Consultation for Repairs to the Puerto Rico State Road 9966
Rio Grande, Puerto Rico

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Introduction

The United States Forest Service (FS) at El Yunque National Forest (EYNF) and the Federal Highway Administration (FHWA) are still conducting recovery work after the passing of various extreme weather events like the Hurricanes of 2017 and 2022. This work has included reconstruction of various sections of state managed roads within the EYNF including Puerto Rico State Road 9966 (PR-9966). The current undertaking seeks to repair the road to make it easier and safer to traverse while providing a secondary access point to the EYNF's main recreation area.

The construction of this road took place between the late 1950s, and the mid 1960s, connecting the PR-186 (El Verde Road) to the PR-191 road and the La Mina Recreation Area located in the centermost part of the forest.

Even though a formal determination of eligibility has not been made for this road, the assessment conducted by the Forest Service suggests that the road retains the necessary historic integrity to be included in the National Register of Historic Places (NRHP) under Criterion A. This is due to the association of the road to the wider historical context of the development of forest infrastructure during the early 1960s, which was implemented as part of Operation Outdoors (Wendzel et al., 2024) and the War on Poverty policies instated during the Johnson administration in the mid-1960s. The recent assessment performed by the Forest Service and others revealed that PR-9966 still retains several road features associated with the original construction of the road that are contributing elements to this property significance (bridges, culvert, guardrails, among others). Many of these road features are in great condition and still serve their function to the road. This determination was concurred by the Puerto Rico State Historic Preservation Office (PRSHPO) on June 2023 (SHPO 06-08-23-05). Along the road many vistas and rivers can be seen, constituting this road a scenic route. Many visitors use this road to reach the PR-191 and to visit the rivers found along the corridor while appreciating the vistas provided.

The Area of Potential Effects (APE) for the improvement undertaking will be circumscribed to 4.6 kilometers covered by the PR-9966 road (Figure 1).

The Federal Highways Administration (FHWA) and the United States Forest Service (FS) are the two federal agencies involved with this undertaking. The proposed action will be implemented by FHWA, on the federal lands managed by the Forest Service at El Yunque. The FHWA has been designated as the lead federal agency for this undertaking.

The agency is submitting an adverse effects determination for this undertaking.

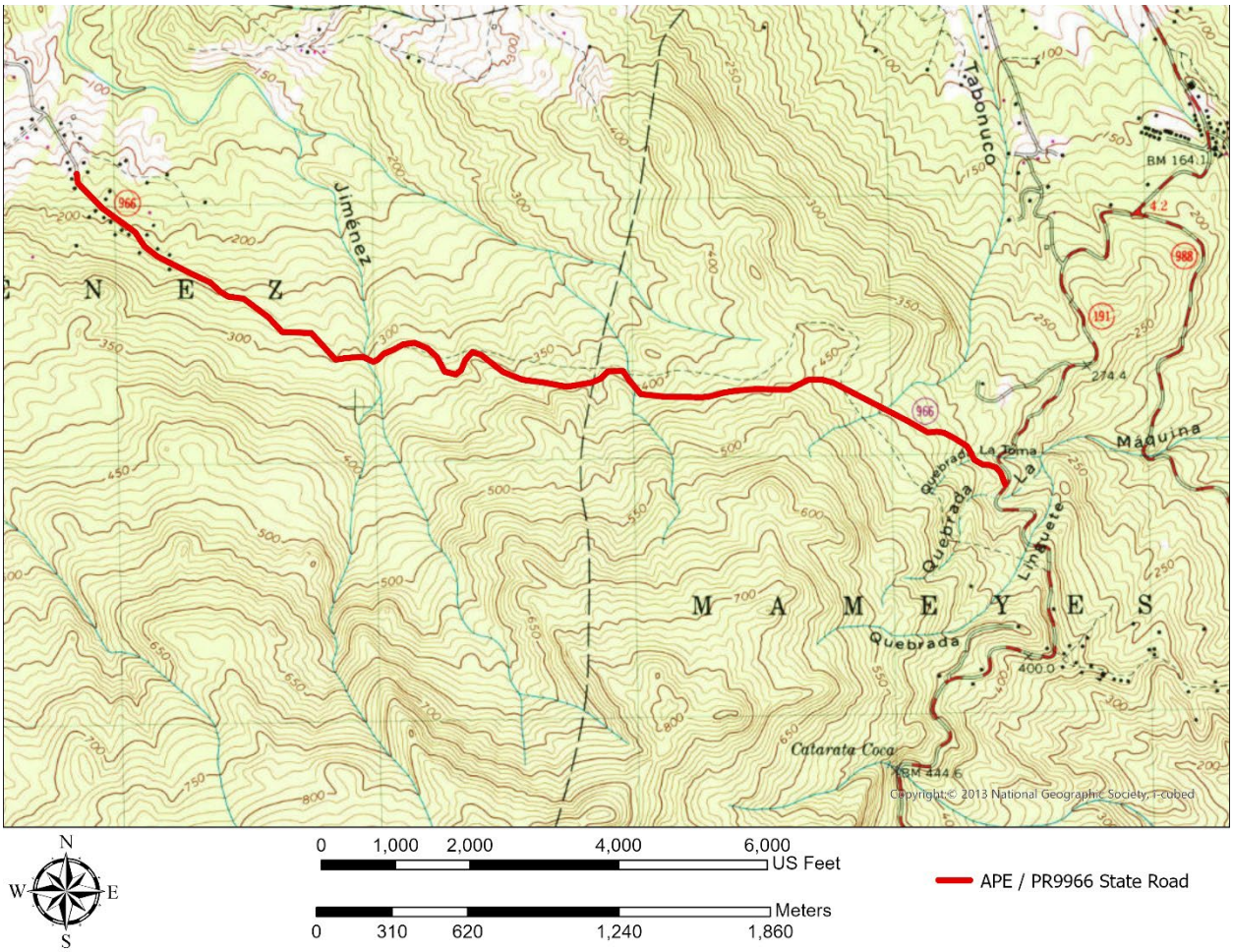

Figure 1. Map showing the undertaking's location and APE.

