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## **Criteria for Multimodal Project Rehabilitation vs. Maintenance**

FINAL REPORT  
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Submitted by

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In cooperation with

New Jersey  
Department of Transportation  
Bureau of Research

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## EXECUTIVE SUMMARY

Cambridge Systematics, Inc. and Fitzgerald & Halliday, Inc. (the “research team”) undertook research on what, if any, distinctions state DOTs, U.S. DOT, and private stakeholders have established between “maintenance” projects or activities and “rehabilitation” projects or activities for rail or airports. The purpose of this project was to help the Bureau of Multimodal Grants and Programs resolve conflicting information regarding the types of projects that qualify for grants supported by the New Jersey Transportation Trust Fund (TTF). Specifically, the threshold between “routine (or scheduled) maintenance,” which the TTF cannot support, and “rehabilitation” or “permitted maintenance” project, which can be supported by the TTF, was not well defined. The goal of this research was to develop criteria for NJDOT to use that reflect the spirit of the TTF, State Airport Aid Grants Program, and Rail Freight Assistance Program legislation and rulemaking, are harmonious with other states, and rational for grant applicants.

The research approach consisted of the following steps.

- Examine state-of-the-practice definitions for the terms “routine/scheduled maintenance,” “rehabilitation,” and “reconstruction,” based upon the body of transportation planning and engineering literature, laws and statutes of other states and federal agencies;
- Prepare recommended policy definitions of these terms for NJDOT to incorporate into office policy (and into rulemaking and legislation if necessary); and
- Develop recommended criteria for classifying candidate projects (or components of candidate projects) for the Rail Freight Assistance Program and Airport Improvement Program as maintenance or rehabilitation.

The literature reviews and interviews yielded the following conclusions:

- The usage of terms for maintenance and rehabilitation for both aeronautics and rail projects, within the literature and in their application in the industry, illustrate that there is significant overlap in the way these terms are deployed. Thus, the terms are not standardized and cannot be considered “terms of art” in most contexts. Rail contractors have significant latitude in which term they deploy to describe an improvement activity.
- Because of this overlap, maintenance and rehabilitation activities are often combined into one program.
- Distinctions between maintenance and rehabilitation are made, either by definition or by practitioners’ interpretations, suggest that rehabilitation activities require significantly greater effort and/or cost, result in a longer extension of service life than maintenance projects, and/or result in an increase in capacity or system performance.

- Examples of criteria used to distinguish maintenance and rehabilitation projects include:
  - Whether the activity is part of a regularly-scheduled maintenance program;
  - Whether the activity is funded using an annual maintenance or operating budget;
  - Whether the activity extends the service life of an asset beyond a specified threshold;
  - Whether the activity exceeds a threshold for the types of activities completed or level of effort, for example, whether a project involves replacement of a specified number of ties, or includes milling existing pavement surfaces, etc.
  - Whether the activity is conducted as an immediate response to a fault or defect found during inspection, or requires planning and project development; and
  - Whether the asset can remain in operation while the activity is being completed, or if the asset must be taken out of service.
  - Whether the project results in an increase in capacity, speed and other metrics of performance.

Guided by the findings of the literature reviews and interviews, the research team crafted a series of “strawman” definitions for maintenance and rehabilitation projects, and lists of activities included under each definition, that would be eligible or ineligible for support from NJDOT’s State Airport Aid Grants Program and Rail Freight Assistance Program. With feedback from NJDOT staff, the strawman definitions were revised and crafted into recommended policy definitions and associated lists of activities, which establish “thresholds” that candidate projects must meet in order to be considered eligible for support. The recommended definitions are:

### **Maintenance (Airports)**

Maintenance activities, which are not eligible to receive funding from the New Jersey Transportation Trust Fund, consist of spot-improvements or removal of debris in order to sustain good and serviceable condition of airport facilities. Activities include: correction of minor pavement defects, which do not require milling, re-paving, or patching of the pavement surface; re-painting of existing pavement markings; maintenance of in-pavement lighting; drainage cleaning; or removal of debris.



## **Rehabilitation (Airports)**

Rehabilitation, or “permitted maintenance,” projects aim to restore airport facilities, which may have been damaged due to unpreventable deterioration or natural disaster, to their original, usable condition and/or extend the useful life of the asset. Activities exceed the scope of normal operating maintenance, and include significant repairs to pavement surfaces, changes to pavement marking patterns, replacement or installation of new in-pavement lighting, installation of new or modifications to existing drainage systems.

## **Maintenance (Rail)**

Maintenance activities occur as part of a regular cycle of inspection, identification of flaws and deficiencies, and repair or replacement of crossties and tie plates at regularly-scheduled maintenance intervals. Maintenance activities do not significantly improve the level of service with regard to speed or loaded railcar weight capacity, nor do they effectively extend the service life of the asset.

## **Rehabilitation (Rail)**

Rehabilitation (or “permitted maintenance”) includes repair or replacement of rail infrastructure with the objective of significantly extending the service life of the asset and/or result in an improvement in the level of service of a rail line, with respect to maximum allowable speed or weight capacity. Rehabilitation projects represent activities that are beyond what a railroad typically considers as part of a routine or scheduled maintenance program, and may require planning prior to initiating the project.

With these definitions, NJDOT should:

- Adopt these as policy definitions, with the intention of defining “rehabilitation” projects as eligible for assistance under the State Airport Aid Grants Program and Rail Freight Assistance Program, and “maintenance” projects as ineligible for assistance under these programs.
- Include the definitions and lists of applicable projects and activities for applicants’ reference in the System for Administering Grants Effectively (SAGE) program, and in the application material for each the State Airport Aid Grants Program and Rail Freight Assistance Program.
- Add the application “questions” provided in this report as requests for information in both the State Airport Aid Grants Program and Rail Freight Assistance Program online grant applications, which prompt applicants to select the eligible activities of their candidate projects.
- Conduct audits annually to assess whether the definitions and criteria are sufficiently screening out ineligible projects. These audits should review submitted applications, and identify which applications are for ineligible project types. Some follow-up outreach to grant program applicants may be desired to

determine whether the definitions and criteria are effectively understood by applicants.

## **BACKGROUND**

The New Jersey Department of Transportation (NJDOT) offers several grant programs to assist owners and operators of private airports, rail lines and spurs, and maritime facilities in the state. The grants programs are funded in part by the New Jersey Transportation Trust Fund (TTF). According to state law, the TTF may fund only rehabilitation, or “permitted maintenance” activities and projects, and cannot be used to fund routine or scheduled maintenance. The threshold between routine or scheduled maintenance and permitted maintenance has historically not been well or consistently defined.

To resolve this conflict the research team evaluated relevant New Jersey legislation and rules, sought input from current national research on the topic, and conducted a review of other states’ funding programs to identify a “standard” delineation between maintenance and rehabilitation. The goal of this research was to develop criteria for NJDOT to use that reflect the spirit of the TTF and Multimodal Grants program legislation and rulemaking, are harmonious with other states, and rational for grant applicants.

