pinatang Park)	2-Lane Minor Arterial	250	C or better
R-2	Rte 10	Airport Road	south of Rte 101	2-Lane Minor Arterial	250	C or better
R-3	Rte 100	Talakhaya Road	east of Sonsong Village and west of Pona Point	2-Lane Major Collector	150	C or better
R-4	Rte 100	Eastern Loop Road	south of Sinapalo	2-Lane Major Collector	150	C or better
R-5	Rte 11	Coral Road	south of Sinapalo	2-Lane Major Collector	160	C or better
R-6		San Jose Street	south of Rte 10	2-Lane Local	60	C or better
R-7		San Francisco De Borja St	south of Rte 10	2-Lane Minor Arterial	110	C or better
R-8		Santa Ana Street	San Jose St to Rte 100	2-Lane Local	60	C or better
R-9		San Ignacio Street	north of Santa Ana Street	2-Lane Local	320	C or better
R-10		San Ignacio Street	south of Santa Ana Street	2-Lane Local	210	C or better
T-1		Riverside Drive	east of 8th Street	2-Lane Minor Collector	20	C or better
T-2		Riverside Drive	west of 8th Street	2-Lane Minor Collector	20	C or better
T-4		8th Street	north of 86th Street	2-Lane Minor Arterial	20	C or better
T-5		8th Street	south of 86th Street	2-Lane Minor Arterial	20	C or better
T-6		86th Ave	8th Street to Broadway	2-Lane Minor Collector	20	C or better
T-7	Rte 21	Broadway	north of 86th Street	2-Lane Minor Arterial	40	C or better
T-8	Rte 21	Broadway	north of 42nd Street	2-Lane Minor Arterial	100	C or better
T-9	Rte 21	Broadway	42nd Street to Rte 201	2-Lane Minor Arterial	370	C or better
T-10		42nd Street	west of Broadway	2-Lane Major Collector	40	C or better
T-11		8th Street	north of 42nd Street to Riverside Dr	2-Lane Minor Arterial	40	C or better
T-12		No Name (School Road)	Rte 202 to 8th Street	2-Lane Local	80	C or better
T-13		8th Street	north of Canal Street	2-Lane Minor Arterial	80	C or better
T-14	Rte 202	Canal Street	west of Broadway	2-Lane Major Collector	410	C or better
T-15	Rte 201	Grand Street	west of Broadway	2-Lane Major Collector	530	C or better
T-16	Rte 21	Broadway	south end / north of Wall Street	2-Lane Minor Arterial	80	C or better
T-17	Rte 21	No name	at Bus Stop / south of Kammer Beach	2-Lane Local	270	C or better
T-18		No Name	road north of Breakwater Park	2-Lane Major Collector	80	C or better



Legend

Roadway Study Segments

XX,XXX 2040 Forecasted Daily Volumes

Paper Size ANSI A

0 2,250 4,500

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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20 - Year Highway Master Plan

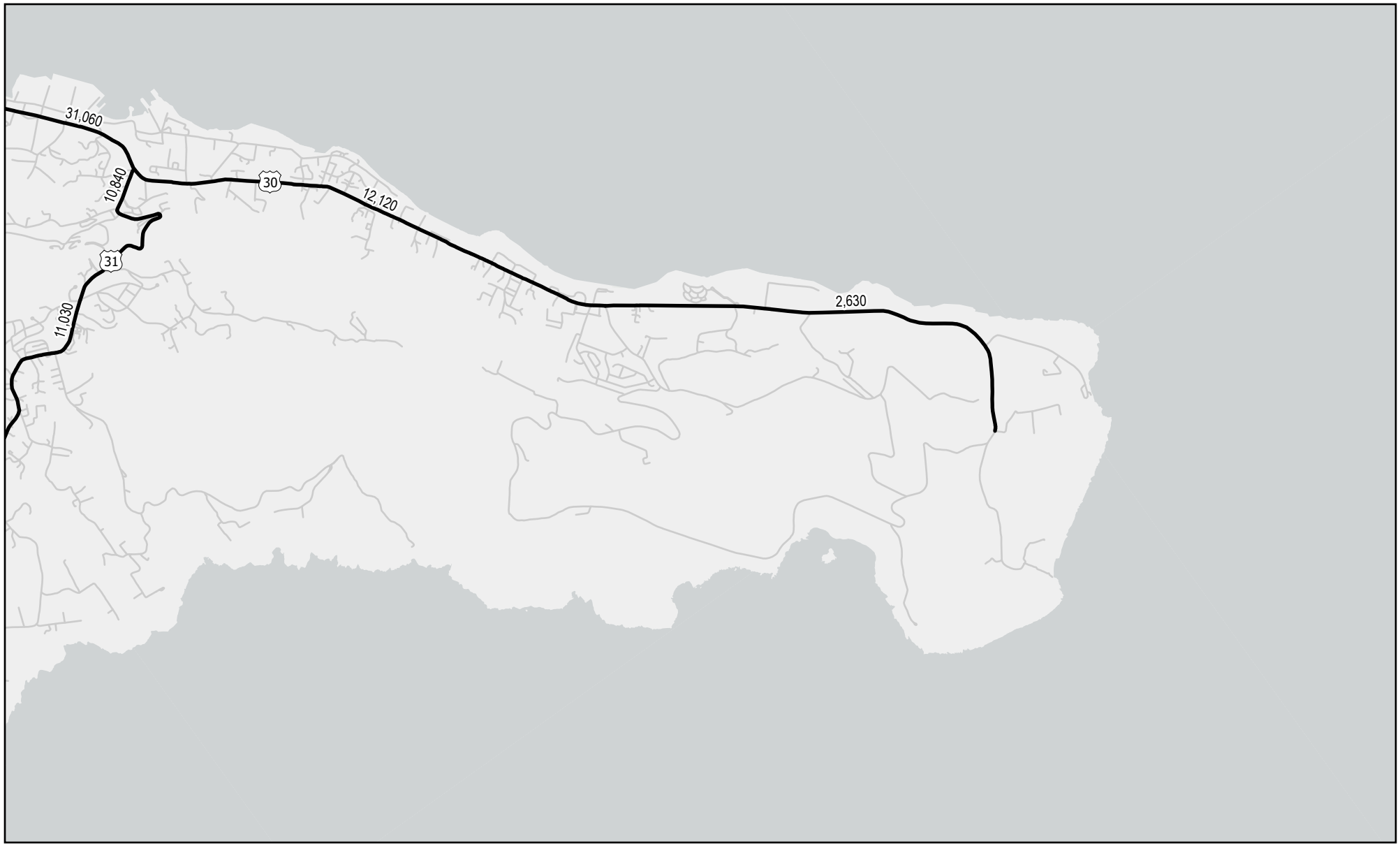
FUTURE YEAR 2040 DAILY TRAFFIC VOLUMES - SAIPAN

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 5-3

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 503_FY 2040 Forecast_Volume_Saipan1
Print date: 29 Jun 2022 - 18:07

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; 2021 Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021. Created by: pthornton



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Roadway Study Segments

XX,XXX 2040 Forecasted Daily Volumes

Paper Size ANSI A

0 2,250 4,500

Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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20 - Year Highway Master Plan

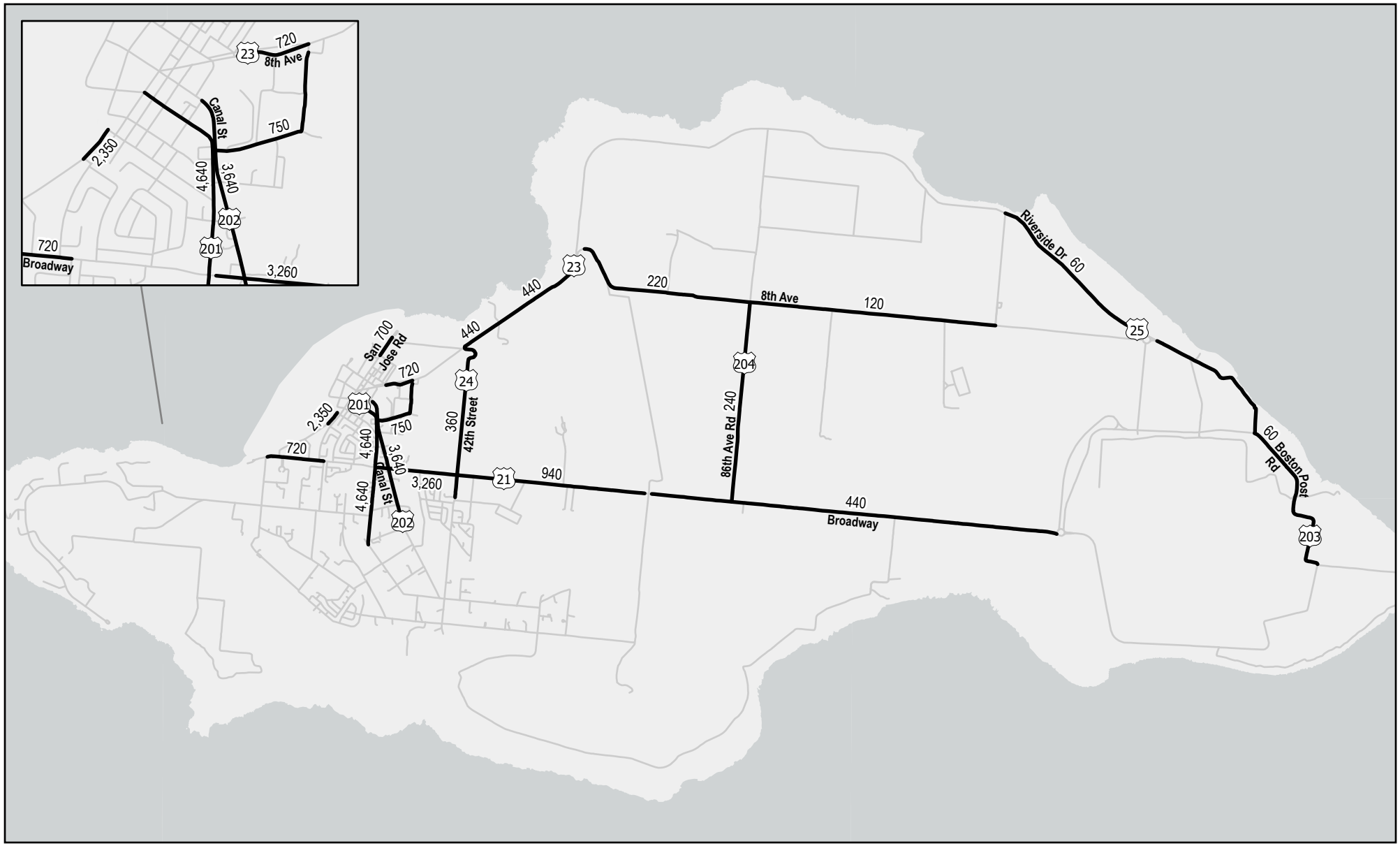
FUTURE YEAR 2040 DAILY TRAFFIC VOLUMES - SAIPAN (NORTH)

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 5-4

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 504_FY 2040 Forecast_Volume_Saipan2_North
Print date: 29 Jun 2022 - 18:08

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS
World_Light_Gray_Base: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community; 2021
Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021. Created by: pthornton



Legend

Roadway Study Segments

XX,XXX 2040 Forecasted Daily Volumes

Paper Size ANSI A

0 1,500 3,000 4,500 6,000

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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FUTURE YEAR 2040 DAILY TRAFFIC VOLUMES - TINIAN

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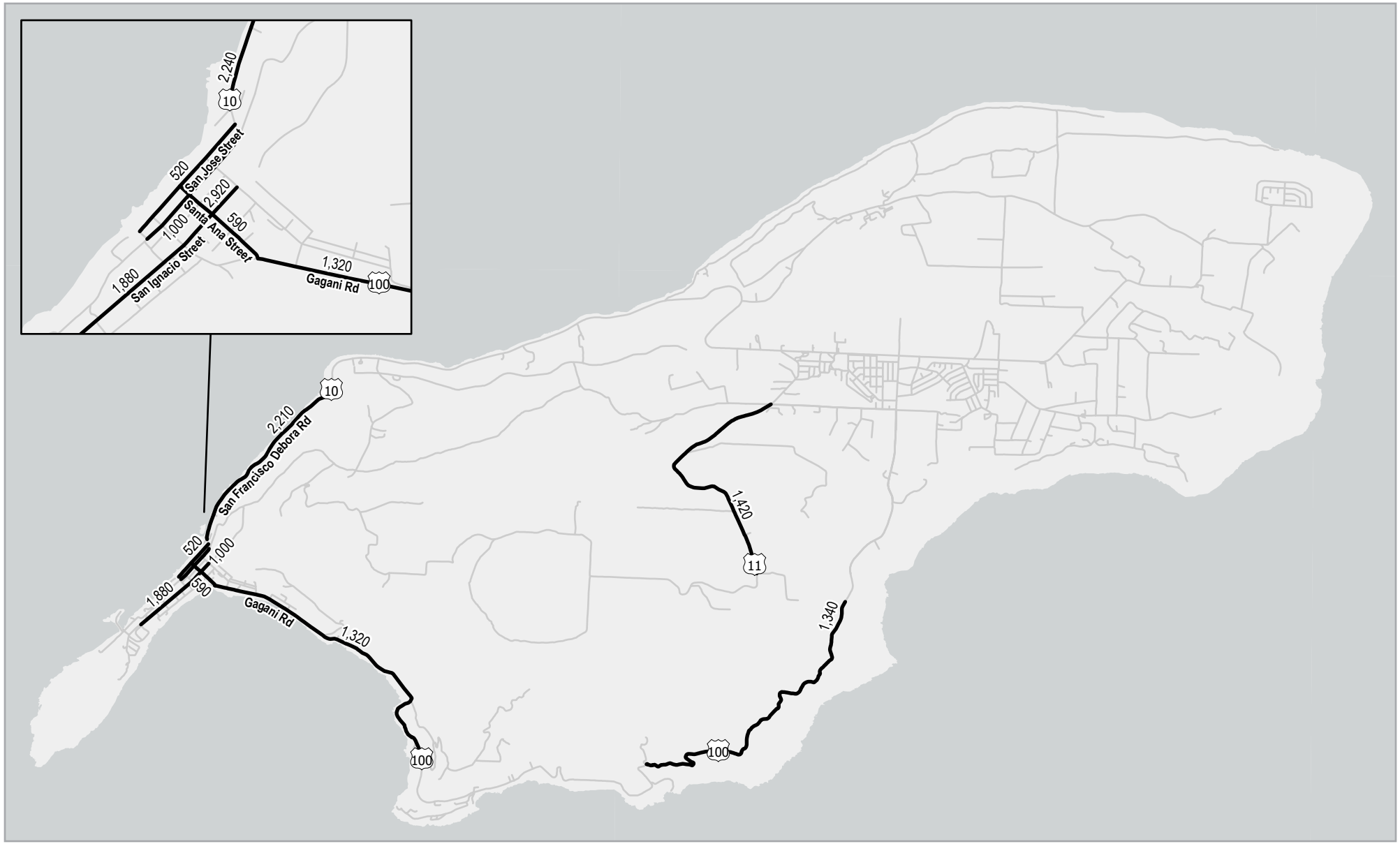
Revision No. **-**
Date **Jun 2022**

FIGURE 5-5

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 505_FY 2040 Forecast_Volume_Tinian
Print date: 29 Jun 2022 - 18:19

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; 2021
Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021. Created by: pthornton



Legend

Roadway Study Segments

xx,xxx 2040 Forecasted Daily Volumes

Paper Size ANSI A

0 1,500 3,000 4,500 6,000

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

N

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FUTURE YEAR 2040 DAILY TRAFFIC VOLUMES - ROTA

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 5-6

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 506_FY 2040 Forecasted_Volume_Rota
Print date: 29 Jun 2022 - 18:26

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, SafeGraph, METI/NASA, USGS; 2021
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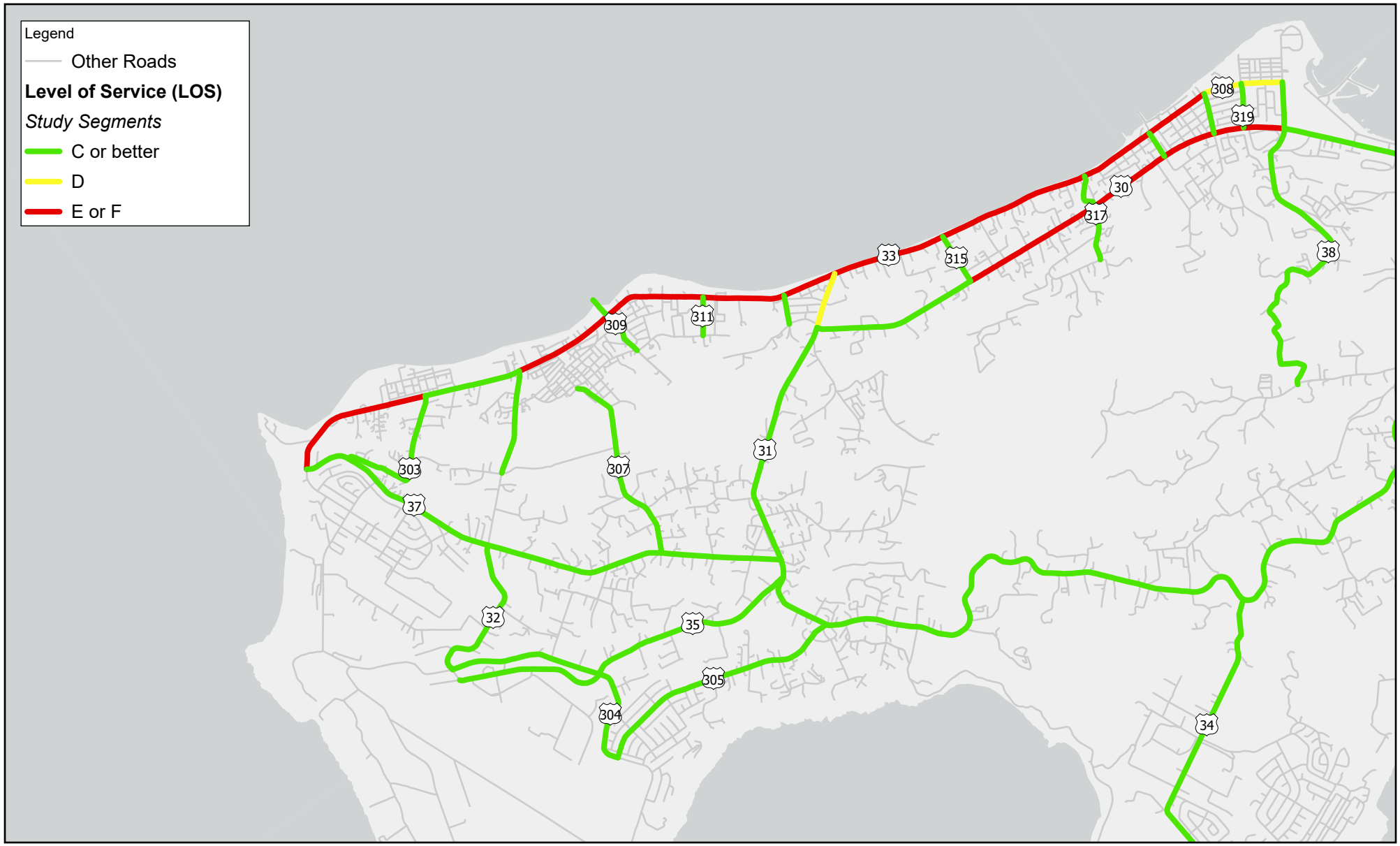

Paper Size ANSI A

0 2,250 4,500

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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20 - Year Highway Master Plan

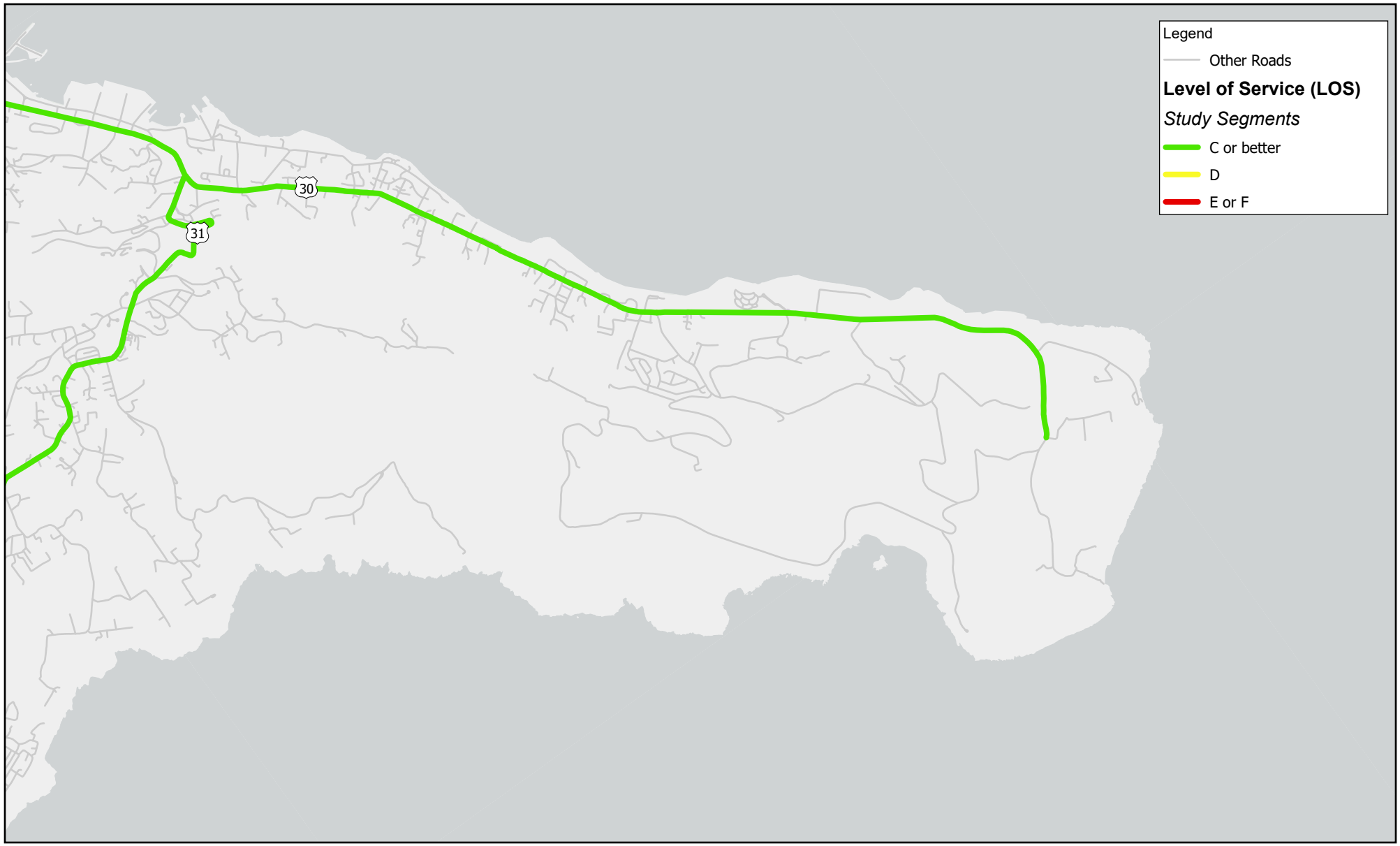
FUTURE YEAR 2040 LEVEL OF SERVICE - SAIPAN

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 5-7

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 507_FY 2040 Roadway LOS_Saipan1
Print date: 29 Jun 2022 - 18:32

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; 2021 Existing Counts: CNMI, 2021; 2021 Count Estimates: GHD, 2021. Created by: pthornton



Paper Size ANSI A

0 1,500 3,000

Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

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20 - Year Highway Master Plan

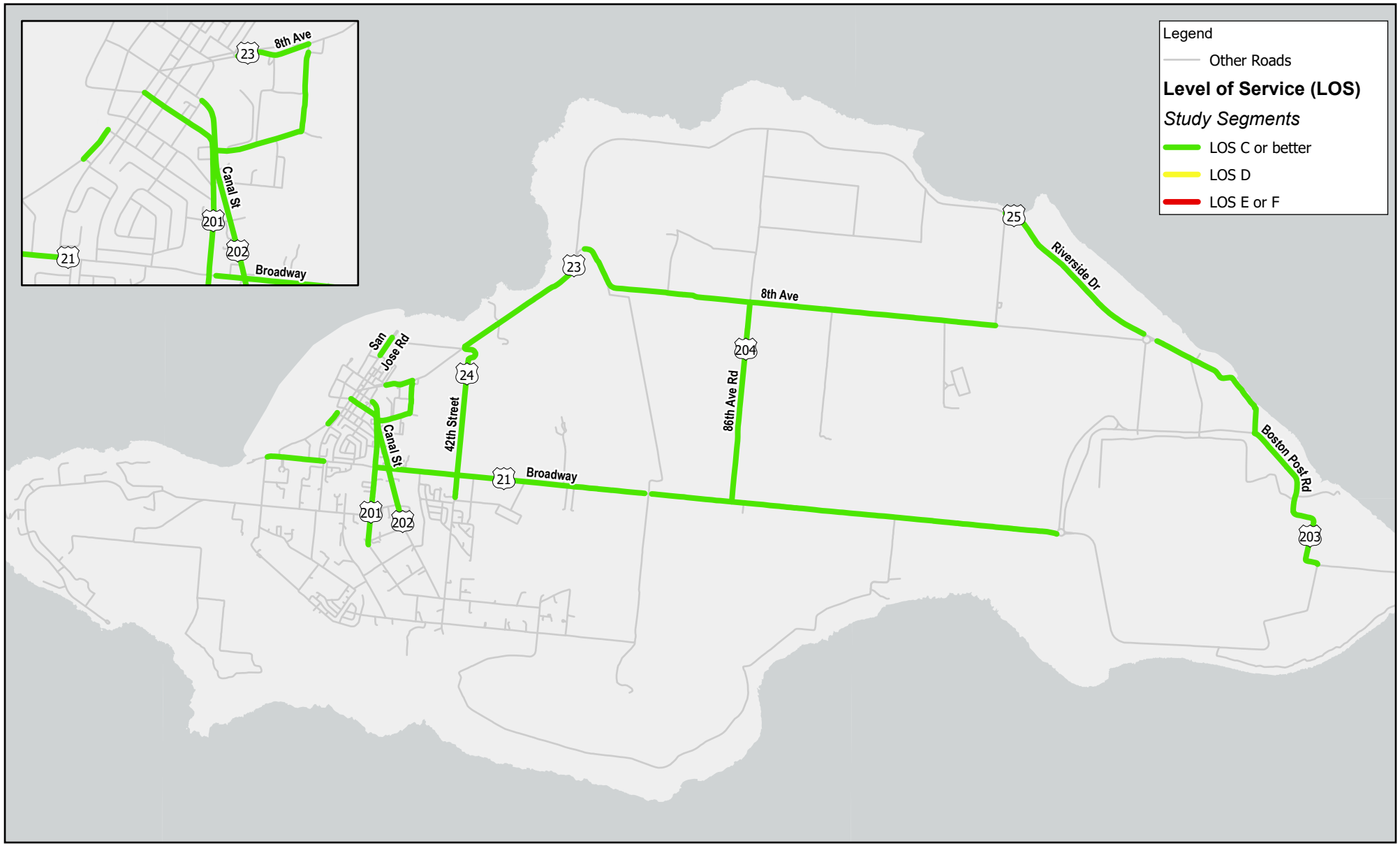
FUTURE YEAR 2040 LEVEL OF SERVICE - SAIPAN

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 5-8

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 508_FY 2040 Roadway_LOS_Saipan2_North
Print date: 29 Jun 2022 - 18:33