Project Description (Scope of Work)

The project will directly impact the 4.6 kilometers of state road PR-9966. An Interagency Agreement (IAA) between the FS and the FHWA calls for the repair to be conducted by the latter agency. The current conditions of the road have made it very difficult to traverse through due to severe deterioration of the road surfacing along its length. Additionally, various landslides and slope failures have made the road unstable on some sections and have even damaged some of the road features. As such, even though the road is currently open, its condition is poor and drivability by anything other than large, wheeled vehicles is limited. The inaccessibility of this road has restricted emergency egress through the route out of EYNF in cases of emergency. It has also reduced the access to the forest from nearby communities located to the west of the forest (Jimenez Ward and El Verde Ward).

The undertaking will involve three major actions (see attachment A for details):

1. Reconstruction of the full depth aggregate base and asphalt pavement.
2. Replacement of curbs and gutters
3. Removal and replacement of guardrail systems

Summary of actions:

Reconstruction of the full depth aggregate base and asphalt pavement:

One of the most visible damages to be repaired along the PR-9966 is its surfacing. Water runoff and effects of extreme weather events have created a vast quantity of potholes causing difficulties for navigating the road. The undertaking aims to reconstruct the surfacing of the road on its entirety. The repair action calls for the scraping of existing asphalt and subsurface aggregate until reaching native soil. A geotextile mesh will be placed to separate the natural soil surface from the new construction. 4 inches of new aggregate and 2 inches of asphalt pavement will be laid on top of the geotextile to form a new roadbed (Figure 2).

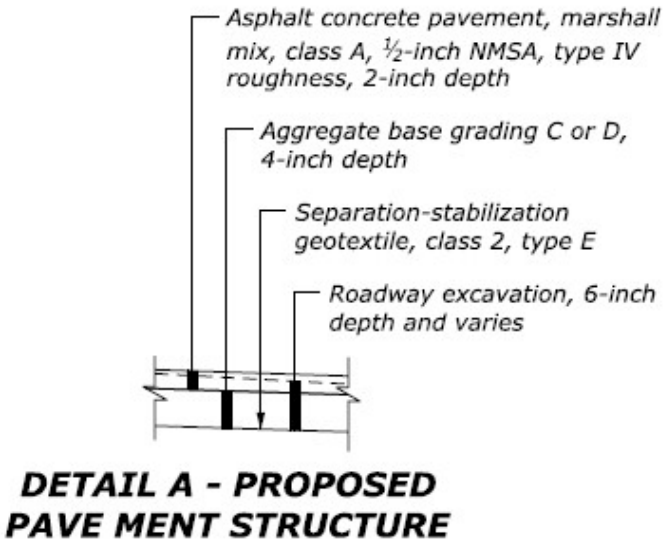

Figure 2. Snippet of undertaking's plans showing the asphalt reconstruction details.

Replacement of curbs and gutters:

The current curbs and gutters along the PR-9966 are made up of a poured concrete (Figure 3) and date to the original road construction. Time and wear have caused some damages to these features causing some of them to not function to capacity, which has compounded the water erosion issues suffered by the road. The undertaking seeks to replace these gutters with new concrete features in kind (Figure 4). These new curbs and gutters will help manage and divert water away from the roadway with the hope of preventing further erosion issues.

Figure 3. Plan view of current curbs & gutters along the PR9966.

Figure 4. Example of new concrete curbs & gutter design.

Removal and replacement of guardrail systems:

PR-9966 presents a non-continuous system of guardrails dating to the original construction of the road, with slight updates. The system is made up of galvanized steel rails directly attached to concrete posts or galvanized steel rails with wooden block dampers that link them to the concrete posts (Figure 5). This guardrail system has sustained damage throughout time due to the falling of trees and car accidents (Figure 6). This has caused for the steel rails and concrete posts to get bent beyond repair requiring replacement. In some sections, landslides caused by extreme weather events have destroyed part of the system (Figure 7). These guardrails will be removed to make way for the new ones to be installed. The undertaking aims to install a *Midwest Guardrail System (MGS)*. This system is composed of steel beams spaced at 25 feet intervals attached to steel posts with rubber dampers. These new guardrails will upgrade the safety system of the road to current highway standards.

Figure 5. Current guardrail system along the PR9966 road.

Figure 6. Example of damage to steel beams of the current guardrail system.

Figure 7. Guardrail damage caused by a landslide.

Historical context of the road

The PR-9966 development can be traced back to 1945 thanks to a United States Geological Survey (USGS) Topographical Map where it shows the route as an unimproved road and trail (Figure 8). The map also showed structures dotted along the route, which possibly accounted for houses along the unimproved transient way. The location of the road is referenced again in a correspondence dated to 1948 where the Forester in charge of the Caribbean region stated that they will be able to build an oxcart trail in said location (USDA, 1948).

The next reference of this road appears in a USGS map dated to 1952. In this map the road extends from the intersection with the PR-186 State Road and travels eastward but does not go as far as reaching the Forest Service land boundary (Figure 9). By this time the road now appears outlined as a light duty road. Furthermore, in a 1951 correspondence addressed to the Puerto Rico Aqueduct & Sewer Authority, it is stated that there is a pipeline in the location where the Forest Service is intending to build what is referred to as the Jimenez Road, now known as the PR-9966 (USDA, 1951). Throughout 1953 multiple correspondence was exchanged between the Forest Service and the Insular Government of Puerto Rico regarding the development of the Jimenez Road. On some of these letters the Forest Service stated how the construction of this road would be beneficial to the community and farmers of the Jimenez ward in Rio Grande (USDA, 1953a). The correspondence also highlighted the Forest Service desire to enter into a Cooperative Agreement with the Department of Public Works of the Insular Government for the completion and maintenance of the road. At this point, it was intended to extend the road to reach the Jimenez River western bank located within forest lands (USDA, 1953b).