## **OBJECTIVES**

The purpose of this project was to help the Bureau of Multimodal Grants and Programs to resolve conflicting information regarding the types of projects that qualify for grants supported by the New Jersey TTF. The research objectives included:

- Examine state-of-the-practice definitions for the terms “routine/scheduled maintenance,” “rehabilitation,” and “reconstruction,” based upon the body of transportation planning and engineering literature, laws and statutes of other states and federal agencies;
- Prepare recommended policy definitions of these terms for NJDOT to incorporate into office policy (and into rulemaking and legislation if necessary); and
- Develop recommended criteria for classifying candidate projects (or components of candidate projects) for the NJDOT Multimodal Grants program as maintenance or rehabilitation.

## **INTRODUCTION**

Cambridge Systematics, Inc. (CS) and Fitzgerald & Halliday, Inc. (FHI) partnered with NJDOT to conduct a literature search of state and federal regulations and policies, state-of-the-practice research studies, manuals, and guides to identify “consensus” definitions or descriptions of maintenance and rehabilitation programs and activities, if

one exists. CS and FHI then conducted interviews of NJDOT staff, staff of other states' DOTs, USDOT, and private sector to gain an understanding of existing regulatory or policy definitions, how those definitions are interpreted in practice in other jurisdictions, and whether any of those interpretations are common across jurisdictions or stakeholder groups. The findings of the literature review and interviews were used to develop draft "strawman" definitions and criteria of maintenance and rehabilitation projects, as applicable to the State Airport Aid Grant Program and Rail Freight Assistance Program. With feedback from NJDOT, revised, recommended definitions and criteria were developed.

## SUMMARY OF WORK PERFORMED

At the direction of NJDOT, the research team investigated regulatory and policy definitions in New Jersey, other states, and at the federal level, and crafted recommended definitions and criteria for use in NJDOT's State Airport Aid Grant Program and Rail Freight Assistance Program. The research project consists of three tasks:

1. Conduct literature review and interviews;
2. Develop recommended definitions and threshold criteria, establishing bounds for which activities qualify as rehabilitation versus maintenance, and appropriate grant application questions; and
3. Prepare a final report documenting work steps and recommendations.

## LITERATURE REVIEW

The consultant team reviewed more than twenty documents, including New Jersey and Federal legislation and rules, "state-of-the industry" research from sources such as the Transportation Research Board, Institute of Transportation Engineers, and the American Railway Engineering and Maintenance-of-Way Association (AREMA). The objective of this review was to identify consensus or central tendency among the information sources regarding thresholds between maintenance and rehabilitation activities. Because the aeronautics and rail networks rely on different infrastructure, with different ownership arrangements, and different maintenance needs and schedules, the literature review documents and findings were separated by mode.

Table 1 – List of Documents Reviewed

Title	Publishing or Authoring Entity	Mode	Date
Guidelines and Procedures for Maintenance of Airport Pavements (AC 150/5380-6B)	Federal Aviation Administration	Aeronautics	2007

FAA Airport Compliance Manual (Order 51960.6B)	Federal Aviation Administration	Aeronautics	2009
Airport Pavement Management Program (AC 150/5380-7A)	Federal Aviation Administration	Aeronautics	2006
Airport Improvement Program	Federal Aviation Administration	Aeronautics	1996
“Effective Practices for Preparing Airport Improvement Program Benefit-Cost Analysis,” Airport Cooperative Research Program Synthesis 13	Transportation Research Board	Aeronautics	2009
“Common Airport Pavement Maintenance Practices,” Airport Cooperative Research Program Synthesis 22	Transportation Research Board	Aeronautics	2011
U.S. Railroad Rehabilitation and Improvement Financing regulations (RRIF), including 45 USC § 821, 45 USC § 822, 45 USC § 823, and 49 CFR part 260.	United States Code	Rail	1999
New Jersey Rail Freight Assistance Program Enabling Legislation (Title 16, Chapter 53C)	State of New Jersey	Rail	2009
“State of Good Repair: Prioritizing the Rehabilitation and Replacement of Existing Capital Assets and Evaluating the Implications for Transit,” Transit Cooperative Research Program Report 157	Transportation Research Board	Rail	2012
Preserving Freight and Passenger Rail Corridors and Service,” National Cooperative Highway Research Program Synthesis 374	Transportation Research Board	Rail	2005
Practical Guide to Railway Engineering	The American Railway Engineering and Maintenance-of-Way Association	Rail	2003

2013 Manual for Railway Engineering	The American Railway Engineering and Maintenance-of-Way Association	Rail	2013
Track Maintenance Costs on Rail Transit Properties: TCRP Web-Only Document 43	Transportation Research Board	Rail	2008
Rail Terminology	Washington State Department of Transportation	Rail	Accessed 2013
Capital Renewal and Deferred Maintenance Programs	Association of Higher Education Facilities Officers	Buildings/Facilities	2009
Glossary of Transit Terminology	American Public Transportation Association	Multiple	1994
New Jersey Transportation Trust Fund Statute (NJSA 27:1B) and amendments	State of New Jersey	Multiple	1984
“Dedicated Revenue Mechanisms for Freight Transportation Investment,” National Cooperative Freight Research Program Report 15	Transportation Research Board	Multiple	2012
“Performance Measures for Freight Transportation,” National Cooperative Freight Research Program Report 10	Transportation Research Board	Multiple	2011
“Designing Safer Roads: Practices for Resurfacing, Restoration, and Rehabilitation,” Transportation Research Board Special Report 214	Transportation Research Board	Highway	1987
“Geometric Design Practices for Resurfacing, Restoration, and Rehabilitation,” National Cooperative Highway Research Program Synthesis 417	Transportation Research Board	Highway	2011

## **Aeronautics**

The consultant team performed a literature review of legal and academic sources that helped to determine the distinctions between maintenance and rehabilitation activities at airports. The following are key findings from the review.

### **Findings Related to Maintenance**

The following types of activities were noted within the literature as examples of maintenance activities:

- Much of the literature reviewed did not specifically define “maintenance” or “maintenance activities” and combines maintenance with rehabilitation or repair.
- Federal grant agreements/obligations require airport sponsors to preserve and maintain airport facilities, including pavement, as designated on an Airport Layout Plan (ALP), in a safe and serviceable condition.
- Federal airport agreements require the sponsor to carry out a continuing program of preventive and remedial maintenance. The maintenance program is intended to ensure that the airport facilities are at all times in good and serviceable condition to use in the way they were designed.
- Pavement maintenance treatments do not substantially modify the existing pavement surface layers.
- Corrective maintenance activities are performed after pavement defects occur (e.g., loss of pavement friction, rutting, or cracking).
- Specific pavement maintenance activities are part of the overall Airport Pavement Management System (APMS).
- Routine or operational maintenance activities do not substantially improve the pavement surface. Instead, they include activities such as removal of debris, snow and ice control, repainting of pavement markings, maintenance of in-pavement runway lights, and removal of rubber deposits. Routine maintenance also includes cleaning, filling, and/or sealing of longitudinal and transverse cracks, grading pavement edges, maintaining drainage systems, pavement patching, seal coats, and remarking paved areas.
- Routine maintenance projects do not include those projects where the pavement condition has deteriorated to such a point that a maintenance project is no longer cost effective and a capital improvement project is required. In many cases a pavement rating system or pavement management system is in place to evaluate and/or monitor the condition of the pavement.