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS.
Created by: pthornton



Paper Size ANSI A

0 1,500 3,000 4,500 6,000

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

N

GHD

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

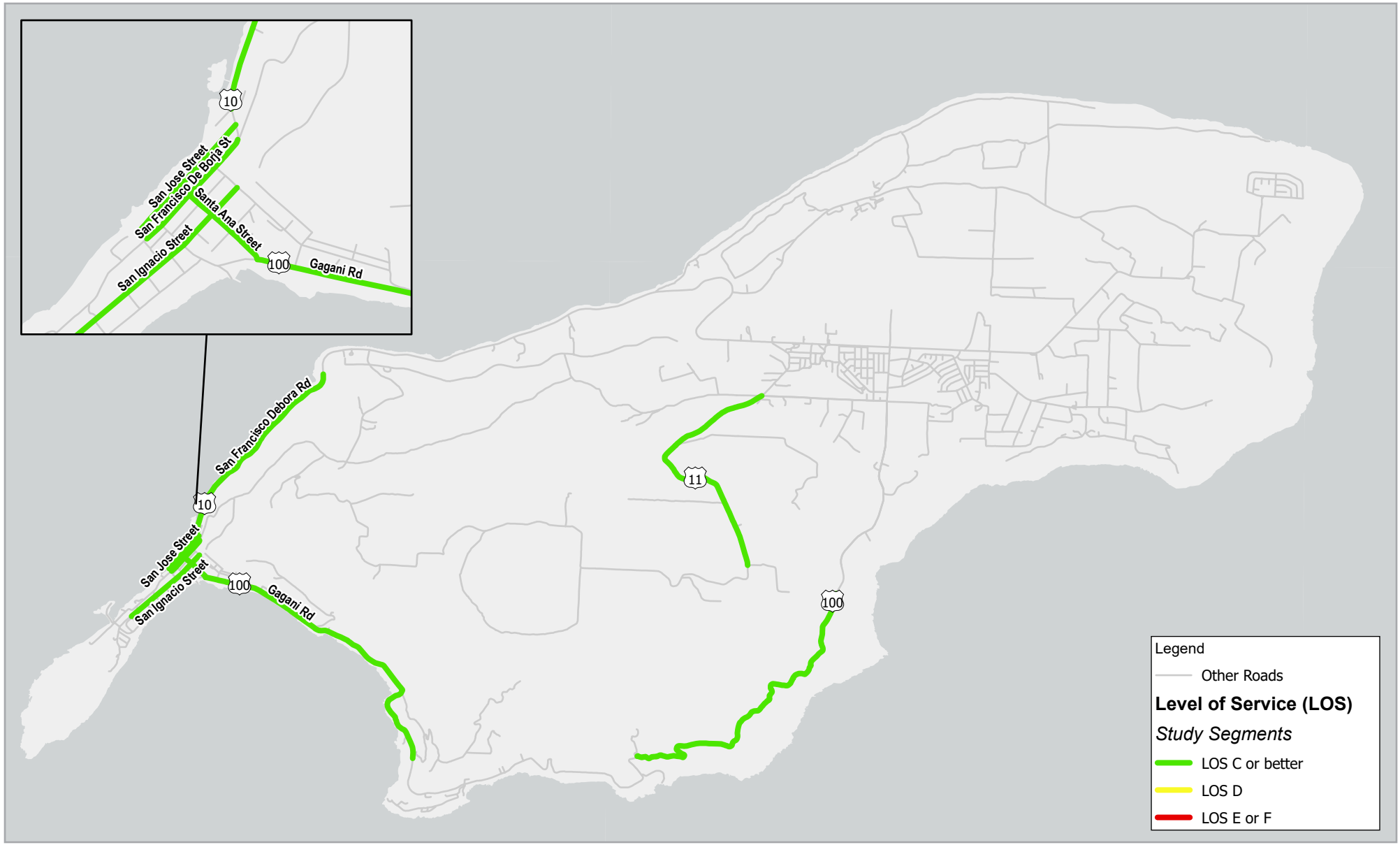
FUTURE YEAR 2040 LEVEL OF SERVICE - TINIAN

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 5-9

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 509_FY 2040 Roadway_LOS_Tinian
Print date: 29 Jun 2022 - 18:39

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS.
Created by: pthornton



Paper Size ANSI A

0 1,500 3,000 4,500 6,000

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

N

GHD

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

FUTURE YEAR 2040 LEVEL OF SERVICE - ROTA

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 5-10

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx
- 11224010_FIG 510_FY 2040 Roadway_LOS_Rota
Print date: 29 Jun 2022 - 18:48

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, SafeGraph, METI/NASA, USGS. Created by: pthornton

5.3 Long-Term (2040) Intersection Operations

The Synchro 10 (Trafficware) software program was used to implement the HCM 6 analysis methodologies for signalized and stop-controlled intersections. Intersection Level of Service (LOS) was calculated for all control types using the methods documented in HCM 6. For signalized or all-way stop-controlled (AWSC) intersections, an LOS determination is based on the calculated averaged delay for all approaches and movements. For two-way or side-street stop controlled (TWSC) intersections, an LOS determination is based upon the calculated average delay for all movements of the worst performing approach.

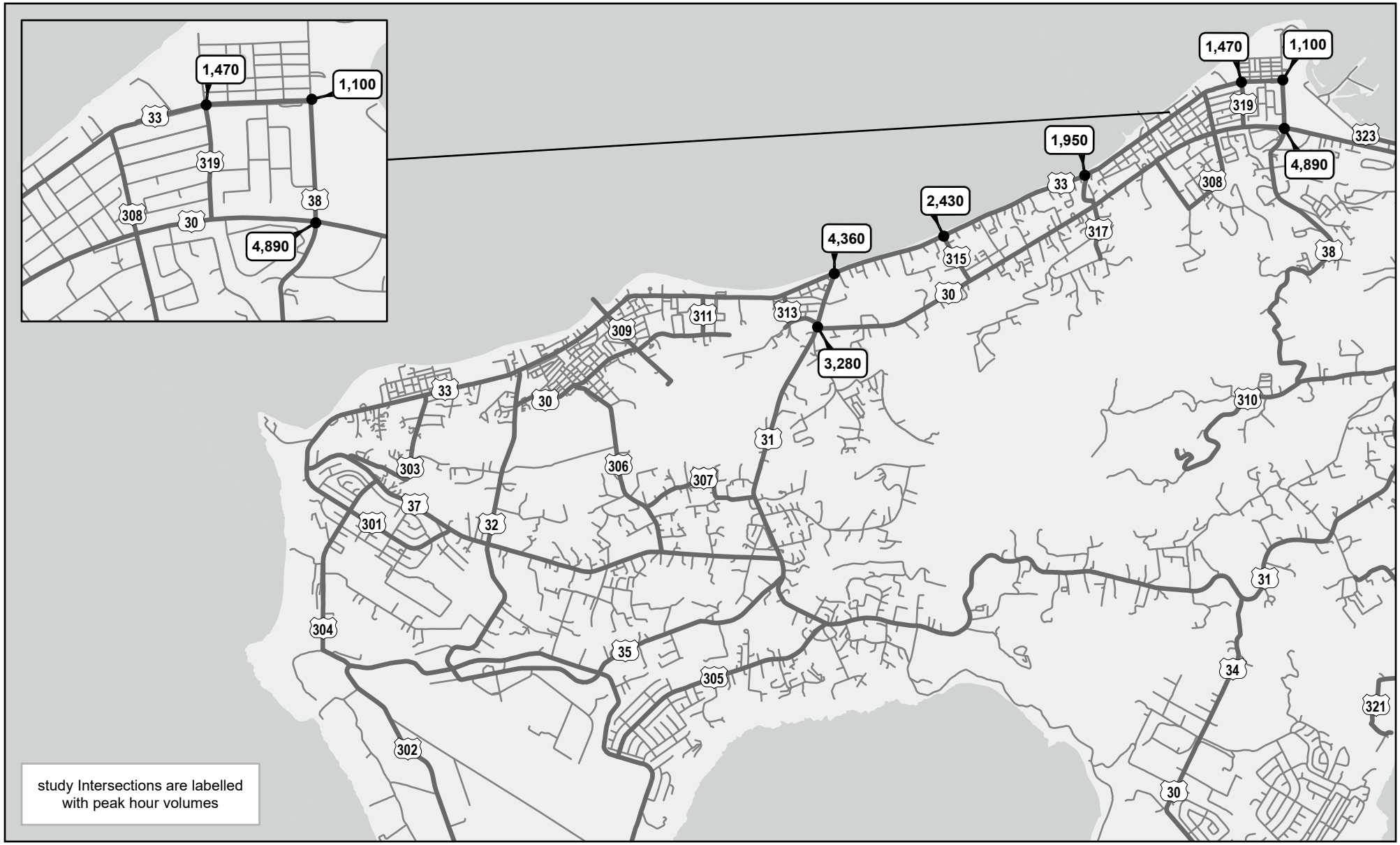
Figure 5-11 presents the Long-Term (2040) Conditions peak hour turning movement volume estimates that were utilized for the intersection LOS analysis. Table 5-4 and Figure 5-12 present the PM peak hour intersection operations at study intersections under Long-Term (2040) Conditions, with deficient intersections highlighted. Near-Term Recovery Conditions results are provided for comparison, where two intersections degrade to LOS F with under future conditions.

Table 5-4 Long-Term (2040) Intersection Operations – PM Peak Hour

#	Intersection	Control Type[1,2]	Target LOS	Near-Term Recovery Conditions		Long-Term (2040) Conditions	
				Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
1	Route 33 (Beach Road) & Route 38 (Micro Beach Road)	AWSC	D	12.1	B	14.9	B
2	**Route 30 (Middle Road/Chalan Pale Arnold) & Route 38 (Micro Beach Road)**	**Signal**	**E**	**OVR**	**F**	**OVR**	**F**
3	**Route 33 (Beach Road) & Route 319 (CPL Derence Jack Road)**	**TWSC**	**E**	**93.5**	**F**	**OVR**	**F**
4	**Route 33 (Beach Road) & Route 317 (Gualo Rai Road)**	**TWSC**	**E**	48.8	E	**190.3**	**F**
5	**Route 33 (Beach Road) & Route 315 (Quartermaster Road)**	**TWSC**	**E**	**OVR**	**F**	**OVR**	**F**
6	**Route 33 (Beach Road) & Route 31 (Chalan Monsignor Guerrero)**	**Signal**	**D**	50.1	D	**83.9**	**F**
7	Route 30 (Middle Road/Chalan Pale Arnold) & Route 31 (Chalan Monsignor Guerrero)	Signal	D	29.5	C	50.4	D

Notes:

1. *AWSC = All Way Stop Control; TWSC = Two Way Stop Control*
2. *LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal*
3. ***Bold** = Unacceptable Conditions*
4. *OVR = Delay over 300 seconds*



Legend

- Study Intersections Locations
- Highways
- Other Roads

Paper Size ANSI A

0 2,250 4,500

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

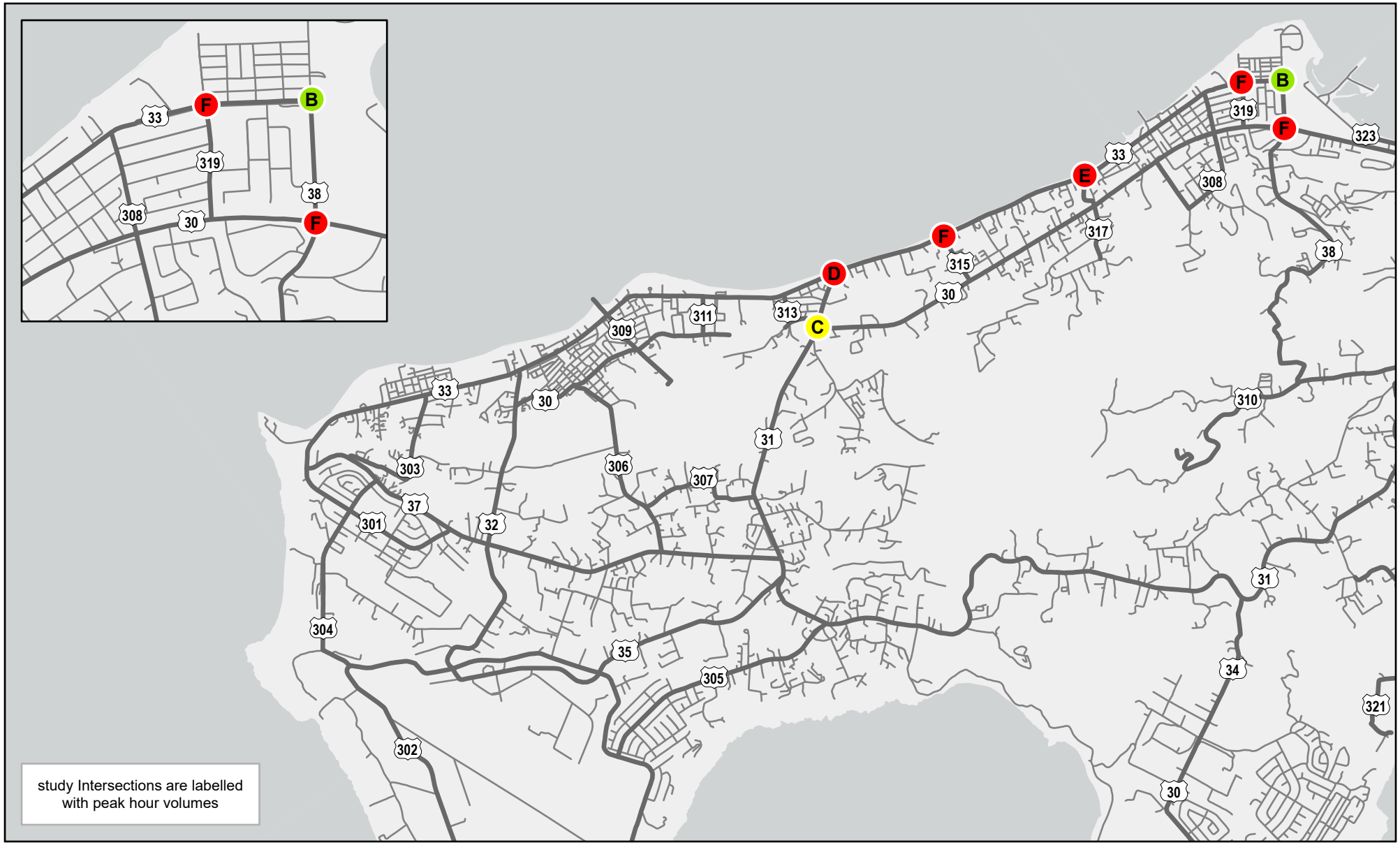
Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

FUTURE YEAR 2040 PEAK HOUR VOLUMES AT STUDY INTERSECTIONS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 5-11

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 511_FY 2040 Peak Hr Vol_Study Intersections_Saipan
Print date: 29 Jun 2022 - 18:55



Legend

Level of Service (LOS)

- LOS C or better
- D
- LOS E or F

- Highways
- Other Roads

Paper Size ANSI A

0 2,250 4,500

Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

FUTURE YEAR 2040 LEVEL OF SERVICE AT STUDY INTERSECTIONS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 5-12

\\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11224010\GIS\Maps\Deliverables\11224010_CNMI_20_YR_2022\11224010_CNMI_20_YR_2022.aprx - 11224010_FIG 512_FY 2040_Study Intersection LOS_Saipan
Print date: 29 Jun 2022 - 18:57

Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS. Created by: pthornton

6 Mobility Improvement Plans

The Highway Master Plan aims to support the visons, objectives, and goals for sustainable development within the CNMI as identified within the *2021-2030 Comprehensive Sustainable Development Plan* (CSDP) by recommending projects that support all modes of travel while improving the resilience and reliability of the transportation system. As such, the recommendations presented in this plan are intended to improve circulation and safety for users of the transportation system, reduce congestion resulting in less resource consumption and pollution, and consider opportunities for cross-cutting benefits, such as those related to stormwater management and flood risk-reduction.

6.1 Approach

Improvements are provided for each of the three islands within the CNMI based on a review of existing infrastructure (Chapter 3), assessment of public input (Chapter 5), and identification of capacity and operational demands to accommodate future growth. Additional recommendations for projects were provided by members of the CNMI Department of Public Works (DPW) staff. In addition, incomplete improvements previously included in the 2008 Highway Master Plan were evaluated for inclusion in the update. In addition, existing conditions inventory data was supplemented by a field visit by the project team involving collection of photos displayed on the following pages.

The recommended improvements within the Highway Master Plan are categorized as near-term and long-term. The designated timeframe for near-term improvements is from one to ten years whereas the designated timeframe for long-term improvements is from 11 to 20 years. Near-term recommendations include new projects, modifications, or upgrades to be implemented due to their critical nature or smaller scale to be implemented in a shorter timeframe. Long-term recommendations are improvements or upgrades that may be on a larger scale and require more time to implement or modifications that are not immediately necessary but should be implemented to maintain the mobility on the islands.

To ensure that the recommended transportation infrastructure projects serve broader goals related to sustainable development, this Highway Master Plan Update includes a comprehensive list of “General Improvements Categories” to be considered when any individual project is identified for further study and/or implementation. These General Improvement Categories highlight the priorities for the future of mobility within CNMI and are applicable to all three islands.

The General Improvement Categories are presented in the following section. The proposed near-term and long-term improvements are presented in subsequent sections of this chapter.

6.2 General Improvement Categories

General improvements include those that aim to address broad challenges facing mobility and safety and they are applicable to general locations on all Saipan, Tinian, and Rota. Descriptions of suggested improvements are detailed in the sections to follow. The general improvement types are listed below:

1. Roadway Pavement and Delineation Maintenance
2. Complete Streets
3. Signage
4. Traffic Signal Upgrades
5. Roundabouts
6. Resiliency & Stormwater Management
7. Data Collection
8. Safety & Speed Reduction

PS-1 Roadway Pavement and Delineation Maintenance

A significant amount of roadway pavement and markings on the CNMI islands are identified to be in average to poor conditions. As mentioned in the existing condition section, roadways with potholes, cracks, unpaved shoulders, and abrupt edges, are not uncommon on the islands. Some of the roadways located in rural areas are even unpaved gravel or dirt roads. For the roadway striping, except those roadways and intersections that have been recently modified, the striping on the road is mostly faded or hardly visible due to the lack of contrast between the pavement and the painted stripes. The following images show examples of locations where pavement is in poor condition, entirely unpaved, or display faded striping hardly visible to drivers.

Photo 6-1 Example of Existing Unpaved Roadway (Route 323) (Saipan)

Photo 6-2 Example of Poor Pavement & Striping Conditions at the Intersection of Route 38 & Route 30 (Saipan)

Photo 6-3 Existing Condition: Route 203 (Tinian)

Having a more smooth roadway surface and clear roadway markings not only could enhance the riding quality, but roadway safety and traffic flow could also be improved. This study recommends the implementation of a roadway pavement and delineation of a maintenance improvement program for the three CNMI islands to inspect, install, maintain, and repair roadway pavement and pavement markings in a programmatic basis. The goal of this program is to enhance the physical roadway environment and provide a safe and secure pavement system for motorists and tourists on the CNMI islands.

The improvement program would require regular inspection and inventory of roadway pavement and markings conditions on the islands. This could be accomplished by performing regular drive through and visual inspection on

the roadways. Information collected on pavement conditions of the roadways could then be used to prioritize the needs for repaving, rehabilitation, reconstruction, and installation of roadway surface and restriping faded pavement markings.

To increase the visibility of the pavement markings, it is also recommended to overlay the roadway surface with a layer of slurry seal before laying the roadway pavement markings or delineators. The black slurry seal would provide a better contrast with the white or yellow pavement delineation devices.

Since paved roads are impervious surfaces, additional consideration should be given to ensure appropriate measures and infrastructure are in place to address surface stormwater runoff. Recommendations specific to stormwater management and drainage are provided under General Improvement Category PS-6: Resiliency & Stormwater Management.

PS-2 Complete Streets

Complete Streets is an approach to planning and implementing infrastructure improvements that aim to design the built environment with all transportation modalities in mind with the goal to support safe and convenient travel for people of all ages and abilities. Complete Streets improvements aim to address road safety, accessibility, and multi-modal connectivity and is a central component of the CNMI's goals for a sustainable built environment.

As described in the Highway Master Plan objective section (Chapter 1), the CSDP provides the following recommendation to support the built environment sustainable development goals:

> Invest in "Complete Streets" concepts that plan for and achieve safe, multi-modal transportation to community centers, encouraging health and well-being by creating walkable and inviting spaces that also accommodate the necessary infrastructure to support sustainable growth.

Complete Street design elements should aim to increase the scale of multimodal infrastructure and services along roadways, reduce vehicular speeds, and generally improve the comfort and quality of multimodal travel including addressing stormwater and flooding hazards. Examples of Complete Streets improvements include:

- Continuous and connected sidewalks and bike lanes
- Comfortable and convenient transit facilities
- Frequent and safe pedestrian crossings
- Accessibility improvements, per the Americans with Disabilities Act (ADA)
- Curb extensions (or bulb-outs)
- Median island with pedestrian refuge
- Reduction in the number of vehicle travel lanes ("road diet")
- Visibility improvements, such as appropriate lighting, pavement markings, and warning signs (Note: Lighting improvements require analysis to determine the location, scale, and type of lighting.)
- Mobility amenities, such as bicycle racks, benches, and transit shelters

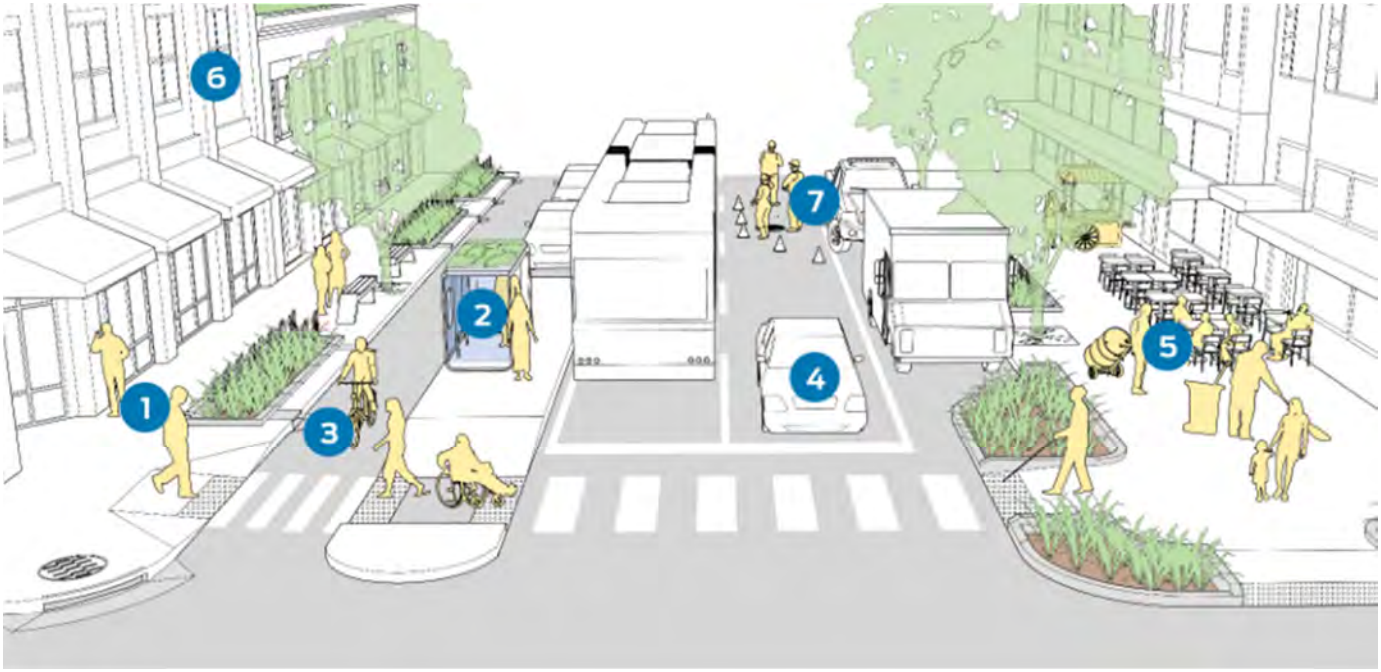
In addition, NACTO provides the following statement[4] regarding the role that green infrastructure plays in a Complete Street:

> *A flooded street is not a complete street. During storm events, people walking, bicycling, and using transit are the first users to encounter barriers and lose access to the street, and are the last to regain it. Green street design tools, which integrate stormwater control and management within the right-of-way, are a critical component of complete street design, ensuring the street remains usable and safe for all people during storm events, regardless of mode.*

[4] Complete Streets are Green Streets | National Association of City Transportation Officials (nacto.org)

To ensure that roadways continue to accommodate all modes of travel during storm events on the islands, the Highway Master Plan recommends incorporating green infrastructure into Complete Street roadway improvements and design. Green infrastructure is designed adjacent to roadways to capture and filter stormwater where it falls decrease potential hazards and/or access restrictions due to flooding on impervious surfaces, such as asphalt and concrete. The following figure illustrates a Complete Street with green infrastructure including landscaping, planter boxes, and bioswales. *Examples of green infrastructure, such as planter boxes, bioswales, and permeable pavements, are included under General Improvement Category PS-6: Resiliency & Stormwater Management.*

Photo 6-4 Complete Street with Green Infrastructure (Source: NACTO)



Public Support for Complete Streets Design

According to the public outreach effort for this plan (Chapter 4), residents of the CNMI have expressed a need for improved pedestrian infrastructure, including sidewalks, crosswalks, and lighting, and improved bicycle infrastructure, including bike lanes or widened shoulders.

Recommendations

To support Complete Street objectives and address public input related to multimodal infrastructure, the Highway Master Plan recommends the following:

1. Roadways should be improved to accommodate multimodal infrastructure such as pedestrian paths/sidewalks and bicycle lanes where multimodal activity is anticipated to occur. The examples below show unofficial pedestrian paths adjacent to roadways in areas of increased pedestrian activity that could be improved into a formal walking area (paved or unpaved) to designate safe walking areas. In addition, the Highway Master Plan can support local efforts for community revitalization by implementing Complete Streets improvements on highways within core commercial or tourism districts.

Photo 6-5 Lack of Pedestrian Facilities on Route 38 (Garapan, Saipan)

Photo 6-6 Lack of Pedestrian Facilities on Route 10 near Guata Beach Park (Rota)

2. Provide street and pedestrian-level lighting. Street lighting improves the visibility of the roadway and its immediate environment. Pedestrian-level lighting specifically shines light on the sidewalk and is important to include in street design along with roadway lighting, especially in populated areas/villages and near schools. The CSDP Goal #9 includes a target related to lighting to install light-emitting diode (LED) lighting at pilot area sites and support safe road lighting deployment planning by 2022.

3. Consider opportunities for mobility hubs where multiple modes of travel are likely or anticipated to occur. Mobility hubs should provide services and amenities that support the multiple modes of travel, such as directional signage (wayfinding), bicycle parking, benches, and transit shelters, where appropriate.

4. Provide frequent and safe pedestrian crossings in appropriate areas to include high-visibility features such as a marked crosswalks or pedestrian warning signs. To provide further supplementation, additional visibility features such as a rectangular rapid flashing beacon (RRFB) can be added to enhance pedestrian conspicuity and increase driver awareness. RRFBs consist of two, rectangular—shaped yellow indications, each with a light-emitting diode (LED)-array based light source, and they flash with high frequency when activated by a pedestrian wishing to cross a roadway. The safety benefits of RRFBs that accompany marked crosswalks and pedestrian warning signs include a potential 47-percent reduction in vehicle-pedestrian rashes and a 98-percent increase in motorist yielding rates (Source: FHWA).

Photo 6-7 RRFB Example

Source: Caltrans Main Street, CA (2013).

5. Accommodate multimodal travel along rural roadways that are not located in areas with significant pedestrian activity but nonetheless serve as critical routes for full island connectivity. Sidewalks and bicycle lanes should be provided where feasible. However, additional design options include paved shoulders with buffers and side paths. As shown in the example image below, Route 21 (Broadway) on Tinian does not have bicycle lanes or sidewalks.

Photo 6-8 Lack of Pedestrian Facilities on Route 21 (Broadway) (Tinian)

6. Consider opportunities to include green infrastructure features within Complete Streets design features, such as bioswales or planter boxes at curb extensions/bulbouts to capture stormwater runoff. *Green infrastructure is discussed in further detail under PS-6.*

Photo 6-9 Bulbout with Bioswale

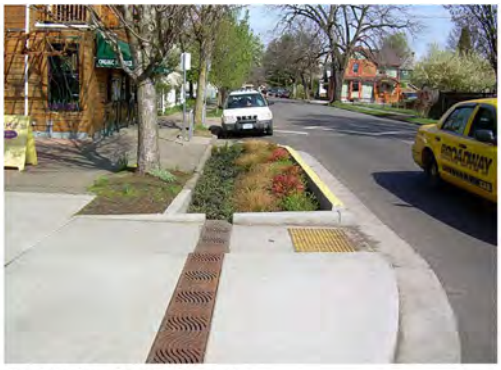


Figure 3.16.6. Corner Extension with Bioswale
(Source: Scott Batson)

PS-3 Increase Signage

Traffic signage provides valuable information to drivers, pedestrians, and bicyclists and are critical to safe travel on roadways. The following section highlight types of signage that could be implemented across the islands.