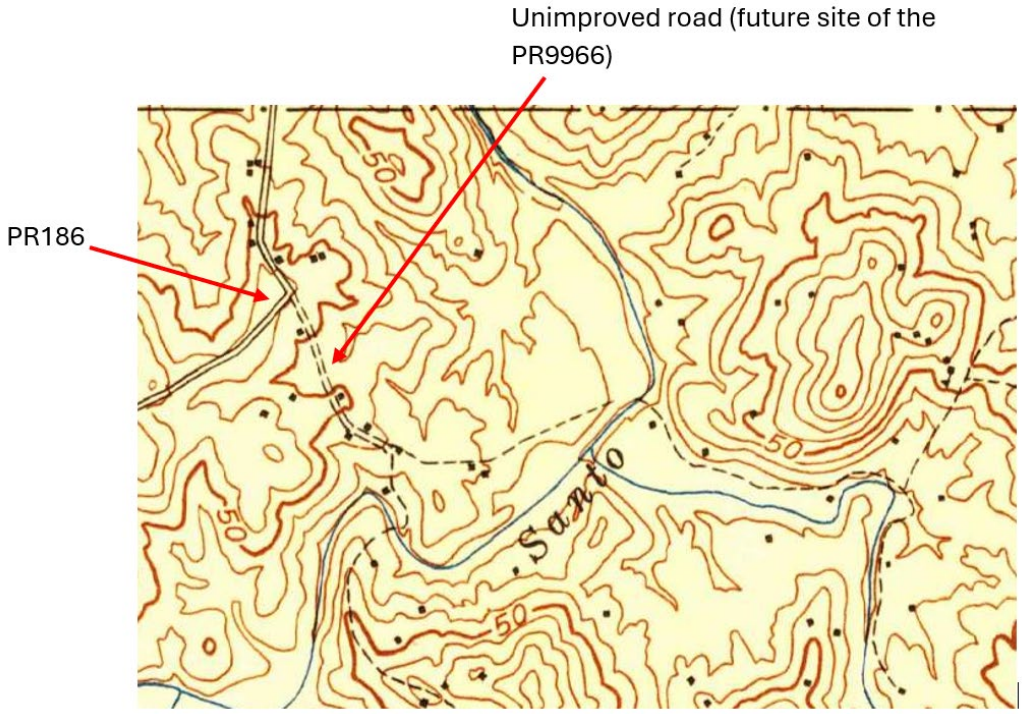

Figure 8. Snippet of 1945 USGS El Yunque Quadrangle map showing the PR186 road and the future site of the PR9966.

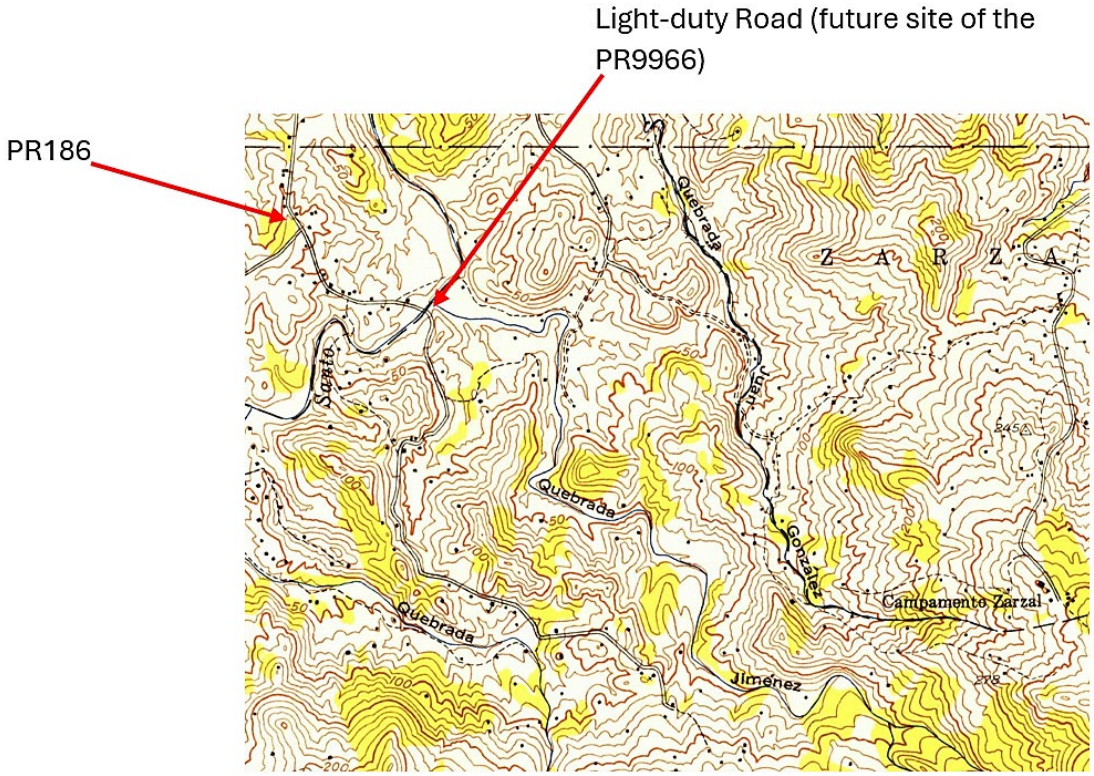

Figure 9. Snippet of 1952 USGS El Yunque Quadrangle map showing the PR186 road and the future site of the PR9966.