- Temporary maintenance treatments are designed to hold the pavement surface together until more permanent or substantial rehabilitation takes place. Temporary maintenance is also called holding maintenance or stopgap maintenance. Temporary maintenance treatments may be necessitated by the timing of future rehabilitation or reconstruction activities or by a lack of funds.

### **Findings Related to Rehabilitation**

The following are the characteristics of projects that are considered rehabilitation as described in the literature:

- The Federal Aviation Administration (FAA) Airport Improvement Program (AIP) defines reconstruction, rehabilitation, pavement overlays, or major repairs of facilities and equipment as those that are considered permanent, with a 20-year life expectancy. These are eligible capital costs within the AIP. Specific rehabilitation projects include airfield paving, lighting equipment and related electric work, fuel farm work and utilities, among others.
- AIP-eligible work items under airfield paving include construction, reconstruction, or rehabilitation of runways, taxiways, and apron areas. For airfield lighting equipment and related electrical work, eligible items include the installation, alteration, and rehabilitation of these facilities. Fuel farm eligibility includes new construction of fuel farms and the rehabilitation of existing fuel farms to ensure that they are up to operating standards. Utility eligibility varies but does allow the rehabilitation of existing utility systems to support the aeronautical use portions of certain airports.
- Pavement rehabilitation is undertaken to restore pavement to its original condition using rehabilitation treatments such as pavement overlays and the replacement of failed Portland cement concrete (PCC) slabs.
- Pavement rehabilitation is undertaken to substantially improve the pavement condition.
- The boundary between maintenance and rehabilitation treatments is not well defined. A thin overlay, for example, may be considered to be either a maintenance or a rehabilitation treatment according to different agencies. A full-depth slab repair is generally considered a rehabilitation project.
- Typically, rehabilitation treatments add or replace one or more pavement surface layers. In this case, milling and re-paving would be considered a rehabilitation project.

### **New Construction or Capital Projects**

- New construction was not defined in much of the literature reviewed.

- Similar to rehabilitation, the FAA's AIP generally defines capital improvements as those that are permanent, with the intention of having a life expectancy of 20 years.

## **Rail**

The consultant team performed a literature review of legal and academic sources that helped to elucidate the distinctions between maintenance, rehabilitation, and construction activities from the perspective of railroads. The following are key findings of the literature review relevant to rail maintenance and rehabilitation activities.

### **Findings Related to Maintenance**

The following types of activities were noted within the literature as examples of maintenance activities:

- Routine activities including planned inspections and repairs that are completed in response to deficiencies discovered by those inspections.
- Actions that are useful for preserving or extending the lifespan of an asset.
- Actions that are required for maintaining a state of good repair.
- Activities that are accounted for in an organization's annual operating budget.
- Several sources make distinctions between "routine," "scheduled/programmed," or "preventative" maintenance, which consists of regularly-scheduled maintenance activities and "crisis" maintenance which corrects defects due to natural disasters, crashes or other accidents, or failure of the infrastructure.
- Research suggests that taxes and fees that tie more directly to imposed maintenance costs such as ton-mile taxes would help to crystalize the understanding of impacts of freight activity. This could help to differentiate maintenance costs from other types of activities. The New Jersey Transportation Trust Fund does not have the legal capacity to cover maintenance, however.

### **Findings Related to Rehabilitation**

The following are the characteristics of projects that are considered rehabilitation as described in the literature:

- Rehabilitation projects are typically described as major events that have a discrete identifiable goal and a definitive start and end date.
- Projects described as having a "onetime investment," the effects of which would last for "five years or more" are labeled as rehabilitation projects eligible for funding under New Jersey Freight Assistance Program Enabling Legislation. Several other literature sources describe rehabilitation as activities to extend the



service life of an asset, which are not included in normal operating or maintenance budgets.

- Projects can be designated as rehabilitation in lieu of maintenance if they adhere to specific technological approaches for lengthening the life of an asset.

### **New Construction or Capital Projects**

- Projects classed as rehabilitation cover a wide range of projects that might be better termed new construction. For example, the restoration of dilapidated partially functional rail can be considered a rehabilitation project. The research team did not find examples, however, of the term “rehabilitation” being used when restoring service to an abandoned line or an abandoned corridor. New assets on an existing line including new sidings or turnouts would also be considered new construction.

### **Other Modes**

Several documents related to highway and bridge maintenance were also reviewed. Although these modes are not the subject of this research task, there was the potential for literature addressing these modes to supply guidance relevant or supplemental to the literature on aeronautics and rail. Key helpful findings related to highways and bridges include:

- The Highway Economic Requirements System (HERS), an FHWA tool that helps state DOTs identify the most cost-effective investments needed in order to achieve desired highway system performance levels, uses a definition of maintenance as the average investment needed to maintain delay and travel costs. In other words, maintenance is defined as the investment needed to maintain the status quo. The National Bridge Investment Analysis System (NBIAS) for bridge maintenance uses an analogous system that maintenance refers to maintaining current assets in their present condition.
- The Association of Higher Education Facilities Officers defines several uses for maintenance funds for academic facilities, in addition to “scheduled maintenance,” including:
  - “Major maintenance,” which consists of major repairs or renovations that are not funded by normal maintenance resources. This definition appears to be more consistent with definitions of “rehabilitation” in other documents;
  - Capital renewal and replacement, which extends the service life of an asset, but is not included in the annual operating budget; and
- Functional improvements, which includes modifications and enhancements to a facility using maintenance funds.

## INTERVIEWS WITH PUBLIC AND PRIVATE STAKEHOLDERS

Because the Literature Review did not yield standard “state of the practice” definitions that could serve as a basis for developing a distinction between maintenance and rehabilitation for New Jersey’s State Airport Aid Grants Program and Rail Freight Assistance Program, the research team reached out to federal, New Jersey, other states, and private sector engineers, planners, and grants program managers. The team sought input on their interpretation of federal and state rules and regulations, industry standards, and practice. Table 2 lists the persons interviewed.