Directional & Guide Signage

Directional and guide signs enhance the driver experience and aim to eliminate confusion where roadways converge. This is especially helpful for motorists who are unfamiliar with the roadway network, including tourists. The first example image below shows an intersection of two highways without route signage. The second example image below shows directional arrows with route numbers to inform drivers as they approach an intersection.

Photo 6-10 Existing Condition: No Signage at Route 23 & Route 202 & Route 26 (Tinian)

Photo 6-11 Example of Existing Route Signage on Route 30 (Saipan)

Bicycle & Pedestrian Signage

Signage can also be used to specify designated paths of travel for pedestrians and bicyclists, and to identify potential points of conflict between modes of travel, such as at a pedestrian crossing. Bicycle and pedestrian signage can be in the form of road signs adjacent to a roadway or pavement markings.

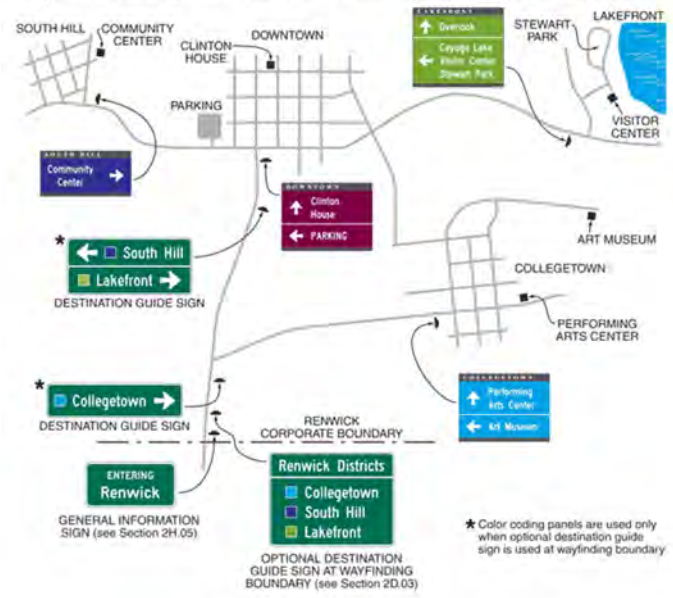
School Signs

School crossing and zone signs are helpful to alert motorists that they are driving within close proximity to a school and to pay attention to potential pedestrians or bicyclists. School signs may also include speed limit signs within identified school zones. An example of a school zone sign is provided to the right (*Source: California's MUTCD 2014 Edition).*

Wayfinding

Wayfinding is also a navigation tool and is recommended on the islands, especially in areas with increased commercial activity. Wayfinding includes guide signs that direct road users to destinations accessible via the roadway and multimodal network and is helpful to both motorist and non-motorists. Popular attractions, such as the resorts, beaches, harbor, island areas, and airport should be signed better. The Manual on Uniform Traffic Control Devices (MUTCD) provides several examples of community wayfinding signs, like in the image to the right.

Figure 2D-20. Example of a Color-Coded Community Wayfinding Guide Sign System



Warning Signs

Advanced warning signs such as notification of blind curves are useful to informing motorists of changing roadway characteristics, potential conflicts between multiple modes of travel, and potentially hazardous roadway conditions. Warning signs can include:

- Advisory speed
- Turn, curve, hill, or winding road
- Truck rollover
- Narrow road/bridge
- Pavement ends
- Share the road

The photos below show examples of blind curves on Saipan highways.

Photo 6-12 Existing Condition: Blind Curve on Route 303 approaching Route 37 (Saipan)

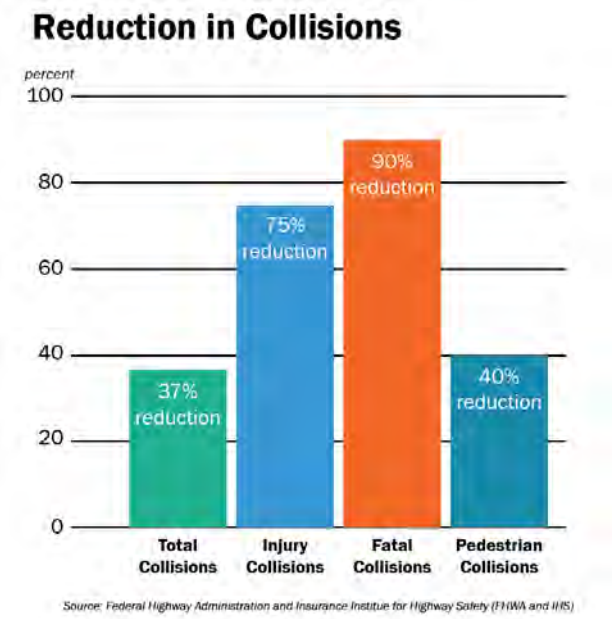
Photo 6-13 Existing Condition: Blind Curve on Route 318 (Saipan)

PS-4 Improve/Upgrade Traffic Signals

Traffic signals should be upgraded with video detection via cameras to allow actuated signal timing. Due to the humidity of the climate on the island, signal hardware often becomes damaged which results in using default pretimed signal phases. Actuated signal timing improves the operational efficiency of the intersection. In addition, leading pedestrian intervals (LPI) should be considered at signalized intersections to allow time for the pedestrian to enter the crosswalks prior to vehicles receiving a green light.

Photo 6-14 Example of an Existing Traffic Signal: Route 30 & Route 38 (Saipan)

PS-5 Roundabouts



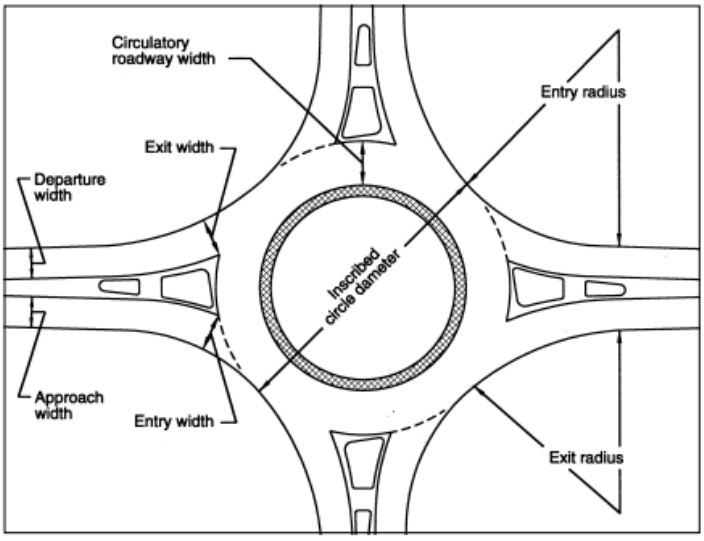
Roundabouts are a type of circular intersection configuration that safely and efficiently moves traffic through an intersection. They have considerable benefits for intersection control, including collision reduction potential, lower vehicle speeds, and improved operational performance. They also could eliminate the need to widen the roadways to address congestion by improving operations at the intersection. The primary benefits of roundabout control include:

- Crash reduction (see graph)
- Lower vehicle speeds
- Reduce points of conflict
- Improved operational performance

In addition, since roundabouts do not require electricity for essential function and provide traffic control through their physical design, this plan recommends that all intersections requiring modifications or upgrades be evaluated for roundabout control. Loss of power is a common occurrence on the islands and results in shutting down of traffic signals, and consequently the loss of their effective traffic control. This occurrence is dangerous not only for the increased potential of traffic accidents, but also for the reduced efficiency of travel during evacuation events.

Roundabouts are recommended at several locations on Saipan; however, this plan recommends a comprehensive evaluation of roundabout potential for all future intersection modifications to determine if roundabout, signalize, or stop-control is most appropriate for specific locations. There is currently one roundabout at the intersection of Route 21 (Broadway) and Canal on the island of Tinian. This plan recommends modifying this roundabout to address existing operational and safety challenges due to its original design. The following illustration shows key roundabout dimensions. The primary difference between roundabouts is the size determined by the width of the inscribed circular diameter.

Illustration 6-1 Key Roundabout Dimensions (US Department of Transportation)



The following are examples of different roundabout types that could be implemented on the islands. These descriptions and illustrations are sources from the US Department of Transportation Federal Highway Administration (FHWA). *Note: Roundabouts are also included as traffic calming treatments under PS-8.*

Table 6-1 Roundabout Types

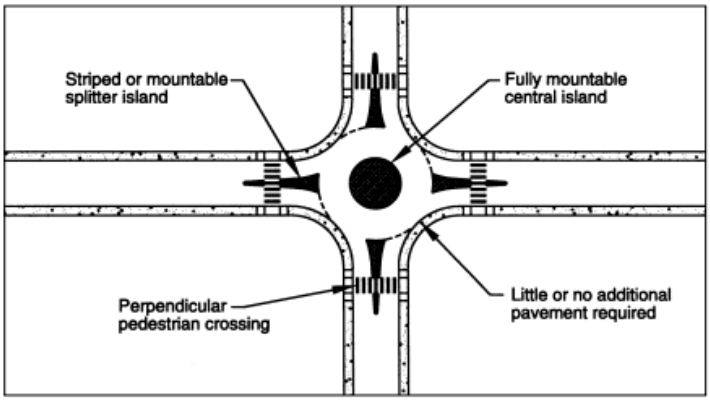
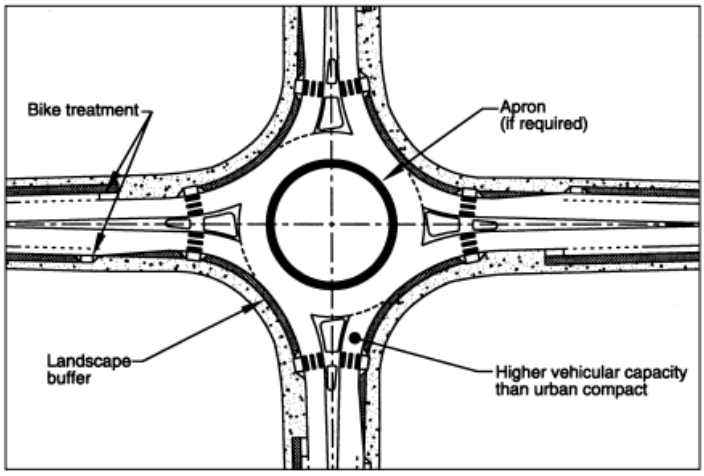
Type	Description
Small Modern or Mini-Roundabout: 	45 to 80-feet inscribed circular diameter Appropriate for the intersection of two local roads or of a local and collector road. Typically, not appropriate for an offset intersection. Can be an appropriate measure at lower traffic volume levels. Can be appropriate along a primary emergency route. May not efficiently accommodate transit buses or large trucks. Can accommodate pedestrian and bicyclist travel. FHWA publication Roundabouts: An Informational Guide shows travel speeds approximately 40-percent lower within mini roundabout than 350 feet away from intersection
Roundabout: 	100 to 130-feet inscribed circular diameter Appropriate for the intersection of arterial streets or of an arterial street and collector road. Can be appropriate at any level of traffic volume. Can be appropriate along a primary emergency route. Can be appropriate along a bus transit route. Can accommodate large trucks. Can accommodate pedestrian and bicyclist travel.

Photo 6-15 Small Modern Roundabout Example Image

Figure 3.8.1. Small Modern Roundabout
(Source: Ken Sides)

Photo 6-16 Roundabout Example Image

Figure 3.9.1. Single-Lane Roundabout
(Source: Omni-Means, Ltd.)

PS-6 Resiliency & Stormwater Management

Stormwater Management

Due to the potential for hazardous weather events on the islands, the CNMI recently received support from the US EPA and FEMA to develop a development guide to identify opportunities to support “Smart, Safe Growth” (SSG). As described in Chapter 2 of this plan, SSG is an approach to community development that prioritizes resiliency to natural disasters. The SSG development guide (*Guidance Manual for Smart, Safe Growth*) states that “resilient communities that result from the incorporation of SSG principles are planned and built to withstand current and future weather events and natural hazards with minimal physical damage or community disruption.” As such, the Highway Master Plan recommends that roadway improvements on all three islands be implemented in coordination with stormwater management efforts.

The *Comprehensive Sustainable Development Plan* (CSDP) was also discussed in Chapter 2 of this plan. The CSDP identifies visions, objectives, and goals for sustainable development. Sustainable development goal (SDG) #9 highlights the importance of “resilient infrastructure” and recommends coordination between transportation planning

and stormwater management. To support this and other goals, the CSDP recommends the use of “green infrastructure” as a “cost-effective, resilient approach to managing wet weather impacts” and to capture runoff from stormwater. Green infrastructure is designed adjacent to roadways to capture and filter stormwater where it falls decrease potential flooding on impervious surfaces, such as asphalt and concrete. The Highway Master Plan recommends that green infrastructure be considered during the planning and design of new roadways or roadway upgrades, especially in flood-prone areas, to mitigate the impacts from extreme weather events. *Note: Green infrastructure is considered a design component of Complete Streets roadway design and is also included under General Improvement Category PS-2.*

The US EPA provides information on green infrastructure (https://www.epa.gov/green-infrastructure/what-green-infrastructure). Some examples of green infrastructure that can be implemented along roadways include:

- Planter boxes to collect and absorb stormwater runoff from streets, sidewalks, and parking lots.
- Bioswales use vegetation or mulch to slow and filter stormwater flows and are often located along curbs and in parking lots.
- Permeable pavements, such as pervious concrete, porous asphalt, or permeable interlocking pavers, infiltrate, treat, and/or store rainwater where it falls.

Culverts

Culverts on the islands channel water under roadways. Some existing culverts are deteriorating or failing and affecting the drainage systems on the islands. This can lead to erosion and potential roadway embankment failure. Other culverts are narrow and constrain the movement of traffic. Some culverts, particularly on Rota, are located under unpaved highways and lack safety rails or advisory signs to signal caution to approaching motorists. Temporary measures installed by DPW should be replaced by physical barriers. This plan recommends rehabilitating existing culverts where feasible to avoid the more costly and time consuming option involved with total replacement.

Photo 6-17 Existing Condition: Narrow Culvert on Route 314, West of Route 30 (Saipan)

Photo 6-18 Existing Condition: Narrow Culvert on Route 100 (Rota)

PS-7 Data Collection

This plan recommends that the CNMI create and continually update relevant transportation and safety data to assist in planning efforts and decision-making processes. The following data sources, among others, are recommended:

– Travel Data:
  - Average daily traffic (ADT) roadway counts
  - Peak hour intersection traffic counts
  - Bicycle & pedestrian counts
– Geographic Information System (GIS) Data:
  - Roadway infrastructure
  - Intersection location & control type
  - Multimodal infrastructure (pedestrian paths, sidewalks, bicycle lanes, transit stops/routes)
  - Pavement condition (Pavement condition index (PCI) should be established consistent with project PS-1)
– Safety Data:
  - Collision location, type, & severity on roadways and at intersections

Note: The CNMI DPW is currently in the process of planning the implementation of an Asset Management Plan (AMP) which would include data collection and asset inventory.

PS-8 Safety & Speed Control

Motor vehicle speeds that exceed the recommended speed limit on roadways were noted as a significant issue in the CNMI. Roadways can be designed with features that slow vehicle speeds using an approach known as traffic calming. The Federal Highway Administration (FHWA) provides a comprehensive look at traffic calming design features and their role in reducing motor vehicle speed and reducing the potential for crashes. The graphic to the right was provided via FHWA and identifies the relationship between motor vehicle speed and the severity of crashes involving a pedestrian.

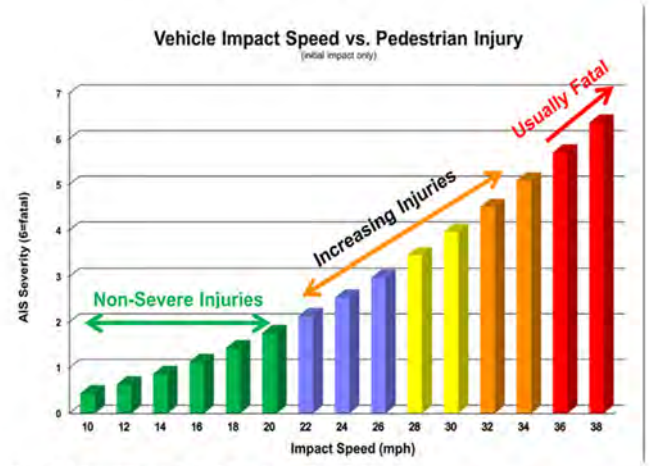
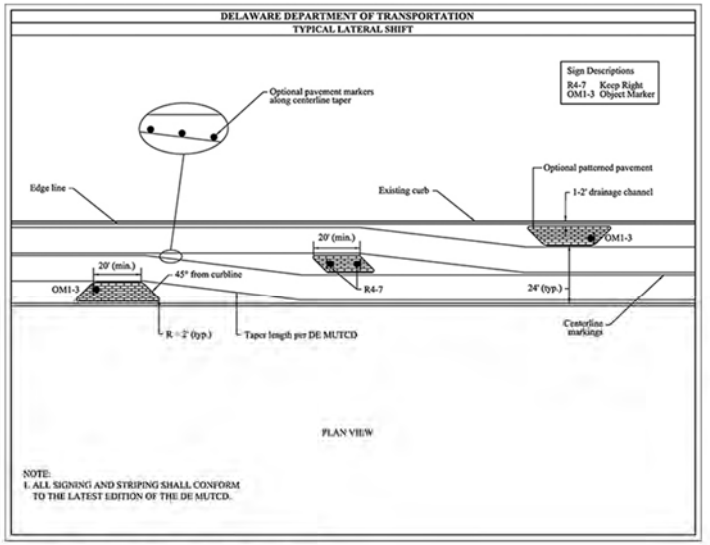


Figure 2.1. Speed/Pedestrian Injury Severity Correlation
(Source: C. E. "Rick" Chellman)

The FHWA provides an extensive list of traffic calming design features that the Highway Master Plan recommends for implementation, especially in areas with increased pedestrian and bicyclist activity. Table 6-2 provides examples.

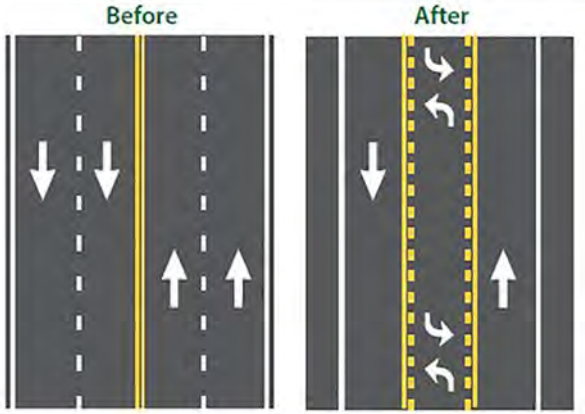
Table 6-2 Traffic Calming Treatments

Treatment	Description	Example Illustration or Image
Lateral shift	Realignment of an otherwise straight street that shifts travel lanes in one direction to slow vehicle speeds. Lateral shift should be supplemented with median islands to prevent vehicles from driving over pavement markings.	 **Figure 3.4.5. Sample Design for Lateral Shift** (Source: Delaware Department of Transportation)
Traffic circle (Not roundabout)	A raised island within an unsignalized intersection to circulate traffic to reduce the number of angle and turning crashes.	 **Figure 3.7.6. Bicyclist Passing Through Traffic Circle** (Source: www.pedbikeimages.org / Dan Burden)

Treatment	Description	Example Illustration or Image
Roundabout (small modern or mini)	Appropriate for the intersection of two local roads or of a local and collector road. Typically not appropriate for an offset intersection. Can be an appropriate measure at lower traffic volume levels. Can be appropriate along a primary emergency route. May not efficiently accommodate transit buses or large trucks. Can accommodate pedestrian and bicyclist travel. FHWA publication Roundabouts: An Informational Guide shows travel speeds approximately 40-percent lower within mini roundabout than 350 feet away from intersection	 **Figure 3.8.1. Small Modern Roundabout** (Source: Ken Sides)
Roundabout	Appropriate for the intersection of arterial streets or of an arterial street and collector road. Can be appropriate at any level of traffic volume. Can be appropriate along a primary emergency route. Can be appropriate along a bus transit route. Can accommodate large trucks. Can accommodate pedestrian and bicyclist travel.	 **Figure 3.9.1. Single-Lane Roundabout** (Source: Omni-Means, Ltd.)

Treatment	Description	Example Illustration or Image
Raised crosswalk	A marked and signed pedestrian crossing with a raised, flat top. Typically constructed flush against the roadside curb. Requires the motorist to decrease speed to mount the raised crosswalk, which is typically three to six inches above street level.	 **Figure 3.14.6. Raised Crosswalk with Bicycle Lane** (Source: Scott Batson)
Speed hump	A speed hump is an elongated mound in the roadway pavement surface extending across the travel way at a right angle to the traffic flow. Appropriate on residential streets and streets that provide access to a school, park, or community center. Appropriate posted speed limit is 30 mph or less. Appropriate daily traffic volume of 3,5000-4,000 maximum. Not generally appropriate along an emergency vehicle route or a bus transit route. Speed cushions are similar to speed bumps but provide gaps between the raised areas to accommodate large emergency vehicles, some trucks, and some buses). Speed tables are similar to speed bumps with a longer flat top to accommodate the entire wheelbase of most passenger cars.	 **Figure 3.10.4. Speed Hump on a Grade** (Source: Scott Wainwright)
Raised intersection	A flat, raised area covering an entire intersection with ramps on all approaches, designed to slow vehicle	

Treatment	Description	Example Illustration or Image
	traffic and improve safety for pedestrians. Typically raised to sidewalk level.	
Corner extension/ Bulbout	A horizontal extension of the sidewalk into the street resulting in a narrower roadway section, located at either a corner or midblock.	 **Figure 3.16.5. Corner Extension and Bicycle Lane** (Source: Scott Batson)

Treatment	Description	Example Illustration or Image
Median island	A raised island located along the street centerline that narrows the travel lanes. Typically wider than a standard median and provides an opportunity for landscaping and a place of refuge for a pedestrian crossing.	 **Figure 3.18.3. Landscaped Oval Median Island** (Source: Ken Sides)
Road diet	Reduces the number of travel lanes for multimodal improvements (such as bike lanes, pedestrian crossing islands, and curb extensions (bulb-outs). Typically, a 4- to 3-Lane conversion. Primary Benefits: • Slows vehicle speeds by narrowing the roadway. • Reduced pedestrian exposure by reducing the crossing distance at intersections. • Improves multimodal safety and access. • Improves access to side streets via left turn lanes/center turn lane. • Reduces total crashes by 19-47-percent!	 **Figure 3.20.1. Road Diet Schematic** (Source: FHWA *Road Diet Information Guide)*
Road closure	A physical barrier placed across a street to close the street completely to through vehicle traffic that can be designed to allow bicyclists and pedestrians to pass through.	

Priority Roadways Based on Crash History

This improvement recommendation aims to determine priority segments along study roadways for safety improvements based on the following data.

As presented in Chapter 3 of this plan, collisions on study roadways were evaluated in terms of collision rate for total or fatal + injury collisions. Collision rates are helpful in comparing study segments to each other, as the rates consider both segment length and daily volume to account for variations in study segments. The study segments with the highest rate (top 10) for either total or fatal + injury collisions are shown in Table 6-3. Garapan Street has the highest total collision rate and fatal + injury collision rates with a length of 1,370-feet (1/4-mile) with 19 total and three injury collisions. The top five (5) segments with the highest crash rates for either total or fatal + injury collisions are highlighted in blue below.

Table 6-3 Priority Roadways based on Crash Rates

			2017 Collisions				Total Collisions Rate	Fatal + Injury Collisions Rate
Study Segment	Road Name	Location	Total	Non-Injury	Injury	Fatal	Rank (of all)	Rank (of all)
S-1	Beach Road	Micro Beach to Garapan St.	**87**	84	3	-	3	17
S-2	Beach Road	Garapan St. to Gualo Rai Rd.	**76**	65	11	-	7	6
S-6	Beach Road	Chalan Hagoi to As Perdido Rd.	**59**	54	5	-	10	15
S-12	Middle Road/Chalan Pale Arnold	Micro Beach Road to Gualo Rai Road	**129**	114	15	-	8	8
S-13	Middle Road/Chalan Pale Arnold	Gualo Rai Road to Quartermaster Road	**86**	72	14	-	9	4
S-22	Dan Dan Road	Chalan Monsignor Guerrero to Flame Tree Road	**18**	11	7	-	28	3
S-27	As Perdido Road	Beach Road to Chalan Monsignor Martinez	**26**	23	3	-	6	7
S-29	Gualo Rai Road	east of Beach Road	**4**	4	-	-	2	27
S-33	Garapan Street	east of Beach Road	**19**	16	3	-	1	1
S-35	Micro Beach Road	east of Beach Road	**10**	6	4	-	5	2
S-36	Afetna Road	east of Beach Road	**12**	12	-	-	4	27

Note: Values in columns are shaded according to their respective ranking compared to all study roadway segments, where dark red represents worse conditions.

Collision Severity

The roadway segments with at least one (1) fatal collision and more than five (5) injury collisions are shown in Table 6-4. Five (5) fatal collisions occurred in 2017 on three (3) roadway segments of Beach Road, Middle Road/Chalan Pale Arnold, and Chalan Monsignor Guerrero. The locations where fatalities were reported are highlighted in blue.

Collisions Involving a Pedestrian

There was a total of twelve (12) collisions that involved a pedestrian that occurred on study facilities in 2017. Of those collisions, most resulted in injuries and one (1) resulted in a fatality. Eight (8) collisions with a pedestrian occurred on Middle Road/Chalan Pale Arnold, and three (3) occurred on Chalan Monsignor Guerrero, including one (1) fatality.