By 1954 the Forest Service had already completed the majority of the worked planned for the construction of the Jimenez Road (USDA, 1954a). On that same year, the agency signed an agreement with the War Emergency program of the Department of Public Works (DPW) for the improvement of the existing section of the Jimenez Road and the extension of the rest of the road to reach the forest boundary (USDA 1954b). Both parties agreed that the work would require at least 200 days for its completion. However, two years later the Forest Service construction inspector found that "… a considerable amount of the work still remained unfinished." (USDA, 1956a). The passing of Hurricane Betsy in 1956 delayed the project even further (USDA, 1956b). By 1959, the previously mentioned agreement with the DPW had been terminated due to lack of progress on the road construction (USDA, 1959).

Even though the agreement had been terminated, the FS still wanted to proceed with the project, stating that this road could also serve the function of "an alternate scenic route to El Yunque" (USDA, 1960). For this, the Forest Service entered into another agreement with the Public Works Department of Puerto Rico (USDA, 1961). This time, the agreement extended from 1961 to 1975 to allow breadth of time for the completion of the project. The terms of the agreement were similar to those outlined in the 1954 agreement, with the main goal being the completion of the road up until they reach the forest boundary. In 1961, the Forest Service received the plans for the construction of the Jimenez Road for review and approval (Department of Public Works, 1961). During the review period it seems negotiations occurred to modify the scope of work in order to extend the road development into the forest boundary to connect it to the PR-191 road located to the east (Department of Public Works, 1961b). The new redefined scope required the termination of the 1961 agreement, and the drafting of a new one that would increase the monies allocated to the project to cover the costs of the new expanded scope, which doubled the projected price of the original development plan (USDA, 1961b). It was not until June of 1965 that a new agreement was finally signed for the completion of the road (USDA, 1965) with the construction plans received in 1961 finally approved in 1966. The 1962 aerial photograph covering the area shows that then the PR-966 road only stretched as far as the forest boundary (Figure 10). The photograph shows the outline of the road much clearer than the other routes within the frame, suggesting that the extension of the road towards the forest was of recent completion, been the road clearly visible due to the clearing of the road and tree canopy during the construction. The lack of progress on the road extension into the forest land is also observable in the 1967 USGS quadrangle (Figure 11), which shows that the road only extended as far as the western bank of the Jimenez River, with the route continuing to be outlined as a trail. It is also on the 1967 map that the route is labeled with the 966-road number officially. It remains unclear when the road was redesignated from its original number of 966 to 9966.

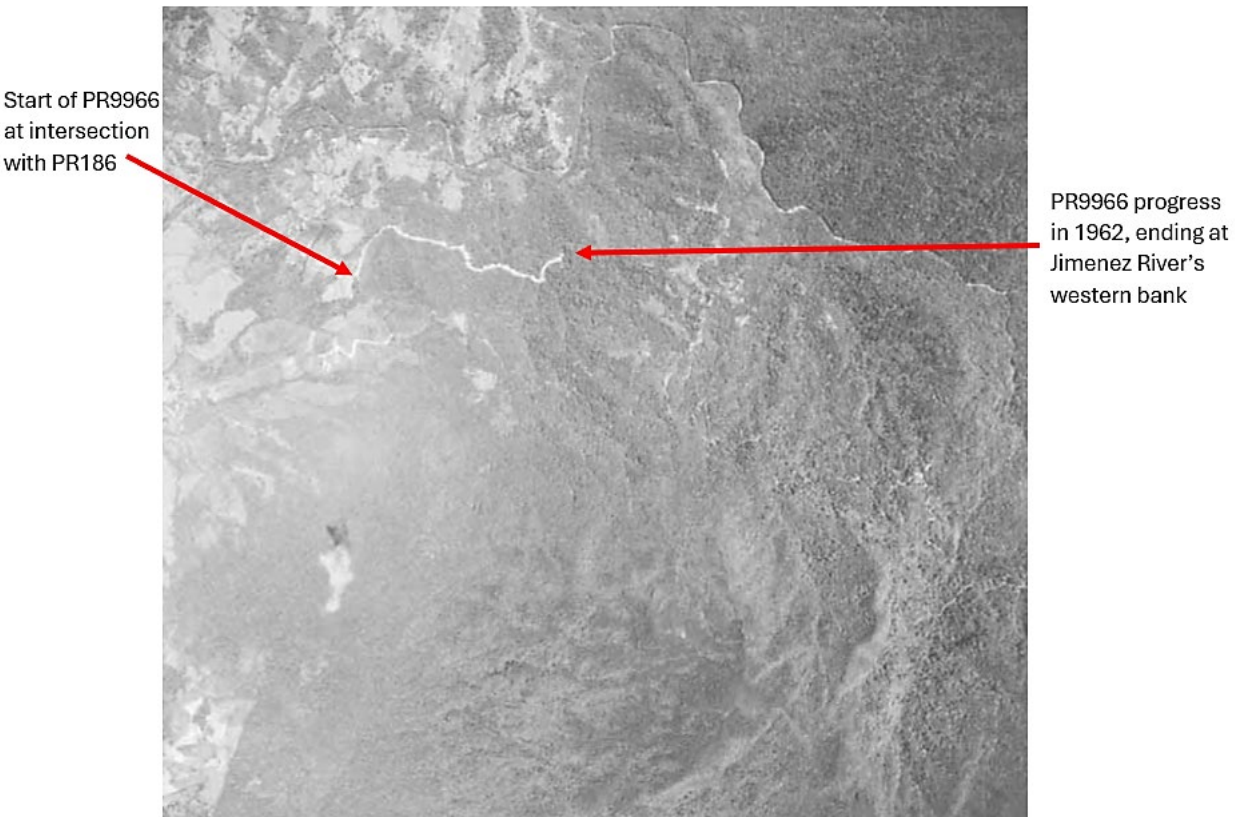

Figure 10. 1962 aerial photograph (1:20,000) showing the area of the PR996 within the EYNF.