Table 2 – List of Interviewees

<b>Agency or Company</b>	<b>Name</b>	<b>Office/Title</b>	<b>Mode</b>
Federal Aviation Administration	Lori Pagnanelli	Eastern Region Aviation District Office Manager	Aeronautics
Federal Railroad Administration	Barbara Barr	Railroad Rehabilitation and Improvement Financing Program Manager	Rail
Federal Railroad Administration	Michelle Mulanger	Deputy Regional Manager, Region 1	Rail
Federal Railroad Administration	Trevor Gibson	Transportation Analyst	Rail
New Jersey Department of Transportation	Bhavin Kapadia	Multimodal Grants and Programs	Multiple
New Jersey Department of Transportation	Gary Brennfleck	Multimodal Grants and Programs	Multiple
New Jersey Department of Transportation	Miki Krakauer	Bureau of Freight Services	Rail
New Jersey Department of Transportation	Todd Hirt	Railroad Engineering and Safety	Rail
New Jersey Department of Transportation	Max Patel	Aeronautics	Aeronautics
New Jersey Transit	Rich Wisneski	Acting Director, Rail Contracts	Rail
New York State Department of Transportation	Raymond Hessinger	Director, Freight and Passenger Rail Bureau	Rail

New York State Department of Transportation	Bill Meyer	Aviation Bureau	Aeronautics
Maine Department of Transportation	Nathan Moulton	Director, Rail Program	Rail
Michigan Department of Transportation	Kris Foondle	Office of Rail	Rail
North Carolina Department of Transportation	Jon Dees	Rail Division	Rail
Ohio Rail Development Commission	Lou Jannazo	Chief of Project Development	Rail
Ohio Department of Transportation	David Dennis	Airport System Planning and Grants Manager	Aeronautics
Virginia Department of Aviation	J. Michael Swain	Manager, Engineering Section	Aeronautics
Washington State Department of Transportation	Eric Johnson	Airport Construction and Grants Program Manager	Aeronautics
Wisconsin Department of Transportation	Frank Huntington	Railroads and Harbors Section	Rail
Ameritrack Railroad Contractors, Inc.	Mike Eldridge	General Manager	Rail
Delta Railroad Construction, Inc.	Greg Marsteller	Estimator	Rail
Conrail	Mike Drenzo	Chief Engineer	Rail

### Aeronautics Maintenance and Rehabilitation Findings

The research team conducted phone interviews with the Federal Aviation Administration and the departments of transportation or departments of aviation in several states to determine how the agencies define maintenance and rehabilitation activities and whether aviation regulations and/or policies provide distinct definitions of these activities. The following are the key outcomes and themes from the phone interviews.

### **Findings Related to Whether “Maintenance” and “Rehabilitation” are Distinct Activities/Programs**

All of the agencies stated that there is a distinct difference between maintenance and rehabilitation activities; however it should be noted that there is no policy or guidance document that clearly defines the two activities/programs. For instance, in Ohio the distinctions are applied in describing the grants as they are issued by the Office of Aviation.

For New Jersey maintenance activities include seal-coating, crack-sealing, and pothole repair; while in Virginia, maintenance covers anything that does not involve the rebuilding, reconstructing, milling or overlaying of pavement. In New York, maintenance includes crack sealing, overlay and minor repairs; rehabilitation includes work on the sub-base and reconstruction of the deck.

The Ohio Airport Grant Program considers all of their work on pavement to be maintenance, which can be three different levels, ascending order of level of effort:

- Maintenance: major crack repair involving cutting out deteriorated sections. The grant program does not fund routine maintenance, e.g., crack filling and sealing.
- Rehabilitation: replacing the surface course of pavement (asphalt); usually involves some crack filling and/or repair; may or may not include milling.
- Reconstruction: Removing all pavement down to the base and applying all new pavement.

### **Findings Related to Funding and the Activities that are Eligible for State-Funded or Federal Airport Grants**

All of the states administer aviation grant programs; however not all activities are eligible for funding. For example, maintenance projects are not eligible for grant funding in New Jersey, Ohio, and Virginia. For all other states maintenance, rehabilitation, and reconstruction projects are eligible for state grant funding. However, it should be noted that Virginia does not fund revenue-producing projects such as hangars.

It is interesting to note that the NJDOT receives money from the FAA Airport Improvement Program (AIP), however they have trouble determining what projects qualify for “maintenance” and “rehabilitation” under that program; NJDOT noted that they have received money from the AIP for seal coating as well as larger runway rehabilitation projects.

### **Findings Regarding the Distinction Between Maintenance and Rehabilitation Projects in the State/Federal Grant Programs**

New York was the only state that does not distinguish between maintenance and rehabilitation projects in their state grant program. New Jersey, Ohio, and Virginia do not write grant agreements for maintenance projects (Virginia only funds maintenance

equipment). Ohio distinguishes between maintenance, rehabilitation, and reconstruction projects, as described above.

In Virginia, rehabilitation/capital grants always include a clause that states that the project sponsors will keep the airport open for at least 20 years after project completion. For private airports, VA enters into a credit line deed of trust, which puts a lien on the property, to protect the state's interests just in case the airport property is sold or ceases operation.

There are no set policies, regulations or guidance documents that define or distinguish between maintenance and rehabilitation projects in New Jersey, New York, and Virginia. The Virginia Airport Program Manual explains the types of projects that are eligible for maintenance; it can be implied that the projects not listed under maintenance could be considered rehabilitation. Again, there are no set definitions within this document.

### **Rail Maintenance and Rehabilitation Findings**

The following is a summary of interviews regarding how the terms maintenance, rehabilitation, and capital investment are used by different stakeholders. In no case were the definitions for these terms found to be airtight or absolute, however the respondents listed different factors when determining how different projects would be judged. As seen from the reporting below, key factors considered by stakeholders when deciding whether a project qualified as a maintenance or a rehabilitation project included 1) how long the project is intended to last 2) whether the project goes beneath the surface and impacts the subgrade, in which case it is typically regarded as rehabilitation rather than maintenance 3) whether the project falls within one of several predefined maintenance categories – specific technical improvements that are automatically coded as maintenance activities 4) whether the improvement resulted in a higher level of service measured, for example an increased operating speed or increased reliability.

The distinction between capital and rehabilitation costs was also probed. While the level of detail regarding the distinction between maintenance and rehabilitation remains somewhat indistinct, the line separating rehabilitation from capital investment was even more amorphous. Private sector respondents, such as Conrail, noted that they do not have a distinction between rehabilitation and capital expenses. Instead, costs that are not borne as maintenance costs are, by definition, capital costs.

### **Findings Related to Whether “Maintenance” and “Rehabilitation” are Distinct Activities/Programs**

All interviewees indicated that their organizations do not have distinctions between “maintenance” and “rehabilitation” defined by law or code, but several have developed threshold definitions or criteria as a matter of policy or interpretation.