Table 6-4 Priority Roadways based on Severity

Segment	Road Name	Location	Total	Injury	Fatal
S-2	Beach Road	Garapan St. to Gualo Rai Rd.	**76**	11	-
S-5	Beach Road	Chalan Monsignor Guerrero to Chalan Hagoi	**157**	19	1
S-11	Middle Road/Chalan Pale Arnold	Isa Drive to Micro Beach Road	**38**	6	1
S-12	Middle Road/Chalan Pale Arnold	Micro Beach Road to Gualo Rai Road	**129**	15	-
S-13	Middle Road/Chalan Pale Arnold	Gualo Rai Road to Quartermaster Road	**86**	14	-
S-16	Chalan Monsignor Guerrero	Chalan Pale Arnold to Chalan Msgr. Martinez	**75**	9	3
S-21	Isa Drive	Capitol Hill Road to Dandan Road	**66**	9	-
S-22	Dan Dan Road	Chalan Monsignor Guerrero to Flame Tree Road	**18**	7	-
S-26	Chalan Monsignor Martinez	Chalan Tun Joaquin Doi to Beach Road	**50**	7	-

Table 6-5 Collisions Involving a Pedestrian

Intersection/Segment Location	2017 Collisions	
	Injuries	Fatalities
Chalan Pale Arnold, east of Saluda Street	**1**	
Chalan Pale Arnold & Gobietno Drive	**1**	
Chalan Pale Arnold & Cheribiyan Drive	**1**	
Chalan Pale Arnold & Europa Place	**3**	
Chalan Monsignor Guerrero & Kannat Tabla Drive		**1**
Chalan Monsignor Guerrero, east of Rasimu Lane	**0**	
Chalan Monsignor Guerrero & Tanduki Drive	**1**	
Beach Road & Kadena Di Amor Street	**2**	
Isa Drive & Atkiya Drive	**0**	
Beach Road Garapan, south of Pupulu Drive	**1**	
Chnl Antonio Apa & Bobolong Drive	**1**	
Chalan Pale Arnold & Micro Beach Road	**2**	

Top 10 Priority Roadways

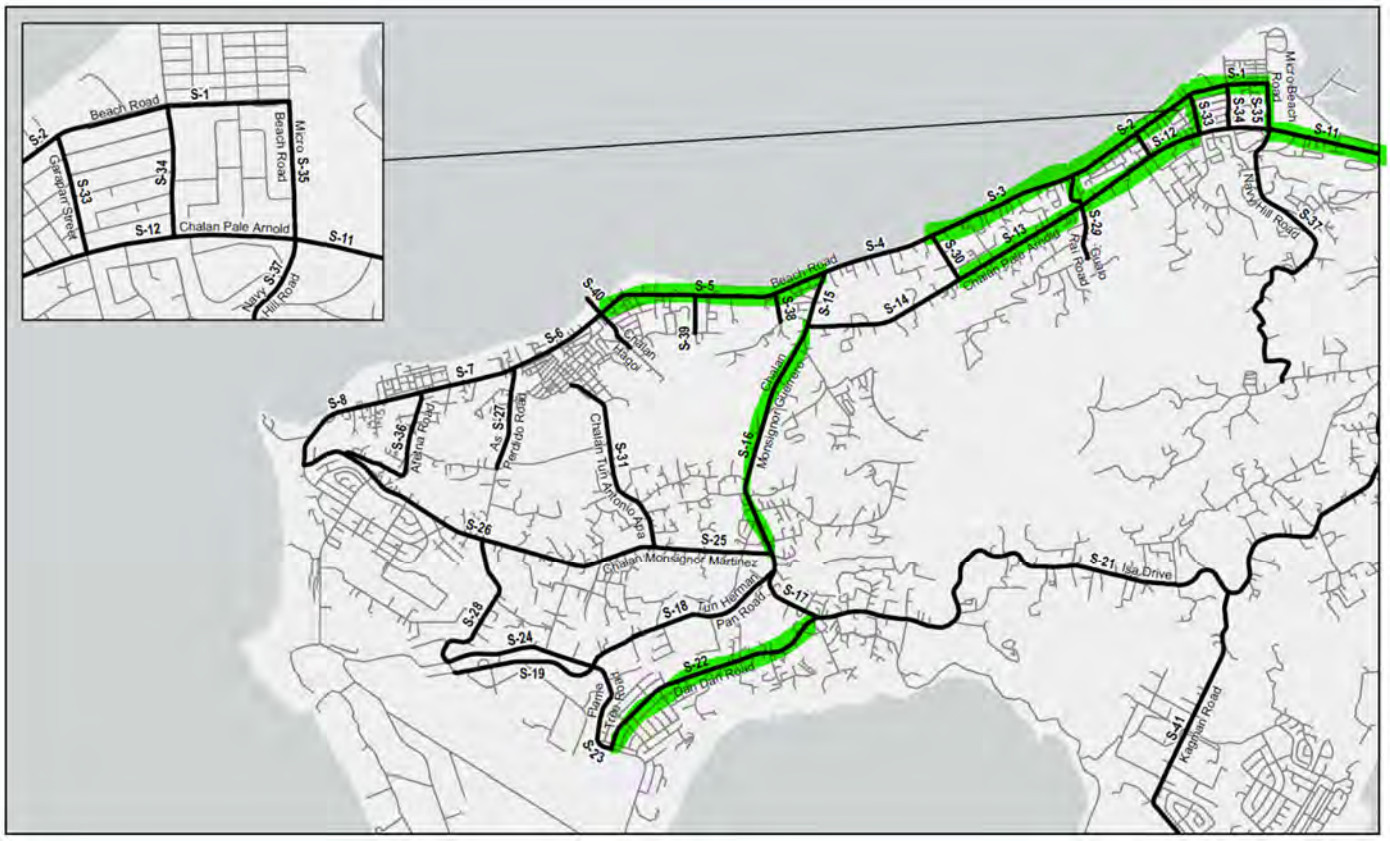
The top ten (10) priority roadways were identified based on crash rates, collision severity, and pedestrian involvement:

1. S-33: Route 308 (Garapan Street), east of Beach Road (based on crash rate)
2. S-35: Route 38 (Micro Beach Road), east of Beach Road (based on crash rate)
3. S-16: Route 30 (Chalan Monsignor Guerrero), between Chalan Pale Arnold and Chalan Monsignor Martinez (based on fatal, injury, and pedestrian collisions)
    a. Pedestrian-involved crashes, including one fatality at Kannat Tabla Drive, were reported between Rasimu Lane and Tanduki Drive. Traffic calming measures and high-visibility pedestrian features should be implemented through this section of Route 30.
4. S-1: Route 33 (Beach Road), between Micro Beach and Garapan Street (based on crash rate)
5. S-11: Route 31 (Middle Road/Chalan Pale Arnold), between Isa Drive and Micro Beach Road (based on fatal, injury, and pedestrian collisions)
6. S-22: Route 305 (Dandan Road), between Chalan Monsignor Guerrero to Flame Tree Road (based on crash rate)
7. S-5: Route 33 (Beach Road), from Chalan Monsignor Guerrero to Chalan Hagoi (based on fatal and injury collisions)

8. S-12: Route 31 (Middle Road/Chalan Pale Arnold), between Micro Beach Road to Gualo Rai Road (based on injury collisions)
9. S-13: Route 31 (Middle Road/Chalan Pale Arnold), between Gualo Rai Road to Quartermaster Road (based on injury collisions)
10. S-29: Route 317 (Gualo Rai Road), east of Beach Road (based on crash rate)

The top ten (10) priority roadways for safety improvements are highlight in the image below.

Photo 6-19 Top 10 Priority Roadways for Safety Improvements



6.3 Saipan Improvements

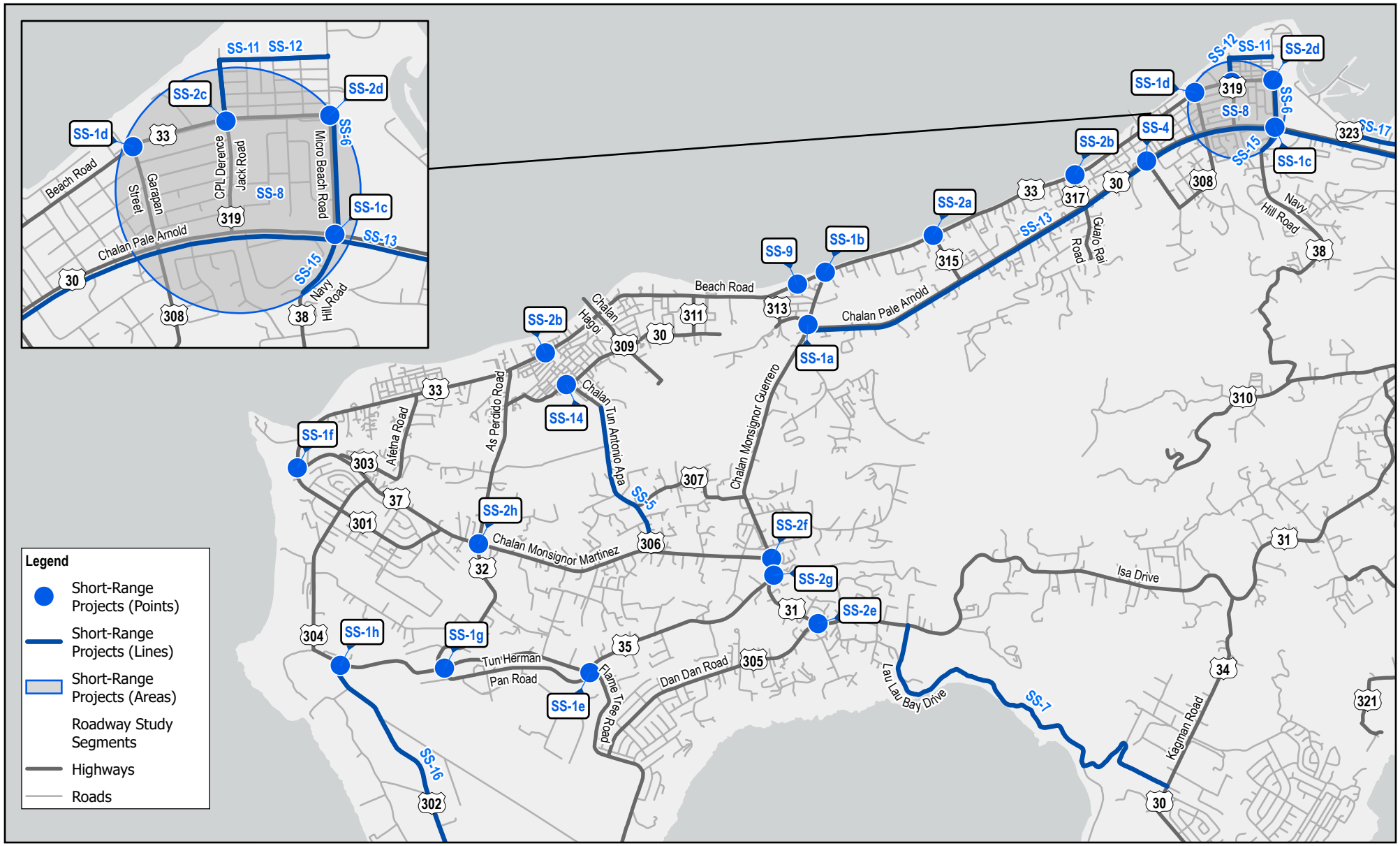
6.3.1 Saipan Near-Term Recovery Conditions Improvements

The comprehensive list of near-term improvements for Saipan are listed below and shown in Figure 6-1 and Figure 6-2. Projects previously included in the 2008 Highway Master Plan are designated with their respective project stage (i.e., Planning/Design or Under Construction). Descriptions for each new improvement proposed in this plan are provided on the following pages.

Table 6-6 Saipan Near-Term Recovery Conditions Improvements

ID	Location	Improvement	Project Stage
Saipan			
SS-1	Intersection Modification at the following locations:		
SS-1a	*Route 31 (Chalan Monsignor Guerrero) & Route 30 (Middle Road/Chalan Pale Arnold)*	Intersection modification	Planning/Design
SS-1b	*Route 31 (Chalan Monsignor Guerrero) & Route 33 (Beach Road)*	Intersection modification	Planning/Design
SS-1c	*Route 30 (Middle Road/Chalan Pale Arnold) & Navy Hill Road*	Intersection modification	Planning/Design
SS-1d	*Route 33 (Beach Road) & Route 308 (Garapan Street)*	Intersection modification	-
SS-1e	*Route 35 (Tun Herman Pan) & Route 304 (Flame Tree Drive)*	Intersection Modification (AWSC)	-
SS-1f	*Route 33 (Beach Road) & Route 37 (Chalan Monsignor Martinez)*	Intersection Modification (SSSC)	-
SS-1g	*Route 304 (Flame Tree Road) & Route 32 (As Perdido Road)*	Intersection modification (AWSC)	-
SS-1h	*Route 304 (Flame Tree Road) & Route 302 (Naftan Road)*	Intersection modification (SSSC or AWSC)	-
SS-2	New Traffic Signal or Roundabout at the following locations:		
SS-2a	*Route 33 (Beach Road) & Quartermaster Road*	Install new traffic signal or roundabout	Under Construction
SS-2b	*Route 33 (Beach Road) & Route 317 (Gualo Rai Road)*	Install new traffic signal	-
SS-2c	*Route 33 (Beach Road) & CPL Derence Jack Road*	Install new roundabout	Planning/Design
SS-2d	*Route 33 (Beach Road) & Route 38 (Micro Beach Road)*	Install new traffic signal	Planning/Design
SS-2e	*Route 31 (Chalan Monsignor Guerrero) & Route 305 (Dandan Road)*	Redesign existing traffic signal	-
SS-2f	*Route 31 (Chalan Monsignor Guerrero) & Route 37 (Chalan Monsignor Martinez)*	Modify traffic signal or install new roundabout	-
SS-2g	*Route 31 (Chalan Monsignor Guerrero) & Route 35 (Tun Herman Pan Road)*	Install intersection improvement in coordination with SS-2f	-
SS-2h	*Route 32 (As Perdido Road) & Route 37 (Chalan Monsignor Martinez)*	Install new roundabout	-
SS-3	Route 36	Construct new bridge and connection	Under Construction
SS-4	Route 30 (Middle Road/Chalan Pale Arnold) & Commonwealth	Relocate pedestrian signal	Planning/Design
SS-5	Chalan Tun Joaquin Doi in As Terlaje	Improve signage and relocate driveway	Planning/Design
SS-6	Route 38 (Micro Beach Road), west of Route 30 (Middle Road/Chalan Pale Arnold)	Add pedestrian pathway	-

ID	Location	Improvement	Project Stage
Saipan			
SS-7	Lau Lau Road to Kagman	Upgrade and pave roadway	Under Construction
SS-8	Garapan (area)	Lighting improvement	-
SS-9	Route 33 (Beach Road)	Add mid-block or signalized crosswalks	-
SS-10a	Route 31 (Chalan Monsignor Guerrero)	Speed enforcement	-
SS-10b	Route 30 (Middle Road/Chalan Pale Arnold)	Speed enforcement	-
SS-11	Garapan	Parking enforcement	Planning/Design
SS-12	Garapan	Improve vehicle circulation	Planning/Design
SS-13	Route 30 (Middle Road/Chalan Pale Arnold)	Hazard elimination	Planning/Design
SS-14	Route 306 (Chalan Tun Joaquin Doi) & Texas Road	Add signage	-
SS-15	Route 38 (Navy Hill Road), near CHCC	Construct pedestrian facilities and bike lanes	-
SS-16	Route 302 (Naftan Road), from Route 304 (Flame Tree Road) to Obyan Route 33 (Beach Road)	Improve roadway	-
SS-17	Route 323 (Industrial Drive), from Smiling Cove Road to Lower Base Drive	Improve roadway	-



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Feet

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Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

SAIPAN SHORT-RANGE IMPROVEMENTS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 6-1

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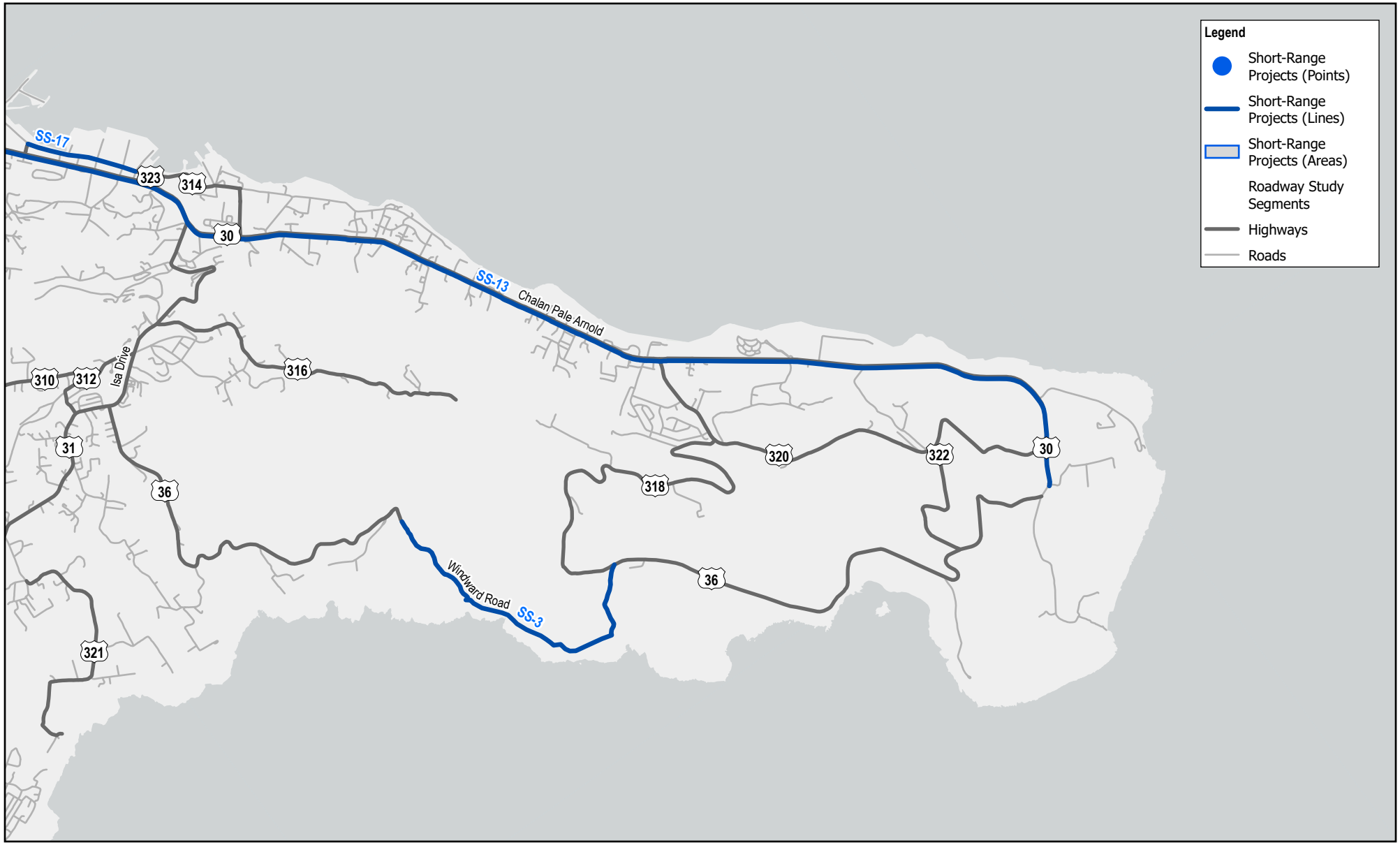
Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; Roads: TIGER, 2020. Created by: pthornton



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Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

SAIPAN (NORTH) SHORT-RANGE IMPROVEMENTS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 6-2

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Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; Roads: TIGER, 2020. Created by: pthornton

SS-1 Intersection Modifications

SS-1 Intersection Modifications are planned for the existing signalized or stop-controlled intersection locations, described below.

SS-1a Route 31 (Chalan Monsignor Guerrero) and Route 30 (Middle Road/Chalan Pale Arnold): *Planning/Design Stage*

This intersection had 16 crashes recorded in the 2017 data. Intersection modifications have been planned for this location. Roundabout control should be evaluated to determine feasibility at this location. Multimodal improvements should be incorporated into intersection modification design. An improvement to realign Texas Road to meet Middle Road/Chalan Pale Arnold to form a four-leg intersection is including under Saipan's long term improvement list (SL-1).

Photo 6-20 Existing Intersection (Northbound View)

SS-1b Route 31 (Chalan Monsignor Guerrero) and Route 33 (Beach Road): *Planning/Design Stage*

This intersection had 15 crashes recorded in the 2017 data. Intersection modifications have been planned for this location. Roundabout control should be evaluated to determine feasibility at this location. Multimodal improvements should be incorporated into intersection modification design.

Photo 6-21 Existing Intersection (Westbound View)

SS-1c Route 30 (Middle Road/Chalan Pale Arnold) and Route 38 (Navy Hill Road): *Planning/Design Stage*

This intersection had one pedestrian crash recorded in the 2017 data. Intersection modifications have been planned for this location. Roundabout control should be evaluated to determine feasibility at this location. Multimodal improvements should be incorporated into intersection modification design.

In addition, other projects included in this plan recommend multimodal infrastructure on Micro Beach Road connecting to Middle Road and Navy Hill Road and continuing east on Navy Hill Road by the Commonwealth Healthcare Center.

Photo 6-22 Existing Intersection (Northbound View)

SS-1d Route 33 (Beach Road) and Route 308 (Garapan Street): Improve Traffic Signal

This intersection had 18 crashes recorded in the 2017 data. The signalized 3-way intersection at Beach Road and Garapan Street is located in Garapan. Garapan Street is one of the key streets connecting Middle Road/Chalan Pale Arnold and Beach Road. The northbound right-turn traffic and westbound traffic are substantially high volume at this intersection based on field observations. To facilitate the northbound right-turn and westbound right-turn movements at the intersection, it is recommended to provide overlap right-turn phases for these movements. With the overlap phases, the northbound right-turn movement will run concurrently with the westbound left-turn movement, and the westbound right-turn will run simultaneously with southbound left-turn movement.

In addition to the signal operation, much of the striping at this intersection including the crosswalks have faded and are not clearly visible to drivers and pedestrians. New striping on top of slurry seal or a black painted background beneath the stripes that could greatly enhance the visibility of the pavement markings at the intersection is recommended. Multimodal improvements should be incorporated into intersection modification design. The traffic signal could be also

upgraded with video detection to actuated signal phases and increase the operational efficiency of the intersection, consistent with the long-term project SL-12.

Photo 6-23 Existing Intersection (Southbound View)

SS-1e Route 35 (Tun Herman Pan Road) and Route 304 (Flame Tree Drive): Modify to Roundabout Control

The intersection of Tun Herman Pan Road and Flame Tree Drive was listed as one of the high accident frequency locations in the previous master plan study. Tun Herman Pan Road is a key roadway providing access to the airport and Flame Tree Drive connects to a residential area and is also a back road to the airport. This location is currently unsignalized with stop-sign control on Flame Tree Drive. The Department of Public Safety identified that the problem at the location is that drivers from the stop-controlled Flame Tree Drive have difficulty finding gaps in the traffic to turn onto the uncontrolled Tun Herman Pan Road. A feasible near-term solution is to modify the two-way stop-controlled intersection to a four-way stop-control. Installation of a traffic signal is not recommended at this time as signal warrants could not be met under the existing condition; however, traffic signal should be considered in the future when traffic volumes increase and the signal warrants are met.

Roundabout control should be evaluated to determine feasibility at this location. Multimodal improvements should be incorporated into intersection modification design. In addition, due to its proximity to the airport, additional recommendations include signage to welcome guests to the island. Art/design features could be incorporated into the intersection improvement design, such as in the center island of a roundabout, and should be considered in coordination with various stakeholders including Marianas Visitors Authority, Commonwealth Ports Authority, Legislature, and the public. Figure 6-2(E) below shows an aerial photograph and recommended improvements of the intersection.

Photo 6-24 Existing Condition: Route 35 – Northbound Approach

Illustration 6-3 SS-1e Location

In addition, Route 304 west of Route 35 transitions abruptly for westbound traffic. Improvements should aim to ensure road widening and/or striping clearly designates lane boundaries.

Photo 6-25 Existing Condition: Route 304 – Westbound View of Eastbound Approach to Route 35

SS-1f Route 33 (Beach Road) and Route 37 (Chalan Monsignor Martinez): Modify from Yield to Two-Way Stop-Control

The T-intersection at Route 33 (Beach Road) and Route 37 (Chalan Monsignor Martinez) is currently yield-sign controlled on Chalan Monsignor Martinez. According to the information provided by Department of Public Safety, vehicles from Chalan Monsignor Martinez usually exit the roadway without stopping usually create a hazardous condition to vehicles on Beach Road. To improve the safety to vehicles on Beach Road, introducing stop control on Chalan Monsignor Martinez and improving roadway delineation at the intersection are recommended. These proposed improvements could prevent vehicles from entering Beach Road without stopping and could provide a better guidance to traffic accessing the intersection.

Illustration 6-2 SS-1f Location

SS-1g Route 304 (Flame Tree Road) and Route 32 (As Perdido Road): Modify from Two-Way to All-Way Stop-Control or Roundabout Control

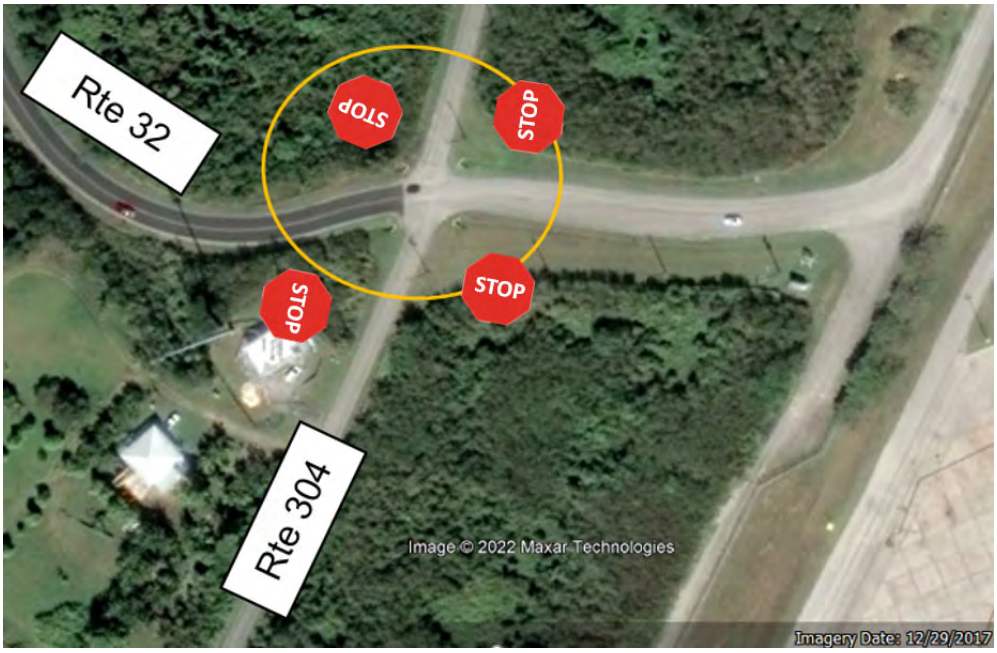
The intersection of Route 304 and Route 32 is currently two-way stop-controlled at the northbound/southbound approaches. The steep grade at the eastbound approach along Route 32 creates visibility issues, as shown in Figure 6-2(G).

This plan recommends modification to all-way stop-control or roundabout control. Roundabout control should be evaluated to determine feasibility at this location. Multimodal improvements should be incorporated into intersection modification design.

Photo 6-26 Existing Condition: Southbound Approach

Photo 6-27 *Existing Condition: Eastbound Approach*

Illustration 6-4 SS-1g Location

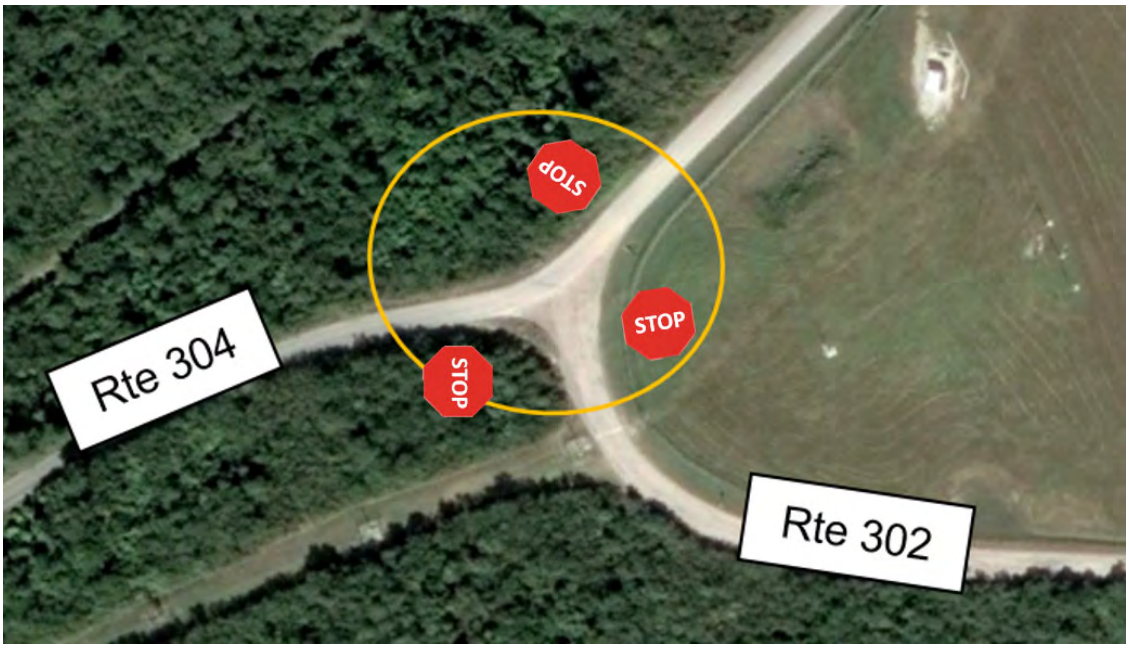


SS-1h Route 304 (Flame Tree Road) and Route 302 (Naftan Road): Modify from Yield to All-Way Stop-Control or Roundabout Control

The intersection of Route 304 and Route 302 is currently yield-sign controlled. Due to overgrown shrubs and the approach curbs, it is difficult to see approaching vehicles. Converting the intersection to two-way or all-way stop-control could address safety concerns associated with visibility, as shown in Figure 6-2(I).

This plan recommends modification to all-way stop-control or roundabout control. Roundabout control should be evaluated to determine feasibility at this location. Multimodal improvements should be incorporated into intersection modification design.