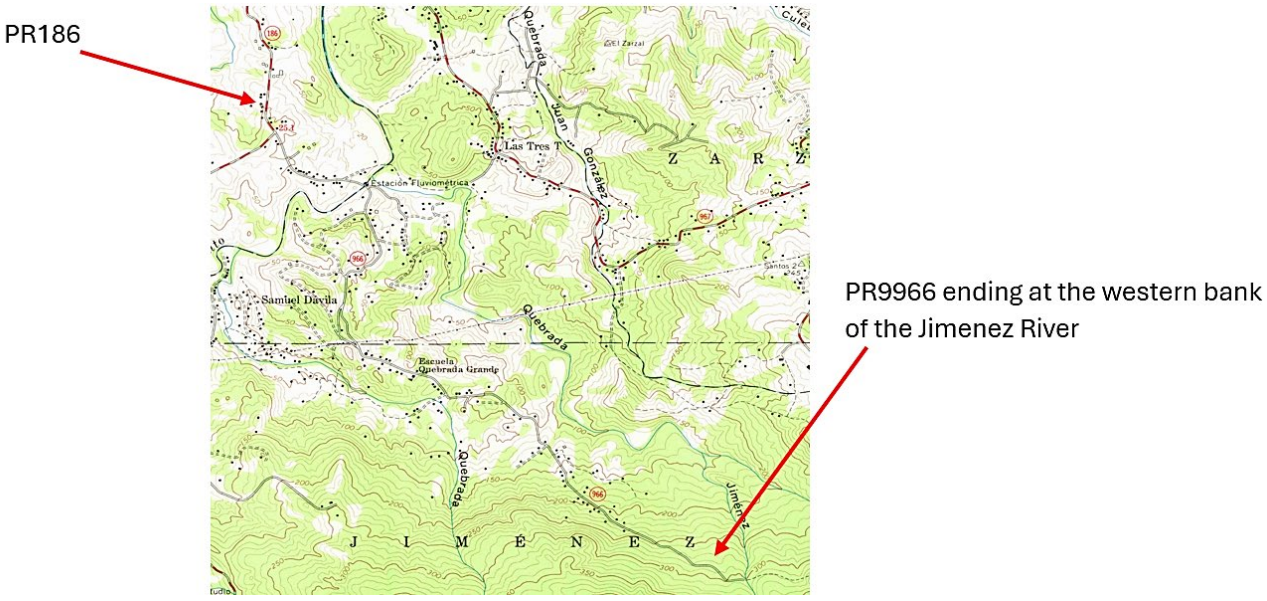

Figure 10.Snippet of 1967 USGS El Yunque Quadrangle map showing the PR186 road and the PR9966.

Aerial photographs dating to 1977 (Figure 12) show the route as completed, extending between the PR-186 and PR-191 roads. The canopy cover on the PR-9966 road on these photos shows a thicker coverage along the route when contrasted to the view on the 1962 photo, suggesting that the road had already been completed for some time. The existence of the completed route is documented in the 1982 topographic quadrangle, which shows the route as officially completed and operational as a full state road (Figure 13). Documentation of the on the ground implementation of the construction of the Jimenez Road between 1966 and 1982 was not found at the moment of this research. Nonetheless the reviewed dataset seems to suggest a completion date for the road somewhere around the early to mid-1970s.

Construction records outline that the road was built following the Telford Road method for the base foundation for the road with an asphalt pavement surface. The construction also implemented the edification of road features including the construction of bridges, culverts, ditches and guardrails. Most of these relied on the use of cast in mold or mass-produced features such as prefabricated concrete pipes and pre-casted guardrail posts. The use of these industrially mass-produced elements was typical for the post war period and was widely adopted and implemented as the standard throughout the nation. The use of these industrial materials has been extensively documented within the structural developments and modifications to road, trail and recreation infrastructure in the forest for the mid-20th century period. As such the utilization of standard designs and standardized materials contrasts greatly with the first period of infrastructure development at El Yunque that took place during the New Deal Era, and which relied almost entirely in the artisanal design and construction of infrastructure with a reliance on the use of local materials such as stone, and the onsite construction of reinforced concrete features.