- The State of Maine and Conrail consider rehabilitation to be a capital cost rather than a maintenance cost. Maine defines rehabilitation as a capital cost that extends the life of an existing project greater than 10 years, such as repairing or replacing the foundation of a bridge.
- In New Jersey, certain categories of activity are maintenance by definition. For example, all tie work is considered to be maintenance, even if it is rather extensive. If the project goes beyond ties and starts to impact the subgrade, it is no longer maintenance but is classified as rehabilitation. An incidental replacement of rail would also be regarded as maintenance. Other maintenance functions would include rail welding and rail grinding activities. Rehabilitation activities often involve the combination of tie and ballast work. Any instance where the repair goes beyond the ties is better defined as a rehabilitation project. These are the types of projects that are eligible through the Rail Freight Assistance Program.
- Ohio, North Carolina, and Michigan do not establish thresholds to distinguish maintenance and rehabilitation (no ties-per-mile threshold, etc.). The distinction does not matter.
- In Kansas, a rehabilitation project is one which involves the replacement of, at minimum, 750 crossties per mile, though 1,000 crossties or more is preferred. Projects applying for state funding must also install, at minimum, an additional 2 inches in depth of ballast and result in an increase in operating speed, either from Federal Railroad Administration (FRA) Class One to Class Two, or from Class Two to Class Three.
- Wisconsin is similar to Kansas, in that its grants and loans programs require an improvement in the capacity or capability of the line. Although not required by law, Wisconsin favors projects which result in an increase in speed to at least 25 miles per hour, and/or which allow capacity for 286,000-pound loaded railcars.
- One characteristic that the FRA would regard as indicative of a maintenance project is that the repair is not planned ahead of time. For example, if the action is correcting a problem that was found on a routine check, even if it was a major correction, this would be regarded as maintenance. Rehabilitation projects are typically planned in advance to address an earlier identified deficiency. In general, rehabilitation on tracks should rarely occur given that if maintenance schedules are followed, major rehabs should not be necessary. From a definitional perspective, any bridge work is rehabilitation. Furthermore, the upgrading of jointed rail track to continuously welded rail should be regarded as a rehabilitation activity, even if it occurs incrementally.

## **Findings Related to Funding and the Activities that are Eligible for State-Funded or Federal Rail Grants**

In Maine, the DOT receives an annual maintenance budget. If it has not spent out all the maintenance funding through its normal process, it will sometimes devote the remainder to performing rehabilitation activities, but capital projects cannot be performed with the maintenance budget. Maintenance always takes first priority. On the other hand, for the state bond funds, minor maintenance activities are ineligible.

The Rail Improvement Program in Ohio funds rehabilitation, maintenance, track work, yard work, structures, etc. Ohio makes \$2 million from the state's general fund available each year. Class I railroads are eligible but rarely apply. Most of the funds are awarded to small projects for shortlines. The state also has a revolving loan fund for track rehabilitation or industrial spurs. The most important consideration is, "what is needed to get the business going?" and "what makes sense economically?" Ohio's philosophy is, if the railroad has significant traffic and significant revenues, they should be expected to do the maintenance themselves. Shortlines, however, might have less traffic/revenue, and the work costs a much greater % of their revenue. Therefore, assistance from the state could help get them over the hump. Similarly, North Carolina and Michigan often fund activities that could be considered "maintenance" when those activities are deemed to be in the interest of economic development and/or public safety.

New York, New Jersey, Wisconsin, and Kansas make grants available to rehabilitation or construction projects only. Wisconsin and Kansas have established specific threshold criteria which distinguish rehabilitation projects from ineligible maintenance projects. In both states, the criteria call for an improvement in the capacity or capability of the infrastructure. For example, both states require that an applicant's project results in an improvement in FRA track classification (maximum operating speed) and/or results in the capacity to handle 286,000 pound loaded railcars. Wisconsin also specifies that projects that improve bridge load rating to E-80 are eligible. Kansas specifies minimum numbers of ties to be replaced (750 per mile minimum, at least 1,000 per mile preferred) and addition of ballast (2 inches to 4 inches in depth).

The FRA's Railroad Rehabilitation and Improvement Financing Program (RRIF) is a program available to railroads to assist with rehabilitation projects. Most recipients of RRIF funds are shortline or regional railroads. The funds may be used to:

- Acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings, and shops;
- Refinance outstanding debt incurred for the purposes listed above; and
- Develop or establish new intermodal or railroad facilities



## **Findings Regarding the Distinction Between Maintenance and Rehabilitation Projects in the State/Federal Grant Programs**

As previously stated, Maine uses its maintenance funds for routine maintenance activities first, and applies remaining funds to rehabilitation projects which extend the life of an existing project. Ohio makes no distinction between maintenance and rehabilitation in its grants program. The FRA's RRIF is used for rehabilitation, stripping track and adding heavier rail, and other types of projects that are large in scale and typically more than a railroad spends on maintenance. Recipients are required to maintain the facility to a specified class standard for a specified term, up to 35 years. This is therefore a long-term commitment.

### **DEFINITIONS AND CRITERIA DEVELOPMENT**

Based upon the findings of the literature review and interviews, completed as Task 1, definitions for the terms "regular (or scheduled) maintenance" and "rehabilitation" were developed for use in Bureau of Multimodal Grants and Programs policy. Because of the differences in materials, infrastructure life cycles, and interpretations among stakeholders evidenced in the literature reviews and interviews, definitions were developed separately for the benefit of the Rail Freight Assistance Program and the State Airport Aid Grants Program.

In addition to the definitions, threshold criteria that applicant projects must meet to qualify under each definition were developed. The criteria specify the types of activities that would be allowable under each definition (for example, "a rail rehabilitation project must consist of..." or "airport maintenance projects consist of..." etc.).

Finally, supplemental questions for the Rail Freight Assistance Program and State Airport Aid Grants Program applications were developed. These questions are intended to lead grant applicants to provide the appropriate discerning characteristics that properly classify their projects as eligible rehabilitation projects or ineligible maintenance projects.

#### **"Strawman" Definitions and Criteria**

The definitions must, at a minimum, be consistent with State laws, statutes, and rules and regulations established within the New Jersey Administrative Code. New Jersey Administrative Code Title 27:1B-3 states that "permitted maintenance," or activities commonly referred to as "rehabilitation," consist of:

*"direct costs of work necessary for preserving or maintaining the useful life of public transportation projects, provided the work performed is associated with the acquisition, installation and rehabilitation of components which are not included in the normal operating maintenance of equipment and facilities or replaced on a scheduled basis. The work shall ensure the useful life of the project for not less than five years and shall*



*not include routine maintenance or inspection of equipment and facilities that is conducted on a scheduled basis.”<sup>1</sup>*

Title 16, Chapter 53C, which authorizes the Rail Freight Assistance Program, states that “‘Routine maintenance’ means inspection and light repairs and the planned program of periodic maintenance necessary to keep a line at its existing condition but not below specified FRA safety standards.” Further, “Rail line rehabilitation or reconstruction shall be as follows: a project to rehabilitate or reconstruct a rail line or bridge, which requires a onetime investment of financial assistance in order to ensure the continuation or creation of safe, adequate, and efficient rail freight services on the rail line for a period of not less than five years.”