Illustration 6-5 SS-1h Location



SS-2 New Traffic Signal or Roundabout

New traffic signals or roundabouts are planned for the following intersection locations, described below.

SS-2a Route 33 (Beach Road) & Route 315 (Quartermaster Road): *Under Construction*

Photo 6-28 Existing Intersection (Westbound Approach)

SS-2b Route 33 (Beach Road) & Route 317 (Gualo Rai Road): Traffic Signal or Roundabout

The intersection of Route 33 (Beach Road) and Route 317 (Gualo Rai Road) is currently an unsignalized intersection with stop-sign control at the westbound approach on Gualo Rai Road. There is one travel lane on Beach Road in each direction, but there is no turn lane.

A project to pave, realign, and improve Gualo Rai Road is proposed by the Department of Public Works. This project is expected to be implemented in the next five years. In addition, due to the change in elevation between the Gualo Rai Road approach and Beach Road, as well as the proximity of the intersection to the shoreline, ongoing engineering design includes evaluating the existing drainage issues on Gualo Rai Road with the potential to install ponding basins and stormwater detentions to eliminate runoff towards the shoreline along Beach Road. Once this substantial roadway, Gualo Rai Road, is improved, it is expected that more traffic will use this intersection to travel between Beach Road and Middle Road/Chalan Pale Arnold. Signalization of this intersection should be considered after the improvements are implemented.

Photo 6-29 Beach Road & Gualo Rai Road Elevation Change and Shoreline Proximity (Southbound View on Beach Road)

An alternative option of constructing a roundabout at this location was also evaluated for both the existing and future year conditions. The analysis results revealed that a single-lane roundabout would be adequate to accommodate both the Near-Term and Long-Term traffic volumes at Beach Road and Gualo Rai Road. The illustration below shows a conceptual layout of a single lane roundabout with a 100-foot diameter inscribed circle and a 15-foot circulating lane at the location. Constructing a roundabout at this location would require acquiring the landscaped area on the west side of Beach Road, the northeast corner, and the parcel on the southeast corner of the intersection.

SS-2c Route 33 (Beach Road) and Route 319 (CPL Derence Jack Road): New Traffic Signal or Roundabout

The intersection of Route 33 (Beach Road) and Route 319 (CPL Derence Jack Road) is in the heart of Garapan. On the northeast corner of this intersection are the Garapan Elementary School and other commercial and retail businesses. CPL Derence Jack Road (previously called Orchard Street) is the primary access to the Fiesta and Hyatt Regency Hotels. This area is one of the more highly trafficked areas for pedestrians.

This intersection is currently unsignalized with stop-sign control on the eastbound and westbound approaches on CPL Derence Jack Road. Vehicle turning movements were observed to be high volume at this location, especially the left turn movements. Due to the high volumes on Beach Road and high pedestrian activities at this intersection, vehicles on CPL Derence Jack Road are queued during the peak hours. Intersection analysis results revealed that the intersection is currently operating at an unacceptable LOS F and is also projected to operate at LOS F in Long-Term (2040).

Signalization of this intersection would provide signalized pedestrian crossings in all directions, which would enhance traffic safety for students, tourists, and reduce vehicle delays. As mentioned in the previous section, this intersection could potentially meet the school area and pedestrian warrants for installation of a traffic signal in the existing condition. It is recommended that a signal warrant analysis to be completed to justify signal installation. *Although an intersection improvement at this location is currently in the Planning/Design stage, this plan recommends further evaluating the potential of a roundabout.*

The following images provide examples of existing conditions and depicts a conceptual layout of a single-lane roundabout with an 80-foot diameter inscribed circle at this location.

Photo 6-30 Existing Condition: Route 33 (Beach Road) – Southbound View

Illustration 6-6 SS-2c Roundabout Concept Diameter

SS-2d Route 33 (Beach Road) and Route 38 (Micro Beach Road): New Traffic Signal or Roundabout

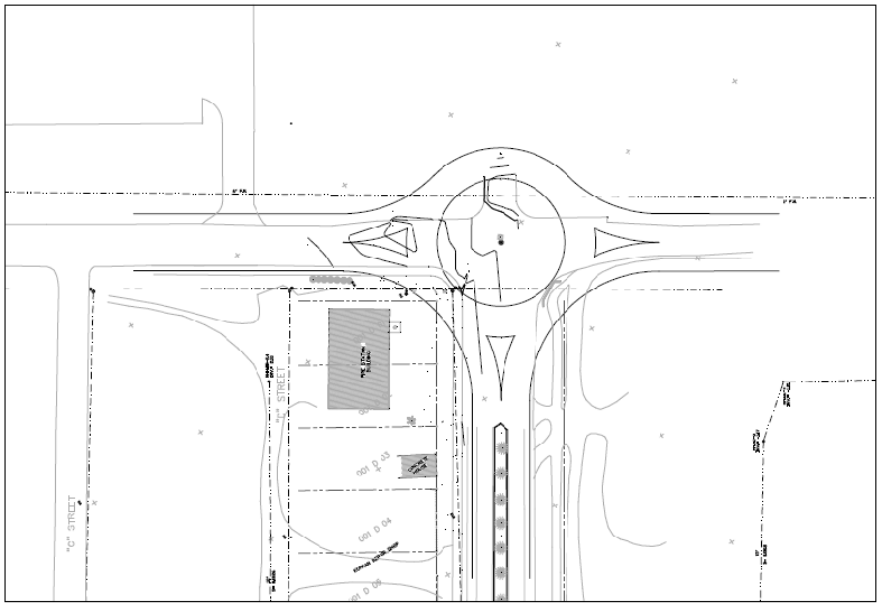
Route 33 (Beach Road) terminates in the north at Route 38 (Micro Beach Road). The westbound volumes, vehicles coming from the intersection of Middle Road/Chalan Pale Arnold and Micro Beach Road, are high volume as this is the principal route for the motorists to access Garapan from the northern areas of the island (north of Route 38 (Navy Hill Road)). The surrounding land uses include open spaces (American Memorial Park), a fire station, commercial and retail resulting in moderate pedestrian activity. The intersection was calculated to operate at LOS B in both Near-Term and Long-Term traffic conditions.

Although an intersection improvement at this location is currently in the Planning/Design stage, this plan recommends further evaluating the potential of a roundabout.

Photo 6-31 Existing Intersection – Southbound View

Conversion of this intersection to roundabout control is recommended at this location. Consistent with current revitalization efforts in the Garapan area, roundabouts will balance traffic flow with reduced vehicular travel speeds, encouraging safer pedestrian activity.

Illustration 6-7 SS-2d Concept



SS-2e Route 31 (Chalan Monsignor Guerrero) and Route 305 (Dandan Road) & Proas Lane

The intersection of Route 31 and Route 305 is currently a three-leg signalized intersection. However, there are closely spaced driveways immediately adjacent to this traffic signal causes, specifically at Proas Lane which allows left-turns out of the driveway onto Chalan Monsignor Guerrero (see Figure 6-2(R)). The project would reconfigure the intersection include the approach at Proas Lane and require modifications to the existing traffic signal at Route 31 and Route 305.

An alternative option of constructing a roundabout at this location was also considered. A roundabout could be an ideal solution, but additional design would be required to determine if a roundabout could be accommodated at this location.

Photo 6-32 Existing Condition

Illustration 6-8 SS-2e Location

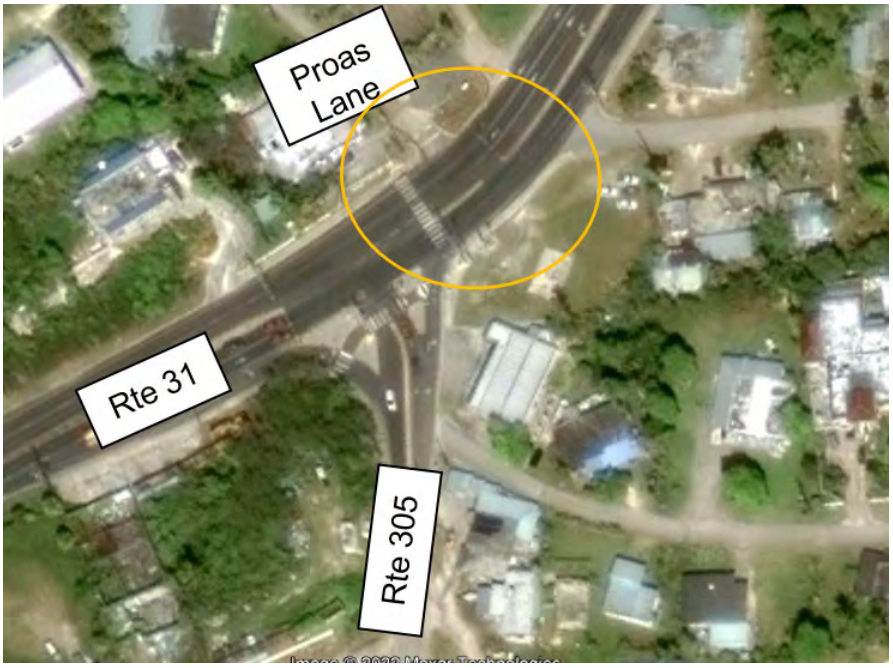


Photo 6-33 Existing Condition – View of Proas Lane

SS-2f Route 31 (Chalan Monsignor Guerrero) and Route 37 (Chalan Monsignor Martinez)

The intersection of Route 31 and Route 37 is currently a three-way traffic signal located just west of the Route 31 intersection with Route 35. Due to the close spacing of these major intersections, improvements need to be coordinated to ensure proper operations. To improve access along the corridor and improve safety, this intersection could be a candidate for roundabout installation, subject to additional design study. Alternatively, a retimed coordinated signal system with the Route 35 intersection is proposed with improved signal hardware to improve motorist safety.

Photo 6-34 Existing Condition

Illustration 6-9 SS-2f Location

SS-2g Route 31 (Chalan Monsignor Guerrero) and Route 35 (Tun Herman Pan)

The intersection of Route 31 and Route 35 is currently a three-way traffic signal located just east of the Route 31 intersection with Route 37. Due to the close spacing of these major intersections, improvements need to be coordinated to ensure proper operations. If a roundabout design is selected for the Route 37 intersection, a traffic signal at this location may not operate optimally and intersection reconfiguration will need to be considered, including relocation of the intersection or realignment of Route 35 to intersect either Route 37 or 31 at an alternate location.

Photo 6-35 Existing Condition

Illustration 6-10 SS-2g Location

SS-2h Route 32 (As Perdido Road) and Route 37 (Chalan Monsignor Martinez)

The intersection of Route 32 and Route 37 is currently a four-way traffic signal. A roundabout is recommended at this location. Roundabouts provide efficient traffic control while minimizing the turn conflicts associated with vehicular movements at a traffic signal. The improvement would include a new four-way single-lane roundabout.

In addition, DPW is currently working on the hazard elimination on Route 32 by providing superelevation on all horizontal curves.

Illustration 6-11 SS-2h Location

Photo 6-36 Existing Intersection (Eastbound View)

SS-6 Add pedestrian pathway on Route 38 (Micro Beach Road)

Route 38 (Micro Beach Road) links Beach Road with Middle Road/Chalan Pale Arnold and provides a vital transportation connection between two of the most important roads on Saipan. It is recommended that pedestrian paths be provided to enhance the walkability of both Micro Beach Road and Garapan. An existing pedestrian pathway is located on the west side of Middle Road/Chalan Pale Arnold between Industrial Drive and Micro Beach Road. Extending this existing pedestrian pathway to connect to Beach Road would improve pedestrian safety and attract more usage of these alternatives to driving.

Photo 6-37 Existing Condition: Missing Sidewalk/Pedestrian Pathway

Photo 6-38 Existing Condition: Missing ADA Curb Ramps at Intersections (at Middle Road/Chalan Pale Arnold)

Photo 6-39 Existing Condition: Missing Sidewalk/Pedestrian Pathway

Illustration 6-12 SS-6 Location

SS-8 Lighting Improvements in Garapan

Street and pedestrian-level lighting are recommended along roadways within the Garapan area. Applications of lighting on a roadway at night improves the visibility of the roadway and its immediate environment.

Consistent with current revitalization efforts in Garapan, the goal of this improvement is to encourage pedestrian activity by providing additional lighting. Current efforts to improve the Garapan area include changes to the circulation and a comprehensive upgrade to pedestrian facilities. These improvements should be supplemented with pedestrian lighting. Pedestrian lighting specifically shines light on the sidewalk and is important to include in street design along with roadway lighting.

Photo 6-40 Existing Condition: View of Garapan – Southbound View on Route 33 (Beach Road)

SS-9 Add mid-block or signalized crosswalks on Route 33 (Beach Road)

Several roadway segments on Route 33 (Beach Road) have been identified as high pedestrian activity locations where no or inadequate pedestrian crosswalks are currently available. These locations include Route 317 (Gualo Rai Road) and Route 315 (Quartermaster Road), and south of Route 31 (Chalan Monsignor Guerrero) near the high school and the sports field. Pedestrians were often observed crossing the road outside the designated pedestrian crossing area because crosswalks are not available within a reasonably short walking distance. It is suggested to evaluate safe and suitable locations for either mid-block crossings or signalized crosswalks on Beach Road to enhance pedestrian and vehicle safety. Advance pedestrian crossing warning signs should be installed on the roadway in conjunction of the crosswalk installation to alert drivers of the pedestrian crossing ahead.

SS-10 Speed enforcement & Safety improvements on Route 31 (Chalan Monsignor Guerrero) (10a) and Route 30 (Middle Road/Chalan Pale Arnold) (10b)

The 2008 Highway Master Plan reported that two roadway segments on Saipan have vehicles traveling at high and unsafe speed. These roadway segments are Route 31 (Chalan Monsignor Guerrero) between Route 30 (Middle Road/Chalan Pale Arnold) and Route 37 (Chalan Monsignor Martinez), and Middle Road/Chalan Pale Arnold north of Lower Base. The respective speed limits on Route 31 and Route 30 are 40 mph and 35 mph. Vehicles traveling at an unsafe high speed on these segments could be hazardous to other drivers and also pedestrians.

Collision Data

Route 31 (Chalan Monsignor Guerrero) and Route 30 (Middle Road/Chalan Pale Arnold) were identified as priority corridors for safety improvements based on the 2017 collision data presented in an earlier chapter of this report. Specifically, of the total five (5) fatal collisions that occurred in 2017, three (3) of those occurred along Route 31 between Chalan Pale Arnold to Chalan Msgr. Martinez at the following intersections:

- Chalan Monsignor Guerrero & Chalan Antonio Apa
- Chalan Monsignor Guerrero & Kannat Tabla Drive
- Chalan Monsignor Guerrero & Rayao Loop

In addition, of the intersections with the highest total number of collisions in 2017, three (3) intersections were located along Route 31, as shown in the following table.

Table 6-7 Route 31 Priority Intersections

Intersection	# Collisions
Chalan Monsignor Guerrero & Kannat Tabla Drive	**18**
Chalan Monsignor Guerrero & Beach Road	**16**
Chalan Monsignor Guerrero & Chalan Pale Arnold	**16**

Based on collision rates for total or fatal + injury collisions, Route 30 had two (2) segments within the top 10 (S-12 and S-13), and one segment (S-11) with a fatal collision.

Table 6-8 Route 30 Priority Segments

Segment ID	Segment	Location	# Collisions	# Injury Collisions	# Fatal Collisions	Rate Rank (Total)	Rate Rank (Fatal + Injury)
S-11	Middle Road/Chalan Pale Arnold	Isa Drive to Micro Beach Road	**38**	6	1	32	19
S-12	Middle Road/Chalan Pale Arnold	Micro Beach Road to Gualo Rai Road	**129**	15	-	8	8
S-13	Middle Road/Chalan Pale Arnold	Gualo Rai Road to Quartermaster Road	**86**	14	-	9	4

Of the total collisions involving a pedestrian, two (2) occurred on Route 31 and eight (8) occurred on Route 31. Of those collisions, most results in injuries and one (1) resulted in a fatality.

Table 6-9 Collisions Involving a Pedestrian

Intersection	2017 Collisions	
	Injuries	Fatalities
Chalan Pale Arnold, east of Saluda Street	**1**	
Chalan Pale Arnold & Gobietno Drive	**1**	
Chalan Pale Arnold & Cheribiyan Drive	**1**	
Chalan Pale Arnold & Europa Place	**3**	
Chalan Pale Arnold & Micro Beach Road	**2**	
Chalan Monsignor Guerrero & Kannat Tabla Drive		**1**
Chalan Monsignor Guerrero, east of Rasimu Lane		
Chalan Monsignor Guerrero & Tanduki Drive	**1**	

Recommendation

Speeding is understood to be a common occurrence on these roadways. The Highway Master Plan recommends implementation of traffic calming measures identified under PS-8 such as:

- Roadway shift, such as lateral shift in vehicle travel lanes.
- Intersection control modification, such as roundabouts.
- Reduce the number of vehicle travel lanes.
- Raised, vertical elements such as at intersections or crosswalks.
- Raised center median to narrow vehicle travel lanes, with designated breaks for U-turns.
- Curb extensions (bulb-outs) are intersections.

In addition, installing speed limit signs together with radar speed signs could help alert drivers if their driving speed is over speed limit). The image below provides an example of a solar-powered radar speed sign system that has been widely used on roadways. This device detects the speed of an approaching vehicle by radar and displays the vehicle speed on the digital display. The vehicle speed display would flash if is the approaching vehicle is speeding.

Photo 6-41 Speed Limit Feedback Sign Example

Additional Considerations for Route 31

The Northern Marians College Community Enhancement Plan includes improvements for the portion of Route 31 (Chalan Monsignor Guerrero) between the Airport Road traffic signal and the crest of As Terlaje hill. Improvements include protected sidewalks, lighting, landscaping, bicycle facilities, several pedestrian crosswalks, and a pedestrian bridge near Dahon Drive. This plan will assist in addressing existing safety issues along Route 31, and similar improvements should be considered for additional portions of the roadway. A roundabout at Route 37 would complement this improvement well and may allow reduction in travel lanes to accommodate additional travel modes.

Photo 6-42 Northern Marianas College Community Enhancement Plan

SS-13 Hazard Elimination along Route 30 (Middle Road/Chalan Pale Arnold)

Although aspects of this project are currently in the Planning or Design phase, this plan makes additional recommendations to evaluate safety needs along the corridor. Middle Road/Chalan Pale Arnold, specifically segments S-12 and S-13 between Micro Beach Road and Quartermaster Road, had some of the highest collision rates for both total and fatal + injury collisions in 2017 (see Table 6-10). As Middle Road/Chalan Pale Arnold is one of the busiest major corridors on the island, it is very important that a well maintained and safe roadway is provided to the users. Therefore, as a goal to enhance safety of this corridor, it is recommended that, as one of the short-term improvements on Saipan, a hazard elimination program be established for Middle Road/Chalan Pale Arnold.

Table 6-10 Route 30 (Middle Road/Chalan Pale Arnold) Collision Rates (Segments S-12 & S-13)

			2017 Collisions				Total Fatal + Injury	
Study Segment	**Road Name**	**Location**	**Total #**	**Non-Injury**	**Injury**	**Fatal**	**Rate Rank**	**Rate Rank**
S-12	Route 30 (Middle Road/Chalan Pale Arnold)	Route 38 (Micro Beach Road) to Route 317 (Gualo Rai Road)	**129**	114	15	-	8	8
S-13	Route 30 (Middle Road/Chalan Pale Arnold)	Route 317 (Gualo Rai Road) to Route 315 (Quartermaster Road)	**86**	72	14	-	9	4

Photo 6-43 Existing Condition: Poorly Defined Driveways along Route 30

Photo 6-44 Existing Condition: Lack of Sidewalk

SS-14 Add signage at the intersection of Route 306 (Chalan Tun Joaquin Doi) and Texas Road

The intersection of Route 306 and Texas Road lacks signage to notify travelers of their location. On Saipan, the highways are generally not marked with route signage, and the intersections do not include directional signage. This improvement recommends adding route signage to the intersection of Route 306 and Texas Road.

Additional recommendations include traffic calming measures along Route 306 approaching the intersection from the east (westbound approach). Route 306 transitions from a rural highway into an urban area without any distinguishing signage to signify the changing roadway characteristics.

Photo 6-45 Existing Conditions: Eastbound Approach

Photo 6-46 Existing Conditions: Route 306 Westbound – Approaching the Intersection with Texas Road

Illustration 6-13 SS-14 Location

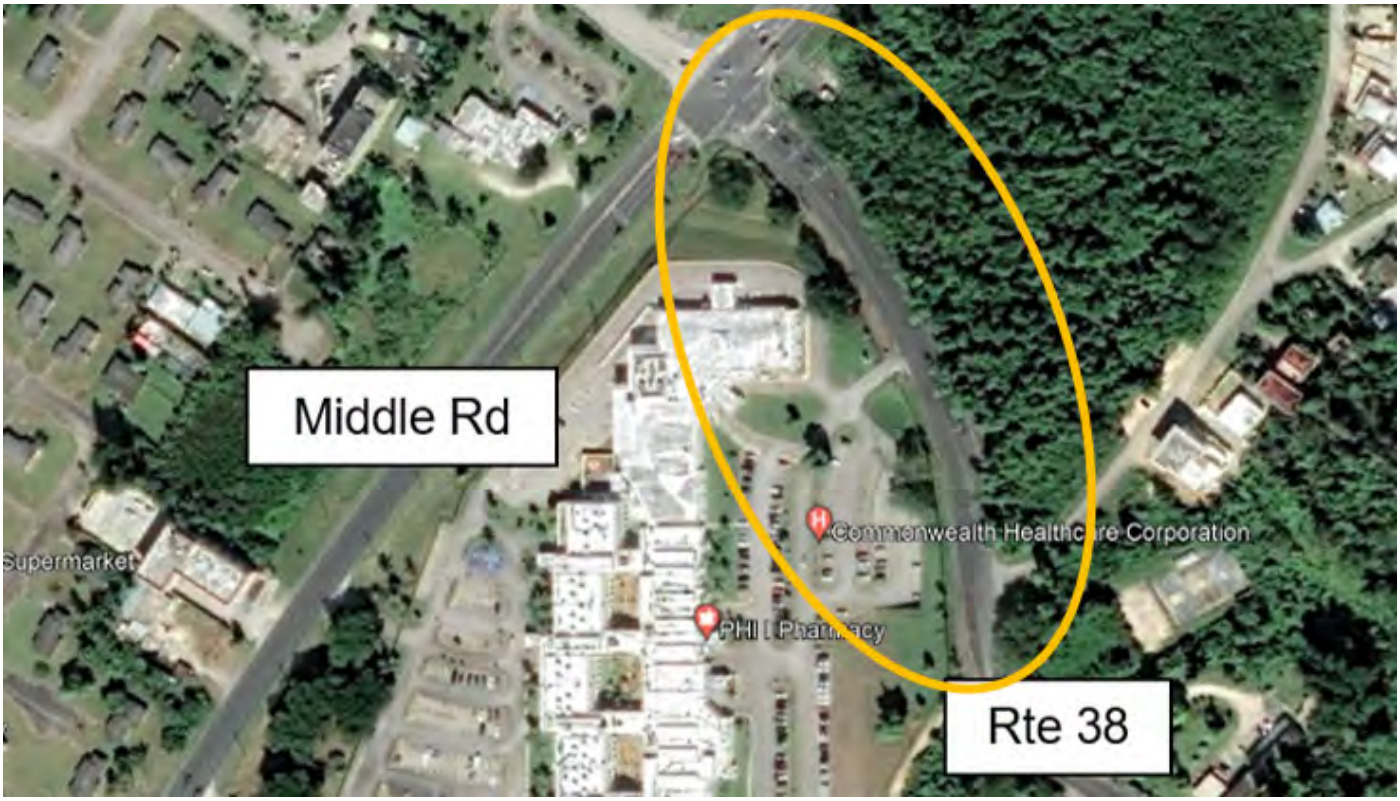
SS-15 Construct multimodal facilities on Route 38 near CHCC near Route 30 (Middle Road/Chalan Pale Arnold)

Route 38 south of Route 30 (Middle Road/Chalan Pale Arnold) provides access to the Commonwealth Healthcare Corporation (CHCC). Existing conditions do not include adequate pedestrian or bicycle facilities along the roadway nor at the intersection. Improvements should aim to increase multimodal access, comfort, and safety for non-motorists traveling to the CHCC. Improvement SS-6 recommends a pedestrian pathway on Route 38 (Micro Beach Road) west of Middle Road/Chalan Pale Arnold. These improvements should continue east of Middle Road/Chalan Pale Arnold to connect to the healthcare center. Six-foot bike lanes on both sides of Middle Road/Chalan Pale Arnold would provide a safer facility for bicyclists. Providing pedestrian facilities and bike lanes along Middle Road/Chalan Pale Arnold would improve pedestrian and bicycle safety and attract more usage of these alternatives to driving.

Photo 6-47 Existing Condition: Missing Crosswalk at Route 38/Route 39 Intersection – Northbound View

Photo 6-48 Existing Condition: Aerial View of Intersection at Route 38 and Route 30 – Westbound View

Illustration 6-14 SS-15 Location



SS-16 Improve Route 302 from Route 304 to Obyan Beach Road

Route 302 provides access to both the airport and Obyan Beach. The improvement includes paving the roadway to standard conditions. Upgrades include widening the roadway in some segments to provide enough right-of-way for two vehicles to pass each other; paving the roadway to enhance drivers' comfort and increase travel speed; installing new pavement, warning signs along winding and curved sections of the road; striping and pavement delineation devices along the route and installing new barriers. In addition, green infrastructure is recommended, including ponding basins to address stormwater runoff in the area.

Photo 6-49 Existing Condition: Unpaved Route 302

Illustration 6-15 SS-16 Location

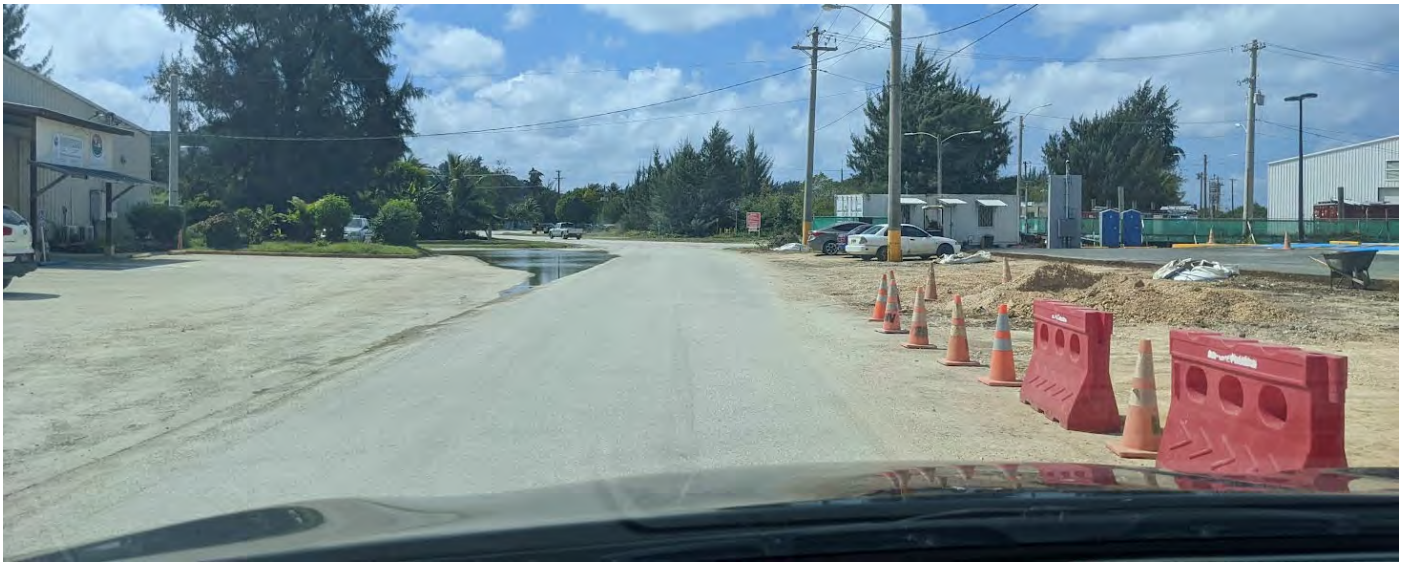
SS-17 Improve Route 323 (Industrial Road) from Smiling Cove Road to Lower Base Drive

The port in Saipan is critical to the island and the industrial area adjacent to Industrial Road. Existing conditions include portions of unpaved roadway, minimal roadway markings, and narrow roadway widths. In addition, the roadway currently has drainage challenges due to uneven pavement conditions, causing water to pool on the roadway or adjacent to it. The improvement includes upgrading existing paved segments and paving the unpaved sections to standard conditions. The pavement condition, pavement markings, crosswalk striping and signage along the entire corridor should be maintained and repaired regularly. Visible warning and regulatory signs including speed enforcement signs should be installed upstream of pedestrian crosswalks, curves, and lane-drop areas to give advance warning to drivers of any changes in roadway conditions.