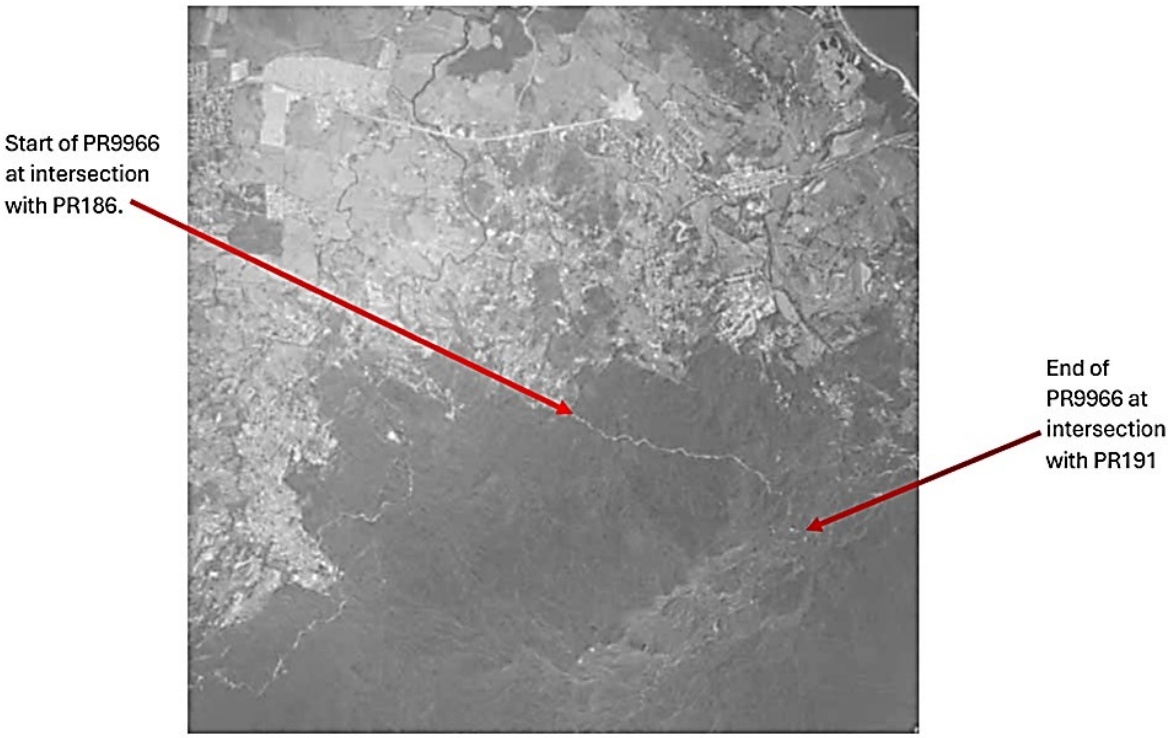

Figure 11. 1977 aerial photograph (1:55,000) showing the completed the PR996 road.

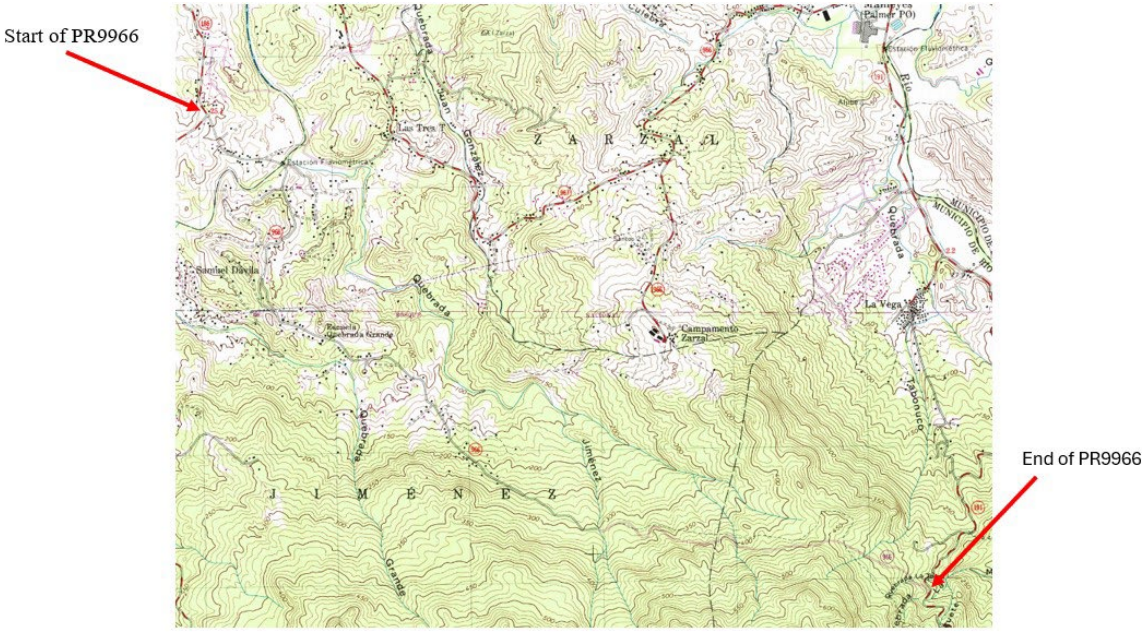

Figure 12. Snippet of 1982 USGS El Yunque Quadrangle map showing a completed PR9966.

Post completion, the route has endured damages, including major landslides, caused in vast degree by severe weather events. In 1998 Hurricane George damaged the road, including a major landslide that necessitated the construction of a fully anchored retaining wall near the entrance to the Puerto Rican Parrot aviary facilities operated by the Fish and Wildlife Service. These repairs along the road were implemented without severe modification to the layout of the road or its original features. Most recently the 2017 (Irma & Maria) and 2022 (Fiona) hurricanes exacerbated the poor condition of the road. Many of the most recent damages relate to erosion of the pavement, damage to guardrails and landslides. These have made the traversing of the road either impossible at some points in the past or extremely inconvenient in more recent times. Damage to the road and its features like the culverts and guardrail system (as previously shown) has steadily decreased the safety standards of the road for decades. This deteriorated condition has also severely hindered interconnectivity between the PR-186 and the PR-191 roads, and has limited emergency egress options, as well as community access to the forest.

Past Archaeological Work

The first archaeological work associated to the PR-9966 is in the form of a Cultural Resource Survey conducted in 2004 by then Forest Archaeologist, Jeffrey B. Walker. The survey was performed as part of a proposed underground utility corridor extending from the northern boundary of the EYNF along the PR-191 into the PR-9966 intersection. This underground utility corridor was proposed to provide electricity to the new Fish & Wildlife Service (FWS) aviary facilities for the Puerto Rican Parrot recovery project in construction at the time along the PR-9966 road. Walker conducted subsurface testing in the proposed construction area with some shovel test pits

excavated along the road. This resulted in a Section 106 consultation submitted to the Puerto Rico State Historic Preservation Office (SHPO 04-23-04-01). The survey and consultation process determined that the construction actions were going to have an Adverse Effect on a CCC era trail eligible for listing in the National Register of Historic Places (NRHP), as well as section of the historic PR-191 road. The adverse effects were mitigated in accordance with a memorandum of agreement between the EYNF and the PRSHPO (04-MU-11081600-020). A NRHP evaluation for the PR9966 was not made at this time since it still had not reach the 50-year mark then.