The New Jersey State Airport Aid Grant Worksheet (2011) states that applicants shall “suitably operate and maintain the airport and all facilities thereon or connected therewith. It shall also maintain the project, as constructed, in a usable condition for the project’s useful life as defined in the grant agreements.”

The research team reviewed each of the definitions of “maintenance” and related terms (including “routine maintenance,” “scheduled maintenance,” “corrective maintenance,” and “temporary maintenance”) found in the literature review and interviews, as they relate to rail and airport projects, and determined which definitions are in keeping with the general parameters established by the aforementioned New Jersey Administrative Code passages. The same exercise was completed for the term “rehabilitation” and related terms (including “major repairs” and “permitted maintenance”).

## **Recommended Definitions and Criteria**

The research team participated in a meeting with NJDOT staff on April 23, 2014. The objective of the meeting was to review draft “strawman” definitions and thresholds, discuss whether the strawman definitions and thresholds meet NJDOT’s needs, and to consider any necessary revisions.

NJDOT staff requested changes to the definition of rail maintenance, in order to specify that crossties and tie plates repaired or replaced at regularly-scheduled maintenance intervals should be considered maintenance activities.

NJDOT staff also requested a change to the definition of airport maintenance, in order to better distinguish the types of pavement defects that may be considered maintenance versus rehabilitation activities. Specifically, a request was made to add the condition that correction of “minor” pavement defects, which do not require milling, re-paving, or patching of the pavement surface be included in the definition of rehabilitation projects. Also, clarification of which types of pavement marking activities (re-marking existing pavement markings and/or changing pavement marking patterns) was requested. The

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<sup>1</sup>NJ Rev Stat § 27:1B-3 (2013).

research team made adjustments to the definitions to satisfy these requests, and rearranged the lists of acceptable activities under each definition accordingly.

### **Recommended Airport Maintenance Definition and Criteria**

Maintenance activities, which are not eligible to receive funding from the New Jersey Transportation Trust Fund, consist of spot-improvements or removal of debris in order to sustain good and serviceable condition of airport facilities. Activities include: correction of minor pavement defects, which do not require milling, re-paving, or patching of the pavement surface; re-painting of existing pavement markings; maintenance of in-pavement lighting; drainage cleaning; or removal of debris.

Activities that shall be considered “airport maintenance” and would therefore not be eligible for State Airport Aid Grant Program funding include the following:

- Removal of snow, ice, slush, foreign objects, or debris from the pavement surface;
- Re-painting of existing pavement markings;
- Maintenance of existing in-pavement lighting;
- Repair of navigational aides and airfield lighting;
- Removal of rubber deposits left by aircraft tires from the pavement surface. Rubber deposits can reduce traction on the runway surface;
- Crack sealing of asphalt concrete (AC) pavements, or resealing of Portland cement concrete (PCC) pavements, subject to an engineering-based judgment by NJDOT of the appropriate number and size of cracks present. Surfaces with multiple cracks or cracks exceeding one-half of an inch in width are likely to require milling, repaving, or patching of the pavement surface, which are activities beyond the scope of maintenance;
- Treatments to route and seal cracks in AC pavements are carried out when the cracks are already well-formed, but before cracks become raveled, have developed into multiple cracks, or before the crack width exceeds about one-half of an inch, subject to an engineering-based judgment by NJDOT;
- Removal of old material sealer; cleaning (preferably by sandblasting) joints and cracks; resealing properly;
- Cleaning and sealing newly-formed cracks;
- Cleaning and removal of debris in order to facilitate proper drainage;

- Scraping off of excess material; blotting with sand. NOTE: Bleeding is usually an indication that other surface deformities (rutting, wash-boarding, etc.) will occur; and/or
- Temporary maintenance treatments designed to hold the pavement surface together until more permanent or substantial rehabilitation takes place. Temporary maintenance is also called holding maintenance or stopgap maintenance. Temporary maintenance treatments may be necessitated by the timing of future rehabilitation or reconstruction activities or by a lack of funds. Temporary maintenance does not include the application of expansion joints or repair of cracks that exceed the scope of maintenance, as determined by an engineering-based judgment by NJDOT.

### **Recommended Airport Rehabilitation Definition and Criteria**

Rehabilitation, or "permitted maintenance," projects aim to restore airport facilities, which may have been damaged due to unpreventable deterioration or natural disaster, to their original, usable condition and/or extend the useful life of the asset. Activities exceed the scope of normal operating maintenance and include significant repairs to pavement surfaces, changes to pavement marking patterns, replacement or installation of new in-pavement lighting, and installation of new or modifications to existing drainage systems.

In order to qualify as a rehabilitation (or "permitted maintenance") project eligible for State Airport Aid Grant Program support, the applicant must demonstrate that the project consists of one or more of the following activities listed below:

- Complete resurfacing of a runway or apron;
- Milling, removing, or reconstructing pavement;
- Installation of AC pavement overlays;
- Patching pavement to correct local defects, applying leveling course and roto-milling;
- Removing and replacing base (and sub-base if required); replacing surface and sealing;
- Resurfacing and grinding rigid pavement surface in response to deformation or breaks in the surface;
- Applying adequate traction or texture to surfaces deemed to be too smooth, by: applying textured seal coat and grooving flexible pavement surfaces; or resurfacing of rigid pavement surfaces;

- Applying seal coat to flexible pavement;
- Resurfacing rigid pavement with bonded concrete or a bituminous concrete;
- Removal and replacement of failed PCC slabs;
- Filling pop-out hole with bituminous concrete or bituminous sand mix (if recurring, may require replacement of slab);
- Major repairs of pavement due to acts of God such as fire, flood, earthquakes, etc.;
- Improving the drainage system in order to prevent entrance of water, pumping slurry under slabs to reseal, replacing slabs and slab foundation as needed, installing drainage;
- Changing the stripe pattern and/or other pavement markings;
- Adding new striping and/or other pavement markings;
- Installing new in-pavement lighting systems; and/or
- Rehabilitation of terminals.

### **Recommended Rail Maintenance Definition and Criteria**

Maintenance activities occur as part of a regular cycle of inspection, identification of flaws and deficiencies, and repair or replacement of crossties and tie plates at regularly-scheduled maintenance intervals. Maintenance activities do not significantly improve the level of service with regard to speed or loaded railcar weight capacity, nor do they effectively extend the service life of the asset.