In addition, considering that this area serves visitors from ships, multimodal facilities should be considered along Industrial Road. Lighting should also be improved as it was a concern noted in the public comments for this plan.

Photo 6-50 Existing Condition

Photo 6-51 Existing Condition



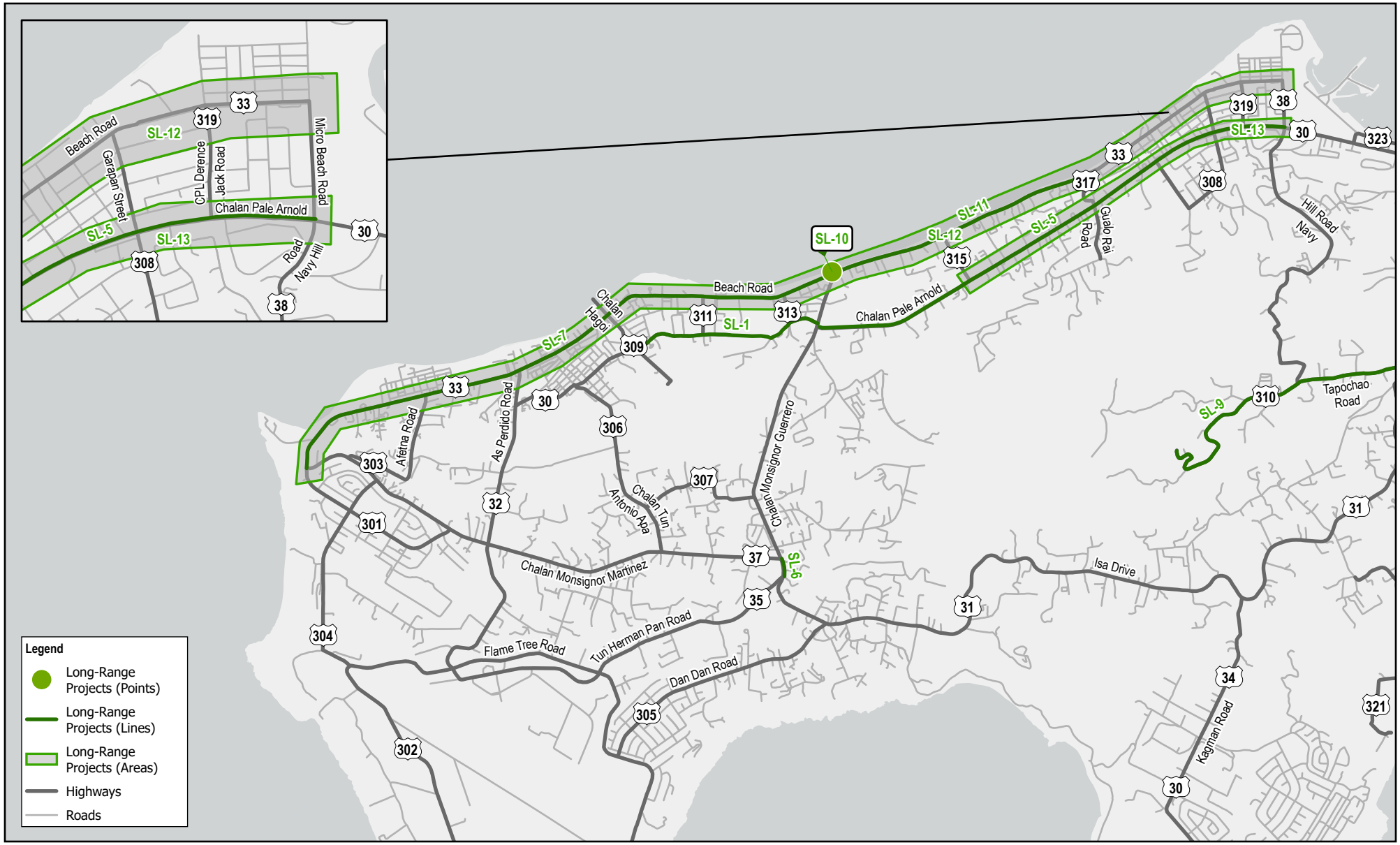
16Illustration 6-17 SS-17 Location

6.3.2 Saipan Long-Term (2040) Improvements

The long-term improvements for Saipan are listed below and shown in Figure 6-3. Descriptions for each improvement are provided on the following pages.

Table 6-11 Saipan Long-Term (2040) Improvements

ID	Location	Improvement	Project Stage
Saipan			
SL-1	Route 30 (Middle Road/Chalan Pale Arnold) & Monsignor Guerrero	Realign Texas road to form a 4-way intersection	-
SL-2	Route 38 (Micro Beach Road), between Route 33 (Beach Road) and Route 30 (Middle Road/Chalan Pale Arnold)	Realign Micro Route 33 (Beach Road)	-
SL-3	Route 38 (Micro Beach Road), between Route 33 (Beach Road) and Route 30 (Middle Road/Chalan Pale Arnold)	Add bike lanes	-
SL-4	Route 38 (Micro Beach Road), between Route 33 (Beach Road) and Route 30 (Middle Road/Chalan Pale Arnold)	Add pedestrian pathway	-
SL-5	Route 30 (Middle Road/Chalan Pale Arnold)	Construct pedestrian facilities and bike lanes	-
SL-6	Route 31 (Chalan Monsignor Guerrero), near Route 35 (Tun Herman Pan)	Drainage upgrade	-
SL-7	Route 33 (Beach Road), from Route 31 (Chalan Monsignor Guerrero) to Afetna	Widen roadway, install two-way left-turn lane	-
SL-8	Route 316 (Chalan Savanna)	Widen and pave roadway	Planning/Design
SL-9	Route 310 (Tapochao Road) towards Mt. Tapochao	Upgrade and improve roadway	Planning/Design
SL-10	Beach Road Parkway	Replace piers	-
SL-11	Route 33 (Beach Road), from Route 31 (Chalan Monsignor Guerrero) to Gualo Rai Road	Coastal reinforcement	-
SL-12	Route 33 (Beach Road), from Route 38 (Micro Beach Road) to Koblerville Road	Corridor signal optimization	-
SL-13	Route 30 (Middle Road/Chalan Pale Arnold), from Route 38 (Micro Beach Road) to Quartermaster Road	Corridor signal optimization	-



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Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

SAIPAN LONG-RANGE IMPROVEMENTS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 6-3

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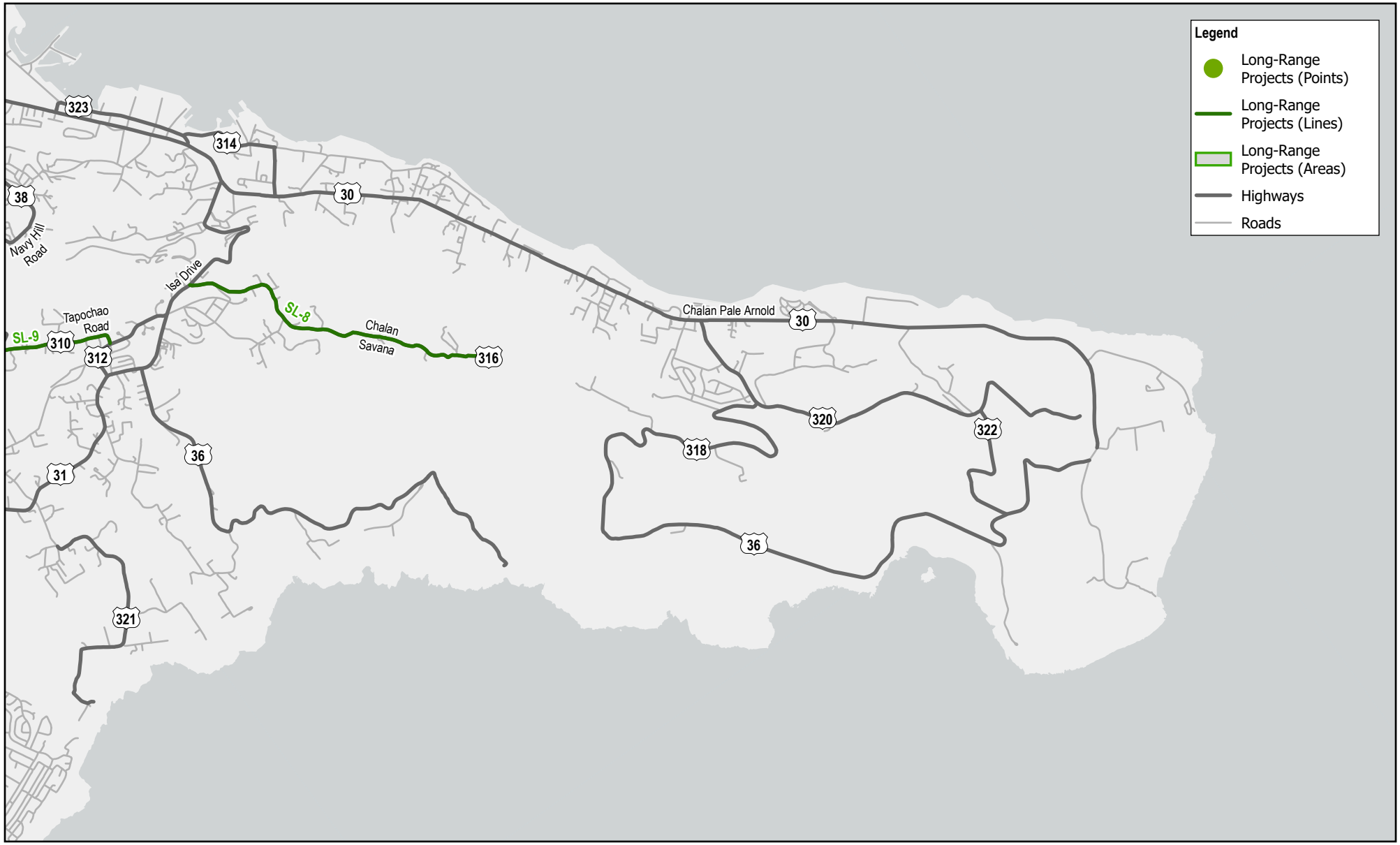

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Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

SAIPAN (NORTH) SHORT-RANGE IMPROVEMENTS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 6-4

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Data source: Light Gray Base: BECQ, Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; Roads: TIGER, 2020. Created by: pthornton

SL-1 Realign Route 306 (Chalan Tun Joaquin Doi) and modify Intersection with Route 30 (Middle Road/Chalan Pale Arnold) and Route 31 (Chalan Monsignor Guerrero) to a four-leg intersection

Improvement SL-1 was previously SL-3 in the 2008 Highway Master Plan.

Route 33 (Beach Road) currently is the main access to areas in southwest Saipan and is expected to serve forecasted traffic demand increases. Alternatives to Beach Road are limited especially in the southern section of Saipan near Susupe, Chalan Kanoa and San Antonio. An alternative to provide an alternative route to Beach Road in the Susupe and Oleai areas would be to upgrade and extend Chalan Tun Joaquin Doi and create a new four-way intersection at Route 31 (Chalan Monsignor Guerrero) and Route 30 (Middle Road/Chalan Pale Arnold). If implemented, this circulation upgrade would relieve the traffic demands along Beach Road south of Chalan Monsignor Guerrero and reduce the turning demands at the Beach Road and Monsignor Guerrero intersection.

This recommendation requires the realignment and upgrade of the existing Chalan Tun Joaquin Doi resulting in some right-of-acquisition and the modification of the existing Chalan Monsignor Guerrero and Middle Road/Chalan Pale Arnold intersection to a four-way intersection. The existing Chalan Monsignor Guerrero and Middle Road/Chalan Pale Arnold intersection would be modified to include a south leg (for northbound traffic movements). With these improvements traffic signal phasing would be revised to include additional phases for the northbound movements. Traffic signal operations at Chalan Monsignor Guerrero and Middle Road/Chalan Pale Arnold are expected to remain at acceptable service levels. Chalan Tun Joaquin Doi would be upgraded to include a minimum of two 12-foot lanes (one in each direction) with 6-foot shoulders that could be used as bike lanes. A sidewalk or pedestrian pathway should also be included as the current land uses along Chalan Tun Joaquin Doi are residential which would generate pedestrian and bicycle activity.

This additional north-south roadway would be used as an extension of Middle Road/Chalan Pale Arnold south of Chalan Monsignor Guerrero reducing the traffic demands along Beach Road and the segment of Chalan Monsignor Guerrero between Beach Road and Middle Road/Chalan Pale Arnold. Improved traffic operations along Beach Road would result and an additional access route to the areas of Susupe, Chalan Kanoa, and San Antonio would be available.

Illustration 6-18 SL-1 Location

Illustration 6-19 SL-1 Location

SL-2/SL-3/SL-4 Realign Route 38 (Micro Beach Road) between Route 33 (Beach Road) and Route 30 (Middle Road/Chalan Pale Arnold) (SL-2). Widen roadways to provide a third lane that would become a westbound left-turn lane and add bike lanes (SL-3). Add pedestrian pathway on Micro Beach Road (SL-4).

These improvements were previously all included in SL-4 in the 2008 Highway Master Plan.

Route 38 (Micro Beach Road) links Route 33 (Beach Road) with Route 30 (Middle Road/Chalan Pale Arnold) and provides a vital transportation connection between two of the most important roads on Saipan. Given the high levels of traffic on Micro Beach Road, the addition of a third lane that also functions as a WB left turn lane at the intersection with Beach Road, would add capacity on the road and at the intersection. Given the current pavement width is approximately 26 feet, the third lane could be provided with the addition of approximately 12 feet of pavement.

Micro Beach Road links Beach Road with Middle Road/Chalan Pale Arnold and provides a vital transportation connection between two of the most important roads on Saipan. The addition of bicycle lanes on Micro Beach Road would connect those already provided or being recommended on Beach and Middle Road/Chalan Pale Arnold, enhancing the usability of those lanes and the island's cycle network. It is recommended that pedestrian paths be provided to enhance the walkability of both Micro Beach Road and Garapan. Six-foot bike lanes on both sides of Micro Beach Road would provide a safer facility for bicyclists. Providing pedestrian facilities and bike lanes along Micro Beach Road would improve pedestrian and bicycle safety and attract more usage of these alternatives to driving.

Figure 6-4(C) illustrates the recommended roadway improvements on Micro Beach Road. Figure 6-4(D) shows the lack of pedestrian facilities and relatively scarce amount of roadway side development along Micro Beach Road.

Illustration 6-20 SL2, 3 & 4 Location

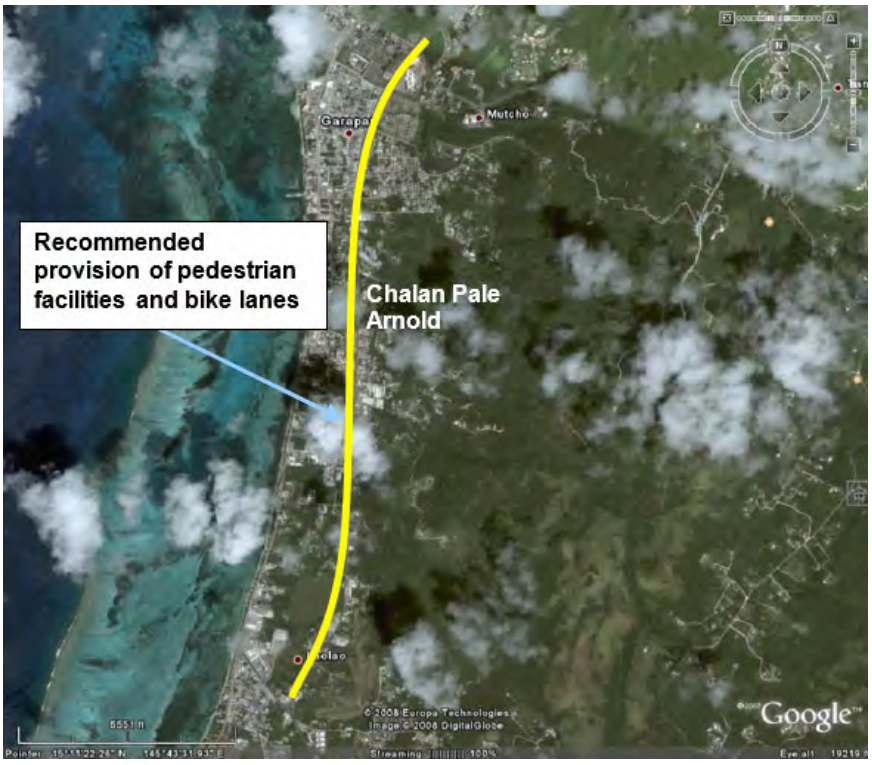
Photo 6-52 Existing Condition

SL-5 Construct multimodal facilities along Route 30 (Middle Road/Chalan Pale Arnold)

Route 30 (Middle Road/Chalan Pale Arnold), also referred to a Middle Road/Chalan Pale Arnold, is the principal thoroughfare for Saipan serving the largest traffic demands and provides vital connections to other primary routes on the island. Unfortunately, adequate pedestrian and bicycle facilities are not provided along Middle Road/Chalan Pale Arnold. Land uses along Middle Road/Chalan Pale Arnold vary and include residential, commercial, retail and office. Pedestrian activity and bicycling could be substantial if non-motorized circulation was enhanced and made safer with a sidewalk and bike lanes.

At a minimum a single sidewalk is recommended along the east side of Middle Road/Chalan Pale Arnold where more available right-of-way exists and power is available to provide lighting the new sidewalk. There are existing street lights along the majority of Middle Road/Chalan Pale Arnold on the eastern side. Six-foot bike lanes on both sides of Middle Road/Chalan Pale Arnold would provide a safer facility for bicyclists. Providing pedestrian facilities and bike lanes along Middle Road/Chalan Pale Arnold would improve pedestrian and bicycle safety and attract more usage of these alternatives to driving.

Illustration 6-21 SL-5 Location



SL-6 Drainage upgrade along Route 31 (Chalan Monsignor Guerrero) near Chalan Tun Herman Pan Road

Route 31 (Chalan Monsignor Guerrero) near Chalan Tun Herman Pan Road is in need of drainage improvements as the road currently has potholes that decrease the safety of drivers especially during monsoon season. The road should be repaved, and the drainage improved.

Illustration 6-22 SL-6 Location

SL-7 Widen Route 33 (Beach Road) from Route 31 (Chalan Monsignor Guerrero) to Afetna to install two-way left-turn lane

According to the accident data and accident rate analysis, the roadway segment between Route 31 (Chalan Monsignor Guerrero) and Afetna Road on Route 33 (Beach Road) is one of the high accident rate locations.

In order to improve the safety of this roadway segment on Beach Road, it is recommended providing a two-way left-turn lane (TWLTL) on Beach Road between Chalan Monsignor Guerrero and Afetna to allow easier turn movements of vehicles into and out of the driveways. This could be acheived by widening Beach Road and restripe the travel lanes to include a TWLTL in the middle. Eliminating the right-angle commercial parking spaces and introducing designated commercial parking lots are also recommended to eliminate any conflict between the backing vehicles and vehicles traveling on Beach Road.

SL-8 Widen and improve Route 316 (Chalan Savana)

Improvement SL-8 was previously SL-10 in the 2008 Highway Master Plan.

Route 316 connects the residential areas located to the north and central parts of the islands to Isa Drive and the rest of the island. Apart from the short paved segment where it meets Isa Drive, the rest of the route is unpaved, bumpy, and practically requires a four-wheel vehicle for safe traveling. The roadway surface is uneven and contains hazards such as potholes, rocks, and standing water. In some segments the roadway is very narrow and two vehicles cannot adequately pass each other while moving at a safe speed. Usually, one vehicle has to pull over and stop while the other vehicle passes with caution at a slow speed. During a rain or if the route is wet, travel is even more difficult due to the standing water and potholes filling up with water.

This roadway needs to be upgraded and paved. Upgrades include widening the roadway in some segments so that two vehicles can pass each other or at a minimum providing wider vehicle pullout areas for passing of slower traffic, installing new asphaltic concrete pavement, new pavement markings, roadside signage, new barriers, and drainage system.

SL-9 Upgrade and improve Route 310 towards Mt. Tapochao

Route 310 provides connectivity to Isa Drive for the residential areas located south of Isa Drive. It terminates in the south at Mt Tapochao. The roadway condition of Route 310 is similar to that of Route 316. Much of the route is an unpaved dirt road, bumpy, narrow, and requires a four-wheel vehicle for safe traveling. Two opposing vehicles may not be able to travel comfortably on some segments of the corridor. This condition is especially hazardous to drivers along winding and steep segments of the road where sight distance is limited.

To provide a safer and comfortable condition to drivers, the roadway needs to be upgraded and paved. Upgrades include widening the roadway in some segments to provide enough right-of-way for two vehicles to pass each other; paving the roadway to enhance drivers' comfort and increase travel speed; installing new pavement, warning signs along winding and curved sections of the road; striping and pavement delineation devices along the route and installing new barriers and drainage system.

SL-10 and SL-11 Replace piers and implement Coastal reinforcement on Route 33 (Beach Road) from Route 31 (Chalan Monsignor Guerrero) to Route 317 (Gualo Rai Road)

The Beach Road Parkway is a major attraction on the island of Saipan. CNMI should reinforce the t-head groins along the pedestrian walkway.

Photo 6-53 Beach Roadway Parkway

SL-12 and SL-13 Corridor signal optimization along Route 33 (Beach Road) and Route 30 (Middle Road/Chalan Pale Arnold)

This improvement aims to address the operational deficiencies along Route 33 (Beach Road) and Route 30 (Middle Road/Chalan Pale Arnold). In lieu of widening the roadway, which in some areas has already been widened, this improvement involves optimizing the traffic signals along the length of the entire corridor. Traffic signals should be upgraded with video detection via cameras to allow actuated signal timing. Due to the humidity of the climate on the island, signal hardware often becomes damaged which results in using default pretimed signal phases. Actuated signal timing improves the operational efficiency of the intersection.

6.4 Tinian Improvements

Tinian is served by a roadway network in which the majority was constructed in the mid-20th Century (War World II) era by the United States Government (US). Most of the principal roadways are in decent or servable condition whereas other highly used routes are in poor condition but not in the Territorial Highway System. As demand grows on the Tinian roadway network, repairs, modifications, and improvements to the highway system will be needed. Potential transportation modifications, upgrades and improvements are identified based on comments from the project's informational meeting, discussions with DPW staff on traffic and safety issues and operations, and field investigations and observations. These recommendations are intended to maintain and improve Tinian's circulation for both vehicles and pedestrians and bicyclists, reduce potential circulation impacts while maintaining the local natural environment, and provide future capacity and facilities to meet the growing needs on Tinian.

To maintain the mobility on the islands, the identified improvements are divided into long-term and near-term recommendations. The designated timeframe for long-term improvements would be from 11 to 20 years whereas the designated timeframe for near-term recommendations would be from one to ten years. Near-term improvements are modifications and upgrades that should be implemented due to their critical nature or are on a smaller scale and could be implemented in a shorter timeframe. Long-term recommendations are improvements or upgrades that may be on a larger scale and take a longer time period to implement or modifications that are not immediately necessary but should be implemented to maintain the mobility on the islands.

Proposed long and near-term improvements recommended for Tinian and shown in Figure 6-5. Detailed discussions of each recommendation is presented on the following pages.

6.4.1 Tinian Near-Term Recovery Conditions Improvements

The near-term improvements for Tinian are listed below and described on the following pages.

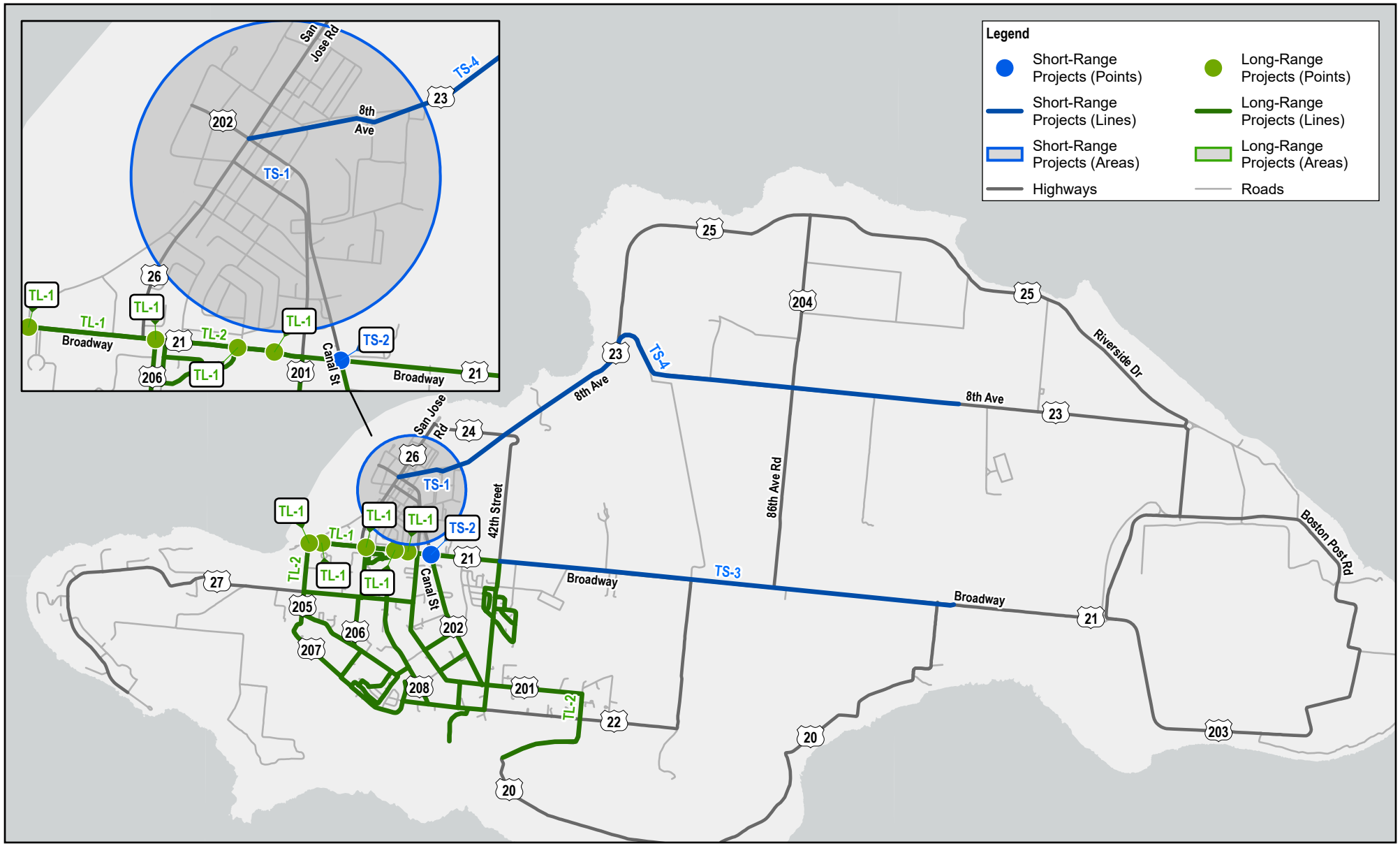
Table 6-12 Tinian Near-Term Recovery Conditions Improvements

Island	ID	Location	Improvement
Tinian	**Tinian**		
Tinian	TS-1	Tinian, especially in San Jose Village	Implement directional and guide sign program
Tinian	TS-2	Route 21 (Broadway) & Canal Street	Fix roundabout
Tinian	TS-3	Route 21 (Broadway), from Route 201 to Military Retention Zone	Improve roadway
Tinian	TS-4	Route 23 (8th Avenue), from Route 202 to Military Retention Zone	Improve roadway

TS-1 Implement directional and guide sign program on Tinian especially in San Jose Song Village

There are very few existing directional and guide signs on Tinian. For unfamiliar travelers on Tinian finding various points of interests, districts, communities, or land uses can be frustrating, confusing and time consuming. Tinian has various attractions and destinations but driving to them is difficult due to the lack of directional and guide signage unless you are a resident or familiar with Tinian. Even in San Jose Village finding a destination can be difficult since the street layout is not in a typical street block network.