In 2020, the Federal Highways Administration (FHWA), conducted a cultural resource survey along six roadways within the EYNF, the PR-9966 road included. This survey was done to identify cultural resources potentially located along these roadways to take them into consideration when conducting the repairs and restoration to these corridors. The mentioned survey excavated 11 shovel test pits along the road to identify any previously undiscovered cultural resource or archaeological sites. All their shovel test pits yielded negative results (Goodwin & Associates, 2020).

In 2021, the FWS proposed the installation of an underground fiber optics cable to provide their aviary facility with broadband internet. Draft designs called for the installation of a fiber optic line along a trench to be dug along the PR-9966 road. Heritage Program Manager, Raymond Feliciano, determined that some of the original road features could be affected by that undertaking. As such, Feliciano conducted a pedestrian survey of the road to identify and document these features (USDA, 2021). This survey confirmed that the road features observed on the road dated to the original construction of the route, following the construction plans prepared in 1966 (as mentioned in the Historical Overview section of this document). The survey found that the western section of the road still retained sufficient integrity related to the construction period during the early 1960s suggesting that the road could be considered eligible for inclusion in the NRHP within the historical context of significance for the second wave of infrastructure and access development in El Yunque National Forest, which took place as part of the Operation Outdoors and War on Poverty initiatives implemented in the early 1960s.

As planning progressed throughout the fiber optics undertaking, in May 2023, Archaeologist, Jeffrey B. Walker was contracted by the FWS to perform an official survey of the road to inform the Section 106 consultation associated with the fiber optic undertaking. Walker used Feliciano's survey notes to verify and confirm that the condition of the original road features and determine the level of effects on them by the undertaking. The survey and subsequent analysis of effects performed in line with Walker's survey determined that the proposed installation of the fiberoptic line was not going to disturb the existing road infrastructure (Walker et al., 2023), thus a No Adverse Effect determination was issued by government for the proposed undertaking. Walker determined that the road still retained a high level of integrity in all aspects (design, material, workmanship, location, setting, feeling and association) to make it eligible to the NRHP under Criterion A due to its relation to a second post-CCC/New Deal Era wave of recreational development on the forest. The PRSHPO concurred with these determinations in June of that same year (SHPO 06-08-23-05).

Current Project Assessment

Upon issuance of the preliminary plans developed by the FHWA outlining the 30% designs for the currently proposed road improvements to remediate damages caused by Hurricane Fiona, the EYNF's Heritage Program personnel proceeded to analyze and evaluate the effects the actions of the undertaking may have on the road eligibility potential. The proposed undertaking by the FHWA calls for the replacement of portions of the original guardrail system, the removal and replacement of the original 1960s concrete curbs and gutters, and the complete re-surfacing along the entire length of the PR-9966. Because of this, Heritage Program Manager, Raymond Feliciano, along with Forest Archaeologist, Jan Pérez, and archaeology interns, Nicole Seda and Mel Carrero, resurveyed the road to document the conditions of the 12 sections of concrete curbs and gutters outlined for replacement, as well as the existing 28 sections of original guardrails scheduled for replacement. The survey confirmed that all the inspected road features dated to the original construction period of the road. The survey documented the features with digital photographs to supplement the original as built designs that were located in the archives. The survey documented that the PR-9966 was built following the designs as planned and laid out back in the mid-1960s, and that the road still retains its original integrity. The survey also documented damages suffered by these features, including damages suffered by the guardrails and guardrail posts due to falling debris and road failures (Figure 14), as well as minor damages to the curbs. Notwithstanding the minor damages observed on some of the features, the survey found that the road still retains a high level of integrity that still supports its listing as outlined below.