Activities that shall be considered “rail maintenance,” and would therefore not be eligible for Rail Freight Assistance Program funding include the following, organized by type of infrastructure or structure affected:

- Rail:
  - Welding or grinding rail (order of magnitude based on previous projects);
  - Adjustments to maintain adequate gage, surface, and line;
  - Repair of defects by cutting short sections and applying standard joint bars and thermite or flash welding rail ends;
  - Managing friction control and applying lubricants;

- If there is evidence of track moving downhill or with the current of traffic (signified by noting if anchored ties are moving toward non-anchored ties), it may be necessary to relieve undesirable stresses by cutting out rail at head end of movement and adding rail at other end. In this case, additional anchors should be added;
- Repair of buckled track;
- Repair of broken rails, pull apart and other defects;
- Making appropriate corrections if the normal 1/4 inch point rail rise above the stock rail has been compromised by point rail wear; and/or
- Replace closure rails, stock rails, and switch points if wheel flanges are contacting the tops of splice bars at the heel casting.
- Crossties and Tie Plates:
  - Replacement of crossties;
  - Repair or replace bent and missing bolts;
  - Repositioning of anchors against ties if necessary; and/or
  - If rail is stilted on one side of the base of the tie plate, relieve pressure to prevent buckling or pull-apart.
- Ballast and Subgrade:
  - Use of ballast compacting equipment to "smooth over" disturbances to the ballast.
- Structures:
  - Cleaning or minor repairs in response to gradual deterioration due to corrosion, mechanical wear, and impact and fatigue damage from moving loads throughout the service life of the structure;
  - Maintenance painting to maintain appearance and corrosion protection;
  - Deteriorated wooden piles may be restored using a cast in place reinforced concrete jacket. The jacket must extend above and below the defective area to adequately support the loads;
  - Voids in the piles may be filled with grout;

- Replacement of individual caps, sills, braces, or struts with similar sized members;
  - Shimming of stringers to provide proper surface and cross level using one hard wood ship under each chord or stringer;
  - Retightening bolts (wooden structures); and/or
  - Controlling moisture by: removing dirt and debris, providing adequate drainage from deck, ensuring adequate support surface for tie plates, waterproofing ballast decks, ensure hardware is tight, seal holes, apply preservative chemicals.
- Switches and Crossings:
    - Switch points which divert flanges (direct traffic to the turnout side), including switch points in normal position which are against the outer rail on curves, must be replaced, rebuilt, or repaired when worn or chipped such that the top at any point is more than 7/8 inch below the plane across the top of the stock rail measured within 6 inches or more from the original end of the switch point.

### **Recommended Rail Rehabilitation Definition and Criteria**

Rehabilitation (or "permitted maintenance") includes repair or replacement of rail infrastructure with the objective of significantly extending the service life of the asset and/or result in an improvement in the level of service of a rail line, with respect to maximum allowable speed or weight capacity. Rehabilitation projects represent activities that are beyond what a railroad typically considers as part of a routine or scheduled maintenance program, and may require planning prior to initiating the project.

In order to qualify as a rehabilitation (or "permitted maintenance") project eligible for Rail Freight Assistance Program support, the applicant must demonstrate that the project consists of one or more of the following activities listed below:

- Rail:
  - Replacement of track with heavier rail, including efforts to upgrade rail load capacity to accommodate 286,000 lb railcars;
  - Upgrading rail to improve FRA track class (max. operating speed);
  - Replacement of jointed track to continuously welded rail;
  - Replacement of track with heavier rail; and/or
  - Major repairs or replacement of rail due to acts of God such as fire, flood, earthquakes, etc.

- Crossties and Tie Plates:
  - Wholesale replacement of ties, as part of a program that requires planning in advance;
  - Replacement of at least 750 ties per mile (1,000 ties per mile or more preferred);
  - Replacing wooden ties with concrete ties; and/or
  - Major repairs or replacement of crossties or tie plates due to acts of God such as fire, flood, earthquakes, etc.
- Ballast and Subgrade:
  - Projects that impact the subgrade would be rehabilitation; and/or
  - Major repairs or replacement of ballast and subgrade due to acts of God such as fire, flood, earthquakes, etc.
- Structures:
  - Reconstruction or replacement of the structure;
  - Surface repairs on concrete structures using Portland cement concrete, polymer concretes and/or polymer Portland cement concretes;
  - Surface repairs including removal of soft, disintegrated, or loose grout from between masonry units, cleaning joints, and filling joints with mortar;
  - Surface repairs including lining stone or brick masonry arches with steel plates, cast-in-place concrete, or shotcrete;
  - Internal structural repairs, including filling voids and/or restoring cracked sections to meet original strength;
  - Repair of cracks or shattered concrete with or without section loss or tendon damage;
  - Replacement of severely damaged members;
  - Repair, strengthening, or retrofitting existing structures due to: accidental damage, deterioration damage, capacity or geometric deficiency resulting in insufficient capacity to carry current loads, or to anticipate potential damage due to natural hazards;
  - Repair of cracks and defects in concrete or steel structures;

- Heat strengthening of damaged steel members;
  - Restoring bearings to correct elevation;
  - Reinforcing plate girders or rolled beams by reinforcing stiffeners;
  - Reinforcing I-beam flanges and webs;
  - Reinforcing lateral cross frame connections; doubling-up girders;
  - Substitution of spans one-at-a-time;
  - Strengthening stringers and floor beams, adding high-strength bolts or welding to strengthen the end connections of a stringer, adding lateral plates to the tension flange of a short-span stringer or floorbeam;
  - Strengthening trusses, reinforcing trusses, adding a center truss, adding auxiliary truss supports or truss members;
  - Addition of temporary supports ("cribbing") to extend service life;
  - Any bridge work would be considered rehabilitation; and/or
  - Major repairs or replacement of structures due to acts of God such as fire, flood, earthquakes, etc.
- Switches and Crossings
    - Repairs to the asphalt approach to the crossings; and/or
    - Major repairs or replacement of switches or crossings due to acts of God such as fire, flood, earthquakes, etc.