Directional and guide signs would enhance the driver experience and eliminate confusion especially for visitors and unfamiliar motorists. Popular attractions, such as the resorts, beaches, harbor, island areas, and airport should be signed better.



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Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
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Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

TINIAN
SHORT AND LONGE-RANGE IMPROVEMENTS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 6-5

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Print date: 30 Jun 2022 - 14:02

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, METI/NASA, USGS; Highways, Roads: TIGER, 2020. Created by: pthornton

TS-2 Improve existing roundabout at Route 21 (Broadway) and Canal Street

Sight distance issues with the existing roundabout at Route 21 (Broadway) and Canal Street were identified during public outreach efforts. Specifically, the line of sight at the northbound approach is obstructed by a raised concrete planter box and plants located within the median. In addition, the roundabout should be redesigned following professional best practices and guidelines to improve approach lane alignments for safer travel through the intersection.

Photo 6-54 Existing Roundabout

Photo 6-55 Improvement Recommendation

TS-3 & TS-4 Improve Route 21 (Broadway) and Route 23 (8th Avenue) to Military Retention Zone

Route 21 (Broadway) and Route 23 (8th Avenue) connect villages on Tinian to the Military Retention Zone to the north. Military and construction heavy equipment and oversized vehicles impact the roadway, which is currently undersized and in poor condition. Existing pavement conditions on these roadways are poor (see example image).

Photo 6-56 Existing Pavement Condition on Route 21 (Broadway)

6.4.2 Tinian Long-Term (2040) Improvements

The long-term improvements for Tinian are listed below and described on the following pages.

Table 6-13 Tinian Long-Term (2040) Improvements

Island	ID	Location	Improvement
Tinian	**Tinian**		
Tinian	TL-1	Broadway, from Route 201 south to Limestone Forest Trail	Upgrade and improve roadway
Tinian	TL-2	Lower Pina, Marpo and Carolinas	Upgrade and improve major roadways

Island	ID	Location	Improvement
Tinian	**Tinian**		
Tinian	TL-1	Broadway, from Route 201 south to Limestone Forest Trail	Upgrade and improve roadway
Tinian	TL-2	Lower Pina, Marpo and Carolinas	Upgrade and improve major roadways

TL-1 Upgrade and improve Route 21 (Broadway) from Route 201 south to Limestone Forest Trail

Improvement TL-1 was previously TL-2 in the 2008 Highway Master Plan.

Broadway is the principal highway and serves the highest vehicle demands on Tinian. Access to the Airport and the most direct connection to San Jose Village is via Broadway. Broadway is a divided highway with an approximate 30 feet, landscaped median separating north and southbound traffic from Route 201 north to the roundabout at the Hinode America Memorial. The current geometrics and layout of Broadway north of Route 201 (Two-lane divided highway) provides a safer facility (due to its separation of opposing traffic) and scalability (right-of-way for increasing capacity). Broadway is the most critical corridor on Tinian and it should be upgraded and improved to maintain it as the central transportation corridor for north-south travel and as the intersection of other island routes.

Upgrades and modifications for Broadway are necessary to continue its mobility capacity and street network connections. Improving Broadway would allow it to serve as the principal highway and corridor for Tinian. Future access along Broadway should also be limited to prevent an over station of driveways, intersections and streets that would impact operations and safety on Broadway. Recommended improvements and upgrades for Broadway:

– Continue the two-lane, divided alignment of Broadway from Route 201 south to intersection just south of the Tinian Dynasty Hotel and Resort.
– Realign several intersections on Broadway (T-intersections) that are within 100 feet of another T intersection along Broadway. These roadways access residential areas and should be realigned to form four leg intersections. Access control along Broadway to limit vehicles accessing Broadway.
– Upgrade the intersection with Routes 201 and 202 to provide delineated left-turn pockets with a minimum length of 100 feet and a standard transition from the through lanes.
– Install positive traffic control or barriers (possibly metal beam guard rail) along curves, fixed objects, and/or intersection corners to eliminate potential vehicle conflicts and incidents.
– Maintain the two-lane, divided alignment on Broadway to provide a safer facility and allow for future roadway capacity increases.

Figure 6-6(E) *TL-1 Recommended Improvements*

TL-2 Upgrade and improve major roadways in Lower Pina, Marpo Heights and Carolinas

Improvement TL-2 was previously TL-3 in the 2008 Highway Master Plan.

As summarized earlier in the report, some of the roadways around the Lower Pina and around Marpo Heights and Carolinas are proposed to be included in the roadway classification system of the island due to a new casino development in Lower Pina area and the expected population growth in Marpo Heights and Carolinas. Since the majority of these roadways are currently narrow or unpaved local facilities, upgrades and improvements are necessary in order to bring these roadways up to the standard of the proposed roadway classification and therefore are recommended to be included as one of the long-term improvement plans for the island of Tinian.

The recommended roadway upgrades and improvements include right-of-way acquisitions to widen the roadways according to the roadway classification assigned, installing new pavement and new pavement striping and markings, installing new warning and regulatory signs, upgrading draining facilities along the roadways, and upgrading intersections along the roadways.

6.5 Rota Improvements

Overall, the existing circulation and mobility on Rota is uncongested with moderate demands (see Chapter 4 for current traffic operations on Rota). Traffic counts were conducted on Rota as well as other information that included comments from the project's informational meeting, discussions with DPW staff on traffic and safety issues and operations, and field investigations and observations. These recommendations are intended to maintain and improve circulation, increase safety for pedestrians, bicyclists and motorists, reduce potential impacts that impact circulation while maintaining the local natural environment, and provide for the future.

To maintain the mobility on the islands, the identified improvements are divided into long-term and near-term recommendations. The designated timeframe for long-term improvements would be from 11 to 20 years whereas the designated timeframe for near-term recommendations would be from one to ten years. Near-term improvements are modifications and upgrades that should be implemented due to their critical nature or are on a smaller scale and could be implemented in a shorter timeframe. Long-term recommendations are improvements or upgrades that may be on a larger scale and take a longer time period to implement or modifications that are not immediately necessary but should be implement to maintain the mobility on the islands.

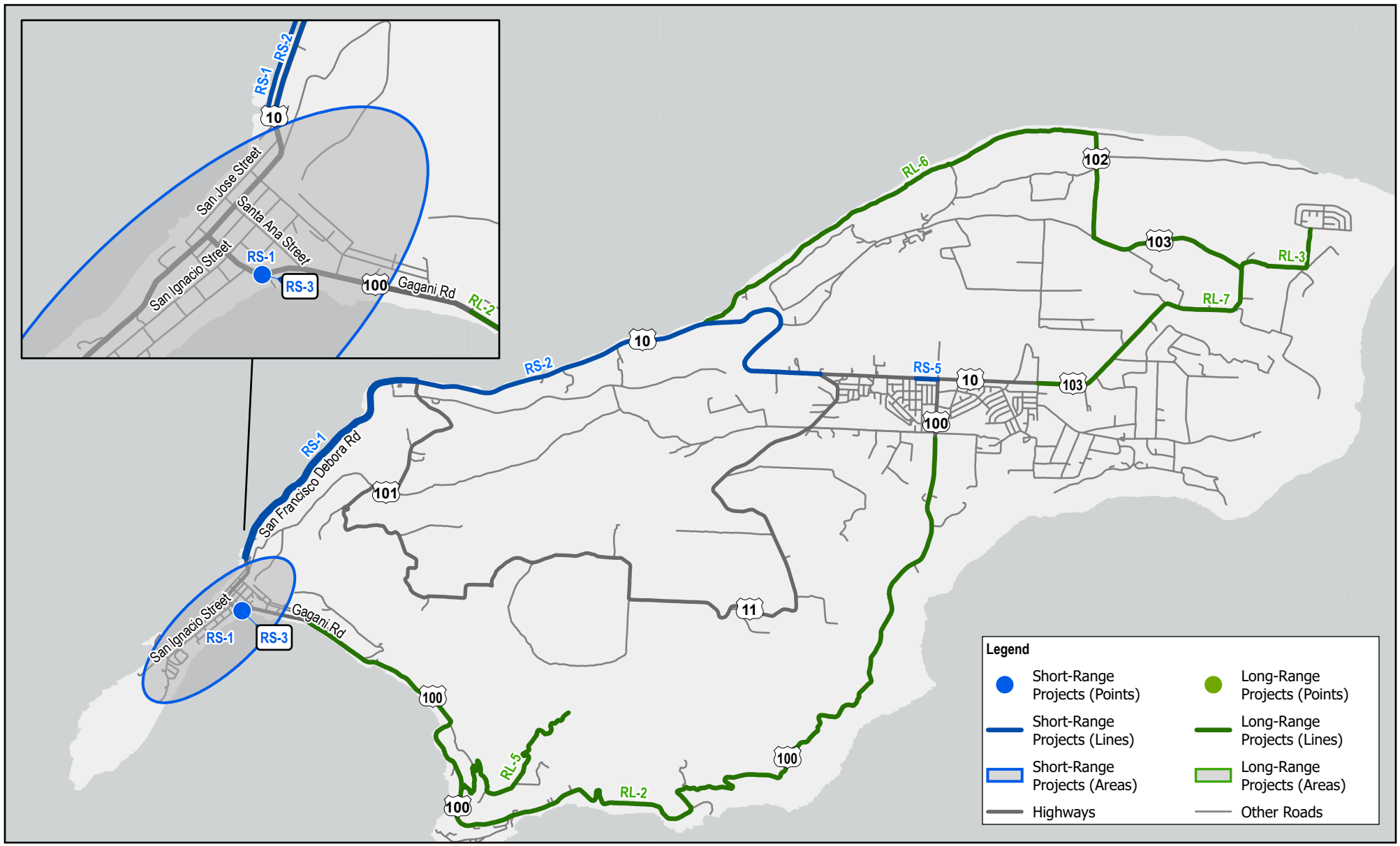
Figure 6-6 illustrates some of the specific near-term and long-term improvements for the island of Rota. Detailed discussions of each recommendation is presented on the following pages.

6.5.1 Rota Near-Term Recovery Conditions Improvements

The near-term improvements for Rota are listed below and described on the following pages.

Table 6-14 Rota Near-Term Recovery Conditions Improvements

Island	ID	Location	Improvement
Rota	**Rota**		
Rota	RS-1	Rota, especially in Songsong Village	Implement directional and guide sign program
Rota	RS-2	Route 10	Hazard elimination
Rota	RS-3	Route 100, from Bay breeze Restaurant to East Harbor entrance	Install positive traffic control
Rota	RS-4	Route 10, within Sinapalo	Lighting improvement
Rota	RS-5	Route 10 & Route 100	Sidewalk



Paper Size ANSI A

0 1,500 3,000 4,500 6,000

US Feet

Map Projection: Transverse Mercator
Horizontal Datum: NAD 1983 MA11
Grid: NAD 1983 MA11 UTM Zone 55N

N

GHD

Commonwealth of the Northern Mariana Islands
20 - Year Highway Master Plan

ROTA
SHORT AND LONGE-RANGE IMPROVEMENTS

Project No. **11224010**
Revision No. **-**
Date **Jun 2022**

FIGURE 6-6

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Print date: 30 Jun 2022 - 14:09

Data source: Light Gray Base: Esri, © OpenStreetMap contributors, HERE, Garmin, SafeGraph, METI/NASA, USGS; Highways, Roads: TIGER, 2020. Created by: pthornton

RS-1 Implement directional and guide sign program on Rota especially in Songsong Village

The existing roadways on Rota are unsigned and not clearly designated. Very few guide signs exist along Route 1 or other routes. Non-residents or motorists who are unfamiliar with Rota's roadways may become lost, disoriented, and/or frustrated when driving on the island. While driving on Rota, for a motorist unfamiliar with the roadway network, often turns to additional routes and local roadways will be missed.

The roadway network on Rota needs to be inventoried and categorized. After the roadway network is designated for the type, names, and direction, a guide and directional street name sign program needs to be implemented. The street name sign program will aid in providing direction and reduce confusion for non-local drivers. A roadway signing program can assist in the identification of deficiencies and landmarks on the islands. In addition, the roadway identification and street name sign program additional roadway signs could be implemented to provide additional traffic controls, motorists warning and directions.

RS-2 Hazard elimination on Route 10

Improvement RS-2 was previously RS-4 in the 2008 Highway Master Plan.

Route 10 is a two-lane undivided roadway located along the coastal area of the island. One of the hazardous situations along the route is sharp curves along the road with a lack of warning signs. This is especially dangerous along the narrow segments of the route. In addition to the curves and lack of signage, striping along the route is generally faded or does not exist.

Photo 6-57 Example of a Warning Sign on Route 10

To improve the safety of the route, it is recommended to reconstruct the roadway with superelevation at the curved segment of the roadway, pave the road with anti-skid asphaltic concrete pavement, and install advance curve warning signs, edge of pavement delineation devices to provide advance warning to drivers of changing roadway condition ahead. Concrete barriers or guardrails should be installed at the edge of curved roadways to prevent vehicles from running off the road. Installing new pavement markings, new center stripes and edge of pavement striping would also be a substantial upgrade to the roadway facility. The drainage system at flooded areas along the route should also be improved and upgraded.

RS-3 Install positive traffic control on Route 100 between the Bay Breeze Restaurant/Bar and East Harbor entrance

Along the eastbound direction of Route 100, approaching the access to East Harbor is a sharp curve just east of the Bay Breeze Restaurant/Bar. The entrance to the East Harbor is located on the curve. This is a hazardous situation as large vehicles will be accessing East Harbor and will have to maneuver along this tight roadway alignment. Compounding this hazardous situation is an existing power pole or fixed object along Route 100 without any advance warning signage or positive traffic protection (barriers). This location will potentially have a safety issue once the East Harbor improvement project is complete. Trucks will access the East Harbor and be required to navigate along this

tight curve. Large vehicles will also have to maneuver past the existing power pole creating a high probability that that power pole will be hit or damaged. In addition, roadway lighting is not provided along the curve. The photo below shows a picture of the tight curve on Route 100 and the existing power pole right off the curve.

Figure 6-8(A) RS-3 Recommended Improvements

The proposed improvement is to install a positive traffic control system such as a metal beam guard rail around the outside of the curve (eastbound direction) or at a minimum install advance warning signs and curve warning signs along the curves. A metal beam guard rail would prevent vehicles from driving off the curve (there is a drop off from Route 100 to the harbor) and protect the existing fixed object (power pole). Installation of advance warning signs and curve warning signs would also be a substantial upgrade to the existing roadway features. Highway lighting (a luminaire) should also be installed on the existing power pole to provide roadway lighting along the curve.

RS-4 Improve lighting and add pedestrian pathway along Route 10 in the Sinapalo Village

Street and pedestrian lighting and a pedestrian pathway are recommended for portions of Route 10 in the Sinapalo Village.

Figure 6-8(B) RS-4 Recommended Improvements

6.5.2 Rota Long-Term (2040) Improvements

The long-term improvements for Rota are listed below and described on the following pages.

Table 6-15 Rota Long-Term (2040) Improvements

Island	ID	Location	Improvement
Rota	**Rota**		
Rota	RL-1	Route 10, from Tatachok Point south to Pinatang Park	Drainage upgrade
Rota	RL-2	Route 100, from Songsong Village to Ginalahan Community and Airport	Complete, widen, and pave roadway
Rota	RL-3	Dugi area, from Route 103	Roadway extension, and other infrastructures to Dugi area
Rota	RL-4a	Route 10	Construct bike/pedestrian path
Rota	RL-4b	Route 100	Construct bike/pedestrian path
Rota	RL-5	unnamed roadway, between Gagani and Haofna	Widen and upgrade roadway
Rota	RL-6	Route 102	Upgrade and pave roadway
Rota	RL-7	Route 103	Upgrade and pave roadway
Rota	RL-8	Alternate routes from Songsong Village to Sailigal Hulo and to Ka'an	Upgrade and pave roadways

RL-1 Drainage upgrade along Route 10 from Tatachok Point south to Pinatang Park

Segments of Route 10 approaching Songsong village from the Airport have poor drainage facilities that are resulting in maintenance issues (roadway pavement, erosion, and impacts to the natural environment due to the untreated runoff and erosions of the side slopes at the edge of the roadway). On the west side of Route 10 is the coastline and run off drains directly into the ocean. Erosion occurs along the roadway as the coastline encroaches on the roadway and in some areas is eroding away at the edge of the roadway pavement section. Another impact is that the runoff is untreated and threatens the natural environment by introducing toxins, pollution, and waste into the ocean and surrounding ecosystems. Eventually, the untreated runoff will result in substantial impacts to the local beaches, coral reefs, and indigenous flora and fauna,

Drainage facilities are needed along the roadways on Rota especially those roadways adjacent to the coastline such a Route 10 and Route 100. Drainage facilities should also include water and runoff treatment facilities such as natural detention basins and grassy swales to capture, detain, and treat the storm water runoff. This would reduce the amount of untreated runoff and pollution entering the ecosystem and reducing erosion along the highway.

RL-2 Complete, widen, and pave Route 100 from Songsong Village to Ginalahan Community and Airport

Improvement RL-2 was previously RL-3 in the 2008 Highway Master Plan.

Route 100 is paved east of Songsong Village for just over two miles then becomes a natural roadway approximately 0.2 miles before the Old Japanese Cannon. The highway becomes very narrow in some segments that maintain a travel-way width where only a single vehicle can proceed if there are two opposing vehicles. If two opposing vehicles happen to meet in one of these narrow segments, one of the vehicles must stop and pull over while the other vehicle proceeds to drive through. Route 100 also has narrow bridges that only allow a single direction of travel (i.e., a single vehicle) to proceed. Near the Japanese Cannon on the east side of the island, Route 100 also has visual erosion problems along the coastal edge of the highway. Proceeding northeast to the Ginalahan Community, the roadway is uneven with substantial potholes and rocks. Travel on Route 101 east of Ponya Point is recommended to be traveled by four-wheel drive vehicles. As development and growth occur, upgrades to Route 100 would be needed since it is the only east-west, coastal route in the southern and central parts of Rota.

Photo 6-58 Existing Condition

RL-3 Expansion of roadway and other infrastructure to Dugi area from Route 103 in Gampapa and Pegnasu areas

Improvement RL-3 was previously RL-4 in the 2008 Highway Master Plan.

The development and expansion of the homestead lots in the vicinity of Dugi area in Rota could eventually be converted into primarily residential communities in the future, with corresponding rapid increases in population expected in the area. The Dugi area is mainly undeveloped with unpaved roads under the current condition. As the new developments occur in the future, the majority of the roadways and infrastructure in the area would require upgrades and improvements in order to meet the future demand. It is recommended that roadways connecting Route 103 in the Gampapa and Pegnasu areas to the Dugi area be widened and paved. As the development footprint becomes available in the future, the details and work involved in the expansion of roadways in the area should be evaluated and finalized.

RL-4a and RL-4b Construct bike/pedestrian path along Route 10 and Route 100

Improvements were previously both RL-5 in the 2008 Highway Master Plan.

There are currently no pedestrian or bike paths on any of the major roadways on Rota. As an enhancement action, new pedestrian and bike paths should be considered along major roadways in Songsong Village, and along coastal roadways, Route 10 and Route 100. Since the introduction of new pedestrian and bike paths on existing roadways would require roadway widening and right-of-way acquisition, it is recommended that the implementation be prioritized and phased, and be coordinated with other roadway upgrade or improvement projects in the area.

RL-6 Widen and upgrade roadway connecting Gagani and Haofna

Improvement RL-6 was previously RL-7 in the 2008 Highway Master Plan.

The residents of Rota are depending on the main water source that supplies Songsong and Sinapalo Village. The transportation route between Gagani and Haofna is very important as this is the only roadway that CUC is using during check-up and maintenance of the main water source and distribution line. It is recommended that improvement of the roadway in the southern area from Gagani leading to Haofna be included as a long-term improvement plan for Rota. This roadway is also a potential route for eco-tours and aquaculture development.

The roadway improvements should include widening the roadway to allow two opposing vehicles to pass simultaneously; repaving the roadway surface, repairing, and implementing preventative erosions; and implementing a roadway signing program for regulatory warning and guide signs.

RL-7 Upgrade and pave Route 102

Improvement RL-7 was previously RL-8 in the 2008 Highway Master Plan.

As the development and expansion of the homestead lots in the vicinity of the Dugi area in Rota occurs in the future and new roadways and infrastructure in the areas are upgraded and improved, Route 102 that potentially provides mobility between Dugi and the rest of the island along the coastline would require upgrades and improvements in order to accommodate the increased traffic in the future.

This route currently consists of narrow unpaved dirt roads with lanes wide enough for one vehicle at a time. The goal in the long-term is to widen and upgrade Route 102 to a standard two-lane roadway with 12-ft travel lanes and 4-ft shoulders in both directions as the development in Dugi area occurs. New concrete barriers, asphalt pavement, roadway signage and pavement markings and striping should be provided as the roads get widened. In addition, drainage facilities should also be constructed where runoff would be captured, detained and treated.

RL-8 Upgrade and pave Route 103

Improvement RL-8 was previously RL-9 in the 2008 Highway Master Plan.

Similar to Route 102, Route 103 is another potential roadway for providing mobility between Dugi and the rest of the island. Therefore, it would require upgrades and improvements to accommodate the increased traffic in the future. This route is a narrow unpaved dirt road with lanes wide enough for one vehicle to pass at a time. The goal in the long-term is to widen and upgrade Route 102 to a standard two-lane roadway with 12-ft travel lanes and 4-ft shoulders in both directions as the development in Dugi area occurs. New concrete barriers, asphalt pavement, roadway signage and pavement markings and striping should be provided as the roads get widened. In addition, drainage facilities should also be constructed where runoff would be captured, detained and treated.

RL-9 Upgrade and pave alternate routes from Songsong Village to Sailigal Hulo and Ka’an

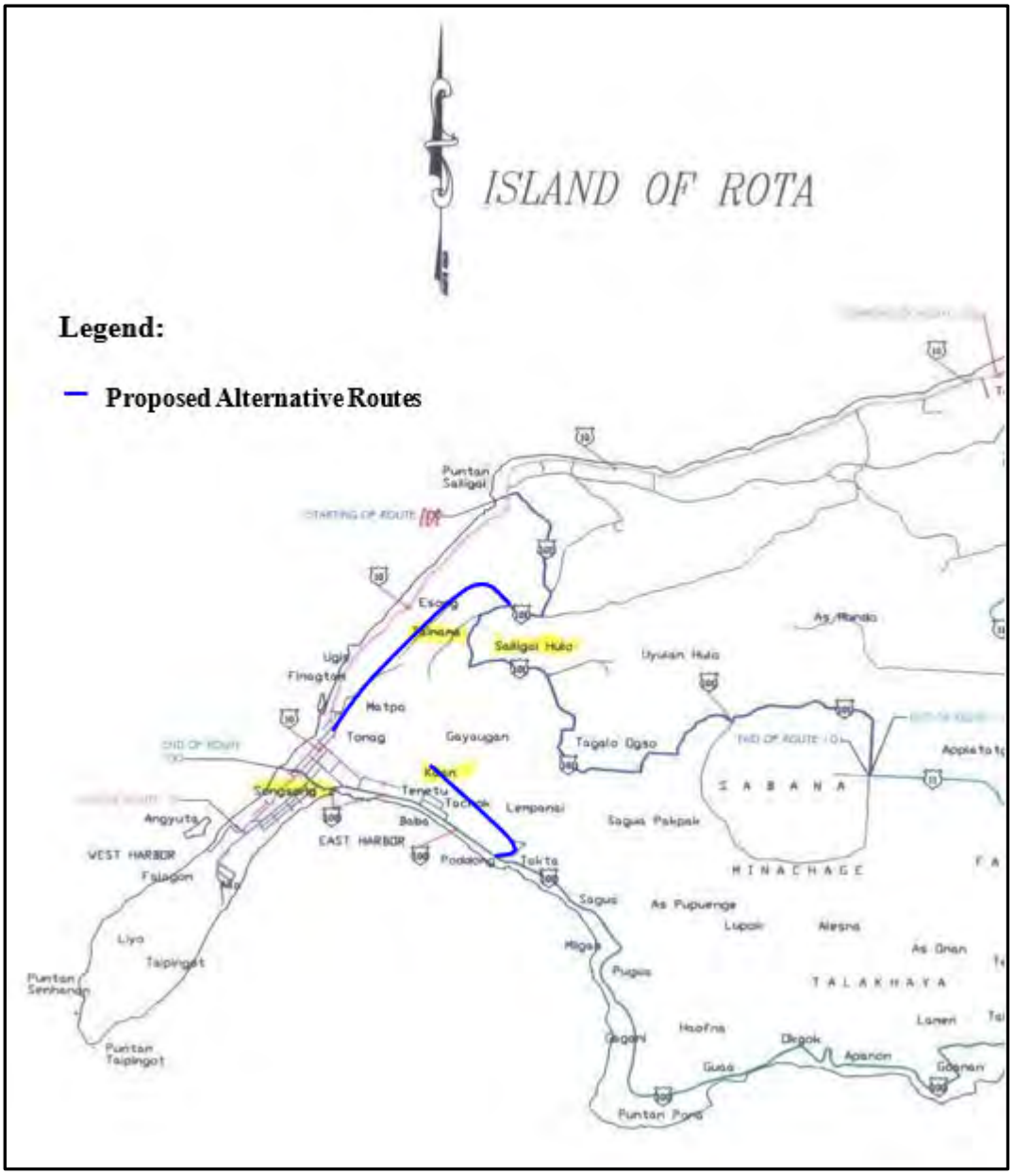
Improvement RL-9 was previously RL-10 in the 2008 Highway Master Plan.

Rota currently has major paved roadways that connect the airport, Sinapalo and Songsong Village; however, these major transportation routes are mainly located along the coastal area of the island. Should there be a tsunami warning or alert, an alternate route should be provided to the public in Song Song village to access a safer place like Sinapalo Village, Ka’an or another high-level area. This alternate route is currently not available.

By reviewing the existing infrastructure and its condition, it is recommended that the road which connects the cross at Taimama to Sailigar Hulo and the road that connects Route 100 to Ka’an be considered as the emergency transportation route for the public in Songsong Village. The two proposed alternate routes are shown in the illustration below.

These two roadways are currently unpaved and narrow roads. For these roadways to better serve as an emergency transportation routes, upgrades to the roadways are necessary. These roadway upgrades should include widening the existing limited roadway width to allow two opposing vehicles to pass simultaneously, install new asphaltic concrete pavement and new pavement markings, and implementing a roadside signing program for regulatory, warning and guide signs.

Figure 6-8(E) *RL-9 Recommended Improvements*



6.6 Cost Estimates

Table 6-17 summarizes the engineer cost estimates for the recommended roadway improvements for the three islands. The estimated total cost to build improvements detailed here is $85.7 million for all the near-term improvements and $188 million for all the long-term improvements. Maintenance costs are funded through DPW operational funding. Cost estimates are not provided for general improvements. The cost estimate worksheets for the recommended improvements are provided in the Appendix.

6.7 Project Evaluations

Table 6-18 on the following page ranks the improvement projects for each of the three main islands and for both near and long-term time frames, based on the following five criteria and scores (where higher scores are better):

– Safety (score of 1 for minimal or no safety improvement, 2 for moderate improvement, 3 for substantial improvement, and 4 for exceptional improvement).
– Traffic Operations (score of 1 for minimal or no traffic flow improvement, 2 for moderate improvement, 3 for substantial improvement, and 4 for exceptional improvement).
– Environmental Impacts (score of 1 for potentially severe environmental impacts, 2 for potentially substantial impacts, 3 for potentially moderate impacts, and 4 for minimal to no impacts).
– Construction Costs (score of 1 for construction costs <$250,000, 2 for costs between $250,000 and $1M, 3 for costs between $1M and $10M, and 4 for costs over $10M).
– Operations and Maintenance Costs (score of 1 for potentially very high operations and maintenance cost, 2 for potentially high cost, 3 for potentially moderate cost, and 4 for minimal to no cost).

The top-ranking projects include:

Table 6-16 Top-Ranking Projects

ID	Location	Improvement	Total Score
SS-2c	Route 33 (Beach Road) & CPL Derence Jack Road	Install new traffic signal or roundabout	17
SS-2f	Route 31 (Chalan Monsignor Guerrero) & Route 37 (Chalan Monsignor Martinez)	Install new roundabout	17
SS-2g	Route 31 (Chalan Monsignor Guerrero) & Route 35 (Tun Herman Pan Road)	Install new roundabout	17
SS-2h	Route 32 (As Perdido Road) & Route 37 (Chalan Monsignor Martinez)	Install new roundabout	17
TS-2	Route 21 (Broadway) & Canal Street	Fix roundabout	16
RS-3	Route 100, from Bay breeze Restaurant to East Harbor entrance	Install positive traffic control	16
RS-4	Route 10, within Sinapalo	Lighting improvement	16
SS-9	Route 33 (Beach Road)	Add mid-block or signalized crosswalks	15
SS-15	Route 38 (Navy Hill Road), near CHCC	Construct pedestrian facilities and bike lanes	15
RS-1	Rota, especially in Songsong Village	Implement directional and guide sign program	15

Table 6-17 Preliminary Cost Estimates

Island	Time Frame	ID	Location	Improvement	Preliminary Cost
SAIPAN	Near-Term Recovery Conditions Improvements (Near)	**SS-1**	Intersection Modification at the following locations:	-	-
		SS-1a	Route 31 (Chalan Monsignor Guerrero) & Route 30 (Middle Road/Chalan Pale Arnold)	Intersection modification	$241,120
		SS-1b	Route 31 (Chalan Monsignor Guerrero) & Route 33 (Beach Road)	Intersection modification	$241,120
		SS-1c	Route 30 (Middle Road/Chalan Pale Arnold) & Navy Hill Road	Intersection modification	$241,120
		SS-1d	Route 33 (Beach Road) & Garapan Street (Rte 308)	Intersection modification	$241,120
		SS-1e	Route 35 (Tun Herman Pan) & Route 304 (Flame Tree Drive)	Intersection Modification (AWSC)	$3,726
		SS-1f	Route 33 (Beach Road) & Route 37 (Chalan Monsignor Martinez)	Intersection Modification (SSSC)	$2,795
		SS-1g	Route 304 (Flame Tree Road) & Route 32 (As Perdido Road)	Intersection modification (AWSC)	$3,726
		SS-1h	Route 304 (Flame Tree Road) & Route 302 (Naftan Road)	Intersection modification (SSSC or AWSC)	$2,795
		SS-2	New Traffic Signal or Roundabout at the following locations:	-	-
		SS-2a	Route 33 (Beach Road) & Quartermaster Road	Install new traffic signal or roundabout	$2,740,000
		SS-2b	Route 33 (Beach Road) & Route 317 (Gualo Rai Road)	Install new traffic signal	$2,740,000
		SS-2c	Route 33 (Beach Road) & CPL Derence Jack Road	Install new roundabout	$2,740,000
		SS-2d	Route 33 (Beach Road) & Route 38 (Micro Beach Road)	Install new traffic signal	$2,740,000
		SS-2e	Route 31 (Chalan Monsignor Guerrero) & Route 305 (Dandan Road)	Install new traffic signal	$482,240
		SS-2f	Route 31 (Chalan Monsignor Guerrero) & Route 37 (Chalan Monsignor Martinez)	Install new roundabout	$2,055,000
		SS-2g	Route 31 (Chalan Monsignor Guerrero) & Route 35 (Tun Herman Pan Road)	Install new roundabout	$2,055,000
		SS-2h	Route 32 (As Perdido Road) & Route 37 (Chalan Monsignor Martinez)	Install new roundabout	$2,740,000
		SS-3	Route 36	Construct new bridge and connection	Under Construction.
		SS-4	Route 30 (Middle Road/Chalan Pale Arnold) & Commonwealth	Relocate pedestrian signal	$853,000
		SS-5	Chalan Tun Joaquin Doi in As Terlaje	Improve signage and relocate driveway	$17,000
		SS-6	Route 38 (Micro Beach Road), west of Route 30 (Middle Road/Chalan Pale Arnold)	Add pedestrian pathway	$402,000
		SS-7	Lau Lau Road to Kagman	Upgrade and pave roadway	Under Construction.
		SS-8	Garapan (area)	Lighting improvement	$2,138,000
		SS-9	Route 33 (Beach Road)	Add mid-block or signalized crosswalks	$53,000
		SS-10a-b	Improvements at the following locations:	-	$79,000
		SS-10a	Route 31 (Chalan Monsignor Guerrero)	Speed enforcement	-

Island	Time Frame	ID	Location	Improvement	Preliminary Cost
		SS-10b	Route 30 (Middle Road/Chalan Pale Arnold)	Speed enforcement	-
		SS-11	Garapan	Parking enforcement	$10,000
		SS-12	Garapan	Improve vehicle circulation	$991,000
		SS-13	Route 30 (Middle Road/Chalan Pale Arnold)	Hazard elimination	$6,296,000
		SS-14	Route 306 (Chalan Tun Joaquin Doi) & Texas Road	Add signage	$8,000
		SS-15	Route 38 (Navy Hill Road), near CHCC	Construct pedestrian facilities and bike lanes	$1,132,000
		SS-16	Route 302 (Naftan Road), from Route 304 (Flame Tree Road) to Obyan Route 33 (Beach Road)	Improve roadway	$12,013,000
		SS-17	Route 323 (Industrial Drive), from Smiling Cove Road to Lower Base Drive	Improve roadway	$11,598,000
	Long-Term (2040) Improvements (Long)	**SL-1**	Route 30 (Middle Road/Chalan Pale Arnold) & Monsignor Guerrero	Realign Texas road to form a 4-legged intersection	$7,411,000
		SL-2,3,4	Improvements at the following locations:	-	$1,132,000
		SL-2	Route 38 (Micro Beach Road), between Route 33 (Beach Road) and Route 30 (Middle Road/Chalan Pale Arnold)	Realign Micro Route 33 (Beach Road)	-
		SL-3	Route 38 (Micro Beach Road), between Route 33 (Beach Road) and Route 30 (Middle Road/Chalan Pale Arnold)	Add bike lanes	-
		SL-4	Route 38 (Micro Beach Road), between Route 33 (Beach Road) and Route 30 (Middle Road/Chalan Pale Arnold)	Add pedestrian pathway	-
		SL-5	Route 30 (Middle Road/Chalan Pale Arnold)	Construct pedestrian facilities and bike lanes	$9,744,000
		SL-6	Route 31 (Chalan Monsignor Guerrero), near Route 35 (Tun Herman Pan)	Drainage upgrade	$327,000
		SL-7	Route 33 (Beach Road), from Route 31 (Chalan Monsignor Guerrero) to Afetna	Widen roadway, install two-way left-turn lane	$9,883,000
		SL-8	Route 316 (Chalan Savanna)	Widen and pave roadway	$5,416,000
		SL-9	Route 310 (Tapochao Road) towards Mt. Tapochao	Upgrade and improve roadway	$11,729,000
		SL-10	Beach Road Parkway	Replace piers	To be determined.
		SL-11	Route 33 (Beach Road), from Route 31 (Chalan Monsignor Guerrero) to Gualo Rai Road	Coastal reinforcement	To be determined.
		SL-12	Route 33 (Beach Road), from Route 38 (Micro Beach Road) to Koblerville Road	Corridor signal optimization	$5,908,000
		SL-13	Route 30 (Middle Road/Chalan Pale Arnold), from Route 38 (Micro Beach Road) to Quartermaster Road	Corridor signal optimization	$3,376,000
TINIAN	Near	**TS-1**	Tinian, especially in San Jose Village	Implement directional and guide sign program	$51,000
		TS-2	Route 21 (Broadway) & Canal Street	Fix roundabout	$2,740,000
		TS-3	Route 21 (Broadway), from Route 201 to Military Retention Zone	Improve roadway	$12,327,000
		TS-4	Route 23 (8th Avenue), from Route 202 to Military Retention Zone	Improve roadway	$12,675,000

Island	Time Frame	ID	Location	Improvement	Preliminary Cost
	Long	**TL-1**	Broadway, from Route 201 south to Limestone Forest Trail	Upgrade and improve roadway	$5,567,000
		TL-2	Lower Pina, Marpo Heights and Carolinas	Upgrade and improve major roadways	$14,117,000
ROTA	Near	**RS-1**	Rota, especially in Songsong Village	Implement directional and guide sign program	$247,000
		RS-2	Route 10	Hazard elimination	Ongoing.
		RS-3	Route 100, from Bay breeze Restaurant to East Harbor entrance	Install positive traffic control	$247,000
		RS-4	Route 10, within Sinapalo	Lighting improvement	$2,138,000
		RS-5	Route 10 & Route 100	Sidewalk	$402,000
	Long	**RL-1**	Route 10, from Tatachok Point south to Pinatang Park	Drainage upgrade	$129,000
		RL-2	Route 100, from Songsong Village to Ginalahan Community and Airport	Complete, widen, and pave roadway	$33,515,000
		RL-3	Dugi area, from Route 103	Roadway extension, and other infrastructures to Dugi area	$3,788,000
		RL-4ab	Improvements at the following locations:	-	$9,945,000
		RL-4a	Route 10	Construct bike/pedestrian path	-
		RL-4b	Route 100	Construct bike/pedestrian path	-
		RL-5	unnamed roadway, between Gagani and Haofna	Widen and upgrade roadway	$10,542,000
		RL-6	Route 102	Upgrade and pave roadway	$24,993,000
		RL-7	Route 103	Upgrade and pave roadway	$19,669,000
		RL-8	Alternate routes from Songsong Village to Sailigal Hulo and to Ka'an	Upgrade and pave roadways	$10,869,000

Table 6-18 Project Evaluations

ID	Improvement	SCORE					
		Safety	Traffic Operations	Environmental Impacts	Construction Costs	Operations & Maintenance	Total Score
SS-1	-	**-**	**-**	**-**	**-**	**-**	**-**
SS-1a	Intersection modification	**-**	**-**	**-**	**-**	**-**	**-**
SS-1b	Intersection modification	**-**	**-**	**-**	**-**	**-**	**-**
SS-1c	Intersection modification	**-**	**-**	**-**	**-**	**-**	**-**
SS-1d	Intersection modification	**2**	**3**	**4**	**1**	**2**	**12**
SS-1e	Intersection Modification (AWSC)	**4**	**2**	**4**	**1**	**3**	**14**
SS-1f	Intersection Modification (SSSC)	**3**	**2**	**4**	**1**	**3**	**13**
SS-1g	Intersection modification (AWSC)	**4**	**2**	**4**	**1**	**3**	**14**
SS-1h	Intersection modification (SSSC or AWSC)	**3**	**2**	**4**	**1**	**3**	**13**
SS-2	-	**-**	**-**	**-**	**-**	**-**	**-**
SS-2a	Install new traffic signal or roundabout	**-**	**-**	**-**	**-**	**-**	**-**
SS-2b	Install new traffic signal or roundabout	**3**	**3**	**3**	**3**	**2**	**14**
SS-2c	Install new traffic signal or roundabout	**4**	**4**	**3**	**3**	**3**	**17**
SS-2d	Install new traffic signal or roundabout	**3**	**3**	**3**	**3**	**2**	**14**
SS-2e	Install new traffic signal	**3**	**3**	**3**	**2**	**2**	**13**
SS-2f	Install new roundabout	**4**	**4**	**3**	**3**	**3**	**17**
SS-2g	Install new roundabout	**4**	**4**	**3**	**3**	**3**	**17**
SS-2h	Install new roundabout	**4**	**4**	**3**	**3**	**3**	**17**
SS-3	Construct new bridge and connection	**-**	**-**	**-**	**-**	**-**	**-**
SS-4	Relocate pedestrian signal	**-**	**-**	**-**	**-**	**-**	**-**
SS-5	Improve signage and relocate driveway	**-**	**-**	**-**	**-**	**-**	**-**
SS-6	Add pedestrian pathway	**3**	**2**	**3**	**3**	**3**	**14**
SS-7	Upgrade and pave roadway	**-**	**-**	**-**	**-**	**-**	**-**
SS-8	Lighting improvement	**4**	**1**	**4**	**3**	**2**	**14**
SS-9	Add mid-block or signalized crosswalks	**3**	**1**	**4**	**4**	**3**	**15**
SS-10a-b	-	**3**	**2**	**4**	**4**	**1**	**14**
SS-10a	Speed enforcement	**-**	**-**	**-**	**-**	**-**	**-**
SS-10b	Speed enforcement	**-**	**-**	**-**	**-**	**-**	**-**
SS-11	Parking enforcement	**-**	**-**	**-**	**-**	**-**	**-**
SS-12	Improve vehicle circulation	**-**	**-**	**-**	**-**	**-**	**-**
SS-13	Hazard elimination	**-**	**-**	**-**	**-**	**-**	**-**
SS-14	Add signage	**2**	**1**	**4**	**1**	**4**	**12**
SS-15	Construct pedestrian facilities and bike lanes	**4**	**1**	**4**	**3**	**3**	**15**

		SCORE					
ID	Improvement	Safety	Traffic Operations	Environmental Impacts	Construction Costs	Operations & Maintenance	Total Score
SS-16	Improve roadway	**2**	**3**	**2**	**4**	**1**	**12**
SS-17	Improve roadway	**2**	**3**	**2**	**4**	**1**	**12**
SL-1	Realign Texas road to form a 4-legged intersection	**2**	**3**	**1**	**2**	**1**	**9**
SL-2,3,4	-	**3**	**3**	**1**	**3**	**2**	**12**
SL-2	Realign Micro Route 33 (Beach Road)	**-**	**-**	**-**	**-**	**-**	**-**
SL-3	Add bike lanes	**-**	**-**	**-**	**-**	**-**	**-**
SL-4	Add pedestrian pathway	**-**	**-**	**-**	**-**	**-**	**-**
SL-5	Construct pedestrian facilities and bike lanes	**3**	**2**	**2**	**2**	**2**	**11**
SL-6	Drainage upgrade	**2**	**1**	**2**	**3**	**4**	**12**
SL-7	Widen roadway, install two-way left-turn lane	**3**	**4**	**1**	**2**	**1**	**11**
SL-8	Widen and pave roadway	**-**	**-**	**-**	**-**	**-**	**-**
SL-9	Upgrade and improve roadway	**-**	**-**	**-**	**-**	**-**	**-**
SL-10	Replace piers	**4**	**1**	**2**		**2**	**9**
SL-11	Coastal reinforcement	**4**	**1**	**3**		**1**	**9**
SL-12	Corridor signal optimization	**2**	**4**	**3**	**3**	**2**	**14**
SL-13	Corridor signal optimization	**2**	**4**	**3**	**3**	**2**	**14**
TS-1	Implement directional and guide sign program	**2**	**2**	**3**	**4**	**3**	**14**
TS-2	Fix roundabout	**4**	**4**	**3**	**3**	**2**	**16**
TS-3	Improve roadway	**2**	**3**	**2**	**4**	**2**	**13**
TS-4	Improve roadway	**2**	**3**	**2**	**4**	**2**	**13**
TL-1	Upgrade and improve roadway	**3**	**3**	**2**	**2**	**2**	**12**
TL-2	Upgrade and improve major roadways	**3**	**3**	**1**	**1**	**1**	**9**
RS-1	Implement directional and guide sign program	**2**	**2**	**4**	**4**	**3**	**15**
RS-2	Hazard elimination	**-**	**-**	**-**	**-**	**-**	**-**
RS-3	Install positive traffic control	**3**	**3**	**3**	**4**	**3**	**16**
RS-4	Lighting improvement	**4**	**2**	**4**	**3**	**3**	**16**
RS-5	Sidewalk	**4**	**1**	**4**	**2**	**3**	**14**
RL-1	Drainage upgrade	**3**	**1**	**3**	**4**	**3**	**14**
RL-2	Complete, widen, and pave roadway	**3**	**4**	**1**	**1**	**1**	**10**
RL-3	Roadway extension, and other infrastructures to Dugi area	**-**	**-**	**-**	**-**	**-**	**-**
RL-4ab	-	**3**	**2**	**2**	**2**	**1**	**10**
RL-4a	Construct bike/pedestrian path	**-**	**-**	**-**	**-**	**-**	**-**
RL-4b	Construct bike/pedestrian path	**-**	**-**	**-**	**-**	**-**	**-**
RL-5	Widen and upgrade roadway	**3**	**4**	**1**	**2**	**1**	**11**

		SCORE					
ID	Improvement	Safety	Traffic Operations	Environmental Impacts	Construction Costs	Operations & Maintenance	Total Score
RL-6	Upgrade and pave roadway	**3**	**3**	**1**	**1**	**1**	**9**
RL-7	Upgrade and pave roadway	**3**	**3**	**1**	**1**	**1**	**9**
RL-8	Upgrade and pave roadways	**3**	**3**	**1**	**2**	**1**	**10**

7 Implementation & Funding

7.1 Implementation

The implementation is prioritized based on Department of Public Works (DPW) 4-Year Territorial Transportation Implementation Plan (TTIP). Maintenance costs are funded through DPW operational funding. During the engineering design process, the Commonwealth Utilities Corporation (CUC) is involved to coordinate plans for utility improvements and to align project schedules. Local utility providers are required to relocate their infrastructure that may be affected by the roadway improvement during the construction phase.

7.2 Funding Sources

There are a variety of potential funding sources for the CNMI Capital Improvement Projects (CIP). These include:

11. Local Revenues
12. Development Fees
13. Federal Funds
    a. Department of the Interior
        i. Office of Insular Affairs
            A. Covenant Funds (Capital Improvement Program Funds)
            B. Compact Impact Funds
    b. Infrastructure Investment and Jobs Act
        i. Federal Highway Administration (FHWA)
        ii. Federal Transit Administration (FTA)
    c. HR2 Moving Forward Act: Surface Transportation Program Funds
    d. Federal Emergency Management Agency (FEMA) (CDBG-DR, too?)
    e. Department of Housing and Urban Development (HUD)
        i. Community Development Block Grant Disaster Recovery (CDBG-DR) Funds
    f. CARES Act (COVID-19 Assistance)
    g. Other Federal funds

7.2.1 Local Revenues and Development Fees

Historically, locally generated revenues and development fees have only comprised a small proportion of the total funds used for roadway improvement projects, largely because of the substantial amount of available covenant funds. However, there are substantial amounts of money generated through these sources, and even a small shift in the overall allocation of current funds would generate substantially more funds of highway capital improvement projects.

According to William H. Stewart a forensic economist, historian, and military cartographer. (Source: Saipan Tribune, January 19, 2007), during the period 1986 to 2004 the CNMI government's internally generated revenue was $3.07 billion. During this period the total expenditures on capital improvement projects in the Commonwealth as generated by their own internal sources was a 3.2-percent ($78.4 million). Over the above period, other government expenditures were wages and salaries of $1.6 billion (64-percent) and all other expenditures of $807.5 million (32.8-percent). Many of the total expenditures made on capital improvement infrastructure projects resulted not from locally generated revenues but largely as a result of U.S. financial assistance in the form of program grants and loans and Covenant

Funds. Over the period 1986 - 2004 the total reported business gross revenue generated by the private sector was $.31.3 million."

7.2.2 Federal Funds

The CNMI receives financial assistance from the US government by basis of it being considered an insular territory. Federal funding to CNMI includes consistent streams of funds available for transportation improvement projects through the Department of Transportation (DOT). Additional funds have been made available through the Department of Housing and Urban Development, in response to specific events, including the 2018 typhoons and the COVID-19 pandemic. Financial assistance for transportation projects and programs is provided via competitive grant programs. The following is a list of Federal funding sources that have been made available to the CNMI to address a range of transportation needs.

Office of Insular Affairs (OIA) Funding Allocations

The Office of Insular Affairs (OIA) oversee Federal funding assistance to territories under the jurisdiction of the Department of the Interior, including the Commonwealth of the Northern Mariana Islands (CNMI).

The Office of Insular Affairs (OIA) under the Department of the Interior has administrative responsibility for coordinating federal policy in certain US territories, including CNMI. OIA programs provide assistance in the form of direct grants, reimbursable agreements, and contracts with technical assistance providers to respond to urgent, immediate needs in the insular areas.

The Office of Insular Affairs annually ranks the territories on 13 criteria which are scored to determine the annual allocation of funding among the insular area grantees.

"The management criteria include the status of audits, quality of financial and grants management, and compliance with procurement rules. There are also project criteria, including how well each proposed project support economic development goals and objectives, whether a project has measurable objectives, if it has measurable milestones, and if the project has detailed cost estimates that are within budget targets." (Source: Saipan Tribune, Aug 13, 2005).

Covenant Funds (CIP Funds)

Covenant funding is also known as Capital Improvement Project (CIP) grant funding[5]. The CIP funds a variety of projects for the improvement of the Commonwealth's critical infrastructure. These projects lay the groundwork to promote economic development and new investments for economic self-sufficiency and a better quality of life for the people of the CNMI.

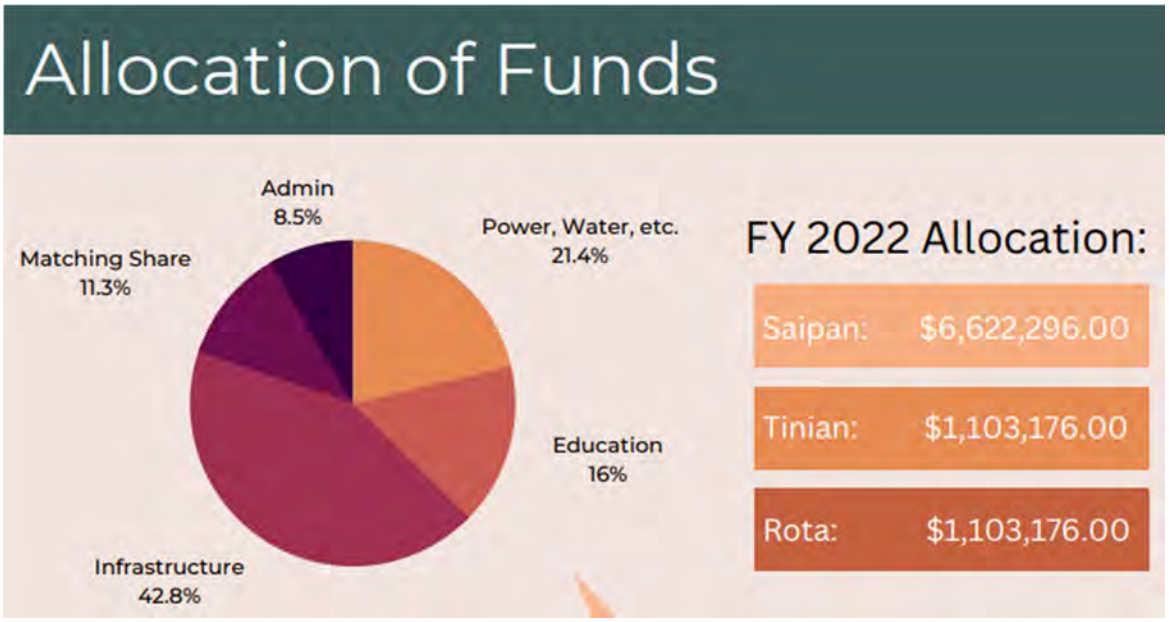
Section 702 of the Covenant between the United States and the CNMI provides a commitment and pledge from the United States for the payment and an authorization for the appropriation of guaranteed annual levels of direct grant assistance to the Government of the CNMI for several years. The Covenant funds are to be allocated to the territories in a competitive system allowing opportunities to improve accountability and providing incentives for territorial management and financial reforms. Covenant funding is subject to annual appropriations and is specifically for capital improvements in any of the four U.S. territories. A unique feature of these grants is that they may be used to meet the local matching requirement for capital improvement grants of other Federal agencies, subject to OIA's approval.

The CIP's objective is to efficiently administer, implement, and manage 702 Capital Improvement Projects funded under the Office of Insular Affairs in accordance with critical needs in areas of health, education, power, water, wastewater and solidwaste for the CNMI. Governor Ralph DLG. Torres was recently informed by U.S. Department of Interior Assistant Secretary for Insular and International Affairs Carmen G. Cantor that the CNMI has been awarded $8,829,728 in fiscal year 2022 Capital Improvement Project (CIP) funding[6]. Included in that dollar amount is $932,640 for the Rota West Harbor access road improvement.

[5] Definition of Each Type of Grant Assistance Funding | U.S. Department of the Interior (doi.gov)
[6] CNMI awarded $8.8 million in CIP funding - Office of CNMI Governor and Lt. Governor, governor.gov, 9/22/22

According to the CIP Citizen Centric Report for FY 2022, the allocation of CIP funds to the CNMI is shown in the following graphic[7].

Photo 7-1 CIP FY 2022 Allocation of Funds



Compact Impact Funds

Compact funds are provided to CNMI, as well as Hawai'i, Guam, and American Samoa. Compact funds are provided to affected jurisdictions to aid in defraying costs incurred as a result of increased demands placed on health, educational, social, or public safety services, or to infrastructure related to such services, due to the residence in affected jurisdictions of qualified nonimmigrants from the Republic of the Marshall Islands, the Federated States of Micronesia, or the Republic of Palau[5].

For fiscal year 2022, OIA announced the availability of $35 million in fiscal year (FY) 2022 Compact Impact funding to be provided, including $30 million in mandatory funding made available under U.S. Public Law 108-188 and an additional $5 million in discretionary funding made available under the Consolidated Appropriations Act of 2022 (Public Law 117-103)[8]. Of the available funds, CNMI was awarded a total of $1,928,359.

Additional Federal Funds

Infrastructure Investment and Jobs Act (2021)

The Infrastructure Investment and Jobs Act was signed in 2021 and makes available $550 billion in new spending for transportation infrastructure and services for fiscal years 2022 through 2026. Applicable projects to receive funding include roads, public transit, rural broadband, airports, water and wastewater systems, and other traditional capital improvement projects. Funds are distributed to recipients through competitive grant programs.

Territorial Highway Program

These funds are available through grants and support the construction and improvement of highway and critical collector roadways.

[7] FY 2022 Citizen Centric Report (opacnmi.com)
[8] OIA Announces $35 Million in Compact Impact Funds for FY 2022 | U.S. Department of the Interior (doi.gov), 5/31/22

National Highway Freight Program (NHFP)

This program allocated funds for investments in infrastructure and operational improvements that strengthen economic competitiveness, reduce congestion, reduce the cost and environmental impacts of freight transportation, improve reliability and safety, and increase productivity.

Coronavirus Aid, Relief, and Economic Security (CARES) Act (2020)

The CARES Act was signed in 2020 to provide over $2 trillion of economic relief to address the impact created by the Coronavirus Disease 2019 (COVID-19). Fiscal Year 2020 appropriations that were made available to CNMI include the Federal Transit Administration (FTA) and Federal Aviation Administration (FAA). Under the CARES Act, the US Department of Transportation (DOT) allocated more than $1 million in FTA funds to help the CNMI public transportation systems and more than $22.7 million in FAA funds for continuing operations and lost revenue for airports in CNMI.

Community Development Block Grant – Disaster Relief (CDBG-DR)

In 2020, the Department of Housing and Urban Development (HUD) allocated $244 million in Community Development Block Grant – Disaster Recovery (CDBG-DR) funds to assist CNMI in recovering from severe damage caused by two typhoons in September and October 2018. The majority of these funds must be used to support activities benefiting low- and moderate-income persons and to primarily consider and address unmet housing needs.

8 Summary & Recommendations

This Comprehensive Highway Master Plan updates the previous Comprehensive Highway Master Plan that was published in 2008. It provides updated traffic data and estimates and forecasts for future conditions for each of the three most populated CNMI islands. Roadway segments and intersections were analyzed to estimate traffic capacity and levels of service.

This Master Plan reassesses previous accident data and provides the status of the recommended improvements from the earlier master plan.

Based on public scoping meetings and interviews and discussions with DPW and other CNMI staff, further deficiencies and constraints in the existing roadway network were identified, and recommendations made for improvements.

To maintain the mobility on the islands, the identified improvements are divided into long-term and near-term recommendations. The designated timeframe for near-term recommendations would be from one to ten years whereas the designated timeframe for long-term improvements would be from 11 to 20 years. Recommended improvements are provided both on a project-wide basis for all three CNMI islands and specific roadway improvement projects for each of the three islands.

This plan recommends that the CNMI create and continually update relevant transportation and safety data to assist in planning efforts and decision-making processes. DPW is in the process of implementing an Asset Management Plan (AMP) that will be instrumental in monitoring facility conditions and needs. Data


GHD