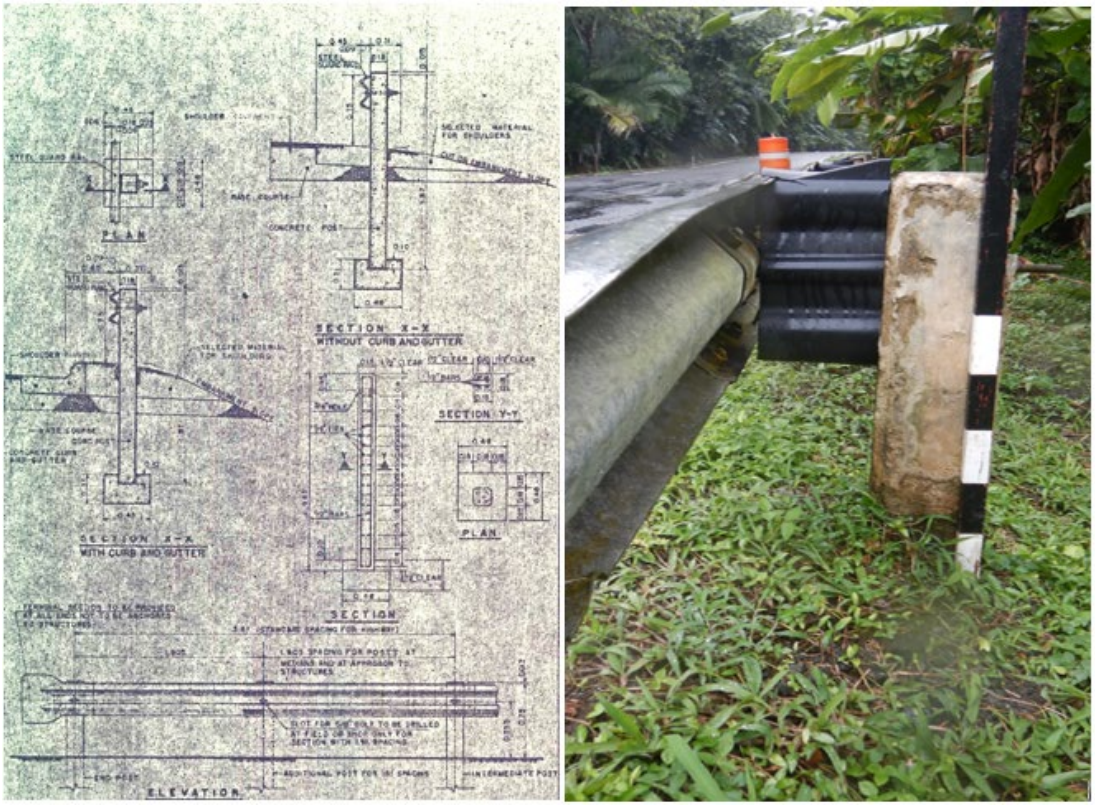

Figure 13. Guardrail details on 1966 plans; guardrail section in PR9966.

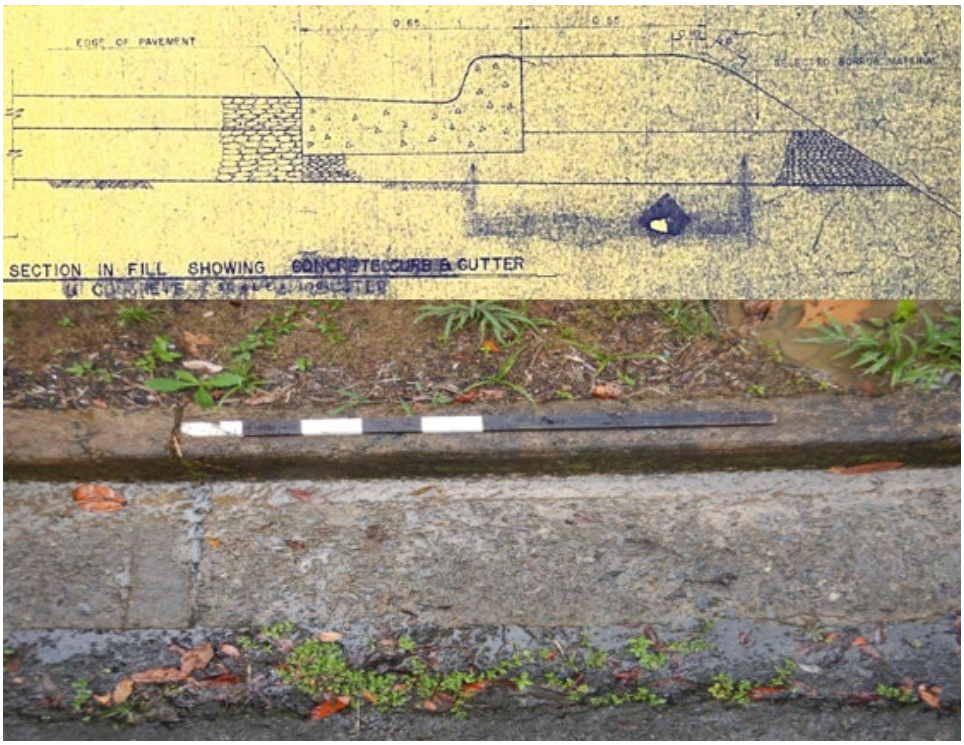

Figure 14. Curbs & gutters details on 1966 plans; curbs & gutters section in PR9966.

National Register Eligibility Assessment

In line with the concurred determination issued in 2023, the Forest Service suggests that State Road PR-9966 is eligible for inclusion under criterion A due to its association with the early to mid-1960s infrastructure developments that took place to expand and modernize public access and recreation opportunities within the forest. These initiatives and undertakings involved improvements and modifications to already existing recreation infrastructure built during the New Deal Era by the CCC, as well as the planning and development of new infrastructure in the forest, including the expansion of new access routes such as road and trails within the forest. These initiatives which commenced as part of the late 1950's and early 1960's Operation Outdoors started the process of planning and development of enhancements and modernization of public access infrastructure in public lands, including Puerto Rico. "Operation Outdoors" (Wendzel et al., 2024) initiatives were further supported by initiatives implemented during the Johnson administration War on Poverty era, including the construction of forest infrastructure such as the Caimitillo Picnic Area at El Yunque. Dating to the same "Operation Outdoors" and War on Poverty era we can also list the construction of State Roads PR-988, the construction of Yokahu Tower, modernization and reconstruction of parking and vista areas throughout the forest, and the modification of CCC era infrastructure such as the Sierra Palm cabins to turn them into picnic sites, in line with the use trends of the mid-20th century. These initiatives served as part of a master national plan to increase public access to recreation in public lands in line with the recreation trends and desires of the post Second World War population of the United States (ibid.). Within this

framework the PR-9966 road significance is granted to the road for being part of a series of recreation infrastructure development within the context of the mid 1960s era (NPS, 2020).

Survey of the road found that the road retains almost all of its original features and integrity of all aspects, including materials, design and workmanship to merit it eligibility for listing in the NRHP for the previously mentioned association.

Determination of Effects

Given that the proposed undertaking as designed calls for the replacement of original, and in many instances still functioning road features that date to the original construction of the road; and given that the road was found to retain a high level of integrity on all aspects which supports its eligibility potential under criterion A for its association to the "Operation Outdoors" and War on Poverty era expansion and development of public access to the forest; the FHWA in concurrence with the Forest Service believes that this undertaking will have an **adverse effect** on the eligibility status of the road.

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