### **Recommended State Airport Aid Grant Application Question(s)**

In the State Airport Aid Grant Application, applicants are asked to list the contact information for themselves and consultant(s); draft detailed project information, including a brief summary, project need and justification, background and history of the project, detailed scope of work, and construction duration; and provide information on the property or facility. In Section II of the application, it would be appropriate to ask the applicant whether their project consists of any of the activities deemed eligible according to the recommended rehabilitation definition and thresholds. Like the Rail Freight Assistance Program application review process, reviewers would likely be able to categorize applicant projects based upon the detailed scope of work provided by the applicant. However, offering the question ensures that candidate projects are appropriately categorized as eligible or ineligible, and reduces the chance that a project is denied award due to an the omission of details in the project scope of work. A



recommended question for inclusion in Section II of the State Airport Aid Grant Program Application is provided below:

Does the project consist of any of the following activities? (check all that apply):

- Pavement rehabilitation, including:
  - ☐ Milling, removing, or reconstructing pavement.
  - ☐ Installation of asphalt concrete (AC) pavement overlays.
  - ☐ Patching pavement to correct local defects, applying leveling course and roto-milling.
  - ☐ Removing and replacing base (and sub-base if required); replacing surface and sealing.
  - ☐ Applying adequate traction or texture to surfaces deemed to be too smooth, by: applying textured seal coat and grooving flexible pavement surfaces; or resurfacing of rigid pavement surfaces.
  - ☐ Applying seal coat to flexible pavement.
  - ☐ Resurfacing rigid pavement with bonded concrete or a bituminous concrete.
  - ☐ Removal and replacement of failed Portland cement concrete (PCC) slabs.
  - ☐ Filling pop-out hole with bituminous concrete or bituminous sand mix (if recurring, may require replacement of slab).
  - ☐ Major repairs of pavement due to “acts of God” such as fire, flood, earthquakes, etc.
  - ☐ Complete resurfacing of a runway or apron.
- Other rehabilitation activities, including:
  - ☐ Improving the drainage system in order to prevent entrance of water, pumping slurry under slabs to reseal, replacing slabs and slab foundation as needed, installing drainage.
  - ☐ Changing the stripe pattern and/or other pavement markings.
  - ☐ Adding new striping and/or other pavement markings.
  - ☐ Installing new in-pavement lighting systems.

- ☐ Rehabilitation of terminals.

### **Recommended Rail Freight Assistance Program Application Question(s)**

The Rail Freight Assistance Program grant application asks applicants to list the contact information for the project sponsor, draft detailed project justification, scope of work, and construction duration, provide information on the property or facility, and expected impacts of the project on rail traffic volume and operations. It would be appropriate to ask the applicant whether their project consists of any of the activities deemed eligible. Although application reviewers would likely be able to categorize applicant projects based upon the detailed scope of work provided by the applicant, offering the question ensures that candidate projects are appropriately categorized as eligible or ineligible, and reduces the chance that a project is denied award due to an the omission of details in the project scope of work. A recommended question for inclusion in the Rail Freight Assistance Program Application is provided below. The text in *italics* contains requests for more information in the event the related box is checked by the applicant. In the System for Administering Grants Electronically (SAGE), these questions could be broken up into several, one for each category (rail, crossties and tie plates, etc.), and the italicized text could be hidden and made to appear only if the related box is checked.

Which rail rehabilitation activities would be funded by this grant, if awarded? (check all that apply)

- Rail
  - ☐ Replacement of track with heavier rail, including efforts to upgrade rail load capacity to accommodate 286,000 lb railcars
  - ☐ Upgrading rail to improve FRA track class (maximum operating speed). *Please specify existing FRA track class: \_\_\_\_\_ and anticipated FRA track class after the project is completed: \_\_\_\_\_.*
  - ☐ Replacement of jointed track to continuously welded rail.
  - ☐ Replacement of track with heavier rail.
  - ☐ Major repairs or replacement of rail due to acts of God such as fire, flood, earthquakes, etc.
- Crossties and Tie Plates
  - ☐ Replacement of crossties. *Please specify the number of crossties-per-mile that will be replaced: \_\_\_\_\_ crossties per mile.*
  - ☐ Replacing wooden ties with concrete ties.

- ☐ Major repairs or replacement of crossties or tie plates due to acts of God such as fire, flood, earthquakes, etc.
- Ballast and Subgrade
  - ☐ Replacement of ballast. *Please specify the depth of new ballast to be added in inches or in number of truckloads per mile: \_\_\_\_\_ inches or \_\_\_\_\_ truckloads-per-mile.*
  - ☐ Major repairs or replacement of ballast and subgrade due to acts of God such as fire, flood, earthquakes, etc.
- Structures
  - ☐ Reconstruction or replacement of the structure.
  - ☐ Surface repairs using Portland cement, polymer concretes, and/or polymer Portland cement concretes.
  - ☐ Surface repairs including removal of soft, disintegrated, or loose grout from between masonry units, cleaning joints, and filling joints with mortar.
  - ☐ Surface repairs including lining stone or brick masonry arches with steel plates, cast-in-place concrete, or shotcrete.
  - ☐ Internal structural repairs, including filling voids and/or restoring cracked sections to meet original strength.
  - ☐ Repair of cracks or shattered concrete with or without section loss or tendon damage.
  - ☐ Replacement of severely damaged members.
  - ☐ Repair, strengthening, or retrofitting existing structures due to: accidental damage, deterioration damage, capacity or geometric deficiency resulting in insufficient capacity to carry current loads, or to anticipate potential damage due to natural hazards.
  - ☐ Repair of cracks and defects in concrete or steel structures.
  - ☐ Heat strengthening of damaged steel members.
  - ☐ Restoring bearings to correct elevation.
  - ☐ Reinforcing plate girders or rolled beams by reinforcing stiffeners.
  - ☐ Reinforcing I-beam flanges and webs.

- ☐ Reinforcing lateral cross frame connections; doubling-up girders.
  - ☐ Substitution of spans one-at-a-time.
  - ☐ Strengthening stringers and floor beams, adding high-strength bolts or welding to strengthen the end connections of a stringer, adding lateral plates to the tension flange of a short-span stringer or floorbeam.
  - ☐ Strengthening trusses, reinforcing trusses, adding a center truss, adding auxiliary truss supports or truss members.
  - ☐ Addition of temporary supports ("cribbing") to extend service life.
  - ☐ Any bridge work would be considered rehabilitation.
  - ☐ Major repairs or replacement of structures due to acts of God such as fire, flood, earthquakes, etc.
- Switches and Crossings
    - ☐ Repairs to the asphalt approach to the crossings.
    - ☐ Major repairs or replacement of switches or crossings due to acts of God such as fire, flood, earthquakes, etc.

## CONCLUSIONS AND RECOMMENDATIONS

With the definitions of maintenance and rehabilitation specified for each grant program, NJDOT should:

- Adopt these as policy definitions, with the intention of defining “rehabilitation” projects as eligible for assistance under the State Airport Aid Grants Program and Rail Freight Assistance Program, and “maintenance” projects as ineligible for assistance under these programs.
- Include the definitions and lists of applicable projects and activities for applicants’ reference in the SAGE program, and in the application material for each the State Airport Aid Grants Program and Rail Freight Assistance Program.
- Add the application “questions” provided above as requests for information in both the State Airport Aid Grants Program and Rail Freight Assistance Program online grant applications, which prompt applicants to select the eligible activities of their candidate projects.
- Conduct audits annually to assess whether the definitions and criteria are sufficiently screening out ineligible projects. These audits should review submitted applications, and identify which applications are for ineligible project

types. Some follow-up outreach to grant program applicants may be desired to determine whether the definitions and criteria are effectively understood by applicants.